Effect of Artificial Intelligence-Powered Be My Eyes App on Menstrual Cramps Knowledge and Practices among Visually Impaired Female Adolescents

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Abstract

Background: Artificial intelligence offers visually impaired adolescent females a more inclusive and effective approach to learning about menstrual cramps, enabling them to recognize and manage these cramps. Menstrual cramps are among the most common issues faced by adolescents, significantly affecting the quality of life for females. **Aim**: This study aimed to determine the determine the impact of the artificial intelligence-powered Be My Eyes app on menstrual cramps knowledge and practices among visually impaired female adolescents. **Design**: A quasi-experimental design (pre/post-test) was employed. **Setting**: The research was carried out at Al Noor School for visually impaired students located in Sohag City. **Sample**: A convenient sample of 100 visually impaired female adolescents was selected. **Tools**: The study utilized three instruments: a structured interviewing questionnaire, that consists of two parts; part (1) visually impaired female adolescents' personal data; part (2) visually impaired female adolescents' menstrual history; a knowledge assessment tool concerning menstrual cramps using the Be My Eyes app, and an observational checklist to evaluate the practices of visually impaired female adolescents concerning menstrual cramps using the Be My Eyes app. **Results**: The results indicated a highly statistically significant difference in the total knowledge and practice scores regarding menstrual cramps among visually impaired females pre and post utilizing the Be My Eyes application. The total knowledge and practice of adolescent females showed improvement in the post-test compared to the pre-test. **Conclusion**: Visually impaired female adolescents experienced enhancements in their knowledge and practice menstrual cramps management due to the use of AI. **Recommendations**: Integrating Be My Eyes with reliable menstrual health resources could further enhance its impact on menstrual cramps knowledge and practice among visually impaired female adolescents.

Keywords: Artificial Intelligence, Be My Eyes app**,** Knowledge and Practice, Menstrual cramps, Visually impaired female adolescents.

Introduction

Adolescents experience a transitional phase that can present various challenges. Menstruation refers to the regular bleeding from the uterus, which typically begins approximately fourteen days after ovulation and is caused by the shedding of the uterine endometrial lining. In instances where the egg is not fertilized by sperm, the endometrium that developed on the uterine wall in anticipation of pregnancy is expelled. Generally, a healthy girl's menstruation lasts between 3 to 7 days, with the menstrual cycle usually spanning 28 to 35 days. A menstrual cycle is deemed abnormal if it extends beyond 40 days or falls below 21 days **(Olyai & Dutta, 2020).**

Menstrual cramps are characterized by lower abdominal pain that commences two or more days before menstruation **(Puja , 2018)**. As a significant menstrual issue, cramps associated with periods manifest as cramping and colicky sensations, predominantly experienced as discomfort in the back and abdomen. Typically, this discomfort is most pronounced on the first day of the menstrual cycle. Many young females endure menstrual cramps, which rank among the most common gynecological conditions **(Karanth & Liya, 2018).**

Globally, between 45% and 95% of

women of reproductive age suffer from menstrual cramps, with 2% to 29% experiencing severe pain. The variation in these rates can be attributed to differences in the methodologies employed to assess menstrual cramps, the selected populations, age demographics, ethnic backgrounds, and regional variations in pain perception. Typically, younger women report a higher prevalence (70% to 90%) compared to older women **(Itani et al., 2021).**

As noted by **Hidayatunnafiah et al. (2022),** approximately 60 to 90% of adolescents often report experiencing menstrual cramps, with 75% of these individuals indicating mild to severe pain. Menstrual cramps can significantly impact the daily activities of females, especially young girls, if not addressed promptly. They require medical intervention or prescription medications to maintain normal functioning. Between 7% and 15% of young women experiencing menstrual cramps, which can range from 30% to 60%, opt not to attend work or school.

The healthcare team often fails to manage menstrual cramps effectively due to a general lack of awareness regarding their high prevalence and associated morbidity. It is commonly believed that 50% of menstruating young women experience primary menstrual cramps, while as many as 90% may endure some level of menstrual cramping. Although some women may not find it significantly disruptive to their daily lives, it can still interfere with their activities, and many do not resort to medication **(Patricio & Sergio, 2019).**

Artificial intelligence (AI) has recently been utilized in health education, creating new avenues to enhance accessibility and learning for individuals with disabilities. AI-driven applications and assistive technologies can provide users with personalized training, immediate guidance, and auditory feedback, empowering them to undertake challenging tasks independently. As noted by **Brenton et al. (2021),** AI-based solutions can offer visually impaired adolescent females a more inclusive and effective approach to learning about menstrual cramps management, ensuring they can identify potential health risks at an early stage.

The Be My Eyes app employs artificial intelligence (AI) to assist individuals with vision impairments in performing everyday tasks. This application, which connects sighted volunteers with visually impaired users, has proven to be an invaluable resource for a range of activities. In recent years, the capabilities of this software have expanded to encompass various domains, including wellness, healthcare, and education (**Simmons et al., 2023).**

The incorporation of the Be My Eyes application into the management of menstrual cramps improves accessibility and education, rendering it more interactive and tailored. Be My Eyes offers a groundbreaking solution by facilitating live, real-time support during the training for menstrual cramps management. By linking visually impaired adolescent females with volunteers—many of whom are healthcare professionals, educators, or trained individuals—the app provides immediate guidance, feedback, and reassurance throughout the menstrual cramps management process. This is especially advantageous for young learners who may find it challenging to comprehend written instructions or who lack adequate access to in-person healthcare resources (**Yang & Liu, 2020)**.

Figure (1): Be my Eyes application on Google Play.

Integrating artificial intelligence into Be My Eyes enhances the tool's capability to assist visually impaired individuals with tasks that require visual input. The AI-driven features, including object recognition, voice feedback, personalized health reminders, and real-time guidance, present significant opportunities in health education, particularly in the training for managing menstrual cramps. AI enables the application to lead users through the examination process, deliver comprehensive auditory feedback, and provide tailored support, thus boosting the independence and confidence of visually impaired adolescent females in overseeing their health. In the realm of menstrual cramps management, the AI-powered functionalities of Be My Eyes are essential in

empowering visually impaired girls by equipping them with the necessary tools to confidently manage menstrual cramps and enhance health outcomes **(Bengio et al., 2020).**

This research aims to investigate the effects of Artificial Intelligence-assisted training on the knowledge and management of menstrual cramps among adolescent females with visual impairments. By utilizing AI-based tools that offer interactive, auditory, and haptic instructions, this study will explore how such technology can enhance understanding and management of menstrual cramps in this marginalized group. The results of this research could have profound implications for advancing health education, encouraging independence in self-care practices, and ultimately aiding in the management of menstrual cramps within a vulnerable population **(Figueira et al., 2019).**

Significance of the Study

In March 2024, President Abdel Fattah El-Sisi demonstrated considerable support for women, particularly those with disabilities, through various statements. These statements illustrate President El-Sisi's dedication to enhancing the health and well-being of Egyptian women, especially those with disabilities, and to improving their societal roles.

A study conducted by the WHO on disability indicates that 15% of the global population—over one billion individuals—experience some form of disability, with between two and 4% of these individuals facing severe functional challenges **(Khalaf et al., 2023).**

Menstrual cramps are among the most common issues faced by adolescents, as they are often linked to menarche and occur during that period. In Egypt, menstrual cramps were reported to be prevalent in 66.0% of cases, with 28.4% classified as mild, 24.3% as moderate, and 13.3% as severe **(Abdelhalim et al., 2023).** These cramps can significantly affect an individual's psychological well-being and health-related quality of life, particularly in adolescents **(George et al., 2019).** Severe menstrual cramps have been associated with limitations in activities and absenteeism from school, college, or work. Consequently, menstrual cramps pose a substantial health burden and socio-economic cost **(Çelik & Apay, 2021).**

Self-care practices are vital for cultivating a fulfilling life and fostering personal respect in adolescents, and they play a significant role in ensuring dignity and promoting good health. Education is an essential component in the management of menstrual cramps. It is the duty of nurses and other healthcare professionals to provide comprehensive care for adolescents. Consequently, equipping teenage girls with accurate information and skills related to menstrual care empowers them with knowledge, thereby enhancing their self-esteem and academic performance **(Hassan et al., 2023).**

This research aims to investigate the feasibility and effectiveness of utilizing AI-assisted methods for managing menstrual cramps to enhance the knowledge and practices related to menstrual management among visually impaired adolescent females with visual disabilities. By integrating AI technology, this study intends to determine the determine the impact of the artificial intelligence-powered Be My Eyes app on menstrual cramps knowledge and practices among visually impaired female adolescents.

Aim of the Study

To determine the determine the impact of the artificial intelligence-powered Be My Eyes app on menstrual cramps knowledge and practices among visually impaired female adolescents.

Research hypotheses

To achieve the aim of the study, the following research hypotheses were formulated:

H1: **After** Artificial intelligence powered the Be My Eyes app expected to improve knowledge regarding menstrual cramps among visually impaired female adolescents

H2: **After** Artificial intelligence powered the Be My Eyes app expected to enhance Practices regarding menstrual cramps among visually impaired female adolescents

Operation definition

Be My Eyes App: A mobile application that links visually impaired individuals with sighted volunteers via live video calls, facilitating real-time support for tasks that require vision. In both research and practice, it

can be evaluated through user engagement metrics (such as the number of calls made and the duration of assistance), improvements in accessibility, or levels of user satisfaction.

Visual Impairments: This term refers to a partial or complete loss of vision that hinders an individual's capacity to carry out daily activities independently, thereby requiring adaptive educational resources for managing menstrual cramps.

Research design:

A quasi-experimental research methodology was employed. A one-group pre- and post-test research design was utilized to assess the causal relationships between the intervention and the outcomes. This method evaluates the impact of an intervention by comparing scores on a specific variable before and after the intervention **(Thomas, 2022).**

Study Settings

The research was conducted at Al Noor School for visually impaired students situated in Sohag City.

Sample Type:

A convenient sample of 100 visually impaired female adolescents was chosen. All participants were adolescent females with visual impairments, drawn from both rural and urban regions, and were enrolled at Al Noor School for visually impaired students in Sohag City.

Tools for Data Collection

Tools: The study utilized three instruments:

Tool (I): A structured interviewing questionnaire, It was developed by the researchers in simple Arabic language and based on **(World Health Organization, 2020; Patricio & Sergio., 2019)** that consists of two parts:

Part (1): Visually impaired female adolescents' personal data such as age, residence, sleeping hours, regular physical activity, and dietary pattern.

Part (2): Visually impaired female adolescents' menstrual history:

The assessment comprises eleven questions pertaining to monthly menstruation, including aspects such as the age of menarche, total duration of menstrual flow, frequency and interval of menstruation, volume of menstrual flow, family history of menstrual cramps, onset of menstruation and associated symptoms with menstrual cramps, home remedies utilized during menstrual cramps, and prior knowledge regarding menstrual cramps.

Tool (II): A knowledge assessment instrument focused on menstrual cramps, utilizing the Be My Eyes application. This tool was created in Arabic by the research team following a review of relevant literature **(World Health Organization, 2020; Abdelhalim et al., 2023)**. It evaluated participants' understanding of menstrual cramps both before and after engaging with the Be My Eyes app. The tool included six multiple-choice questions addressing knowledge of menstrual cramps, covering topics such as definition, symptoms, types, causes, diagnosis, and treatment options.

Scoring System:

• (0) Incorrect answer

• (1) Correct answer Knowledge levels were categorized as follows:

• Good (≥70%)

• Fair (51–69%)

• Poor (≤50%)

Tool (III): An observational checklist designed to assess the practices of visually impaired female adolescents regarding menstrual cramps through the Be My Eyes app. This tool was developed after a thorough review of pertinent literature **(Patricio & Sergio, 2019; World Health Organization, 2020; Abdelhalim et al., 2023).** It aims to evaluate the self-practice of managing menstrual cramps among visually impaired adolescent females before and after utilizing the Be My Eyes app. This application facilitates video calls, allowing visually impaired users to receive real-time assistance from sighted

volunteers to support them in executing self-practice related to menstrual cramps.

The checklist comprises a total of 15 statements categorized into various sections, including: trying a pain reliever. Over-the-counter (OTC) nonsteroidal anti-inflammatory drugs (NSAIDs), such as Motrin and Advil (ibuprofen) or Aleve (naproxen sodium), can alleviate menstrual cramps. Engaging in a walk: Light physical activity, such as walking, can trigger the release of endorphins and enhance blood circulation. Utilizing heat: Applying a heating pad to your abdomen or lower back can help relax tense muscles. Soaking: Taking a warm bath can assist in relieving cramps and other symptoms, such as lower back pain. Adding essential oils or salts can further promote relaxation and ease muscle tension.

Scoring System:

• (1) Practice Completed

• (0) Practice Not Completed.

The total scores of practices were categorized as follows:

• Satisfactory (≥60%)

• Unsatisfactory (<60%)

Validity of the Tool

The researcher developed the data collection tools, which were subsequently reviewed by a panel of three professors with expertise in obstetrics and gynecological nursing. These specialists assessed the instruments for their appropriateness, clarity, applicability, and overall design. Following their evaluation, no changes were deemed necessary.

Reliability of the Tool

The reliability of the tools was evaluated using Cronbach's alpha coefficient, yielding a value of 0.789, which indicates a high level of reliability.

Pilot Study

A pilot study was carried out with 10% of the research sample, involving ten randomly selected females. The purpose of the pilot study was to evaluate the relevance, clarity, and usability of the data collection instruments. Based on the feedback received, several modifications were made to the survey, including revisions to specific questions regarding the participants' knowledge and practices. The individuals who participated in the pilot study were included in the overall sample.

Ethical Considerations

Approval was obtained from the Ethical Research Committee at the Faculty of Nursing on June 6, 2023, under code No: (129) prior to the commencement of the study. Following detailed explanations before enrollment, verbal informed consent was secured from all female participants. Each participant was made aware that their involvement in the study was voluntary and that they had the right to withdraw at any time they chose.

Data collection procedure:

Data were gathered from the end of October 2023 through November 2023. The duration of two months was necessary due to the variations in menstrual cycles among visually impaired adolescent females. The current study was executed through the following phases:

1- Assessment Phase

1.In this phase, researchers assessed the participants' knowledge and practices concerning menstrual cramps utilizing the study tools. Each participant was introduced to the researchers, who provided a clear verbal explanation of the study in terms that were accessible. Given that the participants were visually impaired, the researchers filled out the questionnaires on their behalf, ensuring clarity and comprehension of the instrument's contents. A responsible individual from the association was present during the data collection process. Completing each questionnaire took approximately 20 to 30 minutes per participant. Data collection sessions were held three times a week from 9 a.m. to 12 p.m. Participants were informed that a post-test and follow-up assessment using tools (I, II, III) would be conducted following the AI application intervention (Be My Eyes App). The post-test was administered one month after the intervention.

2- Implementation Phase

Based on the results obtained during the

assessment phase and an examination of relevant literature, adolescent females utilized the AI-assisted application Be My Eyes, which guided them through managing menstrual cramps, offered feedback, and facilitated practice. The program was structured into a series of sessions aimed at teaching effective management of menstrual cramps over a designated timeframe. Researchers provided technical assistance to ensure the seamless operation of the AI application, addressing any difficulties faced by the participants.

This phase consists of three stages: The first stage aims to educate adolescent females on the management of menstrual cramps. It serves as an accessible and supportive resource for guidance on self-practices. During this stage, researchers delivered education to adolescent females with visual impairments regarding the knowledge and practices related to menstrual cramps management using the Be My Eyes App.

Introduction to the Be My Eyes App includes: App Overview: A brief description of the Be My Eyes app is provided, detailing how it connects individuals with trained volunteers to assist with tasks that require visual input. Subsequently, the participating females began to follow: Step-by-Step Guide: Utilizing Be My Eyes for BSE

1. Download the App

o Participants downloaded Be My Eyes from either the Google Play Store or the Apple App Store.

o Permissions such as voice access were granted to enable sighted volunteers to assist effectively.

1. Understand the Purpose

Participants were informed that they would receive guidance on managing menstrual cramps.

They were reminded that Be My Eyes offers visual assistance but does not substitute for medical evaluation.

2. Connect with a Volunteer

Participants selected "Get Help" in the app to connect with a sighted volunteer.

The volunteer joined the call, and the participant explained the task: assistance with managing menstrual cramps.

3. Prepare for Menstrual Cramps Management

Participants were instructed to find a comfortable, private space with a good position.

4. Follow the Volunteer's Instructions

Volunteers provided detailed, step-by-step guidance.

5. Use Heat

Apply a heating pad to the abdomen or lower back to relax tense muscles.

Participants were guided to place the heating pad on their abdomen.

6. Soak

Take a warm bath to alleviate cramps and other symptoms such as low back pain. Adding essential oils or salts can enhance relaxation and soothe tense muscles.

7. Address Any Findings

If any abnormalities were detected, volunteers provided visual assistance.

Participants were encouraged to seek medical evaluation for any further abnormalities.

8. End the Call and Review Results

Participants had the opportunity to ask follow-up questions.

Any significant findings were documented, and medical consultation was recommended if necessary.

These educational sessions occurred three times a week, each lasting approximately 40 minutes. The first session focused on knowledge regarding menstrual cramps management. The second session involved practice, while the third session served as a revision to confirm the participants' ability to demonstrate menstrual cramps management effectively. In the second stage, the researcher reinforced the previously mentioned information by asking related questions to evaluate the improvements in the adolescents' understanding of menstrual cramps management before and after the app implementation. Missed or unclear points were

re-emphasized by the researchers and discussed with them. **Third stage:** at the conclusion, the researchers inquired whether the female participants required a reiteration of the explanation and a discussion of the answers to all questions to ensure clarity regarding all aspects of the program.

Additional steps for the safe and effective utilization of the Be My Eyes App

- Safety and Comfort: Ensure privacy and comfort for the management of menstrual cramps.
- Educational Support: Volunteers emphasized the significance of managing menstrual cramps.

3-Evaluation Phase Post-Test Assessment: Following the intervention, the participants' understanding and practices related to menstrual cramps were re-evaluated through: An assessment was conducted one month after the intervention to ascertain the influence of the artificial intelligence-powered Be My Eyes app on the knowledge and practices concerning menstrual cramps among visually impaired female adolescents, utilizing the same study tools (II, III).

Statistical design:

The analysis of the study's data was performed using SPSS Statistics version 22. Quantitative Data: Summarized through means and standard deviations. Qualitative Data: Presented as percentages. Correlation Analysis: The Pearson correlation test was employed to identify relationships, with a significance threshold set at 0.05.

Results

Table 1 illustrates that the majority of visually impaired adolescent females (70%) were aged between 12 and 14 years, with an average age of 14.22± 1.89. Additionally, 80% of these individuals resided in urban areas. In terms of sleep duration, it was noted that 56% of the visually impaired adolescent females slept between 6 to 9 hours, while 77% did not engage in regular physical activity. Furthermore, 85% of the visually impaired adolescent females maintained an unhealthy diet.

Table 2 indicates that 70% of the visually impaired adolescent females experienced menarche between the ages of 13 and 14 years. The total duration of menstrual flow was reported to be 5 to 6 days for 68% of the visually impaired adolescent females.

Regarding the menstrual cycle interval, **Table 2** also reveals that a significant majority of the visually impaired adolescent females (90%) had a cycle interval ranging from 28 to 30 days, and 80% of them experienced moderate menstrual flow (2-3 pads per day). Additionally, 92% of the visually impaired adolescent females had a family history of menstrual cramps. Lastly, it was noted that 66% of the visually impaired adolescent females had regular menstruation.

Table 3 demonstrates that 72% of the visually impaired adolescent females reported that the onset of their menstrual cramps coincided with the onset of menstruation. In relation to the symptoms associated with menstrual cramps, 92% of the visually impaired adolescent females reported experiencing a feeling of pressure in the abdomen, while 87% experienced pain in the lower back. Moreover, 62% utilized non-pharmacological methods to alleviate their menstrual cramps.

Figure 1 depicts the sources of information regarding menstrual cramps; it was found that 80% of the visually impaired adolescent females lacked any information, in contrast to 12% who obtained their information from friends and 8% from family.

Table (4) demonstrates a notable enhancement in the knowledge of visually impaired female adolescents across all categories. The study overall revealed a highly significant increase in the knowledge related to menstrual cramps among visually impaired female adolescents, underscoring the substantial influence of the artificial intelligence-powered Be My Eyes APP ($P < 0.001$).

Figure 2 presents the overall knowledge score of the visually impaired female adolescents participating in the study regarding menstrual cramps. It indicates that 98% of the visually impaired female adolescents assessed exhibited good knowledge in the post-tests, whereas none of them displayed poor knowledge about menstrual cramps after utilizing the artificial

intelligence-powered Be My Eyes APP.

Table (5) elucidates the average practice scores among visually impaired female adolescents. As indicated following the application of the artificial intelligence-powered Be My Eyes APP, there were alterations in the mean practice scores that reflected highly statistically significant differences in the total practice scores among the visually impaired female adolescents (P = <0.001).

Figure 3 presents the overall practice score of visually impaired female adolescents concerning menstrual cramps. It demonstrates that 94% of the visually impaired female adolescents studied exhibited satisfactory practice in the post-tests, in contrast to 8% who displayed unsatisfactory practice regarding menstrual cramps after utilizing the artificial intelligence-powered Be My Eyes app.

Table 6 depicts a notable positive correlation between knowledge and practices related to menstrual cramps before and after the implementation of the artificial intelligence-powered Be My Eyes app among visually impaired female adolescents. The correlation coefficient (R) rises from 0.369 in the pre-test to 0.598 in the post-test, with both correlations indicating statistical significance (P = 0.006 for the pre-test and P < 0.001 for the post-test)

Table (1): Personal data of the Studied visually impaired female adolescents (n = 100)

Personal data	No.	%
Age		
12- 14 years	70	70.0
15-18 years	30	30.0
Mean ± SD	14.22± 1.89	
Residence:		
Urban	80	80.0
Rural	20	20.0
Sleeping (hours)		
<6	14	14.0
6–9	56	56.0
>9	30	30.0
Regular physical activity		
Yes	23	23.0
No	77	77.0
Dietary pattern		
Healthy diet	15	15.0
Un healthy diet	85	85.0

Table (2): Visually impaired adolescent females' menstrual history (n=100).

Menstrual History	No.	%
Age of menarche:		
11-12 years	23	23
13-14 years	70	70
15-16 years	7	7
Total days of flow:		
3-4 days	29	29
5-6 days	68	68
7-8 days	3	3
The interval of the menstrual cycle/ days		
< 28	10	10.0
28-30	90	90.0
Amount of menstrual flow (No. of pads /day):		
Mild (One)	14	14.0
Moderate (2-3)	82	82.0
Sever (≥4)	4	4.0
Family history of menstrual cramps		
Yes	92	92.0
No	8	8.0
Frequency of menstruation		
Regular	66	66.0
Irregular	34	34.0

Table (3): Menstrual cramps characteristics among visually impaired adolescent females (n=100).

Menstrual cramps characteristics	No.	%
The onset of Menstrual cramps:		
Before the menstrual period	28	28.0
With the onset of menstruation	72	72.0
***Associated symptoms with Menstrual cramps:**		
The feeling of pressure in the abdomen	92	92.0
Pain in the lower abdomen	87	87.0
Low back pain	86	86.0
Pain radiating down the legs	77	77.0
Nausea	72	72.0
Vomiting	59	59.0
Diarrhea	55	55.0
Fatigue	82	82.0
Weakness	62	62.0
Headaches	51	51.0
Fainting	46	46.0
Do you practice home remedies during Menstrual cramps?		
Yes	65	65.0
No	35	35.0
If Yes, Specify (n = 477)		
Pharmacological as analgesic, …	16	16
Non-Pharmacological as applying heat, Massaging, drinking herbs, …	62	62.0
Both	22	22.0

***Responses are not mutually exclusive.**

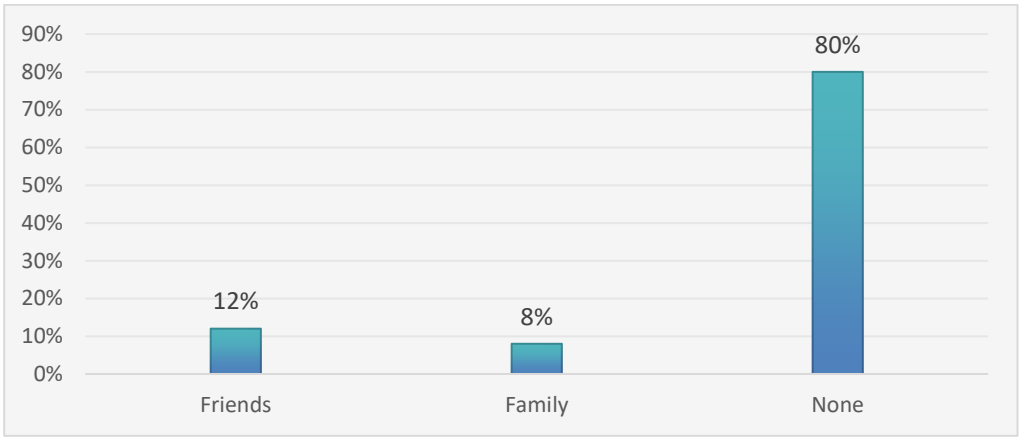

Figure (1): Sources of information regarding menstrual cramps among visually impaired adolescent females (n=100).

Table (4): Comparison between mean practices scores regarding menstrual cramps pre- and post-artificial intelligence-powered Be My Eyes app among visually impaired female adolescents (n=100).

Item	Pre-intervention	Post intervention	t-test	P-value
	Mean ±SD	Mean ±SD		
Mean knowledge scores	3.4 ±0.2	5.3 ±0.8	9.547	0.001 *

*Highly statistically significant level at P < .0001

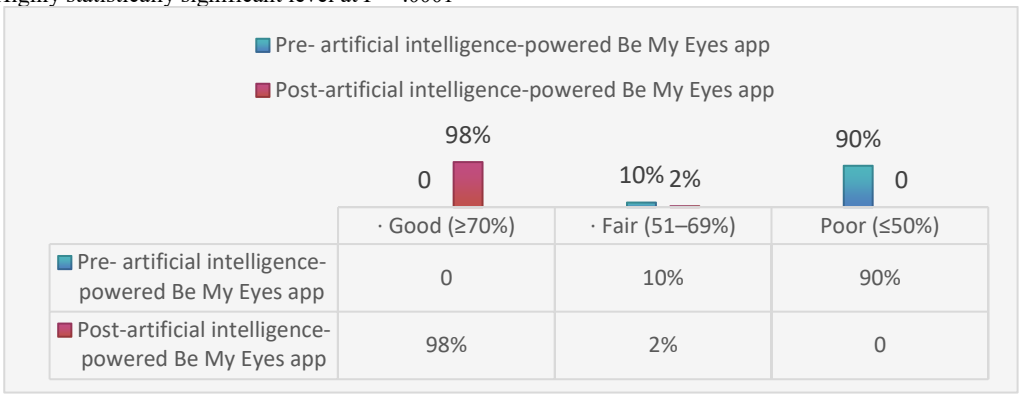

Figure (2): Total knowledge level regarding menstrual cramps pre- and post- artificial intelligence-powered Be My Eyes app among visually impaired female adolescents (n=100).

Table (5): Comparison between mean practices scores regarding menstrual cramps pre- and post-artificial intelligence-powered Be My Eyes app among visually impaired female adolescents (n=100).

Item	Pre-intervention	Post - intervention	t-test	P-value
	Mean ±SD	Mean ±SD		
Mean practices scores	6.33 ±0.7	13.22 ±0.99	11.453	0.001 *

*Highly statistically significant level at P < .0001

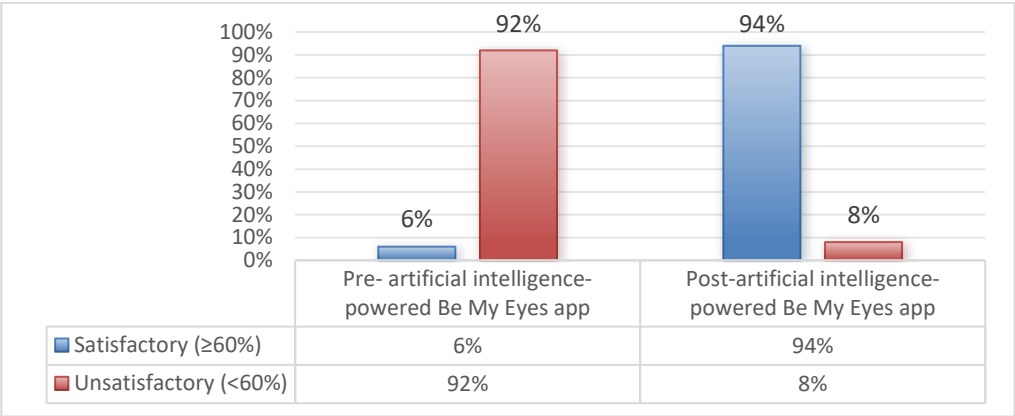

Figure (3): Total practices level regarding menstrual cramps pre- and post- artificial intelligence-powered Be My Eyes app among visually impaired female adolescents (n=100).

Table (6): Correlation among knowledge and practices regarding menstrual cramps pre- and post-artificial intelligence-powered Be My Eyes app among visually impaired female adolescents (n=100).

Variables		Knowledge regarding menstrual cramps	
		Pre	Post
Practices regarding menstrual cramps	R	0.369	0.598
	P	0.006	<0.001

Discussion

Menstrual cramps are a common, often overlooked, and inadequately treated issue affecting both adolescent and adult women. They are characterized by painful sensations in the lower abdomen that typically commence shortly before or at the onset of menstruation and can last for up to three days. Specifically, menstrual cramps adversely impact the quality of life of young women and are a leading cause of their absence from school or work **(Itani et al., 2021)**. The emergence of mobile applications such as Be My Eyes, which links visually impaired users with sighted volunteers via live video calls, holds promise for addressing these knowledge gaps. This discussion will examine the understanding of menstrual cramps among visually impaired female adolescents before and after utilizing the Be My Eyes application **(Brennan et al., 2020).**

Visual impairment, which affects millions of adolescents worldwide, significantly impacts their ability to obtain health information, including that related to breast health. Young people, particularly females, encounter distinct developmental hurdles that are exacerbated by visual impairment. In the absence of visual access to educational resources, these adolescents frequently lack the essential knowledge required for breast self-examination or appropriate breast care **(Barthel et al., 2021).** Therefore, this study was conducted to determine the impact of the artificial intelligence-powered Be My Eyes app on menstrual cramps knowledge and practices among visually impaired female adolescents of menstrual cramps.

The findings of the present study indicated that most visually impaired adolescent females were aged between 12 and 14 years, with an average age of 14.22 ± 1.89, and a significant number of them resided in urban areas. From the researchers' perspective, this age group was selected due to the observed lack of awareness among participants regarding the acquisition of information about menstrual cramps.

This observation was corroborated by **Akilandeswarie et al. (2020),** who conducted research to explore the effects of Jacobson's Relaxation Technique on adolescent females experiencing menstrual difficulties, revealing that the average age of adolescence spanned from 13 to 18 years. According to the **United Nations (2023) and Schoumaker & Bruno (2023**),

adolescence is defined as the period between the ages of 12 and 19 years, or alternatively, from 10 to 19 years to encompass the traditional quinquennial age groups of 10–14 and 15–19 years. It is widely accepted that this age range is recognized as the adolescent phase for females.

According to the results of the current study, over two-thirds of visually impaired adolescent females commence menarche between the ages of 13 and 14. This conclusion is supported by a prior study conducted by **Gebeyehu et al. (2019)**, which assessed the prevalence, impact, and management practices of dysmenorrhea among 400 female students at the University of Gondar in northwestern Ethiopia, finding that the average age at which women began menstruating was between twelve and fourteen years.

In a similar vein, **Vlachou et al. (2023) and El-Mawgoda et al. (2022**) found that the average age for the onset of menstruation was 13 years. This period represents a distinctive phase of human development and is critical for establishing a foundation for good health. The global average age of menarche, a key indicator of the onset of puberty in girls, is approximately 12 years, as reported by the **United Nations (2023).**

The study indicated that regarding the menstrual cycle interval, the majority of visually impaired adolescent females (90%) experienced a cycle length of 28–30 days. These current findings are consistent with those reported by **Sudhadevi (2021)**, who conducted research to evaluate the effectiveness of progressive muscle relaxation on premenstrual syndrome among students from selected colleges at Sri Ramachandra University in Chennai. Sudhadevi discovered that over two-thirds of the students had a regular menstrual cycle. This outcome may be attributed to the normal physiological changes that occur in most females, which are characteristic of menstruating individuals.

The results demonstrated that less than three-quarters of the visually impaired adolescent females experienced the onset of menstrual cramps coinciding with the onset of menstruation. This finding is corroborated by **Hashem et al. (2018),** who conducted a study involving 120 female nursing students at Tanta University to assess the impact of reflex therapy on managing primary dysmenorrhea. They found that the majority of adolescent girls suffering from menstrual cramps reported experiencing them at the beginning of menstruation. This result may be linked to the normal physiological changes associated with menstruation, where menstrual cramps typically commence prior to or at the onset of menstruation.

Moreover, the present finding aligns with the previously mentioned research by **Hashemi et al. (2022),** who investigated the effects of water yoga exercises on the duration and intensity of pain among 40 female students at Allameh Tabatabaei University in Tehran, Iran. They observed that female students reported experiencing menstrual cramps that commenced on the first day of their menstruation.

Regarding the symptoms associated with menstrual cramps, the results indicated that a significant number of visually impaired adolescent females felt pressure in their abdomen, and most of them reported experiencing pain in their lower back. Additionally, over two-thirds of the participants utilized non-pharmacological methods to alleviate their menstrual cramps. This finding corroborates the results of a study conducted by **Itani et al. (2021) and Calis et al. (2023),** which suggested that menstrual cramps are often linked with common symptoms.

The current findings are also consistent with a study by **Sima et al. (2022),** which involved 1,720 Romanian medical students to evaluate the prevalence, treatment, and impact of menstrual cramping on medical students. They reported that the most prevalent symptoms associated with menstrual cramping included restlessness or irritability, fatigue, headaches, diarrhea, nausea, and dizziness.

This study revealed that a majority of adolescent students resort to home remedies during menstrual cramps, with more than half employing non-pharmacological strategies to manage their discomfort. This observation is consistent with other research conducted by **Mendiratta & Lentz (2023),** which found that most females opted for home remedies as a non-pharmacological treatment for menstrual cramps, often using multiple types of home remedies simultaneously. Furthermore, this finding aligns with the results of a study by Abdelhalim et al. (2023) in Egypt, which indicated that over half of

female adolescents adopted non- pharmacological techniques to treat the menstrual cramps.

The findings emphasize that the source of information concerning menstrual cramps was lacking; it was noted that most visually impaired adolescent females were uninformed. From the researcher's viewpoint, this underscored the necessity to educate visually impaired adolescent females about menstrual cramps through the use of the artificial intelligence-powered Be My Eyes application.

The results demonstrated a notable enhancement in the knowledge of visually impaired female adolescents across all categories. In summary, the study revealed a highly significant advancement in the menstrual cramps-related knowledge of visually impaired female adolescents, showcasing the substantial influence of the artificial intelligence-powered Be My Eyes application. From the researcher's perspective, the findings underscore a considerable improvement in the participants' understanding of menstrual cramps following their use of the Be My Eyes application. Initially, all participants, who were visually impaired female adolescents, displayed low levels of knowledge regarding menstrual cramps. However, after interacting with the application as part of the intervention, there was a significant rise in knowledge scores during the post-test. This indicates that the Be My Eyes application was instrumental in enhancing the participants' comprehension of menstrual cramps management. The results suggest the potential of technology-based interventions in advancing health education for visually impaired female adolescents.

The findings of the current study align with those of **Jadhav & Deneen (2020),** who indicated that prior to utilizing the Be My Eyes application, numerous visually impaired female adolescents exhibited a limited comprehension of managing menstrual cramps. These adolescents often lack awareness regarding the significance of menstrual cramps management, primarily due to the absence of specialized health education programs.

This conclusion is further supported by **Brennan & Williams (2020),** who discovered that the lack of easily accessible and suitably designed resources for these adolescents has resulted in lower awareness levels when compared to their sighted counterparts. From the researchers' perspective, the Be My Eyes application serves as a valuable resource for improving the understanding of menstrual cramps management among visually impaired female adolescents. Prior to engaging with the application, many adolescents possess insufficient knowledge about breast health; however, after interacting with trained volunteers via the application, they exhibit an enhanced understanding of menstrual cramps management. This finding substantiates the hypothesis that following intervention, there will be an improvement in menstrual cramps management among visually impaired female adolescents in comparison to baseline measures.

Regarding the overall knowledge score of the visually impaired female adolescents in the study concerning menstrual cramps, the findings revealed that nearly all of the participants demonstrated good knowledge in the post-tests, whereas none exhibited poor knowledge about menstrual cramps after utilizing the artificial intelligence-powered Be My Eyes application. From the researchers' viewpoint, this confirms the beneficial impact of the artificial intelligence-powered Be My Eyes application in alleviating menstrual cramps among visually impaired female adolescents.

The findings of the current study indicate that the average practice scores among visually impaired female adolescents have been revealed. Following the application of the artificial intelligence-powered Be My Eyes app, there were notable changes in the mean practice scores, demonstrating highly statistically significant differences in the total practice scores among these adolescents. From the researcher's viewpoint, the results of this study clearly show an enhancement in the participants' ability to manage menstrual cramps after utilizing the Be My Eyes application, as evidenced by the post-test results.

This improvement can be linked to the thorough guidance offered through the application, which ensured that all participants received the correct instructions for managing menstrual cramps. The findings imply that the Be My Eyes application effectively improved the practical skills of the participants.

This outcome aligns with the work of **Jadhav & Deneen (2020),** which suggests that

numerous adolescents with visual impairments lack the necessary knowledge and skills for effective management of menstrual cramps. Prior to the use of the Be My Eyes application, visually impaired female adolescents typically displayed poor or inconsistent practices regarding breast self-examination. Additionally, a study by **Ballard & Green (2022)** highlighted that some visually impaired adolescents were unaware of menstrual cramps management, which significantly impeded their ability to monitor their health effectively.

The current findings also correspond with a study conducted by George, **Suresh, & Alias (2023)** involving 30 adolescent girls in India, aimed at evaluating the effectiveness of physical activity in managing menstrual cramps associated with menstruation. They found that physical activity is effective in reducing the pain related to menstrual periods.

This finding aligns with a study conducted by **Thompson et al. (2021),** which revealed that after utilizing Be My Eyes, visually impaired adolescent females were more inclined to engage in the management of menstrual cramps. This increase in engagement was primarily due to the volunteers' ability to provide real-time corrections and reinforce proper techniques throughout the process. Furthermore, Be My Eyes facilitated learning for visually impaired female adolescents, aiding them in developing knowledge and confidence in recognizing abnormalities.

Additionally, Be My Eyes has empowered visually impaired adolescent females to adopt a more proactive stance regarding their overall breast health. Those who were previously unaware of how to manage menstrual cramps reported heightened awareness after using the app. They became better equipped to identify effective management strategies for menstrual cramps and to discern when to seek medical advice **(Thompson et al., 2021).** From the researcher's perspective, another significant advantage is the empowerment that many visually impaired adolescents experience after acquiring skills to manage menstrual cramps. Following their engagement with Be My Eyes, numerous adolescents reported a newfound independence in caring for their bodies, which positively impacted their self-esteem and overall well-being. Be My Eyes has been instrumental in nurturing such independence.

From the researcher's viewpoint, prior to using the Be My Eyes application, study participants exhibited limited involvement in the management of menstrual cramps, with many visually impaired female adolescents lacking a clear understanding of its significance or how to effectively manage menstrual cramps. However, after the introduction of the Be My Eyes application, a significant improvement was observed in the participants' ability to manage menstrual cramps. This indicates that the app successfully supported adolescents in managing menstrual cramps, rendering the process more accessible and manageable for them.

This conclusion is further supported by **Jadhav & Deneen (2020),** which also identified a beneficial effect of the Be My Eyes application on visually impaired female adolescents in managing menstrual cramps. By offering real-time assistance, emotional support, and tailored guidance, Be My Eyes aids in addressing the specific challenges that visually impaired individuals encounter in managing menstrual cramps. The application notably enhanced the confidence and understanding of menstrual cramps management among participants, empowering them to adopt a proactive approach to their healthcare.

The findings of the present study demonstrated that the overall practice score of the visually impaired female adolescents regarding menstrual cramps was significant. It showed that 94% of the visually impaired female adolescents studied exhibited satisfactory practices in the post-tests, in contrast to only 8% who had unsatisfactory practices concerning menstrual cramps after utilizing the artificial intelligence-powered Be My Eyes app. From the researchers' perspective, this validates the effectiveness of the artificial intelligence-powered Be My Eyes app in alleviating menstrual cramps among visually impaired female adolescents. This outcome supports the hypothesis that following the intervention, there will be a notable difference in the total practice scores of visually impaired female adolescents when compared to baseline measurements.

The current study revealed a significant positive correlation between knowledge and practices related to menstrual cramps before and

after the use of the artificial intelligence-powered Be My Eyes app among visually impaired female adolescents. From the researchers' viewpoint, this reflects the beneficial impact of the artificial intelligence-powered Be My Eyes app in enhancing the practices of visually impaired female adolescents.

Implications of the study

Implications for Nursing Practice. Community health nurses and gynecological nurses can utilize the artificial intelligence-powered Be My Eyes app across various healthcare environments, especially within the community, as menstrual cramps are prevalent among adolescent students yet often remain undertreated, misdiagnosed, and inadequately managed. The findings of this study underscored the importance of the nurse's role in alleviating menstrual cramps in visually impaired female adolescents through the use of the artificial intelligence-powered Be My Eyes app.

Implications for Nursing Education. Community health nurses and gynecological nurses operating in diverse community settings, as well as those in gynecological wards, should receive in-service education focused on females experiencing menstrual cramps and the positive impacts of the artificial intelligence-powered Be My Eyes app.

Implications for Nursing Research. The findings of the present study have contributed to the existing body of literature, and the implications for nursing research are presented in the form of recommendations. This study can act as a foundation for future research endeavors and motivate other scholars to conduct further investigations.

Conclusion:

According to the findings of the present study, it can be said that visually impaired female adolescents experienced enhancements in their knowledge and practice menstrual cramps management due to the use of AI.

Recommendations

In light of the results obtained from the current study, the subsequent recommendations are:

- Integrating Be My Eyes with reliable menstrual health resources could further enhance its impact on menstrual cramps knowledge and practice among visually impaired female adolescents.

- Providing AI-powered apps like Be My Eyes visually impaired individuals with greater autonomy and access to information, enabling them to better manage their daily lives.

- Be My Eyes' AI-powered feature can offer personalized support and guidance on managing menstrual cramps, potentially improving knowledge and practice among visually impaired female adolescents.

- The app's live video call feature connects users with volunteers or company representatives, providing real-time assistance and support for managing menstrual health.

- Community health nurses & gynecological nurses should organize enlightenment program on non- pharmacological self-help strategies for menstrual cramps.

Further research:

- Integrating Be My Eyes with reliable menstrual health resources could further enhance its impact on menstrual cramps knowledge and practice among visually impaired female adolescents.

- Developing tailored educational content on menstrual health and cramp management, accessible through Be My Eyes, could help address specific needs and challenges faced by visually impaired individuals.

Limitation of the Study

The study participants were chosen from a single educational institution, limiting the generalization of the findings to other contexts.

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