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ORIGINAL RESEARCH

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Development of a mobile-based health management application for men in andropause

Young Sook Lim[1], Sun Jung Park[1,*]

[1]Department of Nursing, Sahmyook Health University, 02500 Seoul, Republic of Korea

***Correspondence**
bun8973@naver.com
(Sun Jung Park)

Abstract

This study attempted to develop a mobile-based health management application targeting middle-aged men experiencing andropause, with the aim of allowing them to prevent and continuously manage health issues that may arise during the experience of andropause. The mobile web-based andropause health management program focused on providing a wide range of information and enhancing self-management by integrating various sources of information. Additionally, the app was developed based on the Android OS (used in domestic smartphones), enabling comprehensive information access anytime and anywhere in daily life, and offering various self-measurement features to facilitate effective self-management for individuals experiencing andropause. Currently, existing andropause management apps are designed for women, making this study's program unique as it is developed for middle-aged men. Furthermore, by connecting various psychological counseling programs, this application can be utilized as a resource for mental health management, allowing for shortened intervention times and flexible, accessible interventions when necessary. While this andropause app for men was developed through user satisfaction surveys, it is necessary to conduct a larger study to test the effectiveness of the andropause health management program for middle-aged men.

Keywords

Andropause; Health information management; Male; Mobile applications

1. Introduction

1.1 Significance of the study

Middle age, marking a crucial transition in the human life cycle toward old age, represents a significant period for individuals to exert influence in their personal, family and societal spheres while striving for a stable life [1]. At the same time, this phase entails experiencing changes in physical, psychological and social aspects, including a gradual decline in health, preparation for retirement, and psychological instability [1]. Specifically, middle-aged men may experience changes in their roles at home, a sense of responsibility related to their careers, and anxiety arising from competition with younger generations. The physical changes that occur during this period play a crucial role as significant influencing factors in life [2]. Failure to cope with these midlife changes can exacerbate midlife crisis, affecting not only the individual's life but also influencing family and societal aspects, potentially giving rise to concerns about aging and the transition into old age [3]. Moreover, as it can have adverse effects on health in old age [4], there is a growing need for research on health issues among middle-aged men.

One of the factors contributing to midlife changes, menopausal symptoms, refers to the physical, mental, and social changes occurring in midlife due to hormonal, physiological, and chemical changes [5]. Andropause (or male menopause) manifests due to androgen deficiency associated with the aging process, resulting in physical changes such as abdominal obesity, decreased muscle mass and strength, hair loss, as well as emotional changes including depression, sleep disturbances, fatigue and alterations in sexual function characterized by changes in libido and erectile dysfunction [5]. As androgen levels decrease gradually, there is a continuous secretion of hormones, making the onset timing of symptoms unpredictable [6]. Unlike women's menopause, the symptoms of andropause do not manifest distinctly, leading to a lack of awareness of their severity and, consequently, an insufficient response to the changes [6]. The prevalence rate of male andropause is over 60%, with a majority of middle-aged men experiencing it [7]. Given that many men still lack accurate awareness and knowledge about andropause, it underscores the importance of increasing awareness and taking proactive measures to cope with this phase effectively [8].

Previous studies targeting middle-aged men have either fragmentarily examined the stress and quality of life differences associated with andropausal symptoms [9–11], or solely focused on determining factors influencing the quality of life in middle-aged men [12]. Recently, the impact

of andropausal symptoms on midlife crisis in middle-aged men has been reported [13], highlighting the increasing importance of developing educational programs related to this matter. Therefore, to promote the health and positive management of andropause in middle-aged men, there is a need to strengthen preventive support through education [13]. Due to the long-lasting nature of andropause, it is crucial to explore intervention strategies that facilitate continuous self-management [14]. In addition, providing accurate knowledge and information is also essential for offering practical assistance in preventing issues proactively [13]. Educational materials should be constructed by faithfully reflecting the needs of the target audience, incorporating attributes that satisfy fundamental psychological demands and utilizing highly accessible media [14].

With the recent surge in smartphone popularity, a growing number of mobile phone users are shifting towards smartphones, and along with this trend, the use of health-related applications (hereinafter referred to as Apps) on smartphones is increasing [15]. Educational Apps on smartphones leverage the advantages of smartphones, which are not constrained by time and place, enabling immediate feedback and interaction between educators and users. Consequently, they are widely utilized as an effective educational medium [16]. As such, this study aims to provide foundational data for the health management of middle-aged men experiencing andropause by developing a mobile web-based andropause health management program, enabling them to self-prevent and continuously manage potential health issues during this life stage.

1.2 Research objectives

This study aims to develop a mobile-based health management application program specifically designed for middle-aged men experiencing andropause.

2. Materials and methods

2.1 Research design

This study employs the ADDIE (Analysis-Design-Development-Implementation-Evaluation) model to develop a mobile-based health management application tailored for middle-aged men experiencing andropause, encompassing the stages of analysis, design, development, implementation and evaluation.

2.2 Research participants

2.2.1 Expert evaluation

In the design phase, expert evaluations for content validity were conducted by 1 urology specialist, 1 family medicine specialist, 1 nurse with over 3 years of experience in urology ward, 1 ward nurse, and 2 nursing professors. Post-development evaluation included a total of 7 experts, consisting of 6 content validity experts and 1 app development expert.

2.2.2 User evaluation

User satisfaction was evaluated among 5 patients undergoing treatment for andropausal symptoms at a university hospital. These individuals, having understood the study's objectives and provided their consent, participated in the assessment after obtaining approval from the Institutional Review Board (IRB).

Participants were selected based on specific criteria, including being middle-aged men experiencing andropausal symptoms (such as sexual dysfunction and erectile dysfunction), absence of mental disorders, ability to comprehend and independently respond to the survey, current usage of an Android-based smartphone, and voluntary agreement to participate with an understanding of the research objectives.

Individuals using iOS-based smartphones or those who are illiterate were not considered as research participants.

2.3 Research tools

2.3.1 Content validity measurement tool

For the selection of app content, the content validity measurement tool, designed by the researcher based on Kim *et al*. [17] and Lee's [18] measurement tools for male andropause, was utilized. A 4-point scale was used to compose a total of 43 items, consisting of 31 items in the education domain, 5 items in the self-assessment domain, 3 items in the inquiry domain, 2 items in the alarm domain, 1 item in the bulletin board domain, and 1 item in the app information domain.

2.3.2 Application evaluation tool

The smartphone app evaluation tool for health management developed by Kim [19] was utilized. The tool comprises 10 items for content, 11 items for interface design, and 3 items for technology, with a higher score signifying greater satisfaction. The tool incorporates 2 open-ended questions designed to evaluate the quality of the content, along with 1 question addressing the likelihood of recommendation. The reliability of the tool, as reported in Kim's [19] study, indicated a Cronbach's alpha of 0.90, while in this study, the Cronbach's alpha is 0.95.

2.4 Application development process

2.4.1 Analysis phase

2.4.1.1 Literature review

Domestic literature was obtained from the Korean Research Information Sharing Service (www.riss4u.net), searching for domestic academic journals and theses related to male andropause health management. Foreign literature was obtained by searching for documents related to male andropause health management on MEDLINE (PubMed) and CINAHL (EBSCO). Through this process, literature published from January 2003 to December 2023 was analyzed.

2.4.1.2 Focus group interviews

In-depth interviews were conducted with 5 individuals undergoing treatment for andropausal symptoms at a university hospital to explore their self-care needs. A 30-minute in-depth interview was conducted with each individual to gain insights into their perspectives on self-care, particularly in addressing challenges related to symptoms of andropause. This involved exploring their current self-care practices, the difficulties they face, issues they have identified, desired knowledge regarding

self-care, and considerations for the development of a mobile application. The interviews were recorded and analyzed, and the content of self-care as well as the structure of the application were examined based on the recorded discussions.

2.4.2 Design phase

2.4.2.1 Verification of app content validity

The content validity of the app in this study was verified by synthesizing information from literature reviews, website research, requirements gathered through focus interviews, and educational brochures currently used in university hospitals in Seoul, Gangwon Province, and Chungbuk Province for managing male andropause. A structural framework for the content was established, and a total of 43 items were selected based on content validity assessments conducted by 7 experts.

2.4.2.2 Database design

In this study, the application was designed based on the Android operating system using MySQL.

2.4.2.3 Screen design

In collaboration with a professional app designer, the study conceptualized the application's name, character illustration, section categorization, screen layout, color, font style, and size to create an application that is easy to navigate and offers high visibility, accessibility and usability.

2.4.3 Development phase

The mobile application for health management education aimed at men in andropause was given the name "Healthy Midlife", and the content, designed in collaboration with application development experts, was implemented through coding work. The development period was from 01 September 2022, to 01 December 2023. The development environment included Windows 11, Android Studio build 2023, and Microsoft Visual Studio Community 2022. The WebApp was implemented as Android and iOS Native Apps, while the content section was developed as a Web Application using. NET Framework Core. The server was based on Windows Server 2022, and MSSQL was used for the database.

2.4.4 Implementation phase

The developed app was directly downloaded onto the smartphones of the 5 individuals undergoing andropause treatment, and access to the app was granted by entering the provided password.

2.4.5 Evaluation phase

The application was evaluated by a total of 7 experts and 5 app users, utilizing a smartphone health management app evaluation tool.

2.5 Data analysis

The collected data, including expert and user app evaluation scores, Data analysis was performed using SPSS (version/statistics) 26.0 software (SPSS Inc., Chicago, IL, USA). Content validity of the measurement tools was verified using the Content Validity Index (CVI), and the reliability of the measurement tools was validated using Cronbach's alpha.

3. Results

3.1 Development of the andropause health management program application

3.1.1 Analysis phase

3.1.1.1 Literature review

A total of 13 sources, comprising 7 domestic and international literature pieces and 4 domestic and international websites, were analyzed to form the content of the andropause health management program, consisting of education, self-assessment, alarms, queries, bulletin boards, and app information.

3.1.1.2 Focus group interviews

Based on the analysis of the interviews, participants expressed a desire to learn more about the self-care check area. The users suggested that the application should include features allowing them to track their health status through self-assessment for self-care checks. They also expressed that features like an alarm function and a question-and-answer platform, enabling users to record and analyze data related to medication use, complication responses, sleep management, nutrition management, health management, *etc.*, would be beneficial.

3.1.2 Design phase

3.1.2.1 Expert content validity evaluation

During the analysis phase, the sub-areas were structured into six categories: education, assessment, alarm, inquiry, bulletin board, and app information, and subsequently evaluated for content validity by experts. The content incorporated into the final application spans the six areas: education, self-assessment, inquiry, alarm, bulletin board and app information (Table 1).

3.1.2.2 Content

The education section includes topics such as andropause diagnosis, hormone therapy, complications, nutrition management, daily life management, and hospital visits. The self-assessment area involves daily self-checks for self-nursing. The alarm function includes reminders for medication at specified times and outpatient clinic appointment dates. The inquiry function encompasses hormone replacement, andropause scale and sleep amount. The bulletin board and app information sections include explanations related to the app and reference materials.

3.1.3 Development phase

When examining the key features of the application developed for each area, each section is designed with easy-to-understand elements such as illustrations, photos and tables. In the self-assessment area, users are prompted to perform daily tasks, including medication intake, checking for complications, managing sleep, nutrition and maintaining a daily checklist for health management, with options to choose from "well", "average" or "poor" for each item. Pressing the "Inquiry" button displays a line graph based on the total score, allowing users to self-check and retrieve results. This provides feedback, triggers motivation, and contributes to self-care by encouraging users to check their own results. The inquiry section allows

TABLE 1. Application configuration contents.

Category	Evaluation details
1. Education	
1-1. Andropause diagnosis	
	(1) Definition of andropause diagnosis: explanation
	(2) Symptoms and preventive measures of andropause: Illustrations and explanations
	(3) Andropause treatment: explanation
1-2. Hormone therapy	
	(1) Definition of hormone therapy: explanation
	(2) Types, administration, efficacy, side effects, precautions of hormone therapy: photos and explanations
	(3) Precautions: explanation
1-3. Complications	
	(1) Decreased sexual function: Illustration
	(2) Decreased muscle strength: table and explanation
	(3) Osteoporosis: explanation
	(4) Diabetes: explanation
	(5) Hypertension: explanation
	(6) Other complications (ophthalmic, hematological, dermatological): explanation
1-4. Nutritional management	
	(1) Andropause dietary guidelines
	(2) Foods that help male hormones
	(3) Recommended *vs.* restricted foods: table
1-5. Daily life management	
	(1) Self-management: explanation
	(2) Adult disease management: explanation
	(3) Ways to navigate through andropause wisely
	(4) Immune system management: illustrations and explanations
	(5) Alcohol management
	(6) Smoking management
	(7) Obesity management: explanation
	(8) Mental health management: explanation
	(9) Hair loss management: explanation
	(10) Exercise management: explanation
	(11) Sexual health management: explanation
	(12) Insomnia management: explanation
	(13) Stress management: explanation
1-6. Hospital visits	
	(1) Outpatient visit timing and methods: table, illustration, and explanation
	(2) Test details during hospital visits: illustrations and explanations
	(3) Regular health check-ups: table and explanation

TABLE 1. Continued.

Category	Evaluation details
2. Self-assessment	
2-1. Self-care daily check	
	(1) Medication management: check the level of self-care daily by using a checklist to distinguish between well/average/poor and monitor accordingly.
	(2) Complications reaction check: check the level of daily self-care through a checklist, categorizing as well/average/poor, and monitor reactions to complications accordingly.
	(3) Sleep management: check the level of self-care daily through a checklist to distinguish between well/average/poor and monitor accordingly.
	(4) Nutrition management: check the level of self-care daily through a checklist to distinguish between well/average/poor and monitor accordingly.
	(5) General health management: check the level of self-care daily through a checklist to distinguish between well/average/poor and monitor accordingly.
3. Alarm	
	(1) Medication time set alarm
	(2) Outpatient appointment date set alarm
4. Inquiry	
	(1) Hormone intake: easily viewable through a graph at a glance.
	(2) Andropausal scale: easily viewable through a graph at a glance.
	(3) Sleep amount: easily viewable through a graph at a glance.
5. Bulletin board	
6. App information: description and references related to the app.	

users to collectively review recorded information from self-assessment, hospital visits, and daily self-checks. Clicking on each item enables users to view the changing process through a line graph at a glance. The alarm feature allows users to set alarms for medication intake times and outpatient clinic dates. After the alarm rings, users are prompted with a pop-up confirmation button 5 minutes later to reconfirm their medication intake. The color scheme was chosen to be easy on the eyes, and a two-tier menu structure was designed from the main screen to the respective pages. In the education section, top function and a home button were placed on each page for user convenience.

3.1.4 Implementation phase

10 experts directly downloaded and used the application on their mobile phones for a week, after which they assessed their satisfaction using the smartphone app evaluation tool for the andropausal health management program. The users were middle-aged men undergoing treatment for andropause. The study was conducted after explaining the purpose and method of this research, and it proceeded after obtaining consent from those who voluntarily wanted to participate.

3.2 Evaluation of the andropausal health management program application

3.2.1 Expert evaluation

The participants included 4 males and 3 females, with an average age of 55 years. Educational levels comprised 1 with a bachelor's degree, 4 with master's degrees, and 2 with doctoral degrees, having an average work experience in the relevant field of 10.8 years. The expert evaluation results are detailed in (Table 2). The health management smartphone app received an average score of 3.76 out of 4 points. The utility of information achieved the highest score of 3.90, while the convenience of the system was rated relatively lower at 3.70.

All of the experts responded affirmatively, stating that they would recommend the application to individuals experiencing andropause and provided an overall positive evaluation, expressing that it would be beneficial for users. Additionally, there was a suggestion to include practical information that addresses the specific concerns of male andropausal individuals, such as easy ways to inquire about hospitals and management methods.

3.2.2 User evaluation

The participants consisted of 5 men with an average age of 47.6 years. Their educational background included 1 high school graduate and 4 college graduates. The evaluation score for the health management smartphone app was an average of 4.23 out of 5 points. System convenience received the highest score at 4.57 points, while the design was rated lower at 3.82 points. The user evaluation results indicate that all participants expressed a positive response towards the application, as shown in Table 3. Specifically, all users stated that they would recommend the application to others. They highlighted the application's comprehensive content, emphasizing its ease in finding relevant and necessary information. Moreover, users appreciated the feature that allows them to record self-care management information, enabling them to actively and

TABLE 2. Expert assessment of the application for andropausal health management subjects (N = 7).

Criteria	M ± SD	Category	M ± SD
System efficiency	3.75 (0.31)	Easy to connect	3.90 (0.48)
		Fast to search information	3.80 (0.32)
		Information related to high risk pregnant mothers	3.80 (0.48)
Information usefulness	3.90 (0.20)	Easy to understand	3.80 (0.32)
		Easy to contact to operator	3.60 (0.42)
System convenience	3.70 (0.41)	Easy to use the system	3.60 (0.61)
		Friendly to use	3.50 (0.55)
		Reliable information	3.30 (0.28)
		Well arrange information	3.90 (0.38)
Information relevance	3.68 (0.32)	Accurate content	3.70 (0.42)
		Up-to-date information	3.50 (0.74)
		Necessary information	3.40 (0.43)
		Clear information	3.65 (0.48)
		Detailed content	3.50 (0.72)
		Rich content	3.40 (0.55)
Design	3.80 (0.74)	Fancy design	3.30 (0.74)

M: Mean; SD: Standard Deviation.

TABLE 3. User assessment of the application for andropausal health management subjects (N = 5).

Criteria	M ± SD	Category	M ± SD
System efficiency	3.81 (0.38)	Easy to connect	3.77 (0.54)
		Fast to search information	3.87 (0.22)
		Information related to high risk pregnant mothers	3.90 (0.56)
Information usefulness	4.41 (0.39)	Easy to understand	3.30 (0.67)
		Easy to contact to operator	3.90 (0.37)
System convenience	4.57 (0.15)	Easy to use the system	3.83 (0.67)
		Friendly to use	3.73 (0.51)
		Reliable information	4.53 (0.52)
		Well arrange information	4.07 (0.70)
Information relevance	4.54 (0.35)	Accurate content	4.33 (0.72)
		Up-to-date information	4.50 (0.41)
		Necessary information	3.97 (0.64)
		Clear information	4.22 (0.70)
		Detailed content	4.43 (0.52)
		Rich content	4.60 (0.68)
Design	3.82 (0.64)	Fancy design	4.20 (0.85)

M: Mean; SD: Standard Deviation.

continuously manage their andropausal health. Furthermore, all users mentioned that the application is concrete and convenient, providing assistance in self-care. They expressed confidence that using the app would contribute to effective management. As additional feedback, there was a suggestion for more visually appealing colors for backgrounds and images to enhance visibility. Subsequently, adjustments were made to the background and image colors based on this feedback.

4. Discussion

This research developed a mobile-based health management application targeting middle-aged men undergoing the andropausal transition, employing the ADDIE (Analysis-Design-Development-Implementation-Evaluation) model across its five stages. The objective of this program is to enhance the health and effective health management skills of middle-aged men by identifying symptoms and

characteristics of male andropause, and implementing personalized intervention activities based on individual traits to ensure their appropriate health management.

The analysis phase involved reviewing 7 domestic and international literature sources on andropausal health care, gathering information from 4 domestic and international websites, and conducting focus group interviews. Based on the literature review results, it was confirmed that nursing interventions hold value in addressing male andropause [20], and there is a potential for positive outcomes in nursing when nursing interventions are maximally utilized. From the outcomes of the group interviews, participants conveyed a keen interest in gaining improved insights into the causes and mechanisms of male andropause, encompassing physical, emotional, cognitive, and sexual changes. They expressed a desire to acquire more effective coping methods for other potential symptoms. Remarkably, these research findings align with a study conducted by Park and Lim YS [21], reinforcing the significance of the present study's results. Utilizing the findings of this study, the app was designed to incorporate both the preferences of the participants and the insights of experts. It focuses on delivering information related to male andropause and includes diverse self-management contents for middle-aged men. The structure of the andropausal health management program includes providing information on the diagnosis of andropause and hormone therapy. It was considered appropriate to integrate self-care through self-assessment, along with learning methods for nutrition and exercise management during andropause.

In Lee's study [22], which examined health behavior changes and information-seeking patterns among health app users, health management apps were found to be primarily utilized for information exploration and the implementation of health-related activities. It is deemed significant as the consumers of health information, upon acquiring information through apps or media and becoming aware of their health issues, consider behavioral changes [22]. Hence, in this study, the mobile-based health management application for middle-aged men was developed with a specific emphasis on delivering specialized and comprehensive information related to andropause, which was identified as the most vulnerable period for middle-aged men during the analysis phase. Furthermore, in accordance with the Task-Technology Fit theory, features facilitating self-assessment, health tracking, and data record analysis were included to enhance usability by ensuring a high alignment between individual health tasks and the technology, resulting in increased information utilization [23]. Users anticipate that through health information services, they can realistically adjust health behavior changes, gain a deeper awareness of individual habitual issues, and thereby expect to devise ways to strengthen changes in health behavior.

In this study, the evaluation of the app among experts showed that the information's utility was the highest. Furthermore, according to user assessment results, users reported finding it easy to locate content of interest or find information within the app. The individuals desiring health behavior changes prioritize swift access to health information and the acquisition of accurate information [24]. Based on this rationale, each section was structured with easy-to-understand elements, including illustrations, photos, and tables along with efforts to ensure effective motivation through essential information.

Behavioral change requires long-term commitment, and to achieve this, strategies such as continuously enhancing motivation and promoting self-efficacy are necessary [25]. However, recognizing that the burden of data entry can act as a barrier to implementing behavioral changes [26], a minimal checklist was provided for health management. Feedback through result retrieval was implemented to induce motivation and actively support self-care. Additionally, to mitigate regression, which is the primary obstacle to behavioral change [22], strategies were implemented to facilitate stress management through activities like meditation, breathing exercises, simple brain games, and emotional well-being practices.

Through technological and environmental analysis as well as learner analysis, this study developed an app-based andropausal health management program based on the Android OS (applicable to domestic smartphones), making it easily implementable on any smartphone for convenient accessibility. Such health management apps allow individuals to access information and engage in self-care anytime, anywhere in their daily lives. While using the mobile app, individuals can autonomously choose the management they need, overcome their immediate challenges, and satisfy the fundamental psychological needs of autonomy and competence [14]. Furthermore, it can bring about positive effects in enhancing self-management, simultaneously improving confidence and self-efficacy in health behaviors [27]. Moreover, as it can open the possibility of replacing traditional nursing interventions with mobile apps [14], it can be seen as a substantial contribution to the diversification of nursing interventions.

This study is significant because it is the first to develop a mobile-based health management application specifically for middle-aged men experiencing andropause, exploring its applicability in nursing education. By applying this mobile-based health management application for middle-aged men experiencing andropause, it is expected to enhance the educational experience by allowing users to easily access content that aligns with their interests and educational needs, offering a variety of experiences, promoting self-directed learning, and improving educational effectiveness. Additionally, it serves as a cost-effective alternative to overcome the limitations of traditional education caused by hospital visit restrictions or lack of information. This program, based on experiential learning theory, does not impose a strict sequence for learning and provides feedback and reflection on concrete experiences or active participation, encouraging a gradual learning process. It is suggested that the learning materials and assessments be used as foundational resources under expert supervision to facilitate further learning for participants.

5. Conclusions

This study attempted to develop a mobile-based health management application targeting middle-aged men experiencing andropause, aiming to empower them to prevent and continuously manage health issues that may arise during the andropausal experience. The mobile web-

based andropausal health management program focused on integrating andropausal information to provide diverse information and enhance self-management. Furthermore, the app was developed based on the Android OS (compatible with domestic smartphones), enhancing the advantage of allowing users to access comprehensive information anytime, anywhere in their daily lives. It also offers various self-assessment features, facilitating effective self-management for individuals experiencing andropause. Currently, andropausal management apps both domestically and internationally are predominantly tailored for women. Therefore, the development of the program in this study targeting middle-aged men holds significance. Moreover, through integration with various psychological counseling programs, the developed application can serve as valuable mental health management material, potentially minimizing the intervention time for participants as needed, and allowing accessible and flexible interventions. The development of the andropausal app in this study was guided by a user satisfaction survey. Nevertheless, to comprehensively evaluate the efficacy of the andropausal health management program for middle-aged men, further investigation with an expanded research sample is deemed necessary.

AVAILABILITY OF DATA AND MATERIALS

Data are available for research purposes upon reasonable request to the corresponding author.

AUTHOR CONTRIBUTIONS

SJP and YSL—study conception and design acquisition; drafting and critical revision of the manuscript; data collection; analysis and interpretation of the data; English review. SJP—discussion and conclusions, suggestions. YSL—abstract and references and final submission. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Passed review by the Clinical Trial Review Committee of Sahmyook Seoul Hospital, Korea IRB No: 116286-202308-HR-02. Informed consent has been obtained from the participants involved.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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