Aims and Scope
The Korean Journal of Women Health Nursing is a primary source of information for meeting the challenges of providing optimal healthcare for women. The journal aims to be a core resource for cutting-edge advancements and clinical applications of new nursing practice, therapeutic protocols for managing health problems in women, and innovative research on gender-based issues that impact treatment and nursing care.

Its scope includes the latest clinical and research papers on health issues that affect women throughout their lifespan. The emphasis is on clinical nursing practice and education on the social science components relevant to women’s health issues. It also includes nursing care, education, and research methodology for ante-, intra-, and post-partum women, middle-aged and elderly women’s health, socio-cultural issues, and therapies. Its regional focus is mainly Korea, but it also welcomes submissions from researchers all over the world.

About the Journal
The Korean Journal of Women Health Nursing (KJWHN) is a peer-reviewed official journal of the Korean Society of Women Health Nursing of the Republic of Korea (South Korea). It was launched in 1995 under its previous title, the Journal of Korean Women’s Health Nursing Academic Society (Vol. 1, No. 1 in 1995 to Vol. 6, No. 1 in 2000; pISSN: 1225-9543), and the Journal of Korean Academy of Women’s Health Nursing (Vol. 6, No. 2 in 2000 to Vol. 7, No. 2 in 2001; pISSN: 1225-9543).

Since June 2012 it has continued under the current title, the Korean Journal of Women Health Nursing (Vol. 18, No. 2 in 2012 to present; pISSN: 2287-1640, eISSN: 2093-7695). The official abbreviated title is Korean J Women Health Nurs. It is published quarterly on the last day of every March, June, September, and December. Any supplementary or special issues may be published. The number of print copies per issue is 60. The copyright, including the right of online transmission, is owned by the Korean Society of Women Health Nursing. This journal is supported by a Korean Federation of Science and Technology Societies grant funded by the Korean government (Ministry of Science and ICT).

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Connecting authors with readers: what makes a good review for the Korean Journal of Women Health Nursing

Hyun Kyoung Kim
Department of Nursing, Kongju National University, Gongju, Korea

Thanks to its dedicated readers and reviewers, the Korean Journal of Women Health Nursing (KJWHN) has been indexed in Scopus, PubMed Central, and Emerging Sources Citation Index. After KJWHN was listed in major citation indices in a short time, the number of authors submitting their research to KJWHN has increased worldwide. The editors of KJWHN appreciate the authors who have submitted their manuscripts and the readers who have shown interest in KJWHN. The reviewers of KJWHN are striving for more transparent and professional reviews. From my perspective as an editor and a reviewer, this editorial presents opinions about good reviews that would facilitate the further development of KJWHN as a professional academic journal. What makes a good review? It may not be simply a matter of reading submitted manuscripts and providing opinions on them. Instead, a good review would help improve the quality of manuscripts by considering how readers will respond to them. The reviewer’s role involves reflecting the perspectives of both readers and authors on the thoughts and ideas in the manuscript and connecting both perspectives. This editorial aims to explain the role of reviewers, the characteristics of a good review, and what reviewers frequently miss or are likely to miss. This editorial will be helpful to authors who submit their manuscripts and reviewers who strive to review manuscripts to enhance the development of KJWHN into a top-tier academic journal.

Role of reviewers

Reviewing the scope of the topic

Since KJWHN covers research on women and their health, pre-screening may be restricted if the research topic is not about women. Likewise, manuscripts that do not deal with health, nursing, medical care, or well-being do not fit the journal’s scope. Although the scope of the journal may seem broad, many manuscripts that do not match its scope are being submitted. Therefore, authors must check the aims and scope of the journal in advance. Given the reality that interdisciplinary convergence studies are preferred, if a manuscript with a creative topic contains topics partially related to women or health, it can be reviewed. The ideal article would be a future-oriented manuscript with up-to-date trends and novelty that can contribute to women’s health, and a revolutionary article can be written on a traditional topic that has been researched repeatedly if it presents a new perspective [1]. If authors have any inquiries about the scope, please do not hesitate to contact the editorial office via email (kjwhn@kjwhn.org).
Peer review
The core of a review is giving valuable comments to the authors. A review serves as a bridge connecting readers and authors. Reviewers are partially responsible for flawless publications. Furthermore, reviewing excellent manuscripts can help reviewers broaden their own horizons, gain ideas, and grow as scholars [2]. Therefore, reviewers should help authors improve manuscripts’ quality to make them robust, logical, and valuable articles that provide insights to readers. This is particularly important because KJWHN, as the official journal of the Korean Society of Women Health Nursing, fosters the development of studies, research, practice, and education in women’s health nursing in Korea and reflects the level of women’s health nursing. High-quality peer review is, therefore, key in order for KJWHN to share scientific and evidence-based knowledge with readers, as well as to develop as a world-class academic journal. In studies dealing with real-world aspects of women’s health, reviewers can comment on providing a theoretical framework or a conceptual model. In addition, reviewers should investigate global issues of women’s health and review manuscripts with the goal of enabling creative research to stimulate practice. Reviewers can request authors to cite international and recent studies as references.

Decision-making
The reviewers of KJWHN make decisions by transparently choosing one of four options (reject, major revision, minor revision, and accept) in the electronic submission system. The decisions of KJWHN are made by the comprehensive judgment of two reviewers and one statistical reviewer. Each of the three reviewers conducts a blind review. If the decisions of reviewers are different, an additional reviewer can be selected to provide an opinion [3]. Since KJWHN recommends two weeks for review, it is important to review manuscripts in a timely manner. Although prompt decision-making is important for authors, reviewers experience a dilemma because an in-depth review is time-consuming. Editors support and help the review process, but do not intrude upon the inherent rights of reviewers. Editors also participate in the initial review and evaluation of manuscripts after review and present opinions to the authors. However, reviewers’ decisions are the primary consideration and are the key to publication. In KJWHN, two associate editors and one editor-in-chief participate in decision-making and the final review of manuscripts.

Characteristics of a good review

Politeness
Since peer reviewers are experts invited to review a manuscript, rather than critics, they must maintain an objective attitude toward the manuscript. There are occasional cases of severe criticism or assertive devaluations, but polite terms should be chosen even if a manuscript has substantial room for improvement. In order to write a reader-friendly review, one must change one’s viewpoint to evaluate whether the manuscript is easy to read from the reader’s perspective [1]. Since women's health is always changing and developing, even top-tier experts should admit that there are areas they do not know and look at the manuscripts with an open attitude. A humble attitude comes from respecting authors and acknowledging the uniqueness of another scholar’s research. It is also important for authors to use thoughtful, constructive, scientific, academic, and clear language.

Expanding expertise
Review is a communication process accompanying new learning and investigation. If a manuscript presents different opinions from those of the reviewers themselves, it is necessary to review the literature to see if there are new discoveries other than the existing knowledge [4]. Since analysis methods, new statistical techniques, and digital technologies have rapidly changed during the coronavirus disease 2019 pandemic, reviewers should be careful to avoid the extremes of excessive acceptance or rejection. Reviewing manuscripts provides a good opportunity for reviewers to expand their expertise and horizons. If a reviewer is requested to review a manuscript on a topic that they consider to be beyond their domain of expertise, it is possible to refuse the review request, and a second reviewer can be selected. Reviewers critically evaluate the structure and content of a manuscript, and, simultaneously, they can encourage authors to make better revisions. KJWHN conducts workshops to improve the competencies of reviewers and editors every year. The workshop videos for reviewers can be watched on the KJWHN homepage after logging into the e-submission system [5].

What reviewers are likely to miss

Structure of the review
Reviews should be written in detail, and it is helpful to plan the structure of a review in advance [3]. First, one should express appreciation to the authors for the submission and provide a complete sentence containing a general review of the manuscript.
Then, very specific opinions should be presented and numbered to match the structure of the manuscript. Indicating page and line numbers will help authors clearly identify the issues pointed out in the review. Common grammatical mistakes include subject-verb disagreement, long sentences (more than three lines), single-sentence paragraphs, and spellings. A reviewer who points out these mistakes should also write comments without grammatical errors to build trust in the reviewer. Therefore, it is recommended to double-check the comments after writing them; one can take some time and keep the review as a draft, rather than clicking “submit” immediately after writing the review.

**Reviewers’ investigations**

Reviewers have an obligation to check manuscripts for ethical issues. The editorial office of KJWHN conducts a plagiarism check using the Copy Killer (MUHAYU Inc., Seoul, Korea) and/or iThenticate programs (Turnitin, LLC. Oakland, CA, USA). Since the plagiarism rate is provided at the word level, identical content is not allowed except for specific methodological descriptions. Reviewers can also request authors to check the sources of graphics, figures, and tables for copyright issues and to mention in the manuscript whether the use of assessment tools has been approved by both the original authors and authors of the translated version. In order to check the originality of the manuscript, the data collection period, details of consent, and respect for the study participants should be checked in the Methods section. When checking statistics, both simple errors and the validity of the analysis should be assessed. In this regard, reviewers serve as gatekeepers, since readers are generally receptive to the findings reported in articles that they consider having passed rigorous peer review [2]. One point that reviewers frequently miss is that many authors state that their studies are descriptive studies when they conduct a regression analysis, but a correlational design study would be appropriate. The articles published in KJWHN do not have a conclusion subheading so conclusions should be described in the last paragraph of the Discussion section. The Discussion section should be written in an order that starts with the most crucial research purpose in detail and then discusses the other aims of the study. Authors tend to write excessively short English abstracts, and reviewers should request authors to write the English abstract in about 240 to 250 words per the journal guidelines. It is helpful for authors if reviewers suggest specific items to be described in greater depth in the abstract, such as research tools or the data collection period. If authors write an ambiguous summary statement, the reviewer can request a detailed statement corresponding to the study results. The number of keywords is limited to five, and reviewers need to check whether they are MeSH (Medical Subject Headings) terms. The consistency of references with the main text should also be reviewed. Other common mistakes that KJWHN reviewers frequently miss are presented in Table 1.

**Review content**

KJWHN only makes reviews available to authors and editors, and it does not disclose them to the public. Reviewers can be seen as playing the role of a hidden bridge. A responsible reviewer feels psychological responsibility for the results because the manuscript is often substantially changed through the review process. Since KJWHN has an open access policy and all manuscripts are open to all readers throughout the world permanently, reviewers are required to examine whether their influences are reasonable, helpful, and valid both in the present and in the future [1]. Reviews should not reveal the identities of reviewers, and information learned during the review process must be kept confidential. In addition, reviewers should confirm that the references are cited well and there are no missing parts in the description of research methods, as well as ensure that the manuscript is

### Table 1. Points to review in submissions to the Korean Journal of Women Health Nursing (KJWHN)

<table>
<thead>
<tr>
<th>Number</th>
<th>Research part</th>
<th>Guidelines of KJWHN</th>
<th>Examples of frequent review errors in KJWHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aim of research</td>
<td>Clear description of the main purpose</td>
<td>Ambiguous description of the aims</td>
</tr>
<tr>
<td>2</td>
<td>Research design</td>
<td>Proper description of the research design</td>
<td>Descriptive or correlational study</td>
</tr>
<tr>
<td>3</td>
<td>Supporting statements</td>
<td>Support from sufficient evidence</td>
<td>Effect size evidence for calculating the sample size</td>
</tr>
<tr>
<td>4</td>
<td>Measurement</td>
<td>Present approval for the use of scales</td>
<td>Missing citations of translated measurement tools</td>
</tr>
<tr>
<td>5</td>
<td>Data collection</td>
<td>Describe mode of identifying, approaching, and recruiting participants</td>
<td>Missing description of the process for vulnerable subjects, such as students</td>
</tr>
<tr>
<td>6</td>
<td>Table</td>
<td>Avoid redundancy of tables and descriptions</td>
<td>Unnecessary table for some results</td>
</tr>
<tr>
<td>7</td>
<td>Discussion</td>
<td>Avoid repetitive descriptions</td>
<td>Redundancy between the Results and Discussion sections</td>
</tr>
<tr>
<td>8</td>
<td>Study limitations</td>
<td>Specify the study limitations</td>
<td>Not reporting realistic limitations</td>
</tr>
</tbody>
</table>

https://doi.org/10.4069/kjwhn.2023.02.23
logical, flows well in terms of scientific context, and follows the EQUATOR guidelines with a comprehensive description [6].

Since reviewers are also potential authors of KJWHN, it is hoped that this editorial will also help reviewers to write high-quality manuscripts. We sincerely appreciate all our reviewers and hope that many reviewers will participate in the development of KJWHN in the future. Just as the quality of education cannot exceed the quality of teaching, the expertise of reviewers is crucial for improving the quality of manuscripts. We applaud our reviewers who are generous with their advice and time, and hope that together KJWHN can develop as a world-class academic journal.

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**Authors' contributions**

All work was done by Kim HK.

**Conflict of interest**

Hyun Kyoung Kim has been an associate editor of the *Korean Journal of Women Health Nursing* since January 2022. She was not involved in the review process of this editorial. Otherwise, there was no conflict of interest.

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**Data availability**

Please contact the corresponding author for data availability.

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None.

**References**

Introduction

The study of differences between men and women in medicine is referred to as “sex/gender-specific medicine” (SGM) and is crucial in medical practice. In 2021, I published the Korean version of Sex/Gender-Specific Medicine in the Gastrointestinal Diseases [1], and its English version [2] was published by Springer, a top-tier publisher, in 2022. This book has been recognized as a textbook that systematizes the concept of SGM and may be the first medical book related to SGM in South Korea (hereafter, Korea). When I first introduced the concept of SGM to acquaintances, I remember they searched Google with awkward facial expressions, thinking it referred to research on sexual minorities. Thus, SGM is not yet universally known in Korea.

My interest in SGM began in 2014 when I participated in the Gendered Innovation Workshop between Stanford University and the Korean Federation of Women’s Science and Technology Associations (KOFWST). While assisting Professor Mi-Kyung Sung from the Department of Food and Nutrition at Sookmyung Women’s University with her presentation on colorectal cancer from a clinical perspective, I became interested in SGM in colorectal cancer. Subsequently, in 2013, I began researching SGM earnestly as a participant in the Korean Center for Gendered Innovations for Science and Technology Research (GISTeR) established under KOFWST. In 2016, I was able to conduct balanced research on both basic and clinical SGM as a participant in the “Promoting Excellence and Practicability of Science and Technology Research through Gendered Innovation” project of the Ministry of Science, ICT and Future Planning. The “Sex and Gender Research in Medical Science” classes held in 2017 and 2019 at the Graduate School of Translational Medicine at Seoul National University College of Medicine received positive feedback from medical students. Later, Sex/Gender-Specific Medicine in Clinical Areas was published [3] with 33 experts in each clinical area. In this paper, I aim to review the concept and necessity of SGM and the challenges and implications it presents to healthcare, practitioners, researchers, and students within the sex/gender-specific framework.

Definition and necessity of sex/gender-specific medicine

SGM is important because even for the same disease, there are differences between men and women, and a different approach is necessary to identify the causes and provide treatment. These differences in SGM should be considered in two aspects: the sex aspect due to the differences in hormones or genes, and the gender aspect due to the difference in social and cultural roles between...
Men and women. Although it is generally believed that there is no difference in the occurrence of diseases between men and women, the reality is that sex and gender shape both the occurrence and clinical course of diseases. SGM conducts research on these differences between men and women to achieve more accurate diagnosis and treatment directions, such as in bowel diseases where differences between men and women are particularly important.

Men and women often exhibit different symptoms of diseases and responses to treatment, which are caused by the effects of sex hormones or genetic predispositions, or by different sociocultural conditions that impact the diseases. In particular, gender considerations are crucial in gastrointestinal diseases such as functional dyspepsia and irritable bowel syndrome because these diseases are highly likely to occur due to stress, and the stress experienced by men and women is different due to gender differences.

It is natural to pay attention to the physical differences between men and women when dealing with the human body, and medicine has made progress by considering these differences. However, it is also true that the differences between men and women have not yet been adequately considered for most diseases’ causes or treatments. Fortunately, with the discovery of various sex/gender differences, research on sex/gender bias of disease occurrence is being actively conducted. Although most physicians in Korea are still unfamiliar with the term “sex/gender-specific medicine,” it is clear that the development of SGM will be an unstoppable trend from the macroscopic perspective of medical development.

Why sex/gender-specific medicine appeared

Before the 1980s, every area of our society was male-centered, including the medical field. The medical field was male-centered enough to have the viewpoint that “a woman is a little man.” As a result, the diagnosis and treatment of most diseases were conducted with men at the center. Unfortunately, this bias led to the development of modern medicine that did not consider sex/gender differences, resulting in tragic cases. Here are some examples.

**Thalidomide**

Thalidomide, which was called a miracle cure for morning sickness, received the most attention [4]. Thalidomide was first developed as a sedative in 1953 and marketed in 1957 under the brand name Contergan by Grünenthal Pharmaceuticals. Although clinical trials on humans were not conducted properly, adverse effects were rarely revealed in various animal experiments such as rats and rabbits. The drug was advertised as “a miracle drug with no adverse effects” and sold as a sedative and sleeping pill that could be purchased without a doctor’s prescription in about 50 countries around the world. Many pregnant women used it, particularly for soothing morning sickness. However, its danger was revealed when pregnant women who took this drug between 1960 and 1961 gave birth to deformed babies. Until sales were completely suspended in 1962, more than 10,000 deformed babies were born (Figure 1).

Research on the drug revealed that taking it before the 42nd day of pregnancy resulted in the birth of a deformed baby with missing limbs, very short limbs, the complete absence of fingers or toes, or the absence of some fingers or toes due to the adverse effect of suppressing angiogenesis.

Later, during the process of developing new drugs, it was belatedly realized that humans, especially women and pregnant women, should be considered. Like the thalidomide case, after experiencing fatal adverse effects of drugs in women, women were excluded from clinical trials due to concerns about their fertility and unpredictable results. Researchers preferred to include only men in clinical trials in order to maintain other variables as consistent as possible except the drug. Women's menstrual cycles and hormone changes were also considered factors that made clinical trials difficult. This trend has gradually changed since the
1990s, when the U.S. Food and Drug Administration (FDA) changed the research guidelines to include women in clinical trials [5]. However, there have been no significant changes in Korea yet.

Cisapride
The U.S. Government Accountability Office investigated 10 drugs withdrawn from the market between 1997 and 2021 due to adverse effects and found that eight of them showed a higher risk in women than in men. One reason for this is that women took those drugs more often, such as appetite suppressants. In some cases, physical differences between men and women caused more fatal adverse effects in women, such as with cisapride (brand name, Prepsulid; Janssen-Ortho). Cisapride is a drug that stimulates gastrointestinal motility by acting on serotonin receptors. It was first developed in 1980 and has been widely used to treat gastrointestinal diseases, including reflux esophagitis. As a gastroenterologist, I prescribed the drug frequently. In 2000, it was shocking to learn that a 15-year-old Canadian girl named Vanessa Young, who was prescribed the drug for stomach discomfort due to bulimia, had died of a heart attack. It was later discovered that cisapride could cause fatal cardiac arrhythmia, and the pharmaceutical company voluntarily stopped selling it [6]. This was a major surprise for gastroenterologists who prescribed the drug frequently. The QT interval, the length between the Q and T waves in an electrocardiogram, tends to be longer in women than in men. Cisapride made the QT interval longer, causing fatal arrhythmia and cardiac arrest, especially in women (Figure 2).

Zolpidem
Zolpidem, a sleeping medication, has recently become a concern. In 2011, Lindsey Schweigert woke up in the back seat of a police car wearing her nightgown, but she could not remember why she was there, no matter how hard she tried. Later, it was discovered that this was due to symptoms such as sleepwalking as an adverse effect of zolpidem [7]. About 700 car accidents related to zolpidem were reported in the United States alone. It was confirmed that the rate of metabolism and excretion in the body after taking the drug is slower in women than in men, and a higher blood drug concentration is maintained in women than in men. In 2013, the FDA recommended that people taking zolpidem avoid driving or work that requires concentration the day after taking it. It was also recommended to lower the first prescription dose to 5 mg, half the previous dose, for women [8]. This case may also have occurred due to not considering the differences between men and women in the initial process of developing the drug and determining the dose.

Why are the adverse effects of drugs different between men and women? These discrepancies are primarily due to physiological differences. Zolpidem is absorbed well by fat. Since women have more body fat than men, the drug remains in women’s bodies longer. In addition, since men’s and women’s heart rates differ, cisapride may cause more fatal cases of arrhythmia in women. Changes in female hormones can also affect drug metabolism through the liver, and the smaller size of a woman’s kidney slows down the excretion rate of drugs. Since women have smaller body weight and surface area, the same dose of a drug may have a greater effect on them than on men. In addition to these physical differences, women tend to complain of chronic symptoms more than men, and therefore take more drugs, which exposes them more frequently to interactions among drugs. Therefore, it is necessary to consider sex/gender differences when developing drugs or using existing drugs.

History of sex/gender-specific medicine
In the late 1980s, concerns about sex/gender bias in clinical trials and drug development were raised, prompting the U.S. National Institutes of Health (NIH) to announce a principle that women must be included in clinical trials [9]. The NIH’s policy was pro-
posed as a law in 1993, requiring the inclusion of women and ethnic minorities in all human research. In phase 3 clinical trials, it was recommended to include sufficient numbers of women and ethnic minorities for subgroup analysis in the verification process of the treatment effect and to prohibit the exclusion of subjects due to cost [10]. At that time, the importance of SGM, which had previously been neglected, received attention and was recommended as a policy, but those recommendations were often not reflected in actual clinical trials [11,12]. However, starting about 10 years ago, SGM received attention in earnest, as major research grant institutions implemented regulations requiring SGM to be considered clinical trials [12]. Since funding is essential to conduct research, these regulations seem to be the most effective way to ensure that SGM is sufficiently addressed. The Canadian Institutes of Health Research (CIHR) since 2010 [13], the European Commission since 2014 [14], and the NIH since 2015 [10] have required that research grant applications must stipulate whether the research considers sex or gender and sex as a biological variable in research design, analysis, and reporting processes [9]. After GISTeR of KOFWST persuaded the National Research Foundation of Korea (NRF) and the Ministry of Health and Welfare (MOHW) that extra points should be given to research on sex/gender, NRF and MOHW research grants have taken a cautious approach, such as awarding extra points for female principal investigators and the inclusion of appended documents related to SGM. Along with the regulations on research grants, academic journals also play a significant role in promoting SGM. In 2014, the editors-in-chief of major biomedical journals gathered to discuss the problem that even research published in influential academic journals could not be replicated in follow-up experiments, and they pointed out that the insufficient consideration of sex/gender in the experiment and reporting processes was a major factor contributing to this problem [9].

Many academic journals have subsequently made it clear that they will consider the application of SGM in preclinical and clinical trials when reviewing articles, which has led researchers to pay more attention to the importance of SGM [15]. Numerous editors have become sympathetic to the fact that many published research articles do not even mention “male” or “female” in animal experiments or present separate analyses for men and women. In November 2017, KOFWST hosted a lecture entitled “Gender Application Cases in International Biomedical and Health Journals,” which introduced SGM to the editors-in-chief of biomedical journals in Korea, leading to the inclusion of content on SGM in the editorial policy of each journal [9]. Over the years, efforts to introduce SGM in biomedical research have led to the inclusion of content related to SGM in the ARRIVE (Animal Research: Reporting In Vivo Experiments) guidelines and recommendations of the International Committee of Medical Journal Editors, as well as the publication of SGM guidelines such as the SAGER (Sex and Gender Equity in Research) guidelines [16-18]. Additionally, information on SGM is readily available through online resources such as the Gendered Innovations Center at Stanford University and the Institute of Gender and Health under CIHR [9]. Progress in this area is steady.

Examples of sex/gender-specific medicine

Research on SGM has revealed that there are significant differences between men and women in various medical areas such as myocardial infarction, heart failure, autoimmune diseases, depression, thyroid diseases, and diabetes. Applying these differences to medical treatment has led to significant outcomes. For example, the main symptom of myocardial infarction is chest pain in men, while women experience heartburn and chest tightness as the primary symptoms. Prior to SGM, only chest pain was recognized as the primary symptom, resulting in misdiagnosis and delayed treatment for women presenting with heartburn and chest tightness. However, SGM has led to proper identification of these symptoms and improved medical outcomes. Additionally, it was discovered that the treadmill test was less accurate for women, but was still performed equally on both men and women [19]. The advent of SGM led to the recognition that the treadmill test should be performed differently for men and women to reduce errors. These examples demonstrate the necessity of SGM in achieving better medical outcomes.

The difference between sex and gender

The differences between men and women in terms of hormones and genes are the main reasons why they show differences in diseases (Figure 3) [20]. Hormone differences are widely known, but genetic differences are not as well-known. Recent research has revealed that genetic differences between men and women are around 1%; this may seem like a small difference, but it is actually quite substantial, since the genetic difference between humans and chimpanzees is only 1.2%. These differences in hormones and genetics can contribute to differences in diseases between men and women. Other biological differences to consider are reproductive function and sex hormone concentrations, as well as the fact that women tend to have a higher percentage of
body fat than men. Moreover, social and cultural factors related to gender differences also have a major impact on the development of diseases. These factors can include differences in behavior, lifestyle, and social experiences. For instance, it is already known that there are substantial differences in thoughts and behaviors between men and women, and it has been discovered that these differences can be associated with the development of certain diseases [21].

However, biological differences and gender differences are so closely related that it can be difficult to determine which of them have a greater influence on the development of diseases. For instance, men tend to show aggression due to their vigorous secretion of testosterone. This trait leads to aggressive behaviors and creates an environment that is more susceptible to health risks, indicating that a biological trait can influence gender. In such cases, it is not clear whether biological or gender impacts should be prioritized. Conversely, gendered behaviors can alter biological factors. For example, poor lifestyle habits such as alcohol consumption or excessive stress can cause genetic mutations in adults, children, and even fetuses. One clear fact is that although biological differences are crucial when young, gender differences become even more critical as individuals age. Therefore, more research should be conducted in the future, and the development of SGM will be determined accordingly. These efforts will undoubtedly aid in disease treatments and significantly impact healthy life expectancy.

**Concluding remarks**

Although the field of SGM is expanding and more researchers, clinicians, and students are recognizing it as a component of personalized medicine, it has not yet been fully developed as a field of study. Unfortunately, many people still misunderstand SGM as research related to the women’s movement or sexual minorities. The reason for the emergence of SGM is to ultimately improve patient treatment outcomes. However, research in this field is still in its early stages, and Korea is in its infancy. To accurately identify differences in diseases between men and women, more scientists in medicine, nursing, and related health fields need to take an interest in researching and studying them. Moreover, continuing attempts to apply and promote SGM among healthcare practitioners, researchers, and students will help propel it forward in earnest.

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All work was done by Kim N.

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Data availability

Please contact the corresponding author for data availability.

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**Introduction**

Preconception care (PCC) has been a focus of attention since the Millennium Development Goals program and continuing into the Sustainable Development Goals program, which aims to optimize maternal health before conception. Many developed and developing countries have established PCC as an important health initiative [1,2]. This preconception agenda reflects the long-term goal of reducing maternal and infant mortality rates, which have recently been a paramount issue in the health sector [3,4]. PCC encompasses behavioral, biomedical, and social interventions performed by women and their partners before conception to identify health problems, behaviors that may lead to health issues, and personal and environmental risk factors contributing to maternal and infant mortality and morbidity [5,6]. Various internal and external obstacles can deter the imple-

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**Preconception care knowledge and information delivery modes among adolescent girls and women: a scoping review**

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**Purpose:** The aim of this study was to conduct a scoping review of knowledge and information delivery modes related to preconception care (PCC) among adolescent girls and women.

**Methods:** A scoping review was performed on studies selected from five electronic databases (Cochrane Library, PubMed, Science Direct, CINAHL/EBSCO, and ProQuest), published between 2012 and 2022, with predetermined keywords and criteria. We included English-language research articles available in full text and excluded irrelevant articles.

**Results:** This study included eight articles, comprising seven quantitative studies and one qualitative study conducted among adolescent girls and women. Five were from low- and middle-income countries and three were from high-income countries. The synthesized themes generated from the data were PCC knowledge and PCC information delivery modes and effectiveness. In general, adolescent girls and women were found to have basic PCC knowledge, including risk prevention and management and a healthy lifestyle, although more extensive knowledge was found in higher-income countries than in lower-income countries. The delivery modes of PCC information have grown from individual face-to-face conventional methods, which are used predominantly in lower-income countries, to more effective digital mass media.

**Conclusion:** Globally, many women still have insufficient knowledge regarding PCC, as not all of them receive access to PCC information and support. PCC promotion efforts should be initiated earlier by involving a wider group of reproductive-age women and combining individual, in-group, face-to-face, and electronic delivery modes.

**Keywords:** Adolescent; Adult; Female; Pregnancy; Preconception care
mentation of PCC. Client-related barriers include unawareness of PCC services, unwillingness to participate in PCC programs, and religious beliefs [7]. Meanwhile, a lack of support from healthcare services, such as insufficient preparation for health promotion [7,8], low self-efficacy of health providers in conveying the programs [6-8], and limited environmental context and resources [7,8], may decrease women's interest in using PCC services. These conditions require an exceptional level of understanding since the topic of PCC is still underdeveloped [7,8]. In the era of digitization, modifying the delivery of health campaigns and communication through web applications and social media has become an essential and convenient solution to increase awareness of reproductive health and access to health services [9,10].

The content of PCC education is extensive, including nutritional deficiencies, smoking behavior, and the potential health consequences of such high-risk behaviors. Moreover, it covers the risks of maternal and fetal illnesses related to environmental factors, genetic disorders, unwanted pregnancy, sexually transmitted infections, infertility, psychiatric disorders, substance and drug abuse, and violence issues [5,6]. Successful PCC implementation is attributed to a multisectoral program for healthy pregnancy targeting girls and women and involving families, schools, community platforms, and healthcare institutions [1,5]. Nevertheless, limited PCC programs tailored to adolescent girls and women have been implemented in low and middle-income countries [1]. The targets of PCC include adolescent girls and women who have not yet conceived and are in the process of getting married. As PCC knowledge and practices have been explored quite intensely in recent years, we conducted this study to answer the following research question: “According to the existing literature, what is known about the scope of essential PCC knowledge and informational delivery modes among adolescent girls and women?”

**Methods**

We conducted a scoping review to summarize the research literature regarding essential PCC knowledge and informational delivery modes among adolescent girls and women across nations with different economic backgrounds. This review adhered to the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews) [11], which guided the authors in developing a scoping report to present the findings.

**Search strategy and study selection**

We used the following keywords: “preconception” AND “content” AND “adult(s) OR adolescent(s)” in the following electronic databases: Cochrane Library, PubMed, Science Direct, CINAHL/EBSCO, and ProQuest. The researchers set several inclusion criteria for the selection of research articles. The criteria stipulated that (1) the type of research was qualitative, quantitative, or mixed-methods; (2) the participants in the included studies were predominantly female adolescents and or reproductive-aged adults (aged 15–49 years) following the World Health Organization (WHO) standard for PCC target groups [2]; (3) the studies were published in English; (4) the studies were published within the past decade (January 2012 to March 2022); and (5) the outcomes included PCC knowledge and informa-
tion. Studies on participants with preexisting conditions, such as chronic illnesses, were excluded if no full text was available. With these keywords, we found 1,230 articles in April 2022. After deleting 987 duplicates and 131 non–full-text articles, 112 articles were selected and read. During the reading, 104 articles were excluded as they did not meet the article selection criteria (e.g., guidelines, protocol articles) (Figure 1). Finally, eight studies [12-19] were included in this review study.

**Methodological quality appraisal**

The 16-item Quality Assessment Tool for Studies with Diverse Designs (QATSDD) by Sirriyeh et al. [20] was used to scrutinize the quality of the selected studies. The reliability and validity of the papers were checked, and rigor was evaluated when choosing these qualitative and quantitative studies. All items of the QATSDD can be used for mixed-method research studies, while 14 items can be used for the quality assessment of quantitative and or qualitative studies. Each included paper was checked individually and assigned a score of 0 (=not at all), 2 (=very slightly), 3 (=moderately), or 4 (=complete) according to the identified criteria. The quality appraisal was presented as a percentage of the maximum possible score (42 for both qualitative and quantitative studies) and was generated from the scores given and agreed upon by the first and second authors to establish interrater reliability. A higher score indicated better quality of the paper. Any disagreements about the percentage were resolved through discussion, and when necessary, the third and fourth authors were involved in resolving the disagreement. The assessment results are presented in Table 1.

**Data extraction and synthesis**

To summarize the results in a logical way that aligns with the aim of this review, we used a chart to extract key information on the selected articles, including the author’s name, the year and country of the study, the study type and sample, the study’s aim, the article’s quality score by QATSDD, and thematic findings (Table 1). Next, the review was structured by transforming the qualitative or quantitative data from the eligible studies into integrated themes. In the synthesis phase, the authors generated broader themes by reviewing, comparing, and contrasting the different

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**Figure 1.** PRISMA 2020 diagram of study selection.
Table 1. Description of the selected studies (N=8)

<table>
<thead>
<tr>
<th>First author [Ref]</th>
<th>Year</th>
<th>Country</th>
<th>Study type, sample</th>
<th>Study aims</th>
<th>Quality score, QATSDD</th>
<th>PCC knowledge</th>
<th>PCC information delivery modes and effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantitative studies</strong></td>
<td></td>
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</tr>
<tr>
<td>Bickmore et al. [12]</td>
<td>2020</td>
<td>United States</td>
<td>A randomized controlled trial, 79 women aged 18–25 years (intervention group)</td>
<td>To examine a web-based PCC intervention (&quot;Gabby&quot;)</td>
<td>90%</td>
<td>Increased health literacy about family planning, physical activity, weight management, immunization, drug abuse, infectious and chronic disease care, and folic acid supplementation</td>
<td>The web-based application of PCC conducted by virtual face-to-face individual modes was effective for improving women’s PCC knowledge</td>
</tr>
<tr>
<td>Priani et al. [13]</td>
<td>2019</td>
<td>Indonesia</td>
<td>A quasi-experimental study, 46 unmarried women (intervention group)</td>
<td>To identify the effectiveness of preconception education for women in preparing for pregnancy</td>
<td>74%</td>
<td>Improved knowledge of physical health, nutrition, and preconception lifestyle after an intervention</td>
<td>Training on PCC through face-to-face individual education was effective in improving women’s knowledge of preconception nutrition, lifestyle, and physical health</td>
</tr>
<tr>
<td>Nagusa and Sasaki [14]</td>
<td>2019</td>
<td>Japan</td>
<td>Longitudinal intervention study, 84 mature female workers (20–35 years)</td>
<td>To implement a health education program on PCC</td>
<td>76%</td>
<td>High knowledge about the definition of PCC, eating foods containing folic acid, healthy lifestyle, self-efficacy, stress management, sexually transmitted disease prevention, cervical cancer screening, breast cancer screening, vaccinations, body weight, infertility, and rubella prevention</td>
<td>PCC education through a face-to-face seminar in small groups, group discussion, and feedback was effective in increasing PCC awareness and behaviors. The seminar was combined with a ‘rubella prevention’ video viewing</td>
</tr>
<tr>
<td>Setegn [15]</td>
<td>2021</td>
<td>Ethiopia</td>
<td>A community-based cross-sectional study, of 427 reproductive-age women (15–49 years)</td>
<td>To determine the intention to use and its predictors of PCC use among reproductive-age women</td>
<td>80%</td>
<td>Insufficient knowledge of STI, hypertension, diabetes mellitus screening, folic acid importance before pregnancy, iron intake, and good nutrition</td>
<td>Health workers and school participated in face-to-face education, web-based education, and face-to-face information from family/friends</td>
</tr>
<tr>
<td>Skouteris and Savaglio [16]</td>
<td>2021</td>
<td>Australia</td>
<td>A cross-sectional study, 91 women aged 18–25 years</td>
<td>To examine the proportion, type, and frequency of social media use to seek general health, preconception, and pregnancy-related information or advice</td>
<td>79%</td>
<td>General health, preconception and pregnancy-related health information, and pregnancy planning</td>
<td>Planning a pregnancy was associated with using social media platforms, primarily Facebook, Instagram, and Snapchat for preconception and pregnancy-related health information</td>
</tr>
<tr>
<td>Teshome et al. [17]</td>
<td>2020</td>
<td>Ethiopia</td>
<td>A community-based cross-sectional study, 623 pregnant women (15–49 years)</td>
<td>To assess the knowledge of PCC and associated factors among pregnant women</td>
<td>88%</td>
<td>Most knew about HIV screening, family planning, and hypertension screening, but only a few understood folic acid consumption, iron, and hepatitis B screening as PCC</td>
<td>Not stated</td>
</tr>
<tr>
<td>Ekem et al. [18]</td>
<td>2018</td>
<td>Nigeria</td>
<td>A cross-sectional study, 453 pregnant women (15–44 years)</td>
<td>To assess the level of awareness and utilization of PCC services</td>
<td>85%</td>
<td>Fewer than 50% understood folic acid supplementation, smoking cessation, alcohol cessation, weight control, blood sugar control, hypertension control, and HIV screening</td>
<td>PCC information was delivered by care providers through face-to-face mode</td>
</tr>
<tr>
<td><strong>Qualitative study</strong></td>
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<tr>
<td>Doke et al. [19]</td>
<td>2021</td>
<td>India</td>
<td>A qualitative FGD method, 76 women (15–39 years)</td>
<td>To assess women’s basic perceptions, knowledge, and attitudes toward PCC</td>
<td>85%</td>
<td>Insufficient knowledge about pregnancy planning, women’s age, women’s height and weight, daily physical activity, nutrition, smoking, and alcohol consumption, pre-pregnancy medical care, and preconception services</td>
<td>Not stated</td>
</tr>
</tbody>
</table>

FGD: Focus group discussion; HIV, human immunodeficiency virus; PCC: preconception care; QATSDD: the 16-item Quality Assessment Tool for Studies with Diverse Designs.
perspectives regarding PCC knowledge and modes of information delivery from the eight selected articles. The integrated themes were formulated to respond to the aims of this scoping review [21].

Results

Characteristics of selected studies
As can be seen in Table 1, all included articles were from 2018 and beyond, and four were from 2021. Of the eight selected studies, five were conducted in low- to middle-income countries (Ethiopia, Indonesia, India, and Nigeria) [13,15,17-19], and three were from high-income countries (the United States, Japan, and Australia) [12,14,16]. These findings indicated the increased interest in PCC research following a better understanding of PCC’s importance for women’s and children’s health across the globe. Seven studies were quantitative, including one randomized controlled trial (RCT) [12], one quasi-experimental study [13], one longitudinal intervention [14], and four cross-sectional studies [15-18], while there was one descriptive qualitative study [19]. The studies involved 2,023 female adolescents and reproductive-aged adults attending health care services or at community sites.

Preconception care knowledge
As noted in Table 1, all studies in this review described some levels and types of basic knowledge regarding PCC, and the details were closely related to the country’s income classification. For instance, in low- and middle-income countries, such as Nigeria, only a few women had good PCC knowledge [18]. Although research in Ethiopia showed that many pregnant women understood human immunodeficiency virus screening, family planning, and hypertension screening, only a few were aware of folic acid and iron consumption and hepatitis B screening, as PCC information was usually provided by health workers only during antenatal visits [17]. A qualitative study in India also reported that of 76 women (aged 15 to 39 years) who participated in focus group discussions, most were well acquainted with the basic concepts of PCC, such as nutrition pre-pregnancy and the effects of tobacco and alcohol effects, but only a few were aware of the need of good mental health, PCC programs, sexually transmitted infections, and the effect of chronic medical conditions; furthermore, 50% had an unplanned pregnancy and most did not access PCC services [19].

On the contrary, research in the United States, as a high-income country, reported that half of the young women had basic PCC knowledge, including treatment goals, the urgency of care, folic acid supplementation, genetic counseling, iron supplementation, and family planning [12]. Meanwhile, an Australian study stated that the adolescents understood well the general health information related to PCC and pregnancy planning [16]. Last, a study in Japan indicated that the female respondents had broader knowledge about PCC, as the study also mentioned cancer screening, infertility, and rubella prevention [14]. These studies indicate that adolescent girls and women in higher-income countries are equipped with more extensive information on PCC.

Modes of preconception care knowledge information delivery and effectiveness
The prevailing method utilized in providing PCC information was direct health promotion through face-to-face meetings with the female respondents; this method was described in four studies [13-15,18]. For example, a PCC information session delivered through a conventional face-to-face individual health education in the Office of Religious Affairs in Indonesia demonstrated significant effectiveness in changing women’s knowledge regarding physical health, nutrition, and lifestyle [13]. Meanwhile, PCC information group seminars in Japan were conducted through face-to-face individual education, which effectively improved women’s knowledge of preconception nutrition, lifestyle, and physical health [14].

In addition to documenting more extensive PCC knowledge, attitudes, and practices, two studies conducted in high-income countries [12,16] reported advanced modes of PCC information delivery. Those studies reported that PCC information was delivered through digital technology, including web-based PCC educational media [12] and social media (Facebook, Instagram, Snapchat, etc.) [15,16]. An RCT in the United States reported that young women who received an automated PCC intervention from embodied web-based PCC counselors for 12 months showed an enthusiastic attitude toward accessing information that increased their PCC knowledge [12]. Adolescent girls and women utilized internet applications as a source of information related to PCC, and most shared PCC information with others [12,16]. Furthermore, some research indicated that healthcare workers played minimal roles as the source of PCC information for women in Nigeria and Ethiopia [15,18], and PCC services provided by healthcare providers might encourage women’s involvement in PCC, including screening for risk factors and genetic disorders [14,22].
Discussion

The primary PCC contents identified in this review were mostly consistent with the concept of PCC as explained by the WHO [2]. The reviewed studies involving adolescent girls and women described how information related to PCC has been developed to cover early pregnancy prevention and preconception education, with topics including nutritional supplementation, stress reduction, the dangers of unprepared and young-age pregnancy, and contraception use until the planned time of pregnancy through digital and non-digital education [12,13,16]. However, no studies mentioned the importance of protecting prepregnancy adolescent girls and women from environmental, household, and vehicle exposures, which could be potentially toxic to the pregnancy [2]. In congruence with this finding, the WHO has emphasized that successful PCC comprises critical information on mental health preparedness for pregnancy [1].

This scoping review highlights the importance of PCC information delivery modes in improving PCC awareness among adolescent girls and women in a global world. Individual or in-group conventional face-to-face education was more frequently conducted in low- to middle-income countries [13,18], while digital modes were effectively used to increase PCC knowledge in developed countries [15,16]. In line with these findings, other studies have also suggested that it is effective to deliver other reproductive information not only through conventional educational methods but also by using social media to disseminate content created under WHO guidelines or employing other digital approaches to increase PCC coverage [1,9,10].

This review found that the level of expertise regarding PCC among adolescents and reproductive-aged women in the African and Asian countries where the included studies were conducted was influenced by the educational status of respondents and their partners [17,18], education from health providers [13,14,17], the frequency of antenatal visits, and the history of previous clinic visits [18]. Adolescent girls and women from low- to middle-income countries were less exposed to PCC information than those in high-income countries, who have taken advantage of technological advances, such as web-based and social media, to seek PCC information. This implies the importance of providing a full package of PCC information to wider community groups, such as high school or university students, through multiple educational methods and media. Modified forms of PCC information delivery should also be developed to match the needs of all women [2,23] by taking into account factors influencing PCC delivery, such as local culture, education levels, and the socioeconomic status of women [24,25].

A limitation of this scoping review may have been that we did not supplement the search results with a hand search of the reference lists of the selected studies; thus, we may have missed some relevant studies. Moreover, our inclusion criteria were restricted to articles published in English with available full texts, which may have caused language bias and reduced the number of selected articles to be reviewed. Hence, expanding the selection of studies through a combination of quantitative and qualitative factors could have improved the comprehensiveness of the study.

In conclusion, this review found that although adequate knowledge of PCC is crucial for improving attitudes and practices toward pregnancy preparation, most adolescent girls and women, predominantly in low-to-middle-income countries, lack exposure to more extensive PCC topics, such as pre-pregnancy vaccination, screening, and supplementation. Face-to-face health education by healthcare workers was the predominant mode of PCC information delivery in most developing countries. Since not all women can take advantage of social media, e-Health, and other digital health forums that require modern technology, intensive individual face-to-face health education combined with discussion, continuing feedback, and adequate support may be a good solution to deliver PCC information to reproductive-age women in low- to middle-income countries. Meanwhile, for middle- to high-income countries and other contexts where young women might have widespread access to technology, this study suggests the optimization of digital technology for delivering PCC information.

In future studies, a combination of promotive and educative methods ranging from direct/conventional information delivery methods to digitalization (web and social media platforms) should be used and studied, with a particular focus on the inclusion of specific high-risk groups such as adult women with impaired immunity, infection, and diagnoses of certain serious diseases such as malignancy/reproductive tract diseases. Empirical studies can also be developed further to use a combination of multiple media and educational approaches (personal, in-group, face-to-face, or electronic methods), providing information related to PCC and evaluating knowledge, attitude, and practice adjustments after receiving this information.

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Conflict of interest

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Data availability

Please contact the corresponding author for data availability.

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Analysis of online parenting community posts on expanded newborn screening for metabolic disorders using topic modeling: a quantitative content analysis

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**Purpose:** As more newborns have received expanded newborn screening (NBS) for metabolic disorders, the overall number of false-positive results has increased. The purpose of this study was to explore the psychological impacts experienced by mothers related to the NBS process.

**Methods:** An online parenting community in Korea was selected, and questions regarding NBS were collected using web crawling for the period from October 2018 to August 2021. In total, 634 posts were analyzed. The collected unstructured text data were preprocessed, and keyword analysis, topic modeling, and visualization were performed.

**Results:** Of 1,057 words extracted from posts, the top keyword based on ‘term frequency-inverse document frequency’ values was “hypothyroidism,” followed by “discharge,” “close examination,” “thyroid-stimulating hormone levels,” and “jaundice.” The top keyword based on the simple frequency of appearance was “XXX hospital,” followed by “close examination,” “discharge,” “breastfeeding,” “hypothyroidism,” and “professor.” As a result of LDA topic modeling, posts related to inborn errors of metabolism (IEMs) were classified into four main themes: “confirmatory tests of IEMs,” “mother and newborn with thyroid function problems,” “retests of IEMs,” and “feeding related to IEMs.” Mothers experienced substantial frustration, stress, and anxiety when they received positive NBS results.

**Conclusion:** The online parenting community played an important role in acquiring and sharing information, as well as psychological support related to NBS in newborn mothers. Nurses can use this study’s findings to develop timely and evidence-based information for parents whose children receive positive NBS results to reduce the negative psychological impact.

**Keywords:** Information; Inborn metabolism errors; Mothers; Neonatal screening

주요어: 정보; 선천성 대사이상; 어머니; 신생아선별검사

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Introduction
선천성 대사이상 질환의 특징은 신생아 시기는 증상이 잘 나타나지 않는다는 것으로, 증상이 나타난 이후에는 치료를 하더라도 이때 손상을 받은 세포가 회복되지 않아 장애아로 살거나 사망하게 된다. 그러나 조기 발견하여 특수 식이요법이나 적절한 치료를 하는 경우 정신지체 등과 같은 심각한 합병증을 예방할 수 있다[1,2]. 전자선 체층 검사 신생아 선별검사는 질환을 조기에 발견하여 영유아 건강증진을 도모하고 정신지체 아 발생을 예방하기 위한 목적으로 많은 나라에서 시행하고 있다[1,3]. 국내에는 1991년부터 정부 모자보건사업의 일환으로 선천성 대사이상 신생아 선별검사에 대한 지원이 시작되었고, 기존의 페닐케톤뇨증, 선천성 갑상선 기능 저하증에 2006년부터 단풍당뇨증, 호모시스템 노증, 갈락토스혈증 및 선천성 부신 과형성증의 4개 질환을 추가, 총 6개 질환으로 지원을 확대하여 모자보건 행정에 기여하였다[2,4].


재검사에 대한 재검사가 필요한 경우 보통 부모들은 문자 또는 전화 통보를 받게 되는데 항상 정확하고 완벽한 정보를 제공받지는 못하며, 대부분 읽기pid가 아니고, 일반적으로 약간의 정보를 제공하는 경우도 많다. 재검사 통보에 부모들은 당황하게 되어 인터넷 사이트를 통해 관련 정보를 검색하거나 육아 관련 온라인 커뮤니티에서 비슷한 문제를 경험한 어머니들의 의견을 참고하여 정신적, 신체적, 경제적 등 여러 측면에서 지지받고 있다[6,7]. 특히 검사 결과를 통보받는 시점, 재검사 및 확진검사가 이루어지는 시기인 어머니들의 산후조리 기간이거나 아기가 어려 외출에 제한을 받는 시기로, 이러한 상황에서 정신적 지지를 받기 힘들 수 있다[6,7].

주산기 여성과 신생아 선발 검사의 시행과 관련 검사 과정을 충전하고 부모 교육이나 추적 검사를 도울 책임이 있으며, 또한 심리적 지지를 위한 역할을 해야 한다.

온라인 육아 커뮤니티 이용이 활발해지면서 온라인 상에서 실시간으로 생성되는 비정형 데이터가 증가하고 있으며, 이를 통해 대상자의 관심사 및 정보 요구를 파악할 수 있으며, 이러한 자료는 건강 관리 영역에서 이들에 대한 검사, 위양성 결과 통보, 재검사 및 확진검사를 통해 최종 결과가 나올 때까지의 어머니들의 경험과 정보 요구로 인해 많은 관심이 있다. 따라서 온라인 커뮤니티의 게시 글은 시간적이고 공간적 제약 없이, 대중의 살아있는 경험과 의견을 비정형화된 형태로 자유롭게 보여주므로 보건의료 제공자는 이를 통해 대상자의 관심사 및 정보 요구 정도를 파악할 수 있으며, 이러한 자료는 건강 관리 영역에서의 연구에서 대량의 자료를 수집하는 데 도움이 될 수 있다[16,17]. 또한, 온라인 커뮤니티의 게시 글은 시간적이고 공간적 제약 없이, 대중의 살아있는 경험과 의견을 비정형화된 형태로 자유롭게 보여주므로 보건의료 제공자는 이를 통해 대상자의 관심사 및 정보 요구 정도를 파악할 수 있으며, 이러한 자료는 건강 관리 영역에서의 연구에서 대량의 자료를 수집하는 데 도움이 될 수 있다[16,17]. 온라인 게시 글과 같은 자연어로 작성된 비구조적 데이터를 대상으로 정보를 추출하는 기술을 텍스트 마이닝(text mining)이라고 한다. 토픽 모델링은 텍스트 마이닝 기법을 활용한 확률 모델 알고리즘으로, 구조화되지 않은 대량의 텍스트에서 토픽과 카테고리를 찾아내고, 일정한 주제를 처리하는 데 사용된다. 토픽 모델링은 온라인 커뮤니티 게시 글과 같이 비정형화된 데이터를 대상으로 정보를 추출하는 기술을 텍스트 마이닝(text mining)이라고 한다. 본 연구의 목적은 온라인 커뮤니티의 선천성 대사이상 신생아 선별검사와 관련된 게시 글을 토픽 모델링 기법을 이용하여 내용 분석을 함으로써 선천성 대사이상 신생아 선별검사, 검사 결과, 재검사 및 확진검사의 관련 정보 요구를 파악하기 위한 검토를 하였다.
성을 확보하였다. 연구자가 각각 게시 글의 본문을 검토한 뒤 선천 성 대사이상 검사에 대한 구체적인 내용이 아닌 단순한 참조 사항에 대한 글, 조리원 후기에 대한 글 등 연구의 목적에 부합하지 않은 것으로 판단되는 경우 분석 대상에서 제외하고 총 634건의 게시 글을 선정하였다.

자료 분석
선정된 게시 글을 대상으로 단어 추출 및 정제, 키워드 분석, 토픽 모델링 분석을 실시하였다. 본 연구자는 연구에 사용된 통계프로그 랜인 NetMiner 4.4 프로그램을 개발한 ㈜사이람(Cyram, Seongnam, Korea)의 텍스트 네트워크 및 토픽 모델링에 대한 통계 분석 관련 교육을 수강하였으며, 연구 과정 중 지속적으로 ㈜사이람의 교육팀에 자문을 구하였다.

단어 추출 및 정제
자료 분석 대상으로 선정된 게시 글은 개별 인식번호, 작성일자, 제목, 본문, 댓글로 구성된 MS Office 엑셀 파일(Excel, Microsoft, Redmond, WA, USA)로 변환하였다. 그 후 NetMiner 4.4 프로그램 [24]에서 제공하는 자연어 처리 과정을 거쳐 단어를 추출하였다. 자연어 처리 과정에서 대명사, 숫자, 부사 같은 불용어(stopword)는 자동으로 제외되고 주요 개념을 파악하기 위해 추출 단어의 품사는 '명사(noun)'로 지정하고, 연구자가 등록한 지정어(defined words), 유의어(thesaurus), 제외어(exception list) 사전을 적용하여 의미형태소를 추출하였다.

본 연구에서 단어 정제를 위한 지정어, 유의어, 제외어 사전의 개발 과정은 다음과 같다. 2인의 연구자가 사전을 적용하지 않고 추출된 전체 단어 목록을 살펴보면서 작업을 진행하였다. 지정어 사전은 NetMiner 프로그램 분석 상 한 개의 형태소를 기본 단위로 인식하기 때문에, 두 개 이상의 형태소로 구성된 고유명사나 복합명사들은 지정어로 등록하였다. '선천성갑상선기능저하증', '아미노산대사장애', '선천성 대사이상검사' 등의 단어들이 분리되지 않도록 지정어로 등록하였다. 유의어 사전은 동일하고 비슷한 의미를 가지거나 표기가 다른 단어와 이어쓰기가 다를 수 있는 동음이의가 모아 하나의 대표어로 대체하는 단어 목록이었다. 선천성 대사이상 질환명의 경우 『제8차 한국표준질병ㆍ사인류명』 [25]를 참고하여 대표어로 등록하였다. 예를 들어, '타이로신혈증', '타이로신형'은 '타이로신혈증'으로 등록하였다. 제외어 사전은 일반적인 개념을 나타내는 단어나 분석에서 제외할 단어를 지정하는 것으로, 게시 글에 없이 사용되는 '몰록', '망남', '그돈안', '그래', '오랜만', '나날' 등 지역명을 제외어로 등록하였다. 또한 의미를 파악하기 어려운 음절 글자는 Netminer의 Query 기능을 이용하여 모두 제외하여 두 음절 이상의 형태소만 분석에 포함하였다. 이 과정에서 연구자가 동의하지 않는 경우, 게시 글 본문을 다시 읽어보고 단어가 사용된 맥락을 확인하는 검토 및 논의를 통하여 최종 결정하였다.

키워드 분석
전체 게시 글의 주요 속성을 파악하기 위하여 단어빈도(term frequency, TF)와 단어빈도-역문서 빈도(term frequency-inverse document frequency, TF-IDF) 분석을 수행하였다. 출현 빈도 값으로 자주 등장하는 단어를 확인할 수 있지만, '선천성 대사이상검사'와 같이 빈도 값이 저조한 경우는 지역표준질병류로 간주하여 제외하였다. TF-IDF는 TF와 IDF의 곱으로, TF는 특정 문서 하나에서 특정 단어가 나온 횟수이며, IDF는 특정 단어의 문서 내 빈도를 역수로 취한 값이다. 따라서 TF-IDF 값은 특정 문서에만 해서 단어가 높은 빈도를 나타내므로, 일반적인 개념을 제외하고 유의미한 단어를 추출하는 데 사용된다 [26].

본 연구에서는 TF-IDF 가중치를 적용하여 키워드를 추출하였다. 선행연구 [26]를 참고하여 TF-IDF 값에 따라 삭제되는 단어들을 검토한 후 TF-IDF 값이 0.5 이상으로 설정하여 키워드를 필터링하였으며, 출현 빈도와 TF-IDF 값을 기준으로 상위 키워드 30개를 각각 추출하였다.

토픽 모델링 분석
토픽 모델링은 문서의 주제, 즉 토픽을 도출하기 위해 텍스트 내 단 어를 분석하는 방법으로 [22], 본 연구에서는 가장 일반적으로 사용되고 있는 잠재 디리클레 할당(latent Dirichlet allocation, LDA) 알고리즘을 사용하였다. LDA는 문서가 여러 개의 토픽으로 구성되며, 토픽은 키워드의 집합이라고 정의하며 문서 내 빈도를 역수로 정의한 토픽이 있다. 토픽은 전체 게시글과 댓글의 주제범주를 나타내는데 있다. 본 연구에서는 LDA 파라미터를 선행연구 [28]에 근거하여 사전확률분포(α를 0.1, β를 0.01)를 사용하였다. 반복 수행 횟수는 1,000회로 설정하였다. 토픽 수는 통계적인 방법과 해석적인 방법을 사용하여 결정하였다. 통계적인 방법은 K-mean clustering을 이용한 실루엣 계수(silhouette coefficient) 값을 참고하였다. 실루엣 계수 값이 각 데이터가 얼마나 조밀하게 모여있는지의 측정을 이용한 값으로, 1에 가까울수록 군집이 적절하게 분리되어 있다고 할 수 있다 [29]. 해석적인 방법으로는 주제 범주화가 잘 되었음이 판단되는 토픽 수로 선택하려는 권장에 따라 [27], 유의한 실루엣 계수로 나눈 토픽 수를 바꾸어 넣어가며 한 개의 토픽으로 묶인 게시글의 주제를 살펴보고 연구팀의 의견을 통한 최종 결정하였다. LDA 분석 결과로 나눈 토픽 그룹의 이름은 토픽 내 가장 많이 높은 키워드 10~20개와 토픽 확률이 높은
신생아 선천성 대사이상 관련 게시글의 토픽 모델링

연구팀은 신생아 선천성 대사이상 관련 게시글의 토픽 모델링을 위해, TF-IDF값을 기준으로 상위 500개의 키워드를 워드 클라우드로 시각화하였다. 신생아 선천성 대사이상 관련 게시글의 키워드 총 634건의 게시글에서 1,057개 단어가 추출되었다. 이들 중, TF-IDF가 높은 상위 30개 키워드를 살펴보면 'XXX병원'이 가장 높았으며, '정밀검사'가 215건, '퇴원' 205건, '모유수유' 196건, '갑상선기능저하증' 191건, '교수' 189건, '유전자검사' 161건, '황달' 158건, '특수분유' 151건 등의 순이었다. 또한 TF-IDF로 본 중요도가 높은 상위 키워드를 살펴보면 '갑상선기능저하증'이 가장 높았고, '퇴원', '정밀검사', '갑상선자극호르몬수치', '황달', '교수', '검색', '건강', '눈물', '입원' 등의 순이었다(Table 1). 빈도와 TF-IDF 값을 기준으로 상위 500개의 키워드를 워드 클라우드로 각각 시각화하였다(Figure 1).

각 토픽 내 가중치를 적용한 각 토픽별 워드 클라우드를 도출하였으며 가중치가 높은 10개의 키워드는 토픽-단어 네트워크를 스프링 맵(spring map)으로 시각화하였다.

Table 1. Top 30 keywords by frequency and TF-IDF

<table>
<thead>
<tr>
<th>Rank</th>
<th>Keyword</th>
<th>Frequency</th>
<th>TF-IDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>XXX Hospital</td>
<td>231</td>
<td>Hypothyroidism</td>
</tr>
<tr>
<td>2</td>
<td>Close examination</td>
<td>215</td>
<td>Discharge</td>
</tr>
<tr>
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<td>Breastfeeding</td>
<td>196</td>
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</tr>
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<td>191</td>
<td>Jaundice</td>
</tr>
<tr>
<td>6</td>
<td>Professor</td>
<td>189</td>
<td>Professor</td>
</tr>
<tr>
<td>7</td>
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<td>185</td>
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</tr>
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<td>8</td>
<td>Powdered milk</td>
<td>161</td>
<td>Health</td>
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<td>9</td>
<td>Jaundice</td>
<td>158</td>
<td>Tears</td>
</tr>
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<td>10</td>
<td>Special milk powder</td>
<td>151</td>
<td>Admission</td>
</tr>
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<td>11</td>
<td>Health</td>
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</tr>
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<td>Taking medication</td>
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</tr>
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<td>Search</td>
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<td>Relief</td>
</tr>
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<td>Thyroid-stimulating hormone levels</td>
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<td>Anxiety</td>
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<td>Admission</td>
<td>128</td>
<td>Taking medication</td>
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<td>Tears</td>
<td>122</td>
<td>Synthroid</td>
</tr>
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<td>17</td>
<td>Confirmed diagnosis</td>
<td>120</td>
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</tr>
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<td>Positive</td>
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<td>21</td>
<td>Diagnosis</td>
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<td>Information</td>
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<td>22</td>
<td>XX Medical Center</td>
<td>106</td>
<td>Obstetrics &amp; Gynecology</td>
</tr>
<tr>
<td>23</td>
<td>Fatty acid metabolic disorder</td>
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<td>Curiosity</td>
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<td>Special milk powder</td>
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</tr>
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<td>Anxiety</td>
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<td>Information</td>
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<td>Positive</td>
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<td>28</td>
<td>Check</td>
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<td>29</td>
<td>Amino acid metabolic disorder</td>
<td>89</td>
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</tr>
<tr>
<td>30</td>
<td>Feeding</td>
<td>88</td>
<td>Amino acid metabolic disorder</td>
</tr>
</tbody>
</table>

TF-IDF: Term frequency-inverse document frequency.
해석적인 적합성이 높은 4개로 판정하였다.

**토픽 모델링**

선천성 대사이상 신생아 선별검사와 관련한 게시 글들에 잠재된 토픽 수를 4개로 설정하여 LDA를 활용한 토픽 모델링 분석 후 먼저 4개의 토픽의 주요 키워드와 확률을 확인하였다. 토픽 1과 토픽 2는 '퇴원', 토픽 3와 토픽 4는 '교수'가 공통의 핵심 키워드로 나타났다. 토픽의 주요 키워드와 토픽 해당 확률이 높은 게시 글의 본문을 확인하여 토픽명을 다음과 같이 명명하였다(Table 2).

토픽 1은 전체 토픽의 21.6%로 네 개의 토픽 중 가장 적은 비중을 차지하고 있었으며, 주요 키워드는 모유수유, 분유, 황달, 퇴원, 수유, 검사결과, 미숙아, 신생아 형질검사, 검사, 입원 등이었다. 퇴원 확률이 높았던 대표적인 게시글은 선천성 대사이상 신생아 선별검사에서 이상 수치를 보인 경우 재검사 전에 모유수유를 지속해도 될지에 대한 부문과 분유 수유에 대한 경험과 정보를 요구하는 내용으로 이루어져, 토픽 1은 '선천성 대사이상 관련 수유'로 명명하였다.

토픽 2는 전체 토픽의 26.5%의 비중을 차지하고 있었으며, 주요 키워드는 갑상선 기능 저하증, 복용, 갑상선 자극 호르몬 수치, 신장 과도, 교수, 갑상선 자극 호르몬, 호르몬, 영양, 발달, 갑상선 기능 항진증 등이었다. 퇴원 확률이 높았던 게시글은 갑상선 기능 저하증, 일상생활과 관련된 경험과 갑상선 기능 이상이 신생아의 발달에 미치는 영향 등에 대한 정보를 요구하는 내용으로 이루어져, 토픽 2는 '갑상선 기능 문제를 가진 산모와 신생아'로 명명하였다.

토픽 3은 전체 토픽의 22.0%로 네 개의 토픽 중 가장 적은 비중을 차지하고 있었으며, 주요 키워드는 피부, 코로나, 눈물, 검사, 검사결과, 입원 등이었다. 퇴원 확률이 높았던 대표적인 게시글은 선천성 대사이상 재검사와 관련된 연락을 받고 외래를 통한 재검사 절차, 재혈 방법.
코로나 상황에서 병원 진료 등에 대한 경험과 정보를 요구하는 내용으로 이루어져, 토픽 3은 '선천성 대사이상 선별검사 재검사'로 명명하였다.

토픽 4는 전체 토픽의 29.0%로 가장 높은 비중을 차지하고 있으며 주요 키워드로는 XXX 병원, 유전자 검사, 정밀검사, 특수 분유, 양성, 교수, 환자 등이 있고, 발견되는 결과에 대한 실태 확인 등의 내용이 있다. 또한, 토픽 4는 '선천성 대사이상 확진검사'로 명명하였다. 이 토픽의 주요 키워드는 '서로소'와 '복합' 등으로 나타나 있으며, 토픽 4의 핵심 주제로는 '주요 키워드의 워드 클라우드'가 포함된다 (Figure 4).

Discussion

신생아 선천성 대사이상 선별검사와 관련하여 온라인 육아 커뮤니티 게시글로부터 도출된 4개의 주요 토픽을 중심으로 논의해 보고자 한다. 토픽이 차지하는 비중 순서로 본 논의를 진행하였다.


Table 2. Results of topic modeling

<table>
<thead>
<tr>
<th>Rank</th>
<th>Topic 1: Feeding related to IEMs</th>
<th>Topic 2: Mother and newborn with thyroid function problems</th>
<th>Topic 3: Retests of IEMs</th>
<th>Topic 4: Confirmatory tests of IEMs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main keyword</td>
<td>Probability</td>
<td>Main keyword</td>
<td>Probability</td>
</tr>
<tr>
<td>1</td>
<td>Breastfeeding</td>
<td>.056</td>
<td>Hypothyroidism</td>
<td>.055</td>
</tr>
<tr>
<td>2</td>
<td>Powdered milk</td>
<td>.046</td>
<td>Taking medication</td>
<td>.041</td>
</tr>
<tr>
<td>3</td>
<td>Jaundice</td>
<td>.034</td>
<td>Thyroid-stimulating hormone levels</td>
<td>.040</td>
</tr>
<tr>
<td>4</td>
<td>Discharge</td>
<td>.023</td>
<td>Synthroid</td>
<td>.032</td>
</tr>
<tr>
<td>5</td>
<td>Feeding</td>
<td>.018</td>
<td>Professor</td>
<td>.024</td>
</tr>
<tr>
<td>6</td>
<td>Test result sheet</td>
<td>.017</td>
<td>Thyroid-stimulating hormone</td>
<td>.023</td>
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<td>7</td>
<td>Premature</td>
<td>.016</td>
<td>Hormone</td>
<td>.019</td>
</tr>
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<td>8</td>
<td>Neonatal intensive care unit</td>
<td>.016</td>
<td>Impact</td>
<td>.017</td>
</tr>
<tr>
<td>9</td>
<td>Text message</td>
<td>.014</td>
<td>Development</td>
<td>.015</td>
</tr>
<tr>
<td>10</td>
<td>Admission</td>
<td>.012</td>
<td>Hyperthyroidism</td>
<td>.014</td>
</tr>
</tbody>
</table>

IEM: Inborn error of metabolism.
기에 발견해 호르몬을 보충해주면 괜찮지만 치료 시기가 늦어지면 정신지체로 이어질 수 있어 조기 발견 및 조기 중재가 중요한 질환이다[3]. 이러한 점을 고려할 때 주산기 여성을 대상으로 특히 갑상선 기능 및 태아 및 신생아에 미치는 영향, 갑상선 기능 검사 등과 관련된 교육이 강화되어야 할 것이다.

토픽 3은 '선천성 대사이상 선별검사 재검사'로 4개의 핵심 주제 중 비중이 세 번째있었고, 이 토픽의 핵심 키워드는 '퇴원'이었다. 외국의 선행연구를 보면 퇴원 후 선별검사에서 양성 통보를 받은 부모들은 정보를 얻기 위해 인터넷 검색을 하지만 관련 정보는 매우 제한적이며, 검색하면서 질환의 경과 및 예후 등에 대한 무서운 정보를 접하면서 두려움, 불안 등을 경험하고 오히려 고통이 가중되는 것으로 나타났다[8]. 따라서 퇴원 교육에 본 검사 관련 정보가 제시될 필요가 있다.
공이나 근거 중심의 정보를 얻을 수 있는 웹 사이트, 상담 가능자의 연락처 등을 구체적으로 제공해야 한다. 선별검사 양성 결과는 혈액 채취 시 아기가 적당한 조건을 만족하지 않아 양성으로 나온 경우, 즉 위양성인 경우가 대부분이며 병원으로 보고한 검사 결과 및 재검사에 대한 의료진의 자세한 설명이나 정보 제공이 부족한 경우 어머니는 대체적으로 실리적, 부담감, 걱정, 두려움, 스트레스 등 부정적 영향을 받게 된다. 특히, 신생아실 및 신생아 중환자실 간호사들은 또한 위양성 결과의 발생 빈도를 줄이고, 검사와 관련하여 신생아 및 부모에게 발생할 수 있는 부정적 영향을 최소화하기 위해 다음과 같은 노력이 필요하다[1]. 첫째, 신생아실 및 신생아 중환자실 간호사는 검사물 채혈 시기 및 방법에 있어서 세심한 주의가 필요하다. 선별검사는 신생아의 수유 상태가 좋을 경우 출생 후 3~7일에 시행할 것을 권장하지만, 수유 상태가 좋은 미숙아 또는 저출생 체중아는 5~7일에 시행하고 수유 상태가 좋아지면 다시(생후 2주경) 하도록 한다. 또한 정확한 검채물을 위해 종이 필터의 유효기간 체크, 적절한 양의 샘플링 등 검채 수집에도 주의를 기울여야 한다. 실제로 부적절한 검채 시기 및 검채물은 위양성 증가의 원인이며, 미숙아나 저체중아에게 위양성률이 높은 것으로 보고되고 있다[36]. 이를 위해 외국의 선행연구에서는 선별검사 관련 교육을 강화하고 엄격한 검사 프로토콜을 개발 및 적용할 것을 주장하고 있다[36,37]. 둘째, 산부인과/신생아실 간호사는 선별검사에 대한 구두 및 서면 정보지 제공 시 재검 가능성 및 재검사의 의미에 대한 정보를 직접적으로 제공할 뿐만 아니라, 구두 및 서면 정보지에 관련 정보를 제공하는 사이트에 대한 정보를 포함하도록 한다. 산전통계상 선별검사 관련 유럽 의 26개국에서 제공하고 있는 정보지 내용을 분석한 한 연구에서 추정한 것처럼, 정보지의 양이 많아지면서 위양성가율이 낮아질 수 있는 추세이다[36,37]. 또한 선별검사 양성 결과의 의미와 해석은 가족에게 누가 어떻게 설명하는지에 따라 다르게 받아들일 수 있다[8]. 호주 연구진이 실시한 선별검사의 유전 상담 심화 연구에 따르면, 간호사가 제공한 유전 상담을 만족한 것으로 나타났다. 국내에서는 간호사가 실전에서 유전 상담을 할 때가 드물으며, 간호 교육 과정에서 매우 제한적으로 다루고 있는 실정이다. 그러나 유전 간호 실무의 역할 및 필요성이 대두되면서 간호 교육에서 유전 간호 역량을 강화시키기 위한 노력이 요구되고 있다[41,42].

토픽 1 '선천성 대사이상 관련 수유'는 4개의 핵심 주제 중 바이어스 인적 연구가 제대로 설명할 수 있는 현장 중앙 검사도 있었다. 이 연구는 선천성 대사질환과 관련된 정보를 제공하여, 산모간의 유전 상담을 보다 효과적으로 수행할 수 있었다. 또한 본 연구를 통해, 선천성 대사질환을 가진 신생아는 태어날 때부터 체내에 특정 효소가 없거나 부족해 일반 분유(모유)를 정상적으로 소화·흡수·분해하지 못하기 때문에 선별검사에서 양성이 나와 재검사 또는 확진검사를 하고 기다리는 동안 모유 또는 일반 분유수를 중단하고 치료받지 못하고 있어야 한다[8,43]. 또한 간호사의 역할은 더욱 중요하며, 간호사가 부모를 위한 지식과 기술을 갖추고 있어야 한다.
월이 소요될 수 있으므로 산부인과/신생아실 간호사를 포함 의료진 들이 이 기간 동안의 수유에 대한 적절한 정보를 제공하고 교육하 는 것이 중요하다[8]. 특히 본 연구에서 대상자들은 퇴원 후 수유와 관련된 불안, 스트레스, 불확실성 등을 경험하였기 때문에 간호사는 특수 분야가 필요한 선천성 대사이상 검사진단에 관련된 경우 관련 의료 인들과 협력하여 대상자들의 퇴원 후 수유 관련 정보를 강화하 고, 퇴원 후에도 수유 관련 정보를 얻을 수 있는 웹 사이트, 수유관 련 상담이 필요한 경우 연결 가능한 부서나 전문 상담사의 연락처 등에 대한 구체적인 정보 제공이 필요함을 인식하고 실무에 반영하 여야 할 것이다.

본 연구는 광범위 신생아 선천성 대사이상 선별검사와 관련 어떤 의료진들과의 협력, 그리고 간호사들이 본 연구의 필요성을 인지 하여 참여한 결과, 신생아 선별검사와 관련한 교육과 정보 제공, 그리고 사용자들의 의견을 반영한 간호실무의 향상이 기대되는 연구이다. 특히 본 연구는 국내 내외의 여러 연구에서 선천성 대사이상 신생아 선별검사와 관련 한 간호사의 역할을 강조하였다. 본 연구의 결과는 간호사의 역할을 인지하고, 간호사들이 선천성 대사이상 선별검사와 관련한 정보 제공 및 교육에 참여할 수 있는 기회를 제공함으로써 간호사의 역할을 강화시킬 수 있는 기회를 제공한다.

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Conflict of interest
The authors declared no conflict of interest.

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Dietary behavior and its influencing factors among experienced shiftwork nurses: a secondary analysis

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Purpose: This study investigated the dietary behavior of experienced shiftwork nurses and aimed to identify factors related to dietary behavior.

Methods: This study was a secondary analysis based on the Shift Work Nurses’ Health and Turnover study (2018–2021) among Korean nurses. In total, 247 experienced (>12 months) shiftwork nurses were included in this study. The participants’ dietary behavior, depression, level of occupational stress, fatigue, physical activity, and general characteristics were measured. Descriptive statistics, Pearson correlation coefficients, independent t-test, one-way analysis of variance, the Kruskal-Wallis test, and multiple regression analysis were conducted.

Results: The dietary behavior score of the participants using the Mini-Dietary Assessment Index was 29.35±5.67. Thirty percent of the participants were depressed, the participants experienced moderate occupational stress, and 74.1% of the participants engaged in an inadequate amount of physical activity. The factors influencing shiftwork nurses’ dietary behavior were having child(ren) (β=.16, p=.027), depression (β=-.13, p=.032), level of occupational stress related to occupational climate (β=-.13, p=.035), and an inadequate amount of physical activity (β=-.17, p=.006). These factors explained 10.4% of the variance in experienced shiftwork nurses’ dietary behavior scores.

Conclusion: Experienced nurses with child(ren) tended to have healthier diets. However, a higher level of occupational stress related to occupational climate, depression, and engaging in an inadequate amount of physical activity were associated with a higher risk of having an unhealthy diet. Therefore, strategies are needed to encourage physical activity and alleviate adverse occupational climate and depression among experienced nurses.

Keywords: Diet; Feeding behavior; Nurses; Shift work schedule

주요어: 식이; 식행동; 간호사; 교대근무
Introduction

간호사의 식행동을 주요 개념으로 하는 선행 연구는 대부분 교대근무 간호사와 비교대근무 간호사를 비교하는 연구가 대부분으로[22], 교대근무 간호사 내에서 대상자의 특성에 따른 식행동의 차이를 조사한 연구는 찾아보기 힘들다. 또한, 선행 연구에서 신규 간호사의 식행동 및 그 영향 요인은 종단연구로 조사된 바 있으나, 경력 간호사의 식행동과 그 영향을 연구한 연구는 찾아보기 힘들다. 본 연구는 교대근무 간호사의 식행동 조사하고, 간호사의 식행동에 영향을 미칠 수 있는 요인을 분석하고자 한다. 본 연구의 목적은 다음과 같다.

1. 교대근무 간호사의 식행동을 조사한다.
2. 교대근무 간호사의 식행동에 영향을 미칠 수 있는 요인을 파악한다.
3. 간호사의 식행동을 증진시키기 위한 연구가 필요하다.
4. 간호사의 식행동을 증진시키기 위한 연구가 필요하다.

Summary statement
· What is already known about this topic?
Although nurses have been reported to have an unhealthy diet due to shiftwork and work overload, most studies have focused on the health of novice nurses.
· What this paper adds
Experienced shiftwork nurses’ dietary behavior was influenced by having child(ren), depression, the level of occupational stress from occupational climate, and an inadequate amount of physical activity.
· Implications for practice, education, and/or policy
Interventions aiming to increase the amount of physical activity and ameliorate the hostile occupational climate and depression among nurses are needed.
연구 설계

연구 대상
SWNHT 연구의 대상자는 서울 소재 2개 상급 종합병원의 신규 간호사와 경력 간호사로, 이때 신규 간호사(n=294)는 아직 근무 부서 에 배치되지 않은 간호사들었으며, 경력 간호사(n=300)는 조사 시작시에서 근무 중인 간호사들이었다. SWNHT 연구에서는 월평의 근무 및 월결정중증군에 대한 조사가 포함되어 있었으므로 간호사 중 여성을 대상으로 하였다. 신규 간호사는 충 세 차례(교대근무 전[T0], 교대근무 6개월 후[T1], 교대근무 18개월 후[T2]에 걸쳐 조사하였으며, 경력 간호사는 1차[T1] 조사 이후 12개월 뒤에 2차[T2] 조사 를 진행하여 총 두 차례 조사하였다.

본 연구에서는 SWNHT 연구 자료 중 경력 간호사 T1 자료 (n=300)을 이용하여 자료 분석을 시행하였다. 본 연구에서 경력 간호사는 임상 등급 중 초보자 단계를 넘은 2년차 이상의 간호사로 정 의하였으며[23], 이에 따라 T1 자료 중 교대근무 기간이 12개월 이 한신 대상자(n=49)와 주요 변수 응답에 누락이 없는 대상자(n=4) 를 제외하였다. 이에 따라 본 연구의 대상자 수는 247명이었다.

본 연구에 필요한 최소 대상자의 수는 G*Power 3.1.9.7을 통하여 산출하였다. 다스 선행 회귀분석에 필요한 최소표본의 크기는 유의 수준.05, 검정력.95, 중간 정도 효과크기.15, 독립변수 5을 기 준으로 148명으로 도출하였다[24]. 본 연구의 대상자 수는 247명으 로 연구에 필요한 최소 대상자 수를 만족시켰다.

연구 도구
식행동

우물
본 연구는 대상자의 우울을 평가하기 위하여 Radloff[26]가 개발한 우울 척도(Center for Epidemiological Studies Depression Scale, CES-D)를 Kohout 등[27]이 20문항으로 축약한 우울 점담서(CES-D의 국문 번역판[28])를 이용하였다. 우울한 CES-D는 4점 척도(‘정상 그 림 생각이 들었다’ 1, ‘조용히 그림 생각이 들었음’ 2, ‘거두 그림 생각이 들었음’ 3)으로 각 점수 범위는 0~30점이며, 총점이 10점 이하 일 때 우울 증상이 있는 것으로 해석한다[28]. 국내 연구에서 축약 형 CES-D의 Cronbach’s α=.79였으며[28], 본 연구의 Cronbach’s α=.83이었다.

직무 스트레스
대상자의 직무 스트레스는 Chang[29]가 개발한 한국형 직무 스트 레스 측정도구 단축형(Korean Occupational Stress Scale, KOSS-26)을 이용하여 측정하였다. KOSS-26은 물리환경(2문항), 직무 요구(4문항), 직무 자율성 절이(4문항), 관계갈등(3문항), 직무불안정(2문항), 조직체계(4문항), 보상부적절(5문항), 조직문화(4문항)의 8 가지 영역, 26문항으로 구성된 도구로 4점 척도(‘ 전혀 그렇지 않다’ 1, ‘그렇지 않다’ 2, ‘그렇다 3, ‘매우 그렇다’ 4)로 평가하였다. 직무 스트레스 총점은 8개의 하위 영역별 점수를 구한 다음(각 100점 만점) 이를 평균하여 산출하였다. 하위 영역별 점수는 개발자가 제시 한 한산성을 이용하여 산출하였다. 총점의 범위는 0~100점으로, 점 수가 높을수록 직무 스트레스가 높은 것을 의미한다[30]. KOSS-26 의 개발 당시 Cronbach’s α=.82였으며[30], 본 연구의 Cronbach’s α=.80이었다. 도구 개발 당시 8가지 하위영역의 Cronbach’s α는 물리환경 .56, 직무요구 .71, 직무 자율성 절이 .66, 관계갈등 .67, 직무불안정 .61, 조직체계 .82, 보상부적절 .76, 그리고 직장문화가 .51이었다[29]. 본 연구에서의 8가지 하위영역의 Cronbach’s α는 물리환경 .42, 직무요구 .61, 직무 자율성 절이 .41, 관계갈등 .66, 직무불안정 .62, 조직체계 .69, 보상부적절 .60, 그리고 직장문화가 .61이었다.

피로
본 연구에서는 대상자의 피로를 측정하기 위하여 Krupp 등[31]이
개발한 피로도 평가 척도(Fatigue Severity Scale, FSS)의 국문 번역판을 이용하였다[32]. FSS는 9문항, 7점 척도("전혀 그렇지 않다" 1~"매우 그렇다" 7)로 이루어져 있다. 각 문항의 점수를 합산하여 평균을 낼 값의 범위는 1~7점으로, 평균이 4점 이상일 때 빈도한 것으로 평가한다[31]. 도구 개발 시 도구의 Cronbach's α= .89였으며[31], 본 연구의 Cronbach's α= .93이었다.

신체활동
본 연구에서 신체활동을 조사하기 위하여 사용한 도구는 World Health Organization (WHO)에서 개발한 국제신체활동설문지 (Global Physical Activity Questionnaire, GPAQ) [33]의 국문 번역판[34]이다. GPAQ은 근무 중, 이동 중, 및 여가시간 신체활동량, 그리고 좌식생활 시간 등 4가지 영역을 평가하며, 총 16문항으로 구성되어 있다. 식행동과 신체활동의 관계를 조사한 기존 연구들에서 주로 임상생활에서의 신체활동량이 아닌 추가로 시행한 운동을 신체활동으로 분석함에 따라[21], 본 연구 또한 여가시간 신체활동량을 신체활동으로 분석하였다. 여가시간 신체활동량은 평균 여가시간 내에 시행하는 일주일 동안의 중강도 및 고강도 활동을 포함하며, 각각의 시행빈도와 시행시간을 토대로 움직임 형태에 따른 metabolic equivalent (MET) value × 활동 시간(min) × 주당 횟수 공식을 이용하여 METs-minute/week의 단위로 신체활동량을 계산하였다. MET value는 중상도 활동은 4.0, 고강도 활동은 8.0으로 계산하였다. 이때, 계산된 신체활동량의 값이 클수록 신체활동량이 많음을 의미한다[33]. WHO에서는 일반 성인에게 일주일에 75분 이상의 고강도 활동 또는 150분 이상의 중 강도 활동 또는 이에 상응하는 수준의 신체활동을 하도록 권고하고 있다[35]. 이를 MET value를 이용하여 METs-minute/week의 단위로 신체활동량을 계산한 결과, 성인에게 권고되는 여가시간 신체활동량은 600 METs-minute/week이었다. 이에 600 METs-minute/week 이상의 여가시간 신체활동을 하는 대상자는 적절한 수준의 신체활동을 하고 것으로 평가하였다.

일반적 특성
본 연구에서는 대상자의 일반적 특성 파악을 위하여 연령(세), 키와 몸무게, 교육 정도(학사 이하/석사 이상), 결혼 여부(미혼/결혼), 자녀 유무, 근무 부서(일반 병동/중환자실/분만실), 근무경력(개월), 평균 근무 횟수(회/달)를 조사하였다. 조사한 키와 몸무게를 바탕으로 체질량지수(body mass index, BMI)를 계산하였으며, 대상자 들의 근무경력을 토대로 상급 초보자 단계(임사 후 13~36개월), 유능 단계(임사 후 37~84개월), 그리고 속련 단계(임사 후 85개월 이상)로 임상 등급을 분류하였다[23].

자료 수집
SWNHT 연구의 총 자료 수집 기간은 2018년 3월부터 2020년 4월까지이며, 경력 갭조사에 대한 자료 수집은 1차 조사, 그리고 12개월 동안 시행된 2차 조사로 총 2차례 시행하였다. 2차 조사 시에는 온라인 설문을 시행하였다. SWNHT 연구에서 조사된 변수는 일반적 특성, 이직 의도, 식행동, 월명 양상, 월명 전후기 중상, 협력 및 제품 노출사고, 사회적 지지, 수면, 피로, 우울, 직무 스트레스, 신체활동, 전문성중Degree of differentiation)별로 인해 여가에 불과하고 중등도 혹은 현상[36])이었다. 본 연구에서는 그 중 일반적 특성, 식행동, 피로, 우울, 직무 스트레스와 신체활동 자료를 활용하였다. 본 연구를 위해 자료 활용에 대한 책임 연구자의 동의를 얻었으며, 본 연구에서는 SWNHT 연구 자료 중에서 두 차례의 경력 갭조사 조사 중 1차 조사 자료를 이용하였다. 본 연구에 필요한 자료는 익명 처리된 상태로 전달받아 분석을 시행하였다.

자료 분석 방법
본 연구에서의 자료 분석은 IBM SPSS ver. 28.0 (IBM Corp., Armonk, NY, USA)를 이용하였으며, 통계적 유의 수준은 p < .05로 하였다. 사용된 도구의 신뢰성은 Cronbach's α로 분석하였다. 대상자의 식행동, 우울, 직무 스트레스, 피로, 신체활동, 일반적 특성은 빈도, 백분율, 평균과 표준편차를 산출하였다. 식행동과 우울, 직무 스트레스, 피로, 신체활동, 그리고 일반적 특성 간의 관계를 알아보기 위하여 유연행 변수의 경우 Pearson 상관계수를 계산하였으며, 범주형 변수의 경우 독립 t-검정, 일원분산분석, Kruskal-Wallis 검정을 이용하여 분석하였다. 또한, 식행동의 영향요인을 알아보기 위하여 입력 방법을 이용하여 다중회귀분석을 시행하였다.

Results
식행동
대상자들의 평균 식행동 점수는 29.35±5.67점이었다(Table 1). 하루 평균 식사 횟수는 2.10±0.44회었으며, 근령 잡식 식사 여부를 묻는 문항에서 49.8%가 '보통 근령 잡식 식사를 한다'라고 대답하였다. 식사 시 식사 시간이 간단한 시간을 섭취하는 경우는 67.6%이 '아닌 편이다'라고 응답하였다. 하루 평균 채소 섭취 횟수는 1.25±0.77회였으며, 과일 섭취 횟수는 0.78±0.61회었다. 유흥품은 하루 평균 0.58±0.69회 섭취하는 반면, 간식은 0.71±0.66회 섭취하는 것으로 나타났다. 또한, 음료, 과자 등 단백질 섭취 횟수는 하루 평균 1.55±0.78회였다. 고지방 식품을 섭취하는 횟수는 주당 평균 1.80±1.14회였으며, 튀긴 음식을 섭취하는 횟수는 주당 평균 2.11±1.29회였다.

MDA 외에 조사한 추가 문항을 분석한 결과, 식사가 불규칙적이 공급 월평균 대상자는 234명(94.7%)이었으며, 식사에 소요되는 시간이 20분 미만으로 섭취 속도가 빠른 대상자는 206명(83.4%)이었다. 대상자들의 평균 주당 약식시간 섭취 횟수는 1.93±1.86회였다.
건강 문제와 신체활동
대상자의 건강 문제와 신체활동은 다음과 같다(Table 2). 우울 중상은 경험하는 대상자는 76명(30.8%)으로, 평균 직무 스트레스 점수는 29.30±4.59점었다. 평균 BMI는 20.25±2.33 kg/m²였다. 학사 학위를 가진 대상자는 206명(83.4%)이었으며, 석사 과정에 재학 중인 대상자는 41명(16.6%)이었다. 기혼 대상자는 56명(22.7%)이었으며, 자녀가 있는 대상자는 27명(10.9%)이었다. 대상자의 평균 밤근무 횟수는 6.18±1.02회였다. 600 METs-minute/week 이상의 적절한 수준의 신체활동을 하는 대상자는 64명(25.9%)으로 나타났다.

일반적 특성
대상자의 일반적 특성은 다음과 같다(Table 3). 대상자들의 평균 연령은 29.30±4.59세였으며, 평균 BMI는 20.25±2.33 kg/m²였다. 학사 학위를 가진 대상자는 206명(83.4%)이었으며, 석사 과정에 재학 중인 대상자는 41명(16.6%)이었다. 기혼 대상자는 56명(22.7%)이었으며, 자녀가 있는 대상자는 27명(10.9%)이었다. 대상자의 평균 밤근무 횟수는 6.18±1.02회였다.

건강 문제 및 신체활동과 식행동
우울한 대상자는 그렇지 않은 대상자보다 식행동이 부적절한 것으로 나타났으며(t=2.93, p=.004). 부적절한 수준의 신체활동을 하는 사람은 적절한 신체활동을 하는 사람에 비해 식행동이 부적절한 것으로 나타났다(t=2.95, p=.003). 그러나 식행동은 피로 여부에 따른 유의한 차이를 보이지 않았다(Table 4).

대상자의 직무 스트레스 총점은 식행동과 유의한 상관관계를 보이지 않았으나 KOS-S의 8개의 하위 영역 중 ‘직장문화 직무스트레스’는 건강한 식행동과 약한 부적 상관관계를 보였다(r=-.19, p=.003)(Table 5).

### Table 1. Dietary behavior of the participants (N=247)

<table>
<thead>
<tr>
<th>MDA index</th>
<th>Categories</th>
<th>n (%) or mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDA score†</td>
<td>29.35±5.67</td>
<td></td>
</tr>
<tr>
<td>Meals (times/day)</td>
<td>2.10±0.44</td>
<td></td>
</tr>
<tr>
<td>Balanced diet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>69 (27.9)</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>123 (49.8)</td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>55 (22.3)</td>
<td></td>
</tr>
<tr>
<td>Additional salt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>13 (5.3)</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>67 (27.1)</td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>167 (67.6)</td>
<td></td>
</tr>
<tr>
<td>Food intake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable (times/day)</td>
<td>1.25±0.77</td>
<td></td>
</tr>
<tr>
<td>Fruit (times/day)</td>
<td>0.78±0.61</td>
<td></td>
</tr>
<tr>
<td>Dairy (times/day)</td>
<td>0.58±0.69</td>
<td></td>
</tr>
<tr>
<td>Snack (times/day)</td>
<td>0.71±0.66</td>
<td></td>
</tr>
<tr>
<td>Protein (times/day)</td>
<td>1.55±0.78</td>
<td></td>
</tr>
<tr>
<td>High fat (times/week)</td>
<td>1.80±1.14</td>
<td></td>
</tr>
<tr>
<td>Fried food (times/week)</td>
<td>2.11±1.29</td>
<td></td>
</tr>
</tbody>
</table>

MDA: Mini-Dietary Assessment index.
†Possible range, 10–50.

### Table 2. Health problems and physical activity of the participants (N=247)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Possible range</th>
<th>n (%)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Total</td>
<td>0–30</td>
<td>7.93±4.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nondepressed (&lt; 10)</td>
<td>171 (69.2)</td>
<td>5.35±2.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depressed (≥ 10)</td>
<td>76 (30.8)</td>
<td>13.75±3.53</td>
<td></td>
</tr>
<tr>
<td>Occupational stress</td>
<td>Total</td>
<td>0–100</td>
<td>50.56±9.12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Job demands</td>
<td>0–100</td>
<td>77.80±13.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical environment</td>
<td>0–100</td>
<td>69.70±16.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of reward</td>
<td>0–100</td>
<td>54.97±16.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizational system</td>
<td>0–100</td>
<td>51.92±16.31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insufficient job control</td>
<td>0–100</td>
<td>50.24±12.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occupational climate</td>
<td>0–100</td>
<td>35.86±16.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpersonal conflict</td>
<td>0–100</td>
<td>33.51±14.55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Job insecurity</td>
<td>0–100</td>
<td>30.43±23.27</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Mean</td>
<td>1–7</td>
<td>4.47±1.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-fatigue (&lt; 4)</td>
<td>80 (32.4)</td>
<td>3.16±0.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fatigue (≥ 4)</td>
<td>167 (67.6)</td>
<td>5.10±0.76</td>
<td></td>
</tr>
<tr>
<td>Physical activity (METs-minute/week)</td>
<td>Total</td>
<td>504.78±1,001.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adequate (≥ 600)</td>
<td>64 (25.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate (&lt; 600)</td>
<td>187 (74.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MET, Metabolic equivalent.
일반적 특성에 따른 식행동
대상자의 식행동은 학력 및 결혼 여부에 따른 유의한 차이를 보였다.

Table 3. General characteristics of the participants (N=247)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>n (%) or mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td></td>
<td>29.30 ± 4.59</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td></td>
<td>20.25 ± 2.33</td>
</tr>
<tr>
<td>Level of education</td>
<td>≤ Bachelor</td>
<td>206 (83.4)</td>
</tr>
<tr>
<td></td>
<td>≥ Master</td>
<td>41 (16.6)</td>
</tr>
<tr>
<td>Marital status</td>
<td>Unmarried</td>
<td>191 (77.3)</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>56 (22.7)</td>
</tr>
<tr>
<td>Have child(ren)</td>
<td>No</td>
<td>220 (89.1)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>27 (10.9)</td>
</tr>
<tr>
<td>Workplace</td>
<td>General ward</td>
<td>198 (80.2)</td>
</tr>
<tr>
<td></td>
<td>Intensive care unit</td>
<td>47 (19.0)</td>
</tr>
<tr>
<td></td>
<td>Delivery room</td>
<td>2 (0.8)</td>
</tr>
<tr>
<td>Total working period (month)</td>
<td></td>
<td>67.10 ± 55.26</td>
</tr>
<tr>
<td>Clinical ladder stage†</td>
<td>Advanced beginner</td>
<td>96 (38.9)</td>
</tr>
<tr>
<td></td>
<td>Competent</td>
<td>84 (34.0)</td>
</tr>
<tr>
<td></td>
<td>Proficient</td>
<td>67 (27.1)</td>
</tr>
<tr>
<td>Night shift (times/month)</td>
<td></td>
<td>6.18 ± 1.02</td>
</tr>
</tbody>
</table>

†The clinical ladder stage was defined according to the total working period: advanced beginner (13–36 months), competent (37–84 months), and proficient (over 85 months).

일반적 특성 중 연속 변수들에 관하여 식행동과의 상관관계를 조사한 결과, 간호사들의 건강한 식행동은 연령과 약한 정적 상관관계가 있는 것으로 나타났다(r=0.19, p=0.004). 그러나 BMI는 식행동과의 유의한 상관관계를 보이지 않았다. 근무기간은 건강한 식행동과 약한 정적 상관관계를 보였으나(r=0.19, p=0.003), 방근무 횟수는 식행동과 유의한 상관관계가 없는 것으로 나타났다.

식행동의 영향요인
교대근무 간호사의 식행동에 영향을 미치는 요인을 파악하기 위하여 다중회귀분석을 시행하였다. 이때 종속변수는 MDA 총점으로 설정하였으며, 식행동과 유의한 관계가 있었던 자녀 유무, 근무경력, 우울, 직장문화 직무 스트레스, 그리고 신체활동을 독립변수로 하였다. 이때 자녀 유무, 우울, 신체활동은 범주화된 변수로서 각각 ‘자녀 유’, ‘우울 유’, ‘적절 수준의 신체활동’을 기준으로 가변수 처리를 시행하였다. 통계에서 사회의 대상자의 연령은

Table 4. Dietary behavior by characteristics (N=247)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Mean ± SD</th>
<th>t or F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Nondepressed (&lt; 10)</td>
<td>30.05 ± 5.46</td>
<td>2.93</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>Depressed (≥ 10)</td>
<td>27.79 ± 5.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Non-fatigue (&lt; 4)</td>
<td>30.30 ± 5.60</td>
<td>1.83</td>
<td>.069</td>
</tr>
<tr>
<td></td>
<td>Fatigue (≥ 4)</td>
<td>28.90 ± 5.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>Adequate (≥ 600)</td>
<td>31.13 ± 5.67</td>
<td>2.95</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Inadequate (&lt; 600)</td>
<td>28.73 ± 5.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
<td>≤ Bachelor</td>
<td>29.07 ± 5.59</td>
<td>−1.77</td>
<td>.078</td>
</tr>
<tr>
<td></td>
<td>≥ Master</td>
<td>30.78 ± 5.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Unmarried</td>
<td>28.98 ± 5.49</td>
<td>−1.89</td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>30.61 ± 6.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have child(ren)</td>
<td>No</td>
<td>28.99 ± 5.42</td>
<td>−2.90</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>32.30 ± 6.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workplace</td>
<td>General ward</td>
<td>29.13 ± 5.47</td>
<td>2.30</td>
<td>.316</td>
</tr>
<tr>
<td></td>
<td>Intensive care unit</td>
<td>30.38 ± 6.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery room</td>
<td>27.00 ± 8.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical ladder stage†</td>
<td>Advanced beginner</td>
<td>28.31 ± 5.34</td>
<td>4.31†</td>
<td>.015</td>
</tr>
<tr>
<td></td>
<td>Competent</td>
<td>29.29 ± 5.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proficient</td>
<td>30.93 ± 6.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†The clinical ladder stage was defined according to the total working period: advanced beginner (13–36 months), competent (37–84 months), and proficient (over 85 months).

MET, Metabolic equivalent.
†Kruskal-Wallis test; †one-way ANOVA.
무경력과의 피어슨 상관계수는 0.97로 근무경력과 매우 높은 상관관계를 보여 분석에서 제외하였다. 휘부의 적합도는 F=6.69, p<.001으로 적합한 것으로 나타났으며, Durbin–Watson값 또한 2.03으로 염차의 독립성 가정을 만족하는 것으로 나타났다. 휘부의 설명력은 10.4%였다. 다중회귀 분석 결과, 대상자들의 건강한 식행동 영향을 주는 요인들은 신체활동(β=–.17, p=.006), 자녀의 유무(β=.16, p=.027), 우울(β=–.13, p=.032), 직장문화 직무 스트레스(β=–.13, p=.035)였다.

Discussion

본 연구는 서울 소재의 상급 종합병원 두 곳에서 근무하는 247명의 경력 간호사들을 대상으로 식행동 및 식행동의 영향요인을 조사하였다. 기존 연구들에서는 간호사들의 식행동에 영향을 주는 요인으로 교대근무를 주로 다루었으나[22], 본 연구에서는 교대근무를 포함하여 식행동에 영향을 미칠 수 있는 다른 요인들을 탐색하고자 하였다. 본 연구 대상자들의 평균 식행동 점수는 29.35점으로, 도구 개발시에 건강한 성인의 식행동 점수로 추정된 30점보다 낮은 것으로 나타났으며[25]. 국내 선행 연구에서 일반적인 여성들의 평균 식행동 점수였던 30.3점에 비해서도 더 높았는데[37]. 이는 교대근무 간호사들이 직장 자신의 건강증진 행위에는 소홀하며[38], 식행동이 건강하지 않다는 선행 연구를 지지한다[39]. 그러나 신규 간호사의 식행동과 비교하였을 때에는 경력 간호사인 본 연구 대상자의 식행동이 더 건강한 것으로 나타났다[3]. 본 연구에서 식행동 점수는 근무 경력과 유의한 정적 상관관계를 보여 근무경력이 많아질수록 건강한 식행동을 하는 것으로 보인다. 근무경력의 영향을 유의한 상관관계를 보여 근무경력이 많아질수록 건강한 식행동을 하는 것으로 보인다. 첫째, 정력 간호사의 업무 능력이 향상되어 근무중 식사할 여유가 생기고, 정시 퇴근이 가능하여 식사 시간이 확보되었을 수 있다[40]. 둘째, 정력 간호사의 경우, 신규 간호사보다 기혼자가 많고 자녀가 있는 대상자가 많아 이러한 요인이 식행동에 긍정적인 영향을 미쳤을 수 있다.


Table 5. Relationships between dietary behavior and participants’ characteristics (N=247)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>MDA score</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational stress</td>
<td>Total</td>
<td>–.11</td>
<td>.098</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Job demands</td>
<td>–.01</td>
<td>.872</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical environment</td>
<td>–.03</td>
<td>.700</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of reward</td>
<td>–.09</td>
<td>.162</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizational system</td>
<td>–.06</td>
<td>.338</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insufficient job control</td>
<td>–.10</td>
<td>.132</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occupational climate</td>
<td>–.19</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpersonal conflict</td>
<td>–.05</td>
<td>.454</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Job insecurity</td>
<td>–.00</td>
<td>.963</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>.19</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Body mass index</td>
<td></td>
<td>.10</td>
<td>.122</td>
<td></td>
</tr>
<tr>
<td>Total working period (month)</td>
<td></td>
<td>.19</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Night shifts (times/month)</td>
<td></td>
<td>.07</td>
<td>.266</td>
<td></td>
</tr>
<tr>
<td>MDA, Mini-Dietary Assessment index.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Factors influencing dietary behavior (N=247)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(constant)</td>
<td></td>
<td>32.44</td>
<td>1.13</td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Depression¹</td>
<td></td>
<td>–1.64</td>
<td>0.76</td>
<td>–13</td>
<td>–2.15</td>
<td>.032</td>
</tr>
<tr>
<td>Occupational stress</td>
<td>Occupational climate</td>
<td>–0.05</td>
<td>0.02</td>
<td>–13</td>
<td>–2.12</td>
<td>.035</td>
</tr>
<tr>
<td>Physical activity¹</td>
<td></td>
<td>–2.21</td>
<td>0.80</td>
<td>–17</td>
<td>–2.79</td>
<td>.006</td>
</tr>
<tr>
<td>Total working period</td>
<td></td>
<td>0.06</td>
<td>0.08</td>
<td>.06</td>
<td>0.80</td>
<td>.426</td>
</tr>
<tr>
<td>Having child(ren)¹</td>
<td></td>
<td>2.97</td>
<td>1.34</td>
<td>.16</td>
<td>2.23</td>
<td>.027</td>
</tr>
</tbody>
</table>

B: Unstandardized coefficients; β: Standardized coefficients.
¹Reference groups were depression (nondepressed), physical activity (adequate), and having child(ren) (no).
을 포함한 건강증진 행위를 촉진하는 요소로 나타났다[47]. 본 연구
에서 간호사의 건강증진 행위에 대하여 따로 조사하지 않아 정확
히 알 수는 없으나, 이러한 결과들은 건강한 식행동과 신체활동과
같은 건강증진 행위를 촉진하는 관念에 대한 관심이 있으
며, 이러한 관심이 다른 건강증진 행위의 수행으로 이어져 나타난
결과일 수 있다.

대상자의 직장문화 직무 스트레스는 식행동의 유의한 영향요
인으로 나타났다. 부정적인 직장문화는 비효율적인 업무 처리로 이
여져 건강증진 행위를 촉진하는 관념에 대한 관심이 있으
며, 이러한 관심이 다른 건강증진 행위의 수행으로 이어져 나타난
결과일 수 있다.
본 연구의 제한점은 다음과 같다. 첫번째로 본 연구에서 간호사
식행동에 대한 회귀분석 결과의 설명력은 10.4%였다. 식행동 조사
는 간호사뿐만 아니라 일반인들 대상으로 하여도 연구 수행이 어려
위 선행 연구에 보다 흔히 이용된다. 특히 식행동의 영향요인을 조사
 연구는 찾기는 더 어려워 연구 결과의 설명력을 비교하는 데에 있
어 한계가 있었다. 본 연구의 낮은 설명력은 식행동은 개인의 신체
적, 정신적 건강 상태뿐만 아니라 주변 환경 및 경제 상태 등 다양한
요인들로부터 영향을 받을 수 있으나[58] 본 연구는 간호사의 건
강을 조사한 SWNHT 연구의 2차분석 연구로 파악할 수 있었던 요
인의 수가 제한적이어서 나타난 결과일 수 있다. 따라서 간호사의
식행동의 영향요인을 총체적으로 분석할 수 있는 연구를 추후로 수행
할 필요가 있다. 또한, 본 연구에서 사용한 도구인 MDA는 각 문
항이 각 식행동을 조사하므로 도구 개발 시부터 신뢰도와 측정적
적 정의가 명확한 것이다. 본 연구에서는 이를 사용하였다.

간호사의 직무 스트레스는 식행동의 영향요인으로서의
중요성을 높일 수 있음을 시사한다.
본 연구 결과, 우울한 대상자는 부적절한 식행동을 할 위험이 더
큰 것으로 나타났다. 이는 적은 채소와 과일 섭취[52], 그리고 적은
식사 횟수 증가와 정적인 관계를 보였다. 현재까지 직무 스트레스와 식행동의 관련성에 대한 연구가 부족하여
정확한 이유를 알 수는 없으나, 직무 스트레스가 개인의 충
동 조절 능력을 감소시키고[50], 당에 대한 요구도를 높여[51] 나타
난 결과일 수 있다. 본 연구 결과에서 직무 스트레스는 다
른 직무 스트레스 하위 영역에 비해 상대적으로 낮은 편이며
중요성이 적어 보이기도 하나, 간호사의 식행동 영향요인으로서
중요할 수 있음을 시사한다.

본 연구 결과, 우울한 대상자는 부적절한 식행동을 할 위험
은 더 큼 것으로 나타났다. 이는 적은 채소와 과일 섭취[52], 그리고 적은
식사 횟수 증가와 정적인 관계를 보였다. 현재까지 직무 스트레스와 식행동의 관련성에 대한 연구가 부족하여
정확한 이유를 알 수는 없으나, 직무 스트레스가 개인의 충
동 조절 능력을 감소시키고[50], 당에 대한 요구도를 높여[51] 나타
난 결과일 수 있다. 본 연구 결과에서 직무 스트레스는 다
른 직무 스트레스 하위 영역에 비해 상대적으로 낮은 편이며
중요성이 적어 보이기도 하나, 간호사의 식행동 영향요인으로서
중요할 수 있음을 시사한다.
본 연구 결과, 우울한 대상자는 부적절한 식행동을 할 위험
은 더 큼 것으로 나타났다. 이는 적은 채소와 과일 섭취[52], 그리고 적은
식사 횟수 증가와 정적인 관계를 보았다. 현재까지 직무 스트레스와 식행동의 관련성에 대한 연구가 부족하여
정확한 이유를 알 수는 없으나, 직무 스트레스가 개인의 충
동 조절 능력을 감소시키고[50], 당에 대한 요구도를 높여[51] 나타
난 결과일 수 있다. 본 연구 결과에서 직무 스트레스는 다
른 직무 스트레스 하위 영역에 비해 상대적으로 낮은 편이며
중요성이 적어 보이기도 하나, 간호사의 식행동 영향요인으로서
중요할 수 있음을 시사한다.
의 직무 스트레스가 있는 것으로 나타났다. 또한, 약 74%의 간호사의 신체활동량이 부적절하였다. 교대근무 경력 간호사들의 식행동은 자녀의 유무, 신체활동, 직장문화 직무 스트레스, 우울에 영향을 받는 것으로 나타났으며, 자녀가 있을 때 부적절한 식행동을 할 위험이 적었다. 그러나 직장문화 직무 스트레스가 높고, 우울하며, 부적절한 수준의 신체활동을 하는 경우 식행동이 부적절할 위험이 증가하였다. 따라서, 간호사들의 신체활동량을 증가시킬 수 있는 건강증진 프로그램을 제공하고, 직장문화를 개선하며, 우울을 완화시키기 위한 전략을 수립하는 등 조직적 노력을 필요함을 제언한다.

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Authors’ contributions
Conceptualization, Formal analysis: Kim S; Writing-original draft: Kim S; Writing-review & editing: All authors.

Conflict of interest
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Data availability
The dataset files are available from Harvard Dataverse at https://doi.org/10.7910/DVN/SNK93G.

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COVID-19 팬데믹이 임부의 우울에 미치는 영향
석다빈, 주현옥
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Impact of the COVID-19 pandemic on depression during pregnancy: a cross-sectional study
Da-bin Seok, Hyeon Ok Ju
College of Nursing, Dong-A University, Busan, Korea

Purpose: Uncertainty and restrictions on daily life have increased fear, stress, and depression during the coronavirus disease 2019 (COVID-19) pandemic. Depression is the most common mental health problem in pregnant women. The purpose of this study was to evaluate the levels of fear and stress related to COVID-19 experienced by pregnant women, as well as their levels of depression, and to examine the factors associated with depression during pregnancy.

Methods: This was a cross-sectional, correlational study conducted among 153 pregnant women who visited a maternity hospital in Busan, South Korea. A self-reported questionnaire was used for data collection from December 18, 2021 to March 8, 2022. Data were analyzed using descriptive statistics, the independent t-test, one-way analysis of variance, Pearson correlation coefficients, and multiple regression.

Results: Pregnant women experienced a moderate level of fear related to COVID-19, with an average score of 21.55±4.90. The average score for depression during pregnancy was 14.86±11.10, with 50.3% of the participants experiencing depression (≥13). The factors associated with depression during pregnancy were fear of COVID-19, contact with a confirmed case of COVID-19, being in the third trimester of pregnancy, high stress levels due to difficulties experienced from social distancing measures, and unintended pregnancy. These five statistically significant factors explained 35.0% of variance in depression during pregnancy.

Conclusion: Considering the prevalence of depression in pregnant women during the COVID-19 pandemic, it is necessary to develop interventions to reduce anxiety by providing correct information and alleviating the stress of social distancing.

Keywords: COVID-19; Depression; Mental health; Physical distancing; Pregnant women

Introduction
**Summary statement**

- **What is already known about this topic?**
  Depression and anxiety are the most common mental health problems in pregnant women and are affected by a variety of psychological factors.

- **What this paper adds**
  Fear of the sudden outbreak of infectious diseases and social distancing policies to control the spread of infectious diseases showed negative associations with depression and mental health in pregnant women during the coronavirus disease 2019 (COVID-19) pandemic.

- **Implications for practice, education, and/or policy**
  Considering the prevalence of depression in pregnant women during the COVID-19 pandemic, it is necessary to develop interventions to reduce anxiety by providing correct information and alleviating the stress of social distancing.

금지, 증가 등 신체 증상을 겪으며 임신 유지에 대한 걱정으로 불안을 경험하고 심한 경우 우울을 경험할 수도 있다[4]. 특히 임부의 활동, 영양, 수면 양상을 변화시키고, 임부의 기분과 태아의 발달에 영향을 미치며, 유산, 조산, 저체중아 출산 및 출생 시 낮은 Apgar 점수 위험을 증가시킨다[5,6].


COVID-19 팬데믹은 임부의 일상에 영향을 미치는 심리적 스트레스 요인으로 나타났으며[9,12], 사회적 거리두기와 격리 등의 사회적 조치는 바이러스 감염으로부터 보호하기 위한 방역조치지만 임부의 정신건강에는 부정적인 영향을 미치는 것으로 나타났다[6,12]. 2019년 1월부터 2020년 9월까지 임부의 정신건강에 대해 조사한 연구들의 메타 분석에 따르면, 한국의 임부의 우울증은 44%에서 54%로 나타났다[13].

일반적으로 임부는 면역력이 저하된 상태로 호흡기 바이러스 감염에 의한 폐렴이 발생하면 폐기능이 급격하게 악화되어 중환자실 입원과 기계적 환기 적용 가능성이 높고 중증 질환 발생 비율이 증가한다[14]. 그리고 임부의 호흡기 바이러스 감염은 임신증후군, 태아곤란과 같은 임신 합병증 발생률을 높이게 되며 조산 및 재정계개 분만을 초래할 수 있다[15]. 그러나 팬데믹 발병 초기에 COVID-19 감염과 사망자가 지속적으로 증가하고 통제할 수 없는 국정적 보건 위기 상황에서 임부는 백신 안전성이 확보되지 않아 접종이 제한적이고[14], 태반을 통한 유아감염 및 질병도 부족한 상태였다[15,16]. 이에 임부는 임신 유지 및 태아에게 미치는 영향에 대한 염려와 바이러스에 대한 두려움을 보였고[17], COVID-19에 대한 두려움은 임부의 우울을 유발하는 것으로 나타났다[18].

COVID-19 스트레스는 다차원적이고, 문화적 환경에 따라 다른 특성이 있으며, 한국인을 대상으로 한 연구에 의하면 3가지 요인이 나타났다[19]. 주변 환경, 특히 사회적 거리두기 및 사회적 격리 방역지침은 임신 중, 특히 출산시의 스트레스를 증가시킨다[20].

임부는 COVID-19 팬데믹의 불확실성과 일상의 제한 및 방역지침의 지속적인 변화로 자신의 임신 상태를 대비하고 출산을 준비함에 있어 산부인과 진료, 산전 교육 참여, 출산을 위한 산후조리 준비가 어려워지는 등 임부의 정신건강에 부정적인 영향을 미치는 것으로 나타났다[21].

국내 임부를 대상으로 COVID-19 유형과 세부적으로 임부의 신체적 영향에 대한 연구는 부족한 실정으로, 임부의 정신건강 영향에 대한 정확한 연구가 부족한 실정이다[22].

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관련 요인을 파악하여 감염병과 사회적 조치가 임부의 정신건강에 얼마나 영향을 미치는지 규명하는 것은 의의가 있다. 본 연구는 임부를 대상으로 COVID-19에 대한 두려움과 COVID-19 스트레스, 우울 정도를 파악하고, 임부의 우울에 미치는 영향 요인을 확인하여 신종 감염병 유행 시 임부의 정신건강을 위한 간호 중재 개발의 기초자료를 제공하기 위한 것으로, 구체적 목표는 다음과 같다. 
(1) 대상자의 우울 수준, COVID-19에 대한 두려움, COVID-19 스트레스 정도를 파악한다. 
(2) 대상자의 특성에 따른 우울의 차이를 파악한다. 
(3) 대상자의 우울과 COVID-19에 대한 두려움, COVID-19 스트레스의 관계를 파악한다. 
(4) 대상자의 우울에 미치는 영향 요인을 파악한다. 

Methods

Ethics statement: This study was approved by the Institutional Review Board of Dong-A University (No. IRB-2-1040709-AB-N-01-202111-HR-076-02). Informed consent was obtained from the participants.

연구 설계

연구 대상
본 연구의 대상자는 COVID-19 유행 상황에 임신을 유지하고 부산에 소재한 2개의 산부인과 전문병원에서 산전 전환을 받은 2-3습 분기 임부를 대상으로 하였다. 임신 1 산분기에 임신 오조로 인한 정신 증상 및 임신 유지와 태어 기형 우유에 대한 불안감을 가질 수 있어[24], 임신 2 분기 임부를 대상으로 하였다. 임신 합병증 치료 및 임신으로 인한 우울을 측정하고, 세부각도 상황 및 임신 중 우울의 미치는 영향을 확인하기 위해 임신 3 분기 임신 합병증을 진단받고 치료 중이나 태어의 신체적-구조적 문제를 진단받은 임부, 과거 우울을 포함하여 정신병력이 있는 임부는 제외하였다. 표본의 크기는 G*Power program 3.1.9.7 프로그램을 이용하였으며, 분석 방법은 화귀분석으로 유의 수준 .05, 효과 크기 .15 (중간 크기), 정적력 .80, 예측 요인 13개를 입력하여 표본 크기를 산출하였다. 최소 표본 수는 131명이었으나, 제품의 디자인에 따라 164명에게 설문지를 배부하였다. 응답이 미비하거나 불충분한 11명을 제외하고 총 153명(응답률 93.3%)을 대상으로 조사하였다.

연구 도구
우울
우울은 Radloff [25]가 개발한 The Center for Epidemiologic Studies Depression Scale (CES-D)를 Eaton 등[26]이 정신건강에 대한 진단 및 통계판타(Diagnostic and Statistical Manual of Mental Disorders, DSM) 제4판의 우울 삼차 증상 및 기전을 반영하여 개정하고 Lee 등[27]이 번역 및 타당화한 한국판 역학 우울 척도 개정판(Korean Version of Center for Epidemiologic Studies Depression Scale--Revised, K-CES-D-R)로 측정하였다. 이 도구는 한국의 사회-문화적 특성이 잘 반영되어 우울증 역학 연구에서 유용한 선별 검사이기 때문에 임산부 자료로 자율점체 사용이 가능하며[27]. 총점의 존재 기준을 기준으로 우울 정도를 측정하는 20개의 문항으로 구성되어 있다. '1일 미만(0점)'에서 '2주간 거의 매일(4점)'까지의 5점 Likert 척도로, 총 점수 범위는 0점에서 30점으로 점수가 높음수록 우울 정도가 높음을 의미하며 최적 점단점 13점 이상은 임산적 우울군에 해당한다[27]. Lee 등[27]의 연구에서 신뢰도 Cronbach's α는 .98이 고, 본 연구에서 Cronbach's α는 .92였다.

COVID-19에 대한 두려움

COVID-19 스트레스

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연구에서도 총점이 아니라 하부 요인으로 결과를 분석하였다.

Kim 등[19]의 연구에서 하부 요인의 신뢰도 Cronbach’s α는 감염에 대한 두려움.93, 사회적 거리두기로 인한 어려움.81, 타인에 대한 분노.89였다. 본 연구에서의 하위 영역별 신뢰도 Cronbach’s α는 각각 .84, .76, .85였다. 본 도구는 개발자에게 사용 승인을 받았다.

COVID-19 관련 특성

일반적 특성 및 산과적 특성
일반적 특성은 연령, 교육수준, 직업 유무, 월 평균 소득수준 등 4문항, 산과적 특성은 현재 임신기간, 임신력, 계획 임신 여부, 산전 진료, 임신 합병증, 우울 진단 유무, 선호하는 분만 형태 등 총 7문항으로 구성되었다.

자료 수집 기간 및 방법
자료 수집 기간은 2021년 12월 18일부터 2022년 3월 8일까지였다. 자료 수집 방법은 부산에 소재하여 응급 분만이 가능한 산부인과 전문병원 8곳 중 연구 진행에 동의해준 2개의 병원 외래 연구 대상자 모집 고품질을 부착하여 모집하였다. 연구자는 모집 포스터를 통해 자발적으로 참여한 대상자에게 연구의 목적과 방법을 설명하였고, 수집된 자료는 연구의 목적으로만 이용되어 참여 중단을 원할 경우 언제든지 철회할 수 있음을 설명하였다. 이에 동의하고 이에 대한 대상자에게 서면으로 동의서를 받았고, 밀봉 가능한 봉투에 담아 설문지를 전달하였다. 설문지는 짧고 가정자가 작성하도록 하였고 이후 작성 완료된 설문지는 병원 내시 담당자 상대적으로 자발으로 제출하도록 하였으며 해당 병원의 연구 보호원을 통해 연구자가 일반 회수하였다. 그리고 연구 대상자에게 감사의 표시로 소정의 답례품(5,000원 상당의 커피 코프)을 제공하였다.

자료 분석 방법
본 연구의 수집된 자료는 IBM SPSS for Windows ver. 28.0 (IBM Corp., Armonk, NY, USA)를 사용하여 분석하였으며 통계적 유의 수준은 p < .05로 설정하였다.

(1) 대상자의 일반적 특성, 산과적 특성 및 COVID-19 관련 특성은 십수, 백분율, 평균과 표준편차로 분석하였다.
(2) 대상자의 우울 정도, COVID-19에 대한 두려움, COVID-19 스트레스 등은 평균과 표준편차로 분석하였다.
(3) 대상자의 특성에 따른 우울은 독립 t-검정(independent t-test)과 일원분산분석(one-way analysis of variance)으로 분석하였다.
(5) COVID-19 유감 시 임부의 우울에 미치는 영향 요인은 동시적 다중회귀분석(simultaneous multiple regression analysis)으로 분석하였다.

Results
대상자의 일반적 및 산과적 특성과 COVID-19 관련 특성
대상자의 일반적, 산과적 특성은 Table 1과 같다. 대상자의 평균 연령은 32.8세였다. 대부분이 대학교 졸업 이상(92.2%)으로 휴직을 포함하여 직업이 있는 경우가 73.2%였고, 가정의 월 평균 소득 수준은 30만 원 이상 500만 원 미만이 42.5%였다.

대상자의 산과적 특성으로는 임신 2심분기 51.0%, 임신 3심분기는 49.0%였다. 대상자의 과반수 이상이 초임부(70.6%)였고, 계획 임신은 68.0%였다. 대상자의 80.4%는 정기적으로 산전 진료를 받았고, 선호하는 분만 방법으로는 질산 분만이 58.2%였다.

대상자의 COVID-19 관련 특성은 Table 1과 같다. 대상자의 대 부분은 COVID-19 확진자 접촉한 경험이 없으며(84.3%), COVID-19로 인하여 삶의 제약을 경험하였다(92.2%). COVID-19 관련 정보 수집 경로는 미디어(39.9%), 인터넷(35.3%) 순이었으며, 임부의 과반수 이상(71.2%)이 수집한 정보를 신뢰하는 것으로 나타났다.

대상자가 COVID-19 유감으로 불편하고 힘들었던 점은 ‘산전 진료 시 보호자 출입 제한(4.10점), ‘외출 제한(3.85점), ‘코로나바이러스 백신 접종 제한(3.82점)’ 순이었다. COVID-19로 인하여 가장 염려스러운 사항은 ‘태아에게 영향을 줄까 걱정된다(4.08점)’였고, 다음은 ‘태아 코로나바이러스에 감염될까 걱정된다(3.67점), ‘코로나바이러스 감염으로 진료를 받지 못하고 임신 합병증이 생길까 걱정한다(2.58점)’ 순이었다(Table 2).

대상자의 우울, COVID-19에 대한 두려움 및 COVID-19 스트레스 정도
본 연구에서 대상자의 우울 정도는 평균 14.86±11.10점이었고, 13 점 이상의 양성 우울 수준의 대상자는 50.3%였다. COVID-19에 대한 두려움 정도는 평균 21.55±4.90점으로 중간 정도 수준이었다. COVID-19 스트레스의 평점 평균을 각 하위 요인 별로 살펴보면...
Table 1. Differences in prenatal depression according to participants’ characteristics (N=153)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Mean ± SD or n (%)</th>
<th>Prenatal depression</th>
<th>Mean ± SD</th>
<th>t/F (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 30</td>
<td>24 (15.7)</td>
<td>15.79 ± 9.80</td>
<td>0.97 (.381)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30–34</td>
<td>80 (52.3)</td>
<td>15.70 ± 12.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 35</td>
<td>49 (32.0)</td>
<td>13.04 ± 10.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>≤ High school</td>
<td>12 (7.8)</td>
<td>15.75 ± 5.03</td>
<td>0.55 (.586)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ College</td>
<td>141 (92.2)</td>
<td>14.79 ± 11.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>Yes</td>
<td>112 (73.2)</td>
<td>15.07 ± 11.29</td>
<td>0.38 (.702)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>41 (26.8)</td>
<td>14.29 ± 10.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly household income (Korean won†)</td>
<td>&lt; 3 million</td>
<td>28 (18.3)</td>
<td>13.82 ± 11.14</td>
<td>0.23 (.794)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3–4.9 million</td>
<td>65 (42.5)</td>
<td>14.71 ± 10.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 5 million</td>
<td>60 (39.2)</td>
<td>15.52 ± 11.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimesters (week)</td>
<td>2nd (14–28)</td>
<td>78 (51.0)</td>
<td>12.55 ± 10.12</td>
<td>−2.68 (.008)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd ( &gt; 28)</td>
<td>75 (49.0)</td>
<td>17.27 ± 11.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity</td>
<td>Primigravida</td>
<td>108 (70.6)</td>
<td>14.68 ± 10.40</td>
<td>0.32 (.748)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multigravida</td>
<td>45 (29.4)</td>
<td>15.31 ± 12.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intended pregnancy</td>
<td>Yes</td>
<td>104 (68.0)</td>
<td>13.00 ± 10.33</td>
<td>−3.11 (.002)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>49 (32.0)</td>
<td>18.82 ± 11.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prenatal care</td>
<td>Regular</td>
<td>123 (80.4)</td>
<td>14.71 ± 11.12</td>
<td>−0.15 (.885)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irregular</td>
<td>30 (19.6)</td>
<td>15.03 ± 11.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with a confirmed COVID-19 case</td>
<td>Yes</td>
<td>24 (15.7)</td>
<td>21.33 ± 12.61</td>
<td>−3.20 (.002)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>129 (84.3)</td>
<td>13.66 ± 10.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life constraints</td>
<td>Yes</td>
<td>141 (92.2)</td>
<td>14.20 ± 11.11</td>
<td>3.49 (.003)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>12 (7.8)</td>
<td>22.67 ± 7.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preferred delivery method</td>
<td>Vaginal delivery</td>
<td>89 (58.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cesarean section</td>
<td>64 (41.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sources of information related to COVID-19</td>
<td>Official website (KDCA)</td>
<td>13 (8.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Media (TV, radio)</td>
<td>61 (39.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internet</td>
<td>54 (35.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social network service</td>
<td>22 (14.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acquaintance</td>
<td>3 (2.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust in information</td>
<td>Yes</td>
<td>109 (71.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>44 (28.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†One million Korean won is roughly 800 US dollars.

Table 2. Scores for uncomfortable experiences and concerns due to COVID-19 (N=153)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomfortable experiences due to COVID-19</td>
<td>Restriction on spouse's access during prenatal care</td>
<td>4.10 ± 1.64</td>
</tr>
<tr>
<td></td>
<td>Restriction on going out</td>
<td>3.85 ± 1.74</td>
</tr>
<tr>
<td></td>
<td>Coronavirus vaccination restrictions</td>
<td>3.82 ± 1.59</td>
</tr>
<tr>
<td></td>
<td>Reduced events and education on pregnancy and childbirth information</td>
<td>3.46 ± 1.59</td>
</tr>
<tr>
<td></td>
<td>Wearing mask</td>
<td>3.40 ± 1.69</td>
</tr>
<tr>
<td></td>
<td>Getting tested for COVID-19 before childbirth</td>
<td>2.39 ± 1.49</td>
</tr>
<tr>
<td>Concerns related to COVID-19</td>
<td>I'm worried about effect of COVID-19 on the unborn baby</td>
<td>4.08 ± 1.03</td>
</tr>
<tr>
<td></td>
<td>I'm worried about getting infected with COVID-19</td>
<td>3.67 ± 1.29</td>
</tr>
<tr>
<td></td>
<td>I'm worried that complications of pregnancy will occur because I cannot receive prenatal care due to COVID-19.</td>
<td>2.58 ± 1.23</td>
</tr>
<tr>
<td></td>
<td>I am concerned about the spread of the coronavirus to other people (family, acquaintances, etc.).</td>
<td>2.37 ± 1.28</td>
</tr>
<tr>
<td></td>
<td>I’m concerned about being infected with COVID-19 from the hospital environment during treatment or delivery.</td>
<td>2.29 ± 1.21</td>
</tr>
</tbody>
</table>

면, '타인에 대한 분노'가 4.16±0.69점, '감염에 대한 두려움'이 4.00±0.51점, '사회적 거리두기로 인한 어려움'이 3.41±0.69점 순이었다(Table 3).

대상자의 특성에 따른 우울의 차이
임부의 특성에 따른 우울의 차이를 살펴보면 임신 3삼분기(t=−2.68, p=0.008), 비계획 임신인 경우(t=−3.11, p=0.002), 임부가 COVID-19 확진자와 접촉한 경우(t=−3.20, p=0.002), 삶의 제약이 없다고 응답한 경우(t=3.49, p=0.003)가 우울 점수가 더 높은 것으로 나타났다(Table 1).

대상자의 우울과 COVID-19에 대한 두려움, COVID-19 스트레스의 관계
본 연구에서 우울은 COVID-19에 대한 두려움(r=0.38, p<0.001)과 양의 상관관계가 있었고, COVID-19 스트레스의 하위 요인 중 '사회적 거리두기로 인한 어려움'(r=0.27, p=0.001)과는 양의 상관관계가 있었다. 그리고 COVID-19에 대한 두려움은 COVID-19 스트레스 하위 요인 '사회적 거리두기로 인한 어려움'(r=0.46, p<0.001), '감염에 대한 두려움'(r=0.31, p<0.001), '타인에 대한 분노'(r=0.24, p=0.002)와 양의 상관관계가 있었다(Table 4).

우울에 미치는 영향 요인
임부의 우울에 영향을 미치는 요인을 확인하기 위해 단변량 분석에서 동영역적 요인의 영향을 알아본 결과, 임부의 우울에 가장 크게 영향을 미친 요인은 COVID-19에 대한 두려움(β=0.26, p=0.002)이었고, 다음은 임부가 COVID-19 확진자와 접촉한 경우(β=0.21, p=0.004), 임신 3삼분기(β=0.18, p=0.012), COVID-19 스트레스의 하위 요인 '사회적 거리두기로 인한 어려움'으로 스트레스가 높은 경우(β=0.16, p=0.047), 비계획 임신(β=0.15, p=0.042) 순이었다. 본 연구의 회귀 모형은 35.0%의 설명력을 보였다(Table 5).

Table 3. Levels of prenatal depression, fear of COVID-19, and COVID-19 stress (N=153)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>n (%)</th>
<th>Possible range</th>
<th>Mean ± SD (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal depression</td>
<td>≤ 13</td>
<td>76 (49.7)</td>
<td>0–80</td>
<td>14.86 ± 11.10 (0–45)</td>
</tr>
<tr>
<td></td>
<td>≥ 13</td>
<td>77 (50.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of COVID-19</td>
<td></td>
<td>7–35</td>
<td>21.55 ± 4.90 (9–33)</td>
<td></td>
</tr>
<tr>
<td>COVID-19 stress</td>
<td>Fear of infection</td>
<td>1–5</td>
<td>4.00 ± 0.51 (2.67–5.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulties of social distancing</td>
<td>1–5</td>
<td>3.41 ± 0.69 (1.00–4.83)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anger toward others</td>
<td>1–5</td>
<td>4.16 ± 0.69 (1.83–5.00)</td>
<td></td>
</tr>
</tbody>
</table>


Table 4. Relationships among prenatal depression, fear of COVID-19, and COVID-19 stress (N=153)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>r (p)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prenatal depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of COVID-19</td>
<td></td>
<td>.38 (&lt;.001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COVID-19 stress</td>
<td>Fear of infection</td>
<td>.02 (.848)</td>
<td>.31 (&lt;.001)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulties of social distancing</td>
<td>.27 (.001)</td>
<td>.46 (&lt;.001)</td>
<td>.34 (&lt;.001)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Anger toward others</td>
<td>.07 (.405)</td>
<td>.24 (.002)</td>
<td>.60 (&lt;.001)</td>
<td>.34 (&lt;.001)</td>
</tr>
</tbody>
</table>


https://doi.org/10.4069/kjwhn.2023.02.21.2
본 연구는 COVID-19로 인해 전 세계인들이 어려움을 겪고 있는 상황에서 새로운 생명을 품고 지켜야 하는 임부들인 심리적 문제를 파악하고, 중재방안을 마련하기 위해 시도하였다.

본 연구에서 임부의 우울에 영향을 미치는 요인은 COVID-19에 대한 두려움, COVID-19 확진자와의 접촉 경험, 임신 3삼분기, 사회적 거리두기로 인한 어려움, 비계획 임신 순이었다.

본 연구에서 임부의 우울은 14.86점이었고 대상자 중 약 50%가 우울을 경험하였다. 본 연구에서 우울을 측정하기 위해 사용한 K-CESD-R은 DSM-4판의 우울 증상을 반영하여 개정한 CES-D-R을 2016년에 한국인 대상으로 표준화한 것으로[27], 본 도구를 사용하여 팬데믹 전후 국내 임부의 우울 유병률에 대해 같은 도구를 사용한 연구가 없어 직접 비교하기는 어렵다. 그러나 본 도구(CES-D-R)에서 제시한 점수 기준을 따라[31] 총점을 60점으로 변환하고 16점을 절단점으로 하였을 때 본 연구에서 우울 임부는 43.8%이었고, 이를 팬데믹 이전 원 도구의 기준을 사용한 국내 임부 유병률 35.3%[1]와 비교해 볼 때 팬데믹 이전보다 이후에 임부의 우울이 증가했고 판단할 수 있다. 같은 도구를 사용하여 캐나다 임부를 대상으로 한 연구에서도 COVID-19 팬데믹 동안 임부의 57.3%가 우울을 경험하였다[32].COVID-19 팬데믹 동안 23편의 연구를 통해 분석한 연구에서도 임부의 불안, 우울, 심리적 스트레스 등의 정신질환 유병률은 각각 37%, 31%, 70%로 높았으며, 임부의 불안과 우울의 상대위험도는 COVID-19 팬데믹 전과 비교해 각각 1.65와 1.08로 나타났다[13].


COVID-19 확진자와 사망자의 급속한 증가는 COVID-19에 대한 두려움을 유발하고, 바이러스에 대한 불확실성 및 불안정한 일상에 대한 불안감으로 팬데믹 동안 임부는 우울을 경험하는 것으로 확인되었다[18]. 그리고 본 연구 조사 시는 오미크론 변이 바이러스의 확산을 통해 정부가 긴급한 대책을 취하고, 한국의 임부들 중 14%가 사망자와의 접촉 경험을 갖고 있으며[14], 임부의 코로나19 관련 정보를 주요 미디어와 인터넷을 통해 얻고 있었다. 비공식 사이트를 통한 정보 수집은 잘못된 정보의 확산과 함께 임부의 두려움과 불안을 더욱 증가시킬 수 있어 정부의 정보 제공이 필수적이다.


COVID-19 확진자와 사망자의 급속한 증가는 COVID-19에 대한 두려움을 유발하고, 바이러스에 대한 불확실성 및 불안정한 일상에 대한 불안감으로 팬데믹 동안 임부는 우울을 경험하는 것으로 확인되었다[18]. 그리고 본 연구 조사 시는 오미크رون 변이 바이러스의 확산을 통해 정부가 긴급한 대책을 취하고, 한국의 임부들 중 14%가 사망자와의 접촉 경험을 갖고 있으며[14], 임부의 코로나19 관련 정보를 주요 미디어와 인터넷을 통해 얻고 있었다. 비공식 사이트를 통한 정보 수집은 잘못된 정보의 확산과 함께 임부의 두려움과 불안을 더욱 증가시킬 수 있어 정부의 정보 제공이 필수적이다.

임부의 COVID-19 확진자와의 접촉 경험은 우울에 영향을 미치지 않은 것으로 나타났다.
는 요인으로, 확진자 접촉이 태아와 가족 등 주변 사람들에게 미치는 영향에 대한 지속적 염려가 임부의 불안과 우울을 유발하는 것으로 나타났다(12). 본 연구에서 임부는 본인의 감염에 대한 걱정보다 태아에 대해 더 염려하는 것으로 확인하였고, 임부는 태아의 건강을 우선적으로 고려하였으며, 임부는 태아에 대한 건강에 대한 염려로 불안과 우울이 증가하였다고 보았다(12,13). 본 연구에서 임신 3삼분기에는 임부의 우울에 영향을 미친 요인으로, 태아에 대한 염려가 가장 크게 영향을 미친 것으로 나타났다(12). 본 연구에서 태아에 대한 염려가 태아와 가족을 포함한 주변 사람들에게 미치는 영향에 대한 염려가 임부의 불안과 우울을 유발하는 것으로 나타났다(12). 본 연구에서 임부는 본인의 감염에 대한 걱정보다 태아에 대해 더 염려하는 것으로 확인하였고, 임부는 태아에 대한 건강에 대한 염려로 불안과 우울이 증가하였다고 보았다(12,13).

본 연구에 따르면, 임신 3삼분기의 우울의 영향 요인으로, 태아의 건강을 우선으로 생각한 후, 임부는 태아에 대해 더 염려하는 것으로 확인하였고, 임부는 태아의 건강을 우선적으로 고려하였으며, 임부는 태아에 대한 건강에 대한 염려로 불안과 우울이 증가하였다고 보았다(12,13).

본 연구에서 임신 3삼분기의 우울은 태아의 건강에 대한 염려가 가장 크게 영향을 미친 것으로 나타났다(12). 본 연구에서 임부는 본인의 감염에 대한 걱정보다 태아에 대해 더 염려하는 것으로 확인하였고, 임부는 태아에 대한 건강에 대한 염려로 불안과 우울이 증가하였다고 보았다(12,13). 본 연구에서 임신 3삼분기에는 임부의 우울에 영향을 미친 요인으로, 태아에 대한 염려가 가장 크게 영향을 미친 것으로 나타났다(12). 본 연구에서 태아에 대한 염려가 태아와 가족을 포함한 주변 사람들에게 미치는 영향에 대한 염려가 임부의 불안과 우울을 유발하는 것으로 나타났다(12). 본 연구에서 임부는 본인의 감염에 대한 걱정보다 태아에 대해 더 염려하는 것으로 확인하였고, 임부는 태아에 대한 건강에 대한 염려로 불안과 우울이 증가하였다고 보았다(12,13).

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결론적으로 신종 감염병의 대유행 시 임부의 정신건강은 산전 관리 중에 평가되어야 하고, 전염병에 대한 정확한 정보와 임부의 안전을 위한 행동지침을 제대로 교육하여 임부의 두려움을 완화할 필요가 있다. 그리고 임부의 사회적 활동을 위한 비대면 교육 프로그램을 활성화하여 가벼운 실내 활동, 타인과의 지속적인 소통을 유지하여 ‘사회적 거리두기’로 인한 임부의 스트레스를 완화할 필요가 있다.

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Authors’ contributions
Conceptualization, Formal analysis: Seok D, Ju HO; Writing-original draft: Seok D; Writing-review & editing: Seok D, Ju HO.

Conflict of interest
The authors declared no conflict of interest.

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Please contact the corresponding author for data availability.

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11. Korea Disease Control and Prevention Agency (KDCA). COVID-19, Omicron variant virus. [Internet]. Seoul: KDCA;


Factors influencing maternal-fetal attachment in pregnant women during the COVID-19 pandemic: a cross-sectional study

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Purpose: Coronavirus disease 2019 (COVID-19) has spread widely throughout the world, causing psychological problems such as fear, anxiety, and stress. During the COVID-19 pandemic, pregnant women have been concerned about both their own health and the health of their fetuses, and these concerns could negatively affect maternal-fetal attachment. Thus, this study aimed to explore the level of COVID-19 stress, resilience, and maternal-fetal attachment among pregnant women during the COVID-19 pandemic, and to identify factors influencing maternal-fetal attachment.

Methods: In total, 118 pregnant women past 20 weeks gestation were recruited from two maternity clinics in Daegu, Korea, to participate in this descriptive correlational study during COVID-19. The factors influencing maternal-fetal attachment were analyzed using hierarchical multiple regression analysis.

Results: The mean scores for COVID-19 stress, resilience, and maternal-fetal attachment were 57.18±10.32 out of 84, 67.32±15.09 out of 100, and 77.23±9.00 out of 96, respectively. Nulliparous pregnant women reported greater maternal-fetal attachment than multiparous pregnant women (p=.003). Religious pregnant women also reported greater maternal-fetal attachment than non-religious pregnant women (p=.039). Resilience (β=.29, p=.002), COVID-19 stress (β=.20, p=.030) and parity (β=-.17, p=.047) were factors influencing maternal-fetal attachment, and these factors explained 26.4% of the variance in maternal-fetal attachment (F=10.12, p<.001).

Conclusion: Converse to common sense, COVID-19 stress exerted a positive influence on maternal-fetal attachment in pregnant women during the COVID-19 pandemic. Healthcare providers need to recognize the positive influence of COVID-19 stress and implement intervention strategies to strengthen resilience in pregnant women to improve maternal-fetal attachment.

Keywords: COVID-19; COVID-19 stress syndrome; Maternal-fetal relations; Pregnant women; Psychological resilience

Introduction

Coronavirus disease 2019 (COVID-19) has spread widely throughout the world since January 2020. As of October 2022, 615,301,980 cases and 6,524,568 deaths have been recorded worldwide [1]. In South Korea, 24,848,184 people have been infected, with women accounting for a higher percentage (53%) of reported cases than men (47%), and there have been 28,528 deaths [2]. COVID-19 causes various physical and mental symptoms and complications that can lead to psychological problems such as fear, anxiety, and posttraumatic stress disorder (PTSD) for confirmed cases, healthcare providers, and the general public...
According to an international study, the COVID-19 pandemic is a life stressor that contributes to psychological pain, and the resulting stress is a major risk factor for mental health problems in perinatal women [5]. Although the COVID-19 pandemic does not meet the diagnostic criteria for general PTSD, the emotional impact is similar to PTSD and can be traumatic. In particular, remembering these experiences can cause pregnant women to experience a higher level of PTSD symptoms and pain [6]. Pregnant women are concerned about the health of their fetus and their own health during the COVID-19 pandemic, which could negatively impact maternal-fetal attachment.

Maternal-fetal attachment is an indicator of the well-being of pregnant women and their fetuses. For the fetus, maternal-fetal attachment is both a physical bond and an emotional connection with the mother [7]. High maternal-fetal attachment has a positive influence on fetal brain development, autonomic nervous system development, children’s emotions and behaviors, and parent-child relationships [8,9]. For mothers, it is also an essential factor that affects the achievement of developmental tasks of pregnant women and the formation of successful mother-child relationships after childbirth [8]. However, an international study on Italian pregnant women reported that the high level of anxiety experienced during the COVID-19 pandemic negatively influenced the process of forming maternal-fetal attachment [10]. Therefore, it can be predicted that pregnant women may have difficulty forming maternal-fetal attachment during the COVID-19 pandemic, which could have negative impacts on the physical and mental health of both the mother and fetus.

Previous studies have reported a very diverse range of factors influencing maternal-fetal attachment, including religion and body image as general factors [11] and planned pregnancy and parity as obstetric factors [11,12]. Additionally, current health status, taegyo (traditional Korean prenatal care for fetus), sociability, and stress coping methods have been identified as relevant personal factors [9,13], and maternal-fetal attachment is also influenced by support system-related factors, such as social support, spouse support, and support from special others [12,14].

Among these influencing factors, stress has been found to have a negative impact on maternal-fetal attachment in most previous studies. Stress during pregnancy refers to unpleasant emotions such as anxiety, fear, and worry. A higher level of stress in pregnant women is associated with a lower quality of life [15], and stress during pregnancy lowers maternal role confidence [16] and negatively affects maternal-fetal attachment and the health of the fetus [9]. For example, depression and stress in pregnant women can cause low birth weight infants, preterm birth, stillbirth, and obstetric complications, and can permanently impede the growth and development of children [17]. In other words, stress during pregnancy can cause negative emotional changes, leading to lower maternal-fetal attachment [18].

As with pregnancy-related stress, stress due to COVID-19 is intense and comparable to posttraumatic stress [6]. Since pregnant women are vulnerable to COVID-19 due to reduced immunity in pregnancy [19], it can be assumed that pregnant women experience higher levels of COVID-19 stress than the general public. However, previous studies on COVID-19 stress in pregnant women are very limited.
stress on pregnant women may be different from the impact of pregnancy stress, it is important to address this as a significant factor.

Stress adaptation can vary depending on how individuals cope with events, and resilience is one of the factors that positively influence methods of coping with stress [20]. Resilience refers to the quality or ability that enables individuals to adapt and recover on their own in serious situations, such as adversities and difficulties that may occur physically, mentally, emotionally, and socially in their lives [21]. In stressful situations, individuals with negative emotions tend to focus on the negative aspects rather than the positive aspects, leading to more stress. If negative emotions are not effectively resolved and are accumulated or repeated, they can cause anxiety and depression, which can lead to difficulties in forming maternal-fetal attachment [13]. Increasing self-management ability through discovering one’s strengths in stressful situations is one way to increase resilience [22]. Therefore, it can be assumed that resolving negative emotions through resilience and seeking better adaptation methods may increase maternal-fetal attachment. Pregnant women strive to reduce stress and anxiety during pregnancy to maintain the health of the fetus, complement negative emotions with positive emotions, and avoid events that may cause problems, and these efforts strengthen resilience [23]. Based on the results of previous studies, it can be inferred that resilience helps reduce stress and positively influences maternal-fetal attachment.

The COVID-19 situation is changing rapidly, and the stress of pregnant women is accumulating due to the prolonged infectious disease pandemic. Although previous studies have extensively investigated the factors influencing maternal-fetal attachment, domestic and international studies on maternal-fetal attachment in stressful situations such as COVID-19 are very limited. Therefore, it is necessary to investigate the influence of COVID-19 stress and resilience on maternal-fetal attachment. This study aimed to identify the influence of COVID-19 stress and resilience on maternal-fetal attachment in a special situation, the COVID-19 pandemic, and to provide basic data for developing measures and intervention strategies to improve maternal-fetal attachment.

The purpose of this study was to determine the level of COVID-19 stress, resilience, and maternal-fetal attachment of prenatal pregnant women during the COVID-19 pandemic and to identify the influence of those factors on maternal-fetal attachment. The detailed objectives of the study were as follows:

1) To determine the level of maternal-fetal attachment according to the general and obstetric characteristics of pregnant women
2) To determine the levels of COVID-19 stress, resilience, and maternal-fetal attachment and to examine the relationships among those variables
3) To identify the factors that influenced maternal-fetal attachment in pregnant women

Methods

Study design
This descriptive correlational study was conducted to determine the levels of COVID-19 stress, resilience, and maternal-fetal attachment among pregnant women during the COVID-19 pandemic and to identify the factors that influenced maternal-fetal attachment. This study adhered to the STROBE reporting guidelines (http://www.strobe-statement.org).

Sample and sampling
Participants were recruited by convenience sampling from two women’s clinics located in Daegu, Korea. The selection criteria were pregnant women at 20 or more weeks of gestation who could feel fetal movements, understood the study’s purpose, and consented to participate in the study voluntarily, and who could understand and respond to the questionnaire. The exclusion criteria were pregnant women diagnosed with high-risk pregnancy, had a fetus with congenital deformities or severe complications, diagnosed with depression during data collection, taking antidepressants or anxiolytics, international marriage migrants, or non-Koreans. The number of participants was calculated using G*Power 3.1.9.7. With a significance level of .05, a power of .80, median effect size of .15, and 10 predictors (COVID-19 stress, resilience, and eight general and obstetric characteristics excluding COVID-19-related characteristics), at least 118 participants were required. Considering a dropout rate of 10%, 130 participants were recruited through convenience sampling. Excluding 12 questionnaires with incomplete responses, 118 questionnaires were used for data analysis.

Measurements
All the measurements used in this study were approved by the measurement developers and translators into Korean.
COVID-19 stress
This study utilized the COVID-19 Stress Scale for Korean People (CSSK) developed by Kim et al. [24]. The tool consists of 21 items that are divided into three factors: fear of infection, difficulties of social distancing, and anger toward others. Each item is scored using a 5-point Likert scale (0–4 points). The score range is 0–84 points, and a higher total score indicates a higher level of COVID-19 stress. Cronbach’s α was .96 at the time of development and .86 in this study.

Resilience
Resilience was measured using the Korean version of the Connor Davidson Resilience Scale (CD-RISC), which was originally developed by Connor and Davidson [21]. The CD-RISC consists of 25 items, and each item is scored using a 5-point Likert scale (0–4 points). The score range is 0–100 points, and a higher total score indicates higher resilience. Cronbach’s α was .89 at development and .96 in this study.

Maternal-fetal attachment
The Maternal-Fetal Attachment Scale (MFAS), originally developed by Cranley [8] and translated into Korean and modified by Kim [25], was also used in this study. The MFAS consists of 24 items, and each item is scored using a 4-point Likert scale (1–4 points). The score range is 24–96 points, and a higher total score indicates stronger maternal-fetal attachment. Cronbach’s α was .85 upon development, .89 in Kim’s study [25], and .88 in this study.

General and obstetric characteristics
The general and obstetric characteristics were developed by the researchers based on the literature [11,26] and included age, religion, educational level, occupation, COVID-19 experience of pregnant women, COVID-19 experience in the family, gestational period, parity, planned pregnancy, and pregnancy method.

Data collection procedures
Data were collected in July 2022, which was when the Omicron variant resurgence was observed. The chiefs of nursing departments at two women’s clinics in Daegu were briefed on the study’s purpose and methods, and cooperation was requested for data collection. The survey was conducted while the participants were waiting for medical treatment. After checking the selection and exclusion criteria, only those who voluntarily agreed to participate in the study and provided written consent were included in the data collection. Participants were provided with an explanation of the study’s purpose, participation period, potential side effects, risk factors, safety measures, benefits and compensation, personal information protection, and confidentiality. Also, we emphasized that participation was voluntary and the right to withdraw from the study at any time. The researchers also provided their contact information in case participants had any questions. In consideration of the COVID-19 pandemic, the participants and researchers wore KF-94 masks, and the researcher explained the study details face-to-face while maintaining a distance of at least 1 meter. Participants used their own pens, and new pens were provided if needed. After completing the questionnaire, participants placed it in an individual envelope and handed it to the researcher. The questionnaire took approximately 10 minutes to complete, and a small gift (worth Korean won 5,000; approximately 3.81 USD) was given to participants.

Data analysis
The collected data were analyzed using SPSS for Windows ver. 24.0 (IBM Corp., Armonk, NY, USA). The general and obstetric characteristics of pregnant women were presented as frequency, percentage, mean, and standard deviation. The degree of COVID-19 stress, resilience, and maternal-fetal attachment of pregnant women was presented using the mean and standard deviation. The t-test and one-way analysis of variance were used to analyze differences in maternal-fetal attachment according to the general and obstetric characteristics of pregnant women, and post hoc analysis was conducted using the Scheffé test. Pearson correlation coefficients were used to analyze the correlations between COVID-19 stress, resilience, and maternal-fetal attachment. Finally, hierarchical multiple regression analysis was conducted to analyze the factors influencing maternal-fetal attachment in pregnant women.

Results

General and obstetric characteristics of pregnant women
The majority of the pregnant women (n = 71, 60.2%) were between the ages of 30 and 34 years. Seventy-three (61.9%) pregnant women were not religious, 78 (66.1%) had graduated from university or higher, and 52 (44.1%) were actively employed. Nearly half of the pregnant women (n = 58, 49.2%) had experienced a COVID-19 infection, and 73 (61.9%) had family members who had experienced a COVID-19 infection. The most common gestational period was between 26 and 30 weeks (n = 36, 30.5%). Most of the pregnant women (n = 77, 65.3%) were nulliparous and 79 (66.9%) had planned their pregnancy.
Most participants (n = 102, 86.4%) had conceived spontaneously (Table 1).

Levels of COVID-19 stress, resilience, and maternal-fetal attachment
A high level of COVID-19 stress (57.18 ± 10.32 points), a moderate level of resilience (67.32 ± 15.09 points), and a high level of maternal-fetal attachment (77.23 ± 9.00 points) were confirmed among the pregnant women (Table 2).

Differences in maternal-fetal attachment according to the general and obstetric characteristics of pregnant women
In the analysis of differences in maternal-fetal attachment scores according to the general characteristics of pregnant women, religion (t = 2.09, p = .039) showed a statistically significant difference. More specifically, the score of maternal-fetal attachment was higher among pregnant women with religion than those without religion. Among obstetric characteristics, parity (t = 3.06, p = .003) demonstrated a statistically significant difference, and nulliparous pregnant women showed higher scores of maternal-fetal attachment than multiparous pregnant women (Table 1).

Correlations among COVID-19 stress, resilience, and maternal-fetal attachment in pregnant women
Maternal-fetal attachment in pregnant women was found to have a weak positive correlation with COVID-19 stress (r = .37, p < .001) and a moderate positive correlation with resilience (r = .44, p < .001). These findings indicated that higher levels of COVID-19 stress and resilience were associated with higher maternal-fetal attachment (Table 3).

Factors influencing maternal-fetal attachment in pregnant women
To identify the factors influencing maternal-fetal attachment in pregnant women, two-step hierarchical regression analysis was conducted. In the first step, religion and parity, which were gen-

### Table 1. Differences in maternal-fetal attachment according to general and obstetric characteristics (N=118)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Categories</th>
<th>n (%)</th>
<th>Maternal-fetal attachment</th>
<th></th>
<th>t/F (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean ± SD</td>
<td>t/F</td>
<td></td>
</tr>
<tr>
<td>Age (year)</td>
<td>≤ 30</td>
<td>26 (22.0)</td>
<td>77.81 ± 9.81</td>
<td>0.46</td>
<td>.630</td>
</tr>
<tr>
<td></td>
<td>31–34</td>
<td>71 (60.2)</td>
<td>77.52 ± 9.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 35</td>
<td>21 (17.8)</td>
<td>75.52 ± 7.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td>Yes</td>
<td>45 (38.1)</td>
<td>79.40 ± 8.55</td>
<td>2.09</td>
<td>.039</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>73 (61.9)</td>
<td>75.89 ± 9.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
<td>≤ College</td>
<td>40 (33.9)</td>
<td>75.43 ± 9.18</td>
<td>–1.57</td>
<td>.119</td>
</tr>
<tr>
<td></td>
<td>≥ Bachelor’s</td>
<td>78 (66.1)</td>
<td>78.15 ± 8.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>Actively employed</td>
<td>52 (44.1)</td>
<td>78.40 ± 8.44</td>
<td>0.87</td>
<td>.420</td>
</tr>
<tr>
<td></td>
<td>Parental leave</td>
<td>42 (35.6)</td>
<td>76.64 ± 9.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not employed</td>
<td>24 (20.3)</td>
<td>75.71 ± 8.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COVID-19 experience</td>
<td>Yes</td>
<td>58 (49.2)</td>
<td>76.69 ± 10.73</td>
<td>–0.63</td>
<td>.572</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>60 (50.8)</td>
<td>77.75 ± 6.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COVID-19 experience in family</td>
<td>Yes</td>
<td>73 (61.9)</td>
<td>77.45 ± 9.55</td>
<td>0.34</td>
<td>.733</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45 (38.1)</td>
<td>76.87 ± 9.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gestational period (week)</td>
<td>20–25</td>
<td>27 (22.9)</td>
<td>76.45 ± 9.23</td>
<td>0.20</td>
<td>.897</td>
</tr>
<tr>
<td></td>
<td>26–30</td>
<td>36 (30.5)</td>
<td>76.72 ± 9.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31–35</td>
<td>27 (22.9)</td>
<td>78.15 ± 8.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36–40</td>
<td>28 (23.7)</td>
<td>77.64 ± 9.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td>0</td>
<td>77 (65.3)</td>
<td>79.01 ± 8.02</td>
<td>3.06</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>≥ 1</td>
<td>41 (34.7)</td>
<td>73.88 ± 9.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned pregnancy</td>
<td>Yes</td>
<td>79 (66.9)</td>
<td>77.44 ± 9.26</td>
<td>0.37</td>
<td>.714</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>39 (33.1)</td>
<td>76.79 ± 8.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy method</td>
<td>Spontaneous</td>
<td>102 (86.4)</td>
<td>77.00 ± 9.44</td>
<td>–1.04</td>
<td>.306</td>
</tr>
<tr>
<td></td>
<td>Ovulation induction</td>
<td>16 (13.6)</td>
<td>78.69 ± 5.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

eral and obstetric characteristics that showed statistically significant relevance with maternal-fetal attachment in the univariate analysis, were entered into the model. In the second step, the net effects of COVID-19 stress and resilience on maternal-fetal attachment were analyzed by inputting COVID-19 stress and resilience while controlling for general and obstetric characteristics. The Durbin-Watson index was 2.02, indicating no autocorrelation among error terms, and the variance inflation factor was 1.06–1.35, confirming no multicollinearity between independent variables. Finally, the normality of independent variables was confirmed through a normal probability plot of the residuals. In the first step, parity (β = –.25, \( p = .006 \)) was a statistically significant influencing factor and explained 9.9% of maternal-fetal attachment. In the second step, resilience (β = .29, \( p = .002 \)), COVID-19 stress (β = .20, \( p = .030 \)), and parity (β = –.17, \( p = .047 \)) were found to be factors influencing maternal-fetal attachment in pregnant women, with an explanatory power of 26.4% (\( F = 10.12, p < .001 \)) (Table 4).

**Table 2. Levels of COVID-19 stress, resilience, and maternal-fetal attachment (N=118)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Min</th>
<th>Max</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19 stress</td>
<td>0–84</td>
<td>32</td>
<td>75</td>
<td>57.18 ± 10.32</td>
</tr>
<tr>
<td>Resilience</td>
<td>0–100</td>
<td>38</td>
<td>95</td>
<td>67.32 ± 15.09</td>
</tr>
<tr>
<td>Maternal-fetal attachment</td>
<td>24–96</td>
<td>53</td>
<td>93</td>
<td>77.23 ± 9.00</td>
</tr>
</tbody>
</table>

**Table 3. Correlations among COVID-19 stress, resilience, and maternal-fetal attachment (N=118)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>R (( \rho ))</th>
<th>COVID-19 stress</th>
<th>Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19 stress</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resilience</td>
<td>.47 ((&lt; .001))</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Maternal-fetal attachment</td>
<td>.37 ((&lt; .001))</td>
<td></td>
<td>.44 ((&lt; .001))</td>
</tr>
</tbody>
</table>

**Table 4. Factors influencing maternal-fetal attachment (N=118)**

<table>
<thead>
<tr>
<th>Step</th>
<th>Categories</th>
<th>B</th>
<th>SE</th>
<th>( \beta )</th>
<th>( t (p) )</th>
<th>( R^2 (\Delta R^2) )</th>
<th>F (( p ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>88.30</td>
<td>3.36</td>
<td>26.32 ((&lt; .001))</td>
<td>.10 (.099)</td>
<td>6.29 (.003)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Religion†</td>
<td>–2.89</td>
<td>1.65</td>
<td>–.16</td>
<td>–1.76 (0.82)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parity†</td>
<td>–4.74</td>
<td>1.68</td>
<td>–.25</td>
<td>–2.82 (0.06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>61.85</td>
<td>6.15</td>
<td>10.06 ((&lt; .001))</td>
<td>.26 (1.65)</td>
<td>10.12 ((&lt; .001))</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Religion†</td>
<td>–1.35</td>
<td>1.53</td>
<td>–.07</td>
<td>–0.88 (3.82)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parity†</td>
<td>–3.14</td>
<td>1.57</td>
<td>–.17</td>
<td>–2.00 (0.047)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COVID-19 stress</td>
<td>0.18</td>
<td>0.08</td>
<td>.20</td>
<td>2.20 (0.030)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resilience</td>
<td>0.18</td>
<td>0.06</td>
<td>.29</td>
<td>3.12 (0.002)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†The reference groups were religion (yes) and parity (0).

Discussion

The mean score for COVID-19 stress in this study was 78.18 out of 105 points, which was similar to the score of 72.87 points reported in a previous study on the effects of mothers’ COVID-19 stress on young children’s problem behaviors using the same tool [27]. Although a direct comparison is difficult due to differences in measurement tools, a national mental health survey conducted by the Korean Society for Traumatic Stress Studies in June 2022 reported a score of 11.16 out of 27 points for “fear of infection,” a subcategory of the CSSK, indicating that the COVID-19 stress of pregnant women in this study was much higher than in the general population [28]. Additionally, a previous study on the stress levels of Polish pregnant women during the COVID-19 pandemic, which used the Perceived Stress Scale (PSS-10), found a score of 18 out of 40; this score was lower than 50% of the maximum possible score and indicated a moderate level of stress [29]. These results suggest that COVID-19 stress in Korean pregnant women is higher than that in pregnant women from other countries.

Although caution is necessary when making comparisons due to insufficient studies on COVID-19 stress of Korean pregnant women during the pandemic, this study’s results can be interpreted based on previous research on women in their 20s to 40s due to the age range of participants. Firstly, a previous study on COVID-19 stress among university students reported a score of 78.00 out of 105 points [30], which was similar to the score in the current study. Secondly, a study on the effect of COVID-19 stress on psychological burnout of special education teachers
found a mean score of 3.62 points [31], equivalent to 76.02 points on a 105-point scale, which was comparable to the current study’s findings. Female university students and female teachers have been shown to experience higher COVID-19 stress than their male counterparts, respectively [30,31], suggesting that women are more susceptible to COVID-19 stress than men. Additionally, an international study on posttraumatic growth of pregnant women during the COVID-19 pandemic found that socially marginalized and vulnerable groups, such as pregnant women, experienced higher levels of stress and psychological pain [32]. Specifically, adults aged 35 years or younger and women experienced more stress during the pandemic [33], and women experienced more negative emotions, such as anxiety and fear, during this period [34]. Although it is challenging to make direct comparisons due to the lack of domestic studies on COVID-19 stress of pregnant women using the same tool as this study, these findings indicate the need for increased attention to COVID-19 stress among pregnant women and women who may become pregnant.

Religion was found to be the only significant factor among the general characteristics of pregnant women, with religious pregnant women exhibiting significantly higher maternal-fetal attachment. This finding is consistent with previous studies on factors influencing maternal-fetal attachment in pregnant women [11] and women who had a miscarriage [35]. It is suggested that religious activities help pregnant women to offset negative emotions and strengthen their positive relationship with the fetus. Religious beliefs emphasizing the preciousness of life may also favorably impact maternal-fetal attachment. Therefore, even if face-to-face activities are difficult, encouraging non-face-to-face religious activities such as real-time broadcasting to help generate positive emotions in pregnant women may improve maternal-fetal attachment.

Among the obstetric characteristics, parity was significantly associated with maternal-fetal attachment, with nulliparous pregnant women exhibiting higher maternal-fetal attachment than multiparous pregnant women. This finding is inconsistent with a previous study on pregnant women of advanced maternal age, which found that those who had experienced two or more childbirths exhibited higher maternal-fetal attachment than those who had not given birth or had experienced only one childbirth [12]. However, the current study’s results are consistent with a previous study on the relationship between prenatal stress and maternal-fetal attachment, according to which nulliparous pregnant women exhibited higher maternal-fetal attachment than multiparous women [18]. This may be due to the fact that nulliparous pregnant women are having their first children, and they are sensitively caring for the fetuses with particular affection and attention. Despite these results, the differences from previous studies suggest the need for replication studies on the relationship between childbirth experience and maternal-fetal attachment.

Resilience was found to have a positive correlation with maternal-fetal attachment in this study, and it was also identified as a major factor influencing maternal-fetal attachment. The relationship between these two variables can be explained by the fact that a series of positive emotions during pregnancy promote emotional growth in the brain, increase serotonin levels, and release pleasure hormones for the mother and ultimately in the fetus, leading to decreased maternal anxiety and the formation of stable maternal-fetal attachment [23]. The resilience questionnaire used in this study included questions about adaptability, confidence in dealing with challenges and adversities, and self-esteem, which are key components of resilience. This finding is consistent with previous studies that have shown that higher self-esteem of pregnant women was associated with higher maternal-fetal attachment [11], and that higher parental efficacy was associated with higher maternal-fetal attachment [36]. Since resilience can be improved through self-management in stressful situations by discovering one’s individual strengths [22], it is considered that maternal-fetal attachment is enhanced through the process of self-control and adaptation to a new role as a mother despite external adversities.

Converse to common sense, this study also found that COVID-19 stress in pregnant women was a positive factor influencing maternal-fetal attachment, and higher COVID-19 stress was associated with greater maternal-fetal attachment. This result is similar to studies on other types of stress during pregnancy, such as a previous study that found a positive correlation between preterm labor stress and maternal-fetal attachment [37], and an international study that found an increase in maternal-fetal attachment as pregnant women perceived more psychosocial stress [38]. Although a direct comparison is difficult due to a lack of studies on the correlation between maternal-fetal attachment and COVID-19 stress, the results of this study indicate that COVID-19 stress does not always have a negative effect on the relationship between a mother and her fetus. For instance, an international study found that maternal-fetal attachment in high-risk pregnant women was higher than normal pregnant women, and high-risk situations such as high-risk pregnancies increased adaptation to pregnancy and strengthened maternal-fetal attachment [39]. Furthermore, previous studies have suggested that COVID-19 stress could lead to an increase in maternal-fetal at-
attachment by wanting to care more for the fetus and provide protection [40]. Childbirth during traumatic situations like the COVID-19 pandemic has also been reported to trigger maternal psychological growth by presenting feelings of gratitude for life and individual capacity, and thus bringing about better mother-infant attachment [41]. Based on these findings, it can be inferred that even during the COVID-19 pandemic, pregnant women experience changes from womanhood to motherhood, feel gratitude for life and their ability to overcome adversity through the fetus, rather than perceiving COVID-19 stress negatively; thus, transforming COVID-19 stress into a positive concept toward maternal-fetal attachment. However, as other studies [15,16] reported pregnancy stress negatively influencing maternal-fetal attachment, the possibility that COVID-19 stress could negatively impact maternal-fetal attachment also cannot be ruled out, and stress should be monitored. Future research should investigate this issue. Furthermore, a previous study has already investigated COVID-19 stress and pregnancy stress separately and emphasized the importance of reducing both types of stress [42]. Considering the reports of previous studies that pregnant women experienced increased maternal-fetal attachment over time [43] and it was not negatively affected by the COVID-19 pandemic [44], it seems necessary to consider COVID-19 stress separately from pregnancy stress.

Since this study was conducted in a limited number of maternity clinics in a particular region, generalization of the results should be approached with caution. Additionally, this study was conducted during the resurgence of the Omicron variant, and the first death of a pregnant woman confirmed with COVID-19 in January 2022 [45] may have increased the weight of COVID-19 stress on pregnant women. The Omicron variant was first reported in South Korea in December 2021 [46], and the Korea Disease Control and Prevention Agency announced the spread of the Delta variant in August 2021 [47]. Social countermeasure recommendations were changing depending on the type of variant, and South Korea was preparing to release regulations regarding wearing masks indoors [48]. Therefore, since the level of COVID-19 stress in pregnant women can differ depending on the effects of case fatality rate and transmission of the variant, and social coping, it is important to interpret the results of this study carefully. Studies investigating the relationships between COVID-19 stress, resilience, and maternal-fetal attachment of pregnant women in the context of the COVID-19 pandemic are insufficient, and more studies are necessary to confirm those relationships.

In conclusion, while many studies have investigated variables related to maternal-fetal attachment, this study is significant in that it investigated COVID-19 stress and resilience in pregnant women in relation to maternal-fetal attachment, which has rarely been explored in previous studies. Moreover, this study confirmed that strategies to strengthen resilience are necessary when developing programs to enhance maternal-fetal attachment during infectious disease situations similar to COVID-19, and it presents a new perspective according to which COVID-19 stress can be positively sublimated, rather than being viewed only negatively. Healthcare providers can use these findings to assess stress related to COVID-19 and/or future widespread infectious conditions, while considering its positive influence on maternal-fetal attachment. Further COVID-19 studies that include pregnant women from other domestic and international regions, high-risk pregnant women, and long-term hospitalized pregnant women are needed. Also, practical educational programs that strengthen resilience to enhance maternal-fetal attachment are needed for future widespread infectious conditions.

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**Authors' contributions**

Conceptualization: Yoon H, Choi H; Formal analysis: Yoon H; Writing–original draft: Yoon H, Choi H; Writing–review & editing: Yoon H, Choi H.

**Conflict of interest**

Hyunkyung Choi has been an editorial board member of the Korean Journal of Women Health Nursing since January 2022. She was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest.

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**Data availability**

Please contact the corresponding author for data availability.
Acknowledgments

None.

References


22. Ha BY, Jung EJ, Choi SY. Effects of resilience, post-traumatic


Effect of pectoralis major myofascial release massage for breastfeeding mothers on breast pain, engorgement, and newborns’ breast milk intake and sleeping patterns in Korea: a randomized controlled trial

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Purpose: Supportive interventions to improve breastfeeding practice are needed in nursing. This study investigated the effects of pectoralis major myofascial release massage (MRM) on breast pain and engorgement among breastfeeding mothers and on breast milk intake and sleep patterns among newborns.

Methods: Breastfeeding mothers who had delivered between 37 and 43 weeks and had 7-to 14-day-old newborns were recruited from a postpartum care center in Gunpo, Korea. Participants were randomized to the MRM or control group. The outcome variables were breast pain and breast engorgement among breastfeeding mothers and breast milk intake and sleep time among newborns. The experimental treatment involved applying MRM to separate the pectoralis major muscle and the underlying breast tissue in the chest. After delivery, the first MRM session (MRM I) was provided by a breast specialist nurse, and the second (MRM II) was administered 48 hours after MRM I.

Results: Following MRM, breast pain (MRM I: t=-5.38, p<.001; MRM II: t=-10.05, p<.001), breast engorgement (MRM I: right, t=-1.68, p=.100; left, t=-2.13, p=.037 and MRM II: right, t=-4.50, p<.001; left, t=-3.74, p<.001), and newborn breast milk intake (MRM I: t=3.10, p=.003; MRM II: t=3.09, p=.003) differed significantly between the groups.

Conclusion: MRM effectively reduced breast engorgement and breast pain in breastfeeding mothers, reducing the need for formula supplementation, and increasing newborns’ breast milk intake. Therefore, MRM can be utilized as an effective nursing intervention to alleviate discomfort during breastfeeding and to improve the rate of breastfeeding practice (clinical trial number: KCT0002436).

Keywords: Breast feeding; Human milk; Massage; Pain; Pectoralis muscles

Introduction

Breast milk is an important nutrient source for both preterm and term infants, as reported in numerous studies [1]. Breast milk has several benefits: it improves infant digestion, lowers morbidity rates, reduces atopy by minimizing exposure to allergens, and stimulates the development of an emotionally stable personality [2]. For mothers, uterine contractions help prevent postpartum bleeding and reduce the severity of anemia [3]. In addition, breastfeeding assists with weight loss by burning calories [4];
lowers the risks of premenopausal breast cancer, ovarian cancer, and osteoporosis; and ultimately helps establish an intimate bond between mother and child [5,6].

In South Korea (hereinafter, Korea), the breastfeeding rate was 90.0% in the 1970s; however, this rate has progressively declined despite the advantages of breastfeeding [7]. Thus, one goal of Korea's Fourth National Health Promotion Policy was to increase the rate of breastfeeding continuation for 6 months to 66.8% by 2020 [8]. The rate of breastfeeding in Korea is high (95.6%) immediately after birth, but drops to 47.5% by 3 months of age, and fewer than two in 10 mothers continue to breastfeed for 6 months [9]. This information suggests that despite its many advantages, breastfeeding is associated with various problems [3]. These include discomforts such as breast pain, breast engorgement, nipple damage, lack of breast milk, fatigue from frequent feeding, and lack of sleep, which inhibit breastfeeding [10-12]. Due to these factors, alternative food consumption (breast milk with formula feeding, or formula feeding alone) has become increasingly common in Korea [13].

With recognition of the need for preventive health care to reduce discomfort and difficulty during breastfeeding [12], nursing interventions such as cabbage therapy, breast massages, and education on the benefits of breast milk have been provided to mothers at the commencement of prenatal care. Breast massage has been found effective in alleviating breast discomfort [14]. Specifically, pectoralis major myofascial release massage (MRM) involves gently separating the firm connective tissue between the mammary gland and the pectoralis major muscle using hand pressure and movement to create space at the rear of the breast tissue. This improves blood circulation, softens the hard breast tissue, and reduces pain [15]. This randomized controlled trial investigated the effects of pectoralis major MRM on breast pain and breast engorgement in breastfeeding mothers and on breast milk intake and sleeping time among newborns (Figure 1). This study adhered to the CONSORT (Consolidated Standards of Reporting Trials) reporting guidelines [16].

Methods

Ethics statement: This study was approved by the Institutional Review Board of Eulji University (No. EU17-01). Informed consent was obtained from participants.

Sample and sampling

The participants were mothers at the postpartum care center affiliated with Sanbon Hospital in Gunpo, Korea. The inclusion criteria were delivery (vaginally or by cesarean section) of a newborn weighing at least 2,500 g between 37 to 42 weeks, without medication due to complications. Mothers who received breast massages at the hospital before entering the postpartum care center and mothers unable to directly breastfeed were excluded. Newborns with physiologic jaundice (total bilirubin, 12.0 mg/dL or higher) were also excluded. Considering the hospitalization period for delivery, mothers of newborns aged 7 to 14 days were recruited. The sample size was calculated using G*Power 3.1.9.2 (University of Düsseldorf, Düsseldorf, Germany) [17]. Parameters were chosen (effect size = .75; α = .05, and power = .80), and the t-test was selected as the method of analysis [18]; the results indicated a minimum requirement of 58 participants. In general, if the attrition rate is low (10%-15%), the sample is considered to be close to the target population [19].
fore, in this study, the probability of dropout rate was set at 10% and 64 participants were recruited. Of the 72 mothers originally identified as eligible, eight were excluded because they were unable to directly breastfeed due to physiological jaundice or neonatal injury, were taking medications, or were later found to have had a short gestation period. Random assignment was performed using the RAND function in Microsoft Excel (Microsoft Corp., Redmond, WA, USA) (Figure 2). Six women—one in the experimental group and five in the control group—were excluded from the study because they did not participate in the second session. Upon completion, the study included a total of 58 participants: 31 in the experimental group and 27 in the control group.

Outcome measurements

Primary outcomes
1) Breast pain
The degree of breast pain perceived by the participants was assessed using an 11-point scale from no breast pain (0 points) to extreme breast pain (10 points).

Secondary outcomes
1) Breast engorgement
A rubber hardness tester (SHORE C; Yueqing Handpi Instruments Co., Ltd, Zhejiang, China) was used to measure changes in breast engorgement. Participants were placed in the supine position on a bed privately enclosed by a cubicle curtain. Then, a trained professional nurse examined the left and right breasts, and measurements were recorded in 1-point increments at the 2 o’clock and 10 o’clock positions, 3 cm from the nipples of both breasts.

2) Breast milk intake of newborns
Breast milk intake was measured (g) before and after breastfeeding following the first MRM (MRM I) and the second MRM (MRM II) using a microscopic scale (CAS AD-15T; CAS Corp., Seoul, Korea).

3) Formula supplementation
Formula supplementation was assessed by measuring the amount of formula supplement (mL) used over 48 hours by the breastfeeding mothers.

4) Sleeping patterns of newborns
The total sleeping time of each newborn after breastfeeding was measured by the breastfeeding mother, who recorded the feeding type and sleeping pattern in a self-report questionnaire over 48 hours.

Most secondary outcomes were measured after both MRM I and MRM II; however, formula intake and sleep were measured only after MRM I, since many mothers had been discharged by the time at which the MRM II measurement would have been taken.

5) General characteristics
The sociodemographic characteristics of breastfeeding mothers...
and newborns (e.g., maternal age, gestational age, nipple shape, breastfeeding education in pregnancy, delivery type, and neonatal age, height, weight, birth order, and sex of the newborn) were collected.

**Experimental treatment**

1) Pectoralis major myofascial release massage

The experimental treatment was performed by a nurse specializing in breast care, who had completed the International Board Certified Lactation Consultant course and had worked in a breast care counseling room for 10 years. MRM, a breast massage method that improves blood circulation in the breast and relieves pain caused by breast engorgement by releasing the pectoralis major muscle from the breast tissue in the chest, was provided in the breastfeeding care consultation room. This was a quiet area designated for the study, and it provided an environment that maintained personal privacy by enabling participants to wear a comfortable open gown while positioned behind curtains. With the participant supine on a bed, both breasts were massaged at 5-minute intervals for a total of 30 minutes (Figure 3, Supplementary Figure 1). A MRM I was administered in the same manner 48 hours after the MRM I to confirm the effect of repeated treatment, under the assumption that the effect decreased over time after experimental treatment. Since mothers receiving the same care at the postpartum care center were targeted, a second massage was performed 48 hours later to exclude exogenous variables.

**Data collection**

Data were collected between March and June of 2017 according to the following procedures:

1) Recruitment flyers were posted at the postpartum care center affiliated with Sanbon Hospital in Gunpo, Korea.

2) After explaining the purpose, method, duration of participation, potential side effects and risk factors, benefits of participation, confidential treatment of personal information, and researcher contact information, written consent was obtained.

3) Consenting women were allocated into groups by 1:1 parallel random allocation using Excel random number generation. The research participants were not provided with information about their assigned groups, but the data collector had this information; as such, this was a single-blind study.

4) A preliminary survey was administered before the start of the experiment by distributing questionnaires to the members of both groups.
5) In the experimental group, after the newborns were weighed, the participants received their MRM I therapy and subsequently breastfed their newborns. The left and right breasts were divided into four areas, and the pectoralis major muscle and breast tissue were separated with six hand movements each (right breast, R1 to R6; left breast, L1 to L6) (Figure 3). MRM was administered on the participant’s right side using the provider’s left and right hands. MRM on the right breast comprised six hand motions from R1 to R6 within 1 minute, which was continued for 5 minutes. This method was repeated on the left breast from L1 to L6. The therapy was repeated three times, alternating between the right and left breasts, for a total of 30 minutes (Supplementary Figure 1). For the control group, the mothers breastfed their infants after the newborns were weighed.

6) For both groups, breast pain, breast engorgement, and the breast milk intake of the newborns were measured after breastfeeding, and the mothers completed a 48-hour report on newborn sleep patterns.

7) The MRM I was performed as described above 2 days (48 hours) after the MRM I, meaning that the study participants received two therapy sessions.

Data analysis
The collected data were analyzed using IBM SPSS Statistics ver. 24.0 (IBM Corp., Armonk, NY, USA). The general characteristics of the breastfeeding mothers and newborns were analyzed by frequency, percentage, mean, and standard deviation. The homogeneity of the two groups was verified using the t-test and the chi-square test. The normality of the data distribution for each variable was checked. The differences between the two groups in the degrees of breast pain and breast engorgement, the amount of breast milk intake of the newborns, and the sleeping patterns of the newborns were analyzed using the t-test. Breast pain, breast engorgement, and neonatal breast milk intake over time were analyzed with repeated-measures analysis of variance.

Results
Verification of the homogeneity of participants
Participants’ general characteristics and the dependent variables showed no statistically significant differences between the two

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Figure 3. Myofascial release massage techniques.
II: Inferior internal; IL: inferior lateral; Lt: left; Rt: right; SL: superior lateral; SI: superior internal.
Korean J Women Health Nurs 2023;29(1):66-75

Effects of the pectoralis major myofascial release massage

Breast pain

No significant difference in breast pain was present between the two groups before experimental treatment; however, a significant difference was found in breast pain between groups after the MRM I (t = −5.38, p < .001). Breast pain before the MRM I was significantly lower in the experimental group than in the control group (t = −4.45, p < .001), and breast pain after the MRM I was also significantly lower in the experimental group (t = −10.05, p < .001).

The results of repeated-measures analysis of variance indicated a significant group-by-time interaction effect (F = 27.57, p < .001) (Table 2, Figure 4).

Breast engorgement

The results for breast engorgement are shown in Table 2 and Figure 4. No significant difference in breast engorgement was present between the groups at baseline for either breast. However, after the MRM I, the right breast received scores of 2.23 points and 3.07 points in the experimental group and control group, respectively, while the left breast received scores of 1.32 points and 2.56 points in the experimental group and control group, respectively. The latter difference was statistically significant (right: t = −1.68, p = .100; left: t = −2.13, p = .037). In other words, breast engorgement was not significantly different for the right breast after the MRM I, but a significant difference was found for the left breast. A significant difference was noted for the right breast before the MRM I, with 2.39 points measured in the experimental group and 4.00 points in the control group; however, no significant difference was observed for the left breast, which showed a score of 1.84 points in the experimental group and 2.70 points in the control group (right: t = −2.98, p = .005; left: t = −1.81, p = .075). After the MRM I, a significant difference was seen in breast engorgement, with the right breast receiving a score of 1.23 points in the experimental group and 3.00 points in the control group, and the left breast receiving a score of 0.84 points in the experimental group and 2.41 points in the control group (right: t = −4.50, p < .001; left: t = −3.74, p < .001). A significant difference was found in the right breast before the MRM I, but no significant difference was seen in the left breast. Following the MRM I, the left and right breasts showed significantly less engorgement in the experimental group than in the control group. The interaction between time and group was also statistically significant (right: F = 17.12, p < .001; left: F = 14.10, p < .001). Overall, after the MRM intervention, breast engorgement was lower in the experimental group than in the control group. Softening of the breast was also greater in the experimental group than in the control group.

Newborn breast milk intake

Breast milk intake was measured twice by comparing the weights of the newborns before and after breastfeeding. The results are

Table 1. Homogeneity test of general characteristics (N=58)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Categories</th>
<th>Exp (n = 31)</th>
<th>Cont (n = 27)</th>
<th>χ² or t (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td></td>
<td></td>
<td></td>
<td>−1.84 (.071)</td>
</tr>
<tr>
<td>Gestational age (day)</td>
<td></td>
<td>276.16 ± 7.92</td>
<td>275.30 ± 6.44</td>
<td>0.45 (.653)</td>
</tr>
<tr>
<td>Newborn age (day)</td>
<td></td>
<td>8.90 ± 2.21</td>
<td>8.00 ± 1.69</td>
<td>1.76 (.084)</td>
</tr>
<tr>
<td>Newborn height (cm)</td>
<td></td>
<td>50.73 ± 2.42</td>
<td>51.28 ± 1.35</td>
<td>−1.09 (.281)</td>
</tr>
<tr>
<td>Newborn weight at birth (g)</td>
<td></td>
<td>3,252.58 ± 491.57</td>
<td>3,371.11 ± 277.87</td>
<td>−1.15 (.256)</td>
</tr>
<tr>
<td>Birth order</td>
<td>First</td>
<td>25 (80.6)</td>
<td>20 (74.1)</td>
<td>0.36 (.549)</td>
</tr>
<tr>
<td>Type of delivery</td>
<td>Second or later</td>
<td>6 (19.4)</td>
<td>7 (25.9)</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td></td>
<td>23 (74.2)</td>
<td>18 (66.7)</td>
<td>0.40 (.530)</td>
</tr>
<tr>
<td>Cesarean</td>
<td></td>
<td>8 (25.8)</td>
<td>9 (33.3)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>13 (41.9)</td>
<td>12 (44.4)</td>
<td>0.37 (.847)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>18 (58.1)</td>
<td>15 (55.6)</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td></td>
<td>11 (35.5)</td>
<td>10 (37.0)</td>
<td>4.60 (.100)</td>
</tr>
<tr>
<td>Flat</td>
<td></td>
<td>13 (41.9)</td>
<td>16 (59.3)</td>
<td></td>
</tr>
<tr>
<td>Inverted</td>
<td></td>
<td>7 (22.6)</td>
<td>1 (3.7)</td>
<td></td>
</tr>
<tr>
<td>Breastfeeding education during pregnancy</td>
<td>Yes</td>
<td>4 (12.9)</td>
<td>5 (18.5)</td>
<td>0.35 (.556)</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>27 (87.1)</td>
<td>22 (81.5)</td>
<td></td>
</tr>
</tbody>
</table>

Cont: Control group; Exp: experimental group.
Table 2. Comparison of breast pain and breast engorgement between groups (N=58)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean ± SD</th>
<th>t</th>
<th>p</th>
<th>F (p)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast pain (VAS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-MRM I</td>
<td>5.61 ± 1.15</td>
<td>0.68</td>
<td>.501</td>
<td></td>
</tr>
<tr>
<td>Post-MRM I</td>
<td>2.71 ± 0.94</td>
<td>-5.38</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Pre-MRM II</td>
<td>3.71 ± 1.37</td>
<td>-4.45</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Post-MRM II</td>
<td>1.58 ± 0.77</td>
<td>-10.05</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Breast engorgement (right)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-MRM I</td>
<td>4.45 ± 1.95</td>
<td>1.15</td>
<td>.256</td>
<td></td>
</tr>
<tr>
<td>Post-MRM I</td>
<td>2.23 ± 1.56</td>
<td>-1.68</td>
<td>.100</td>
<td></td>
</tr>
<tr>
<td>Pre-MRM II</td>
<td>2.39 ± 1.36</td>
<td>-2.98</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>Post-MRM II</td>
<td>1.23 ± 1.09</td>
<td>-4.50</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Breast engorgement (left)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-MRM I</td>
<td>3.32 ± 1.83</td>
<td>1.47</td>
<td>.147</td>
<td></td>
</tr>
<tr>
<td>Post-MRM I</td>
<td>1.32 ± 1.30</td>
<td>-2.13</td>
<td>.037</td>
<td></td>
</tr>
<tr>
<td>Pre-MRM II</td>
<td>1.84 ± 1.49</td>
<td>-1.81</td>
<td>.075</td>
<td></td>
</tr>
<tr>
<td>Post-MRM II</td>
<td>0.84 ± 0.97</td>
<td>-3.74</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Newborn’s breast milk intake (g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-MRM I</td>
<td>35.16 ± 25.02</td>
<td>3.10</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Post-MRM II</td>
<td>36.13 ± 22.01</td>
<td>3.09</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Formula supplementation intake over 2 days (mL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-MRM I</td>
<td>334.84 ± 270.76</td>
<td>-2.50</td>
<td>.015</td>
<td></td>
</tr>
<tr>
<td>Total sleep time over 2 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-MRM I</td>
<td>2,295.71 ± 273.80</td>
<td>0.38</td>
<td>.702</td>
<td></td>
</tr>
</tbody>
</table>

Cont: Control group; Exp: experimental group; MRM: major myofascial release massage; MRM I: the first pectoralis MRM; MRM II: the second pectoralis MRM; VAS: visual analog scale.

*Repeated-measures analysis of variance.

Figure 4. Results for breast pain and engorgement.

MRM: Myofascial release massage; MRM I: the first pectoralis major MRM; MRM II: the second pectoralis MRM; VAS: visual analog scale.

shown in Table 2. After the MRM I, a significant difference was observed in newborns’ breast milk intake between the two groups (t = 3.10, p = .003). A significant difference was also found in breast milk intake between the groups after the MRM I (t = 3.09, p = .003). That is, after both the first and second MRM interventions, newborns’ breast milk intake was higher in the
MRM experimental group than in the control group.

Formula supplementation
The amount of infant formula supplementation used over the 48 hours following the MRM I is shown in Table 2. After the MRM I, a significant difference between the two groups was observed in the amount of infant formula supplementation used (t = −2.50, p = .015), with greater intake in the control group than in the experimental group.

Newborn sleeping patterns
No significant difference was noted in the newborns’ sleeping patterns during the 48-hour period after the MRM I (t = 0.38, p = .702).

Discussion
This study found that MRM was effective in reducing breast pain and breast engorgement in breastfeeding mothers. These results align with a previous study reporting the alleviation of breast pain and reduction in breast engorgement after massaging the base of mothers’ breasts [10], as well as a study that reported effective relief of breast pain by fascia relaxation breast massage [18].

In the present study, MRM was applied twice over 48 hours. After MRM I, breast pain significantly decreased in the experimental group, and the effect continued for MRM II, again showing a significant difference between the two groups. After MRM II, breast pain was significantly reduced relative to before the MRM I treatment. Although direct comparison is limited, in a study [20] where women received general breast massages and cabbage therapy for 3 days after childbirth, breast pain was slightly reduced in the experimental group compared to the control group. Breast pain is caused by fascia tension, nerve entrapment and blood vessel constriction in the chest muscles; this aligns with the results of this study, since the pectoralis muscle massage was effective for immediate relief of breast pain by relaxing the breast muscles [15].

In this study, the right breast showed greater engorgement than the left breast. Following MRM intervention, breast engorgement significantly decreased. Like breast pain, in the previous study [20], breast engorgement was reduced after general breast massage therapy; however, in the present study, the average reductions in breast engorgement for both breasts were 2.85 and 0.47 points in the experimental group and control group, respectively. These results show a six-fold difference in breast engorgement reduction between the groups, demonstrating the effectiveness of the MRM intervention.

No prior studies have directly measured the breast milk intake of newborns after the application of breast massage therapy. Importantly, in this study, the amount of breast milk intake was directly measured using an objective indicator: the weight of newborns before and after breastfeeding. In the preliminary examination before the commencement of the study, the amount of milk powder intake and the weight before and after formula intake were confirmed to be consistent. Regarding weight gain, newborns in the experimental group gained 17 g more (approximately twice as much) than the newborns in the control group, a significant difference. Furthermore, insufficient breast milk intake was evaluated based on the amount of formula supplementation consumed. The amount of formula consumed over the 48 hours after the MRM I was significantly lower in the experimental group than in the control group. Therefore, MRM was effective in increasing the amount of breast milk consumed by the newborns.

The sleeping patterns of newborns are affected by various sleep environment factors. However, in this study, sleeping time was evaluated to assess the specific effects of differences in breast milk intake on sleeping patterns after breastfeeding. The average total sleeping time of the newborns in both groups was 19 hours per day, with no significant difference observed between the groups in total sleeping time after the MRM I. This is consistent with a previous study [21].

This study focused on breastfeeding mothers and their newborns and examined the effects of pectoralis major MRM on engorgement, breast pain, breast milk intake, formula supplementation, and newborns’ sleeping patterns by employing direct measurement methods. To generalize pectoralis major MRM as a nursing intervention to improve the rate of breastfeeding practice, studies of various types with diverse participant groups are necessary. Moreover, the continuity of the effect must be evaluated by examining the rate of breastfeeding practice and the type of feeding after 6 months.

A limitation of the study is that since it was conducted at a postpartum care center affiliated with a hospital, its generalizability may be limited. Furthermore, although the study gathered data on the delivery type (cesarean vs. vaginal delivery), differences according to delivery type were not found. Finally, as only the effects of MRM were investigated, a more comprehensive comparison with other breast care interventions would be helpful in the future.

In conclusion, this study revealed that MRM delivered to breastfeeding mothers in two 30-minute sessions separated by a 48-hour interval was effective in reducing breast pain, reducing
the severity of breast engorgement, and increasing breastfeeding in newborns. In particular, a significant difference was observed in breast pain between the experimental and control groups following the first and second MRM sessions, and a significant group-by-time interaction effect was noted. Since pectoralis major MRM is effective and relatively easy to administer in clinical practice, it can be utilized as a nursing intervention to alleviate discomfort during breastfeeding and increase newborns’ breast milk intake. The active application of MRM may consequently improve the continuation of breastfeeding.

Supplementary materials
Further details on supplementary materials are presented online (available at https://doi.org/10.4069/kjwhn.2023.03.15).

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Authors Choi WR and Kim YS equally contributed as first authors.

Conflict of interest
The authors declared no conflict of interest.

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Data availability
Please contact the corresponding author for data availability.

Acknowledgments
None.

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 j.infbeh.2012.06.005
Addendum: Clinical trial registration number for interventional health studies

This addendum was issued to note clinical trial registration numbers for the following publications. In line with strengthening journal guidelines on adhering to the ICMJE guidelines on specifying clinical trial registration for interventional studies, the following manuscripts declare their clinical trial registration numbers. Prospective registration was not mandated by the funding agencies at start of the study and thus, retrospective registration was done by the author(s).


The clinical trial registration number of above article is KCT0008065.

The clinical trial registration number has also been updated to the manuscript PDF and online access.

*Korean Journal of Women Health Nursing* strongly recommends prospective registration of interventional health studies.
Digital Era Education for Women’s Health and Well-being
To be published in September 2023

Aims and scope
The COVID-19 pandemic induced changes that have potentiated digital transformation on multiple levels world-wide. Although the pandemic initially created gaps in educational support for women with health issues, adapting digital technology made new teaching modalities and supportive interventions possible. Meanwhile, in clinical practicum, stricter infectious disease management protocols and privacy concerns have doubled the challenge of preparing nursing students to adequately assess and meet the needs of women. In this context, digital technologies can offer teaching solutions that can reach women more effectively and support their health and well-being, as well as prepare nursing students to learn more effectively about women's health nursing.

The thematic scope of this special issue includes scientific issues related to the design and implementation or to the utility and usability of novel digital solutions, tools, and/or systems, provided that they contribute to women’s health.

Main topics
This special issue will focus on the design, development, evaluation, and use of digital solutions that support the health and well-being of women through education. Contributions should demonstrate how digital transformation based solutions support nurse clinicians and/or educators in enhancing women's health.

Contributions are solicited on, but not limited to, the following topics:

- Design and implementation of digital solutions to improve reaching and teaching women to manage and promote their health and well-being.
- Design and implementation of novel tools to help nurse clinicians and/or educators adapt teaching modalities for women, nurses, and/or nursing students, to the changing needs of the digital era.
- Topics include, but are not limited to, digital transformation, artificial intelligence, mixed reality (MR) modalities, etc., applied to educational support for women's health issues.
- Various manuscript types are welcome in either English or Korean: Systematic reviews, scoping reviews, methodology papers, concept papers, experimental research, qualitative research, action research, etc.

Important dates
Deadline for submission of papers has been extended to 31st Mar 2023.
Notification of acceptance: 15th Jun 2023
Deadline for submission of final version of accepted papers: 15th Aug 2023

Submission guidelines
Submissions should be prepared according to the author instructions available at the journal homepage, https://www.kjwhn.org/authors/authors.php. Typical length of a manuscript is 14–15 pages.
Instructions to Authors

Korean Journal of Women Health Nursing
Enacted in March 1995 and most recently revised in November 2022 and applied from Vol 28, No 4 (December 2022)

1. General Guidelines for Manuscript

The Korean Journal of Women Health Nursing is focused on women's healthy life processes or on conditions relevant to women due to greater risk or prevalence among women. It features original articles and review papers. Manuscripts for submission should be prepared according to the following instructions. The Journal follows the Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (http://www.icmje.org) if not otherwise described below.

1-1. QUALIFICATION FOR AUTHORS AND LANGUAGE

Nurses or researchers throughout the world can submit a manuscript if the scope is appropriate for Korean Journal of Women Health Nursing. Manuscripts should be submitted in English or in Korean. Medical or nursing terminology should be written based on the most recent edition of Dorland's Illustrated Medical Dictionary, the most recent edition of English-Korean Korean-English Medical Terminology (https://term.kma.org/search/list.asp) published by the Korean Medical Association or the most recent edition of Standard Nursing Terminology published by the Korean Society of Nursing Science. Authors are required to state their affiliation and related status (job titles) upon submission, to support the reliability of the research.

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For the policies on research and publication ethics that are not stated in these instructions, the Good Publication Practice Guidelines for Medical Journals (https://www.kamje.or.kr/board/view?b_name=bo_publication&bo_id=13&per_page=) or the Guidelines on Good Publication Practice (https://publicationethics.org/guidance/Guidelines) can be applied.

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Publication of master’s thesis or doctoral dissertation: When thesis or dissertation work is submitted for publication, the first author should be the thesis awardee and should declare that content is from thesis/dissertation.

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This journal follows the data sharing policy described in “Data Sharing Statements for Clinical Trials: A Requirement of the International Committee of Medical Journal Editors (ICMJE)” (https://doi.org/10.3346/jkms.2017.32.7.1051). As of July 1, 2018 manuscripts submitted to ICMJE journals that report the results of interventional clinical trials must contain a data sharing statement as described below. Clinical trials that begin enrolling participants on or after January 1, 2019 must include a data sharing plan in the trial’s registration. The ICMJE’s policy regarding trial registration is explained at http://www.icmje.org/about-icmje/faqs/clinical-trials-registration/. Authors of interventional clinical trials are expected to submit the registration number (e.g., CRIS registration number, https://cris.nih.go.kr/) at submission. If the data sharing plan changes after registration this should be reflected in the statement submitted and published with the manuscript, and updated in the registry record. All of the authors of research articles that deal with interventional clinical trials must submit data sharing plan of example 1 to 4 in Table 1. Based on the degree of sharing plan, authors should deposit their data after de-identification and report the digital object identifier (DOI) of the data and the registered site.

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All contributions (including solicited articles) are critically reviewed by the editorial board members, and/or reviewers. If the manuscript does not fit the aims and scope of the Journal or does not adhere to the Instructions to Authors, it may be returned to the author immediately after receipt and without a review. Before reviewing, all submitted manuscripts are inspected by Similarity-Check powered by iThenticate (https://www.crossref.org/services/similarity-check/), a plagiarism-screening tool. Reviewers’ comments are usually returned to authors. The decision of the editor is final. Manuscripts are sent simultaneously to two reviewers for double blinded peer review. A third reviewer will be assigned if there is discrepancy. Authors will receive notification of the publication decision, along with copies of the reviews and instruction for revision, if appropriate, within two months after receipt of the submission.

Final revised manuscript: A final version of the accepted manuscript should be submitted on the web. If aspects of the research are reported elsewhere, include a copy of the publication(s). Include all main manuscript material in one file (with exception of title page). Save your file as MS Word. Failure to resubmit the revised manuscript within two weeks of the editorial decision is regarded as a withdrawal and will be treated as a new submission if submitted again later.

Peer review process for handling submissions from editors, employees, or members of the editorial board: All manuscripts from editors, employees, or members of the editorial board are processed same to other unsolicited manuscripts. During the review process, submitters will not engage in the selection of reviewers and decision process. Editors will not handle their own manuscripts if they are commissioned ones.
Table 1. Examples of data sharing statements that fulfill the requirements of the International Committee of Medical Journal Editors.

<table>
<thead>
<tr>
<th>Element</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
<th>Example 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will individual participant data be available (including data dictionaries)?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>What data in particular will be shared?</td>
<td>All individual participant data collected during the trial, after deidentification.</td>
<td>Individual participant data that underlie the results reported in this article, after deidentification (text, tables, figures, and appendices).</td>
<td>Individual participant data that underlie the results reported in this article, after deidentification (text, tables, figures, and appendices).</td>
<td>Not available</td>
</tr>
<tr>
<td>What other documents will be available?</td>
<td>Study protocol, statistical analysis plan, informed consent form, clinical study report, analytic code</td>
<td>Study protocol, statistical analysis plan, analytic code</td>
<td>Study protocol</td>
<td>Not available</td>
</tr>
<tr>
<td>When will data be available (start and end dates)?</td>
<td>Immediately following publication. No end date.</td>
<td>Beginning at 3 months and ending at 5 years following the article publication.</td>
<td>Beginning at 9 months and ending at 36 months following the article publication.</td>
<td>Not applicable</td>
</tr>
<tr>
<td>With whom?</td>
<td>Anyone who wishes to access the data.</td>
<td>Researchers who provide a methodologically sound proposal.</td>
<td>Investigators whose proposed use of the data has been approved by an independent review committee (“learned intermediary”) identified for this purpose.</td>
<td>Not applicable</td>
</tr>
<tr>
<td>For what types of analyses?</td>
<td>Any purpose</td>
<td>To achieve aims in the approved proposal.</td>
<td>For individual participant data meta-analysis.</td>
<td>Not applicable</td>
</tr>
<tr>
<td>By what mechanism will data be made available?</td>
<td>Data are available indefinitely at [link to be included].</td>
<td>Proposals should be directed to [xxx@yyy]. To gain access, data requestors will need to sign a data access agreement.</td>
<td>Proposals may be submitted up to 36 months following article publication. After 36 months the data will be available in our University’s data warehouse but without investigator support other than deposited metadata.</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Data are available for 5 years at a third-party website [link to be included].</td>
<td>Information regarding submitting proposals and accessing data may be found at [link to be provided].</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1-10. CONTACT US
Any inquiries regarding suitability of manuscripts according to the aims and scope of the Journal, submission, review, publication, or journal-related issues are welcomed. Please contact the Editorial Office (kjwhn@kjwhn.org).

For manuscript submission, please visit: http://submit-kjwhn.org

2. Publication Type and Manuscript Preparation

2-1. WRITING MANUSCRIPTS
All manuscripts must be prepared in accordance with the “Uniform Requirements for Manuscripts Submitted to Biomedical Journals” available at http://www.icmje.org. Manuscripts are accepted for publication with the understanding that their contents, or their essential substance, have not been published elsewhere, except in abstract form or by the express consent of the Editors. Materials taken from other sources must be accompanied by written permissions for reproduction, obtained from the original publisher. Statistical methods should be identified. Priority claims are discouraged. All materials must be written in clear, appropriate English using Microsoft Word (doc or docx). Each page must be numbered at the lower central portion. Number pages consecutively.

2-2. TITLE PAGE
On the title page include title (only capitalize first letter of the first word); subtitle (if any); running title, first name, middle initial, and last names of each author, ORCID number (required for all authors), name of department(s) and institution(s) to which the work should be attributed. The address, phone number, and email of the person responsible for correspondence concerning the manuscripts should be listed separately and clearly labeled as such. List keywords and present authors’ contributions. The journal does not limit first author status to only one person, in cases where equal contribution is evident. Describe contributions, such as the following:

Example 1:
Conceptualization: Piao H, Kim MH; Formal analysis: Piao H, Kim MH, Cui M, Choi G; Writing–original draft: Piao H, Kim MH; Writing–review & editing: Piao H, Choy JH.

Example 2: All work was done by Jeong GH.

Also, describe conflicts of interest, funding, data availability, and acknowledgments (acknowledge only those people and their institutions that have made significant contributions to the study). If applicable, state disclaimers, such as whether manuscript was adapted from thesis/dissertation.

The title page must be submitted separately from the manuscript. A template is available online (https://www.kjwhn.org/authors/authors.php).

2-3. MAIN MANUSCRIPT
Organize the main manuscript in the following order; title, abstract and keywords, summary statement, text, references, tables, figures, and pictures.

Original articles

Abstract and Keywords
An abstract of no more than 250 words should be typed double-spaced on a separate page. It should cover the main factual points, according to the following subheadings: Purpose, Methods, Results, and Conclusion. The abstract should be accompanied by a list of up to five keywords for indexing purposes. Be very specific in your word choice. Use MeSH keywords (https://meshb.nlm.nih.gov/) and present keywords in alphabetical order.

Summary Statement
Following the abstract, describe a summary statement on a separate page according to the following subheadings, with 30 words or less under each subtitle.

• What is already known about this topic?
  Example: The 75 years and older age group, with its complex health needs, is likely to make up an increasing proportion of the workload of accident and emergency strain the coming years.

• What this paper adds
Example: An alcohol-based surgical hand rub is more effective than a 6-minute surgical hand scrub using 4% chlorhexidine gluconate in terms of microbial counts immediately after scrubbing.

• Implications for practice, education and/or policy
Example: Parents’ ability and willingness to participate in their child’s care in the hospital should be thoroughly assessed and their participation needs to be supported.

Main Text
Maximum word count should be within 5,000 words, although less is preferred, excluding tables, figures, and references. The manuscript should be written on A4 sized paper, in Times New Roman 12-point font, double-spaced and have margins of at least one inch (2.54 cm). In general, the text should be organized under the following headings: Introduction, Methods, Results, and Discussion.

Introduction: Clearly state the need of this study and main question or hypothesis of this study. Summarize the literature review or background in the area of the study.

Methods: Present an “Ethics statement” immediately after the heading “Methods” in a boxed format.

Example 1:

Ethics statement: This study was approved by the Institutional Review Board of XXXX University (IRB-201903-0002-01). Informed consent was obtained from the participants.

Example 2:

Ethics statement: Obtaining informed consent was exempted by the Institutional Review Board (IRB) of YYYY University (IRB-201903-0002-01) because there was no sensitive information and the survey was anonymously treated.

Describe the study design, setting and samples, and measurements, procedure, analysis used. Authors are encouraged to describe the study according to the reporting guidelines relevant to their specific research design, such as those outlined by the EQUATOR Network (http://www.equator-network.org/home/) and the United States National Institutes of Health/National Library of Medicine (http://www.nlm.nih.gov/services/research_report_guide.html).

Ensure correct use of the terms sex (when reporting biological factors) and gender (identity, psychosocial or cultural factors), and, unless inappropriate, report the sex or gender of study participants, the sex of animals or cells, and describe the methods used to determine sex or gender. If the study was done involving an exclusive population, for example in only one sex, authors should justify why, except in obvious cases (e.g., ovarian cancer). Authors should define how they determined race or ethnicity and justify their relevance.

Results: Describe the main results in a concise paragraph. This section should be the most descriptive. Note levels of statistical significance and confidence intervals where appropriate.

Discussion: Make discussions based only on the reported results. Describe conclusions and recommendations for further study needed. Do not summarize the study results.

Abbreviations: Use standard abbreviations and units recommended in the publication manual of the to the NLM Style Guide for Authors, Editors, and Publishers (2007), 2nd ed., National Library of Medicine, Bethesda, MD, USA (http://www.nlm.nih.gov/citingmedicine). Non-standard abbreviations should be defined the first time they appear in the text. At first usage, spell out terms and give abbreviations in parentheses. Thereafter, use only abbreviations. It is not necessary to spell out standard units of measure, even at first usage.

Review article
An invited review will be published on an interesting or a new topic. Also submitted reviews are welcomed on any field according to the aims and scope, including systematic review and meta-analysis, scoping reviews, and integrative reviews. The main text is composed of introduction, methods, results, and discussion. There is no limit to the total number of references for a review article. The word count for the main text should be within 8,000 words.

Invited paper
It is a commissioned article for specific purpose only with request base. The topics were discussed between editors and authors before submission. The main text is composed of 3 sections: introduction, text, and conclusion. The total number of references article is recommended to be equal to or less than 30. The word count for the main text should be within 8,000. An abstract is optional and is limited to 250 words.

Issues and perspectives
Issues and Perspectives is usually an invited short article, which deals with the present hot issues in women’s health nursing, al-
though not limited to this field. Authors of general interest to nursing and health care are also invited. Its format consists of introduction, main content, and conclusion. Length of the main text is limited to 2,000 words and keywords are limited to 5, preferably in MeSH terms. Number of references is limited to 20 and figures and tables are limited to 10 in total.

Special essay
It is a commissioned publication type for the presentation of experiences in nursing or health field. Authors are invited by the editor-in-chief. Topics are discussed upon request. There is no specific format.

Editorials
An editorial is usually invited by the Editorial Board. It provides the brief review and comments on pressing developments and events in the field of women's health nursing. It also may deal with a change in the journal’s style and format and communication with an outside organization or professional. Other various topics shall be dealt by the Editorial Board as deemed appropriate. Divisions in the body of an editorial are not required. The total number of references is recommended to be equal to or less than 10. The word count of the main text should be less than 2,500 words.

Letter to the editor
Any opinion or inquiry on a paper published can be addressed to the editor. Title, author, affiliation, main text and the references are the required sections. The total number of references is recommended to be less than 10. The word count of main text should be equal to or less than 1,000 words.

In reply
As the reply to “Letter to the editor” its format is same to the “Letter to the editorial” and will be published simultaneously.

2-4. References
In the text, references should be cited with Arabic numerals in brackets (e.g. [1]), numbered in the order cited.

In the references section, the references should be numbered in order of appearance in the text and listed in English citation form. Journal titles should be described in NLM style.

References within the past 5 years are encouraged, and unpublished PhD or master’s thesis are not recommended as reference.

Other types of references not described below should follow the NLM Style Guide for Authors, Editors, and Publishers (http://www.nlm.nih.gov/citingmedicine). There are no limits to the number of references. However, limit supporting citations in text to 1-2 per statement. Note the DOI in URL form, if available.

Journal article with up to six authors:

Journal article with more than six authors:

Book:

Book Chapter:
Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in

| Table 2. Recommended maximums for articles submitted to the Korean Journal of Women Health Nursing |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Publication type          | Abstract (word count)     | Text (word count)**      | References                | Tables & figures          |
| Original articles         | 250                       | 5,000                    | No limit                  | 6                         |
| Review articles           | 250                       | 8,000                    | No limit                  | 6                         |
| Invited papers            | Optional (250)            | 8,000                    | 30                       | 10                        |
| Issues and Perspectives   | None                      | 2,000                    | 20                       | 10                        |
| Special essays            | None                      | 3,000                    | 20                       | 10                        |
| Editorials                | None                      | 2,500                    | 10                       | 5                         |
| Letter to the editor      | None                      | 1,000                    | 10                       | 3                         |
| In reply                  | None                      | 1,000                    | 10                       | 3                         |

**Maximum number of words excludes the abstract, references, tables, and figure legends

Above limitations are negotiable. If more word count or number of figures and tables are required, authors can contact the editor-in-chief.

Unpublished thesis or dissertation:

Web reference:

2-5. Tables/Figures/Pictures
Each table, figure, and picture should be placed on a separate sheet. Number tables consecutively and supply a brief title at the top for each. Footnotes to tables should be indicated by superscript symbols (†, ‡, §, ‖, ¶, ††, ‡‡…) unless abbreviations are explained in which case superscripts are not required. All abbreviations used should be described in table footnote by writing the abbreviation followed by colon sign and definition, placed in alphabetical order.

Tables and figures are printed only when they express more than can be done by words in the same amount of space.

Do NOT indicate placement of tables of figures in the text. The editor will automatically place your tables and figures.

3. How The Journal Handles Complaints and Appeals

The policy of Korean Journal of Women Health Nursing is primarily aimed at protecting the authors, reviewers, editors, and the publisher of the journal. If not described below, the process of handling complaints and appeals follows the COPE guidelines available from: https://publicationethics.org/appeals

Who complains or makes an appeal?
Submitters, authors, reviewers, and readers may register complaints and appeals in a variety of cases as follows: Falsification, fabrication, plagiarism, duplicate publication, authorship dispute, conflicts of interest, ethical treatment of animals, informed consent, bias or unfair/inappropriate competitive acts, copyright, stolen data, defamation, and legal problem. If any individuals or institutions want to inform the cases, they can send a letter via the contact page on our website (https://kjwhn.org/about/contact.php). For the complaints or appeals, concrete data with answers to all factual questions (who, when, where, what, how, why) should be provided.

Who is responsible for resolving and handling complaints and appeals?
The Editor, Editorial Board, or Editorial Office is responsible for them. A legal consultant or ethics editor may be able to help with decision making.

What may be the consequence of the remedy?
It depends on the type or degree of misconduct. The consequence of resolution will follow the guidelines of COPE.

4. Direct Marketing

Journal propagation has been done through the journal website and distribution of an introduction pamphlet. Invitations to submit a manuscript are usually focused on the presenters at conferences, seminars, or workshops if the topic is related to the journal’s aims and scope.
Research and Publication Ethics

For the policies on research and publication ethics that are not stated in these instructions, the Good Publication Practice Guidelines for Medical Journals (https://www.kamje.or.kr/board/view?b_name=bo_publication&bo_id=13&per_page=) or the Guidelines on Good Publication Practice (https://publicationethics.org/guidance/Guidelines) can be applied.

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2. Statement of Human And Animal Rights

Clinical research should be done in accordance with the Ethical Principles for Medical Research Involving Human Subjects, outlined in the Declaration of Helsinki (https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/). Clinical studies that do not meet the Declaration of Helsinki will not be considered for publication. Research participants’ rights to privacy must be protected, and personal identifiable information should not be disclosed unless absolutely necessary. Human subjects should not be identifiable, i.e., patients’ names, initials, hospital numbers, dates of birth, photographs, or other protected healthcare information should not be disclosed. If such personal information is needed as scientific data for publication, this should be explained to participants (or legal guardians) and written consent must be obtained. The possibility of online information sharing (not only printed publications) must also be explained. For animal subjects, research should be performed based on the National or Institutional Guide for the Care and Use of Laboratory Animals, and the ethical treatment of all experimental animals should be maintained. For studies using literature review and meta-analysis, Institutional Review Board (IRB) approval is not required. For secondary data analysis studies, the editorial committee will decide whether IRB approval is needed.

3. Statement of Informed Consent

Copies of written informed consents and IRB approval for clinical research should be kept. If necessary, the editor or reviewers may request copies of these documents to resolve questions about IRB approval and study conduct.

4. Authorship

All authors, including the co-authors, should be responsible for a significant part of the manuscript. All authors and co-authors should have taken part in writing the manuscript, reviewing it, and revising its intellectual and technical content. Any author whose name appears on a paper assumes responsibility and accountability for the results.

5. Originality and Duplicate Publication

All submitted manuscripts should be original and should not be considered by other scientific journals for publication at the same time. Manuscripts are accepted for publication with the understanding that their contents, or their essential substance, have not been published elsewhere, except in abstract form or by the express consent of the Editors. Any part of the accepted manuscript should not be duplicated in any other scientific journal without the permission of the Editorial Board. The duplication will be checked through SimilarityCheck powered by iThenticate (https://www.crossref.org/services/similarity-check/) before review. If duplicate publication related to the papers of this journal is detected, the authors will be announced in the journal and their institutes will be informed, and there also will be penalties for the authors. Materials taken from other sources must be accompanied by writ-
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6. Secondary Publication

It is possible to republish manuscripts if the manuscripts satisfy the condition of secondary publication of the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (http://www.icmje.org).

7. Publication of Master’s Thesis or Doctoral Dissertation

When thesis or dissertation work is submitted for publication, the first author should be the thesis awarerer and should declare that content is from thesis/dissertation.
Author’s Checklist

☐ This manuscript has not been submitted for publication elsewhere and follows the Publication and Research Ethics of the Korean Journal of Women Health Nursing.

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Manuscript preparation
☐ A4, 12 point font Times New Roman in MS Word file
☐ Line space: Double spacing / Margins of at least 1 inch (2.5 cm)
☐ Within 5,000 words (excluding figures, tables, references)
☐ Author information is removed

Abstract
☐ 250 words or less (240-250 words are suggested)
☐ Subheadings of Purpose, Methods, Results, and Conclusion

Summary Statement
☐ 30 words or less under each subtitle

Main Text
☐ Subheadings of Introduction, Methods, Results, and Discussion
☐ Permission to use instruments should have been obtained
☐ Specify Ethics statement under Methods subheading. Avoid redundant descriptions in the text

References
☐ References follow NLM style
☐ Limit supporting references to 1-2 per statement

Table, figure, and picture
☐ No more than 6 figures, tables, and pictures altogether
☐ According to Instructions to Authors
☐ Abbreviations are noted under the table, in alphabetical order, and are congruent with text descriptions
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