Effectiveness of Health Promoting Based Program Versus Artificial Intelligence Based Program on Quality of Life among Menopausal Women

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Abstract

Background: A full year without menstrual blood is known as menopause, if there has been no surgery or medical condition such as hormonal birth control, radiation therapy, or surgical ovarian excision that may halt the bleeding. It comes with growing older.. The aim: The study aimed to investigate the effectiveness of health promoting based program versus artificial intelligence based program on knowledge and quality of life among menopausal women. **Design:** Quasi-experimental study was utilized. **Setting:** The study was conducted at gynecological outpatient clinic at obstetric at gynecological hospital, Ain Shams University, Egypt. **Sample:** Purposive sampling of 100 peri menopause and menopausal women. **Tools**: **Structured interviewing questionnaire: Part A:** Socio-demographic characteristics for women. **Part B:** Women medical history, **Part C**: Women knowledge regarding menopause. **Part D: Menopause Specific Quality of Life Questionnaire (MENQOL): Results:** The current study reveals there are statistically significant differences regarding total knowledge between two groups (p value < 0.042), statistically significant differences between physical domains at (P value < 0.025, Psy-social domain at (P value < 0.047) between two groups. **Conclusion:** Implementation of the health promoting based program improved menopausal woman knowledge and their quality of life compared to implementation of artificial intelligence based program. **Recommendations:** The present study recommended that, the health promoting based program have to be applied to all women health care settings as the best methods and a template for teaching women about the menopause.

Key words: Artificial Intelligence Based Program, Health Promoting Based Program, Menopause, Quality of life.

Introduction

Loss of ovarian follicular function and a drop in blood estrogen levels are the two main causes of menopause.For most women, monthly menstruation also known as a menstrual period or "period ends during menopause due to the suppression of ovarian follicular activity. **(Talaulikar, (2022).**

The World Health Organization (WHO) defines natural menopause as "the persistent cessation of menstruation resulting from the loss of ovarian follicular activity which occurred after 12 consecutive months of amenorrhea." For women worldwide, natural menopause usually commences between the ages of 45 and 55, menopausal transition can also occur gradually, usually beginning with modifications to the menstrual cycle. **(United Nations, Department of Economic and Social Affairs, 2022)**.

While the exact cause of menopausal symptoms remains elusive, factors such as genetics, environment, infections, and nutrition are believed to contribute to its onset, nervousness, vaginal dryness,

discomfort during sexual activity, incontinence, and anomalies in the regularity and flow of the menstrual cycle that result in cessation of menstruation. ***(Shokouhi, et al., 2021).***

Women endure different symptoms throughout and after the menopausal transition. While some have few or no symptoms, others may experience severe symptoms that negatively impact their quality of life. Menopause symptoms, such as hot flashes and nocturnal sweats, can last for several years for some people. **(Talaulikar, 2022)**

Experiencing an unanticipated sensation of warmth in the face, neck, and chest, together with flushing of the skin, perspiration, palpitations, and severe physical pain that may endure for several minutes, is known as a hot flush.Additional symptoms include changes in mood, melancholy, anxiety, vaginal dryness, discomfort during sexual activity, incontinence, and anomalies in the regularity and flow of the menstrual cycle that result in cessation of menstruation.**(Pearl, & Sankar, 2023).**

Women going through menopause may complain of hot flashes, weight gain, depression, vaginal shrinkage, and other symptoms that lower their quality of life. Menstrual cycle abnormalities are usually the initial sign of a progressive menopausal transition. The period of time that begins one year after the last menstrual cycle and ends when these symptoms appear is termed to as the "peri-menopause." The effects of peri-menopause on social, mental, emotional, and physical health might endure for several years. **(Lee,etal, 2022).**

Globally, the proportion of postmenopausal women is increasing; in 2021, women over 50 accounted for 26% of all women and girls. This was risen from 22% a decade earlier, and women were also living longer. It is projected by the Central Statistics Agency that by 2025, there would be 60 million menopausal women globally. It is projected that by 2030, there will be 1.2 billion menopausal and postmenopausal women globally, with 47 million of them entering the population each and every year.. **(Pertyńska, etal, 2021)**

The hormonal changes associated with menopause can have an impact on one's physical, emotional, mental, and social well-being.associated with the condition

hormonal changes, hormone imbalance,vasomotor symptomsaging related sexual dysfunction fertility problems. Each woman has a unique set of symptoms both during and after the menopausal transition. Few or no symptoms are present in some. Others may experience severe symptoms that impair their quality of life and ability to carry out everyday tasks. For years, some women may not have symptoms. **(Tseng, etal, 2023).**

Quality of life (QOL) is defined by the world health organization as "individuals' perception of their place in life in relation to their goals, expectations, standards, and interests, as well as the culture and value systems in which they live." According to the definition of quality of life, it is "a large-scale phenomenon that is influenced in a complex way by an individual's physical health, psychological state, and degree of independence, as well as their relationship to salient features of their environment and social relationships." Menopausal symptoms can also have an impact on women's physical, mental, and social well-being, it is a multifaceted notion that encompasses the physical, emotional, and social aspects of sickness and treatment. **(United Nations,**

Department of Economic and Social Affairs, 2019).

Significance of study

Women going through menopause require the availability of high-quality healthcare services, communities, and systems that can assist them. Regrettably, the level of understanding and the ability to obtain information and services related to menopause continue to be major obstacles in numerous nations, menopause is frequently not talked about in families, communities, workplaces, or healthcare environments**.(Stanzel, Hammarberg, & Fisher,. 2021).**

The main goal of health promoting based program is achieving improvement in quality of life for menopausal women as empowerment them for achieving optimum health and preventing menopausal consequences and educating women about menopause, managing it, and using may be vital step toward decrease postmenopausal symptoms. **(Rostami-Moez, et al, 2023).**

In primary care and public health, giving an intervention to a group of menopause women in order to improve their health outcomes is becoming more and more common. However, the term "group" is a catch-all that refers to a wide variety of objectives, theories, procedures for implementation, and techniques for assessment., suggested a framework that will help practitioners, researchers, and policy makers in the design and process evaluation of health improvement interventions that actually occur in a group setting. **(Rodrigo, et al, 2023).**

Artificial intelligence (AI) holds great promise in revolutionizing menopause management and improving the quality of life for millions of women worldwide. By harnessing the power of AI to predict the onset of menopause, provide personalized recommendations, and facilitate remote monitoring and support, can empower women to take control of their health and well-being during this challenging phase of their lives. As explore the potential of AI in menopause management, it is crucial that address the challenges and concerns that arise, ensuring that this new frontier in women's health is both effective and equitable. **(Brandão,et al, 2024)**

Aim Of The Study

The study aimed to investigate the effectiveness of health promoting based program versus artificial intelligence based program on quality of life among menopausal women through:

- Assessing knowledge of women regarding menopause pre/post two program implementation.
- Assessing quality of life among menopausal woman pre/post two program implementation.
- Designing and implementing group based health promoting program and artificial intelligence based program for menopausal women regarding their quality of life.
- Compare between the effectiveness of health promoting based program versus artificial intelligence based program on knowledge and quality of life among menopausal women.

Hypothesis

H1: Implementation of artificial intelligence based program will improve knowledge of menopausal women compare to health promotion based program.

H2: Implementation of artificial intelligence based program will improve quality of life of menopausal women compare to health promotion based program.

Subjects And Methods

Study design

This study used a quasi-experimental (pre/post-test) design to achieve its aim. Consequently, an empirical study which

uses random assignment to estimate the causal impact of an intervention on the target population is referred to as quasi-experimental. **(Cook & Campbell, 1979).**

Research setting

The study was carried out at a Gynecological clinic at Obstetric and Gynecological hospital, Ain Shams University, Egypt by used multistage technique for selected the previous mention setting. This clinics serves variety of health needs and problems related to women health from all Egypt Governorates with affordable cost.

Subjects

Based on the study's inclusion criteria, 100 pri-menopausal and menopausal women were included in a purposive sample. A total of 100 women were assigned to and split up into the AIB group (n = 50) and the HPB group (n = 50). The following criteria were used to select the sample, and each woman has an equal chance of being included in the study from the previously mentioned settings:

The inclusion criteria included:

- Women who experienced irregular menstruation for less than five years or who stopped their periods for more than four months but less than twelve months are included in the perimenopause category. These ladies did not get hormone therapies for menopause and had hot flashes and/or night sweats.
- Women who had a permanent, irreversible menstrual stoppage for more than a year and who were not getting hormone therapy for menopause are included in the postmenopause category..
-Women have smart mobile phone and what's-App to receive artificial intelligence based program which created by researchers with artificial intelligence technologist assistance.

Sample size

100 women were included in the study depended on the following equation:

$$n=\frac{N\times p(1-p)}{\left[\left[N-1\times\left(d^2\div z^2\right)\right]+p(1-p)\right]}$$

n =Sample size

Z = Statistics for a level of confidence. (For the level of confidence of 95%, which is conventional, Z value is 1.96).

P = the expected proportion in population based on previous studies.

d=error percentage = (0.05).

The standard normal deviate for α = Zα = 1.960

The standard normal deviate for β = Zβ = 0.842

A = 1700 B = (Zα+Zβ) 2 = 7.849

C = (E/S (Δ)) 2 = 0.1132

AB/C = 99.7251

n= (1.96+0.84)2/0.1132= 99.7251 ≈ 100 women. **(Thompson, 2012**)

Tools of data collection

A. Structured interviewing questionnaire: Developed by the researchers after strength review of the relevant literature. It was designed in the Arabic language based on related literature; **(Talaulikar, (2022)** it will divide into **four parts:**

Part A: Socio- demographic characteristics for women: to assessing age, marital status educational level, residence and occupation,

Part B: Women medical history: to take women history of medical diagnosis, present complains current treatment, presence of menopausal symptoms and women weight.

Part C: Women knowledge regarding menopause it aimed for assess women knowledge related menopause concept, onset, symptoms, and its effect and their menopausal measures, pre and post program implementations**.** It contain nine question in multiple choose form.

Scoring system of knowledge: women answers was compared with a model key answer, where (2) scored was given for

correct answer, (1) was given for incomplete correct answer, (0) was given for do not know and incorrect answer.

D. Menopause Specific Quality of Life Questionnaire (MENQOL:

It is a self-report tool designed to evaluate the degree to which menopausal symptoms negatively impact women's lives, as well as their presence and severity. It was adopted **by Lewis et al. in 1996**. There are four domains in which the 31 items are categorized: physical (18 items), vasomotor (2 items), psycho-social (8 items), and sexual (3 items). Items like bloating, pain, fatigue, energy, and weight gain are evaluated in the physical domain. Sweating, night sweats, and hot flashes are evaluated by the vasomotor domain. The psychosocial domain includes questions about anxiety, memory, and feeling "blue" in order to assess an individual's psychological health. Items pertaining to changes in intimacy, vaginal dryness, and sexual desire are included in the sexual domain.

The scoring system of MENQOL: For scoring and data analysis, the seven-point Likert scale that was utilized during its administration was transformed. This seven-point Likert scale was translated into an eight-point scale, ranging from 1 to 8, for each of the 31 items. If a woman answers "no" with a "one," it means she hasn't had this symptom in the previous month. A "two" means that although the woman felt the symptom, it wasn't at all bothersome. The numbers "three" through "eight," which correlate to the numbers "1" through "6," show escalating levels of discomfort brought on by the symptom. The score by domain, which spans from 1 to 8, is the average of the converted item scores that make up that domain.

Severity of menopause symptoms scoring system: as the following, Score range from 2-4 consider mild, score range from 5-6 moderate, and score range from 7-8 severe symptoms.

Procedures:

A panel of five experts from obstetrics and women health nursing and community health nursing professors assessed the instruments for clarifying comprehensiveness, appropriateness, and legibility content validity of tools

Reliability performed by Cronbach's Alpha coefficient test for one tool which was knowledge questionnaire and its result was 0.721 which indicates an accepted reliability of the tool. No modification was done for QOL tool.

A pilot study A Pilot study conducted on 10 women at the beginning of October 2023 in order to ensure the clarity and feasibility of the research process and the applicability of the tools and the time needed to complete the tool, the pilot sample included in the study results and no modification done.

Fieldwork: Fieldwork begins from early December 2023 to early November 2024. Data was collected three days a week (Sunday, Tuesday and Thursday) from 9 a.m. to 12 p.m. After obtaining regulatory approvals to conduct the study, the researchers meet the study sample to clarifying the aim of the study and to determine the suitable time for collecting data. The researchers distributed the questionnaires for all participants to fill it then checked for its completeness.

The data was collected through 4 phases: interviewing and recruitment, assessment, synthesis of AI program and health promotion program, implementation of research program, and evaluation phase. The group of women was divided into two comparing group HPB group and AIB group.

1- **Interviewing and recruitment:** Eligible women were recruited from the

gynecological outpatient clinic. The researchers was interviewed the women who met the inclusion criteria, describe the nature, aim of the study and take their approval for participation by written consent. Data was gathered three days/ week through interviewing each participant individually to collect the needed demographic data, and medical history using (Structured Interviewing Questionnaire), each interview took 15–20 minutes approximately.

2. Assessment phase: The researchers assessed the preliminary data for all women (100) women history, women knowledge and quality of life for two group involved in this study.

Phase 3: designing AI based program: During this phase the researchers started with setting up the educational objectives, scientific content developed of episodes and classification of episodes and the then need assistant from informational technology engineer to develop the episodes and clarified the aim and objective of AI program to the engineer. After 4 months and 7 times meeting with the engineer. The first trail of episodes was done by using D-iD AI video generator program the researchers made some modification as the voice in the video changed to be real voice of the researcher also the character of cartoon personality changed to be matching with our culture. Also the episodes was mad by monthly description 125 $ to the websites specialized for synthesis of similar videos.at the end the researcher receive the 10 episodes to disseminated for the 50 participant.

3. Implementation of the program. In this phase, the researchers was divided the study sample into two group: HPB group and AIB group

First group: Health promoting based group: (50 women) was received the session with face to face lecture which included one theoretical session and 5 practical sessions regarding menopause management at the previous setting the health promoting group attended the outpatient clinics. The researchers took women's medical history and their history for related menopause symptoms. Women during their visits to obstetric clinic and the researchers interviewed the health promoting group seven times, firstly at the booking visit for filling interviewing questionnaires and then 6 times for applied health promoting program the session for two weeks continuously

As soon as the participants were arranged in a circle, the researchers gave self-introductions and reminders about the group's rules (such as respect and confidentiality). Women were offered opportunities to socially connect with one another during the interactive sessions. They promoted involvement in their own conflicts. Women actively participated in the following sessions by being ready to communicate to to the researchers about these menopausal symptoms, ask them for further explanations, and offer feedback.

Education was given through women's classes covering specific topics related to menopause, such as adopting health-promoting behaviors. (e.g., such as how to control of hot flushes and sleep disturbances, how to keep healthy diet and how to use natural herbal supplementation to decrease associated menopausal symptoms. Also the researcher trained the women in this subgroup mindfulness technique and to increase their quality of life and provided demonstration and re-demonstration during mindfulness technique. In addition, the HPB group received the previously discussed topics in the Arabic booklet.

Second group :Artificial intelligence based group: AI based program was received via women what's-A application

containing the videos with AI technology developed and designed by researchers with assistance of information technology engineer which contain the same information in the group based health promoting program which included 10 episode every episode duration between 5 -10 minutes, regarding menopause information. this group was receive AI based program designated to studied sample (50) women via smart phone in what-App and then instructed 50 women to watching it as a self-learning methods of education.

Phase 4: Follow up and outcomes; following the study session, the participants' phone numbers were collected for follow-up purposes. The upcoming visits were at after three months after two program implementation ending .the same questionnaire was collected to assess the effectiveness of HPBP and AIBP on quality of life of menopausal women.

4. **Evaluation.** Finally at the end of the three months with the last meeting the researchers was evaluated participant satisfaction regarding two program (HPBP, AIBP).

Administrative Approval Before starting data collection, official approval to conduct this study was given by the Dean of the Faculty of Nursing to the Director of the Gynecological Clinic at the Obstetric and Gynecological Hospital, Ain Shams University, Egypt. Every participant gave informed consent during the interview with the researchers.

Ethical considerations: The Ain Shams University scientific research ethics committee faculty of nursing, provided ethical approval prior to the pilot study. Furthermore, each participant provided written informed consent, ensuring them of the right to remain anonymous and confidential throughout the study, as well as the ability to withdraw at any point. The questionnaires were completed in a quiet, private room. The study was carried out adhering to the World Medical Association's code of ethics. **(Helsinki Declaration)**.

Statistical Design: Data checked before being input into a computer. Data analysis was performed using the statistical package for social sciences (SPSS version 22), which was then followed by data tabulation and presentation. Standard deviation, mean, and minimum and maximum values are used to describe quantitative data. Significance test (Chi-square, Student's t-test for independent samples). When $P \leq 0$ point 0.05, a significant level value was taken into consideration.

RESULTS

Table (1) Shows that 57% of studied women their age ranged between 50-55 years, with mean age 53.732 ± 4.471 years while 84% of them were married, 54 % of them had intermediate education, 58% of them lived in a rural area and 62% of the studied women were not working.

Table (2) illustrate that, 88% of studied women had menopausal symptoms. Regarding having chronic diseases, 33% of them had hypertension, 47% of them there weight ranged "Between" 50-79 k with mean ± SD 89.7±6.28

Table (3): Shows that 82.0 % of women had correct respond regarding the onset of menopause post AIBP while it is become 88.0% post HPBP. Also 74% of women had correct respond regarding effect of menopause on their quality of life post AIBP while it was 80.0% post HPBP. And there are 80.0 of women had correct responds regarding measures that should be taken to deal with the symptoms of menopause post AIBP versus to 86.0% of them post HPBP.

According to total women knowledge pre AIBP group was 33.48±4.31, while pre HPB group was

31.12±3.98 with no statistically difference between two groups (p. value < 0.154).while the mean ±SD of total knowledge of post AIBP was 35.56±4.57 while post HPBP was 37.89±4.86 with statistically difference between two groups with (p value < 0.042).

Table (4) Illustrates that there was no statistically significant difference between pre HPBP and pre AIBP related physical menopausal domain of quality of life while there are statistically significant difference between two group related physical menopausal domain of quality of life with (p>0.025).

Table (5): Also the current study documents no statistically significant difference between two group preprogram implementation related total vasomotor domain while there was no statistically significant difference between HPB group and AIB group with (p>0.823) post program implementation related to vasomotor domain of quality of life.

And there was documents no statistically significant difference between two group preprogram implementation related to psychosocial domain of quality of life while there was statistically significant difference between HPB group and AIB group with (p>0.074) post program implementation related psychosocial domain of quality of life.

Also there was no statistically significant difference between two group preprogram implementation and no statistically significant difference between post program implementation between two groups regarding sexual domain with (p value 0.471)

Figure (1): the current study clarified that there are less than half of women had mild QOL, more one third of them had moderate QOL and few of them had severe QOL pre HPBP implementation while there are more than half of them had mild QoL, more than one third of them had moderate QOL and few of them had severe QOL pre AIBP implementation.

While less than three quarter of them had mild QOL, less than one third of them had moderate QoL and
few of them had severe QoL post HPBP implementation while less than three quarter of them had moderate QOL, less than one third of them had mild QOL and few of them had severe QoL post AIBP implementation.

Table (6): Displays that the mean ± SD of satisfaction of AIB group was 48.66 ± 1.52 while it was 46.00 ± 2.64 for HPB group.

Table (1): Distribution of studied peri-menopausal and menopausal woman's according to their socio-demographic characteristics (N=100)

Characteristic		No	%
Age (years)	Pri menopause 40-49 Y	43	43.0
	Menopause 50-55 Y	57	57.0
	Mean± SD 53.732 ± 4.47		
Marital status	Married	84	84.0
	Divorced	14	14.0
	Widow	2	2.0
Education level	Not read and write	2	2.0
	Basic education	22	22.0
	Intermediate education	54	54.0
	University education	22	22.0
Residence	Rural	58	58.0
	Urban	42	42.0
Occupation	Working	38	38.0
	Not working	62	62.0

Table (2): Distribution of studied women according to their medical history (N= 100)

Medical History		No	%
Present complain*	Menstrual disturbance	43	4.0
	Vaginal bleeding	15	15.0
	Menopausal symptoms	88	88.0
***Presence of chronic diseases**	Hypertension	33	33.0
	Diabetes mellitus	9	9.0
	Anemia	21	21.0
Current treatment:*	Anti-hypertensive drug	15	15.0
	Diabetic treatment	9	9.0
	Vitamins supplementary	3	3.0
Weight:	Normal Weight: 50-79 K	47	47.0
	Overweight: 80-100K	36	36.0
	Obesity: ≥100 K	17	17.0
	Mean ± SD 89.7 ±6.28		

* Not mutually exclusive

Table (3): Comparisons between health promoting based group and artificial intelligence based group regarding the women knowledge ((N= 100)

Women knowledge regarding menopause	Pre-artificial intelligence Based Program (50)		Pre- Health Promoting based-Program (50)		$\chi 2$	P value	Post-artificial intelligence Based Program (50)		Post-Health Promoting based-program (50)		$\chi 2$	P value
	correct		correct				correct		correct			
	N	%	N	%			N	%	N	%		
Concept of menopause	18	36.0	15	30.0	0.407	.523	32	64.0	29	58.0	0.378	.538
When does menopause occur	22	44.0	19	38.0	0.372	.451	41	82.0	44	88.0	0.705	.400
Menopause considered a general stage that occurs to every woman	16	32.0	13	26.0	0.437	.508	38	76.0	41	82.0	0.542	.461
Symptoms associated with menopause	19	38.0	24	48.0	1.022	.312	29	58.0	37	74.0	2.852	.091*
Vitamin D have a relationship with the severity of menopausal symptoms:	8	16.0	14	28.0	2.097	.147	31	62.0	33	66.0	0.173	.676
Effect of menopause on a woman's quality of life.	18	36.0	21	42.0	0.378	.538	37	74.0	40	80.0	0.711	.571
Concept of early menopause.	17	34.0	21	42.0	0.262	.631	32	64.0	39	78.0	2.379	.012*
The women who begin menopause at a younger age than other women.	24	48.0	20	40.0	0.649	.420	37	74.0	38	76.0	0.011	.915
Measures that should be taken to deal with the symptoms of menopause	13	26.0	16	32.0	0.437	.508	40	80.0	43	86.0	0.637	.424
Total Mean & SD	33.48±4.31		31.12±3.98		T-test 2,670	0.154 NS	35.56±4.57		37.89±4.86		T-test 3.297	0.042*

N.B. ^ independent T test Chi Square test= $\chi 2$ *Significant (p≤ 0.05).

Table (4): Comparisons between health promoting based group and artificial intelligence based group regarding of physical domain of quality of life.

Physical domain	Pre- AI based-group (50)	Pre- HP based-group (50)	Post- AI- based group (50)	Post- HP based-group (50)
	Mean & SD	Mean & SD	Mean & SD	Mean & SD
Physical domain				
flatulence (wind) or gas pains	1.38±.567	1.32±.587	1.38±.567	1.38±.567
weight gain	1.42±.642	1.46±.613	1.30±.463	1.30±.463
aching in muscles and joints or gas pains	1.34±.626	1.40±.535	1.34±.593	1.34±.593
difficulty sleeping	1.44±.644	1.42±.609	1.36±.563	1.36±.563
aches in back of neck or head	1.38±.567	1.42±.609	1.38±.635	1.38±.635
feeling tired or worn out	1.46±.542	1.46±.579	1.32±.513	1.32±.513
decrease in physical strength	1.32±.551	1.34±.593	1.32±.551	1.32±.551
changes in appearance, texture or tone of my skin	1.36±.598	1.44±.611	1.34±.557	1.34±.557
low backache	1.42±.642	1.42±.676	1.38±.530	1.38±.530
frequent urination	1.46±.646	1.38±.667	1.42±.609	1.42±.609
involuntary urination when laughing or coughing	1.44±.541	1.40±.606	1.44±.577	1.44±.577
lack of energy	1.48±.614	1.50±.535	1.40±.639	1.40±.639
dry skin	1.40±.535	1.40±.571	1.28±.497	1.28±.497
leg pains or cramps	1.44±.611	1.50±.647	1.40±.639	1.40±.639
increased facial hair	1.44±.611	1.36±.525	1.32±.513	1.32±.513
feeling bloated	1.44±.541	1.54±.579	1.30±.463	1.30±.463
breast pain or tenderness	1.36±.598	1.32±.621	1.34±.557	1.34±.557
vaginal bleeding or spotting	1.36±.525	1.32±.587	1.36±.525	1.36±.525
Total	12.41±2.31	10.72±1.97	11.92±1.29	9.74±.881
T-test & P value	7.425	P=0.649	13.683	P=0.025*

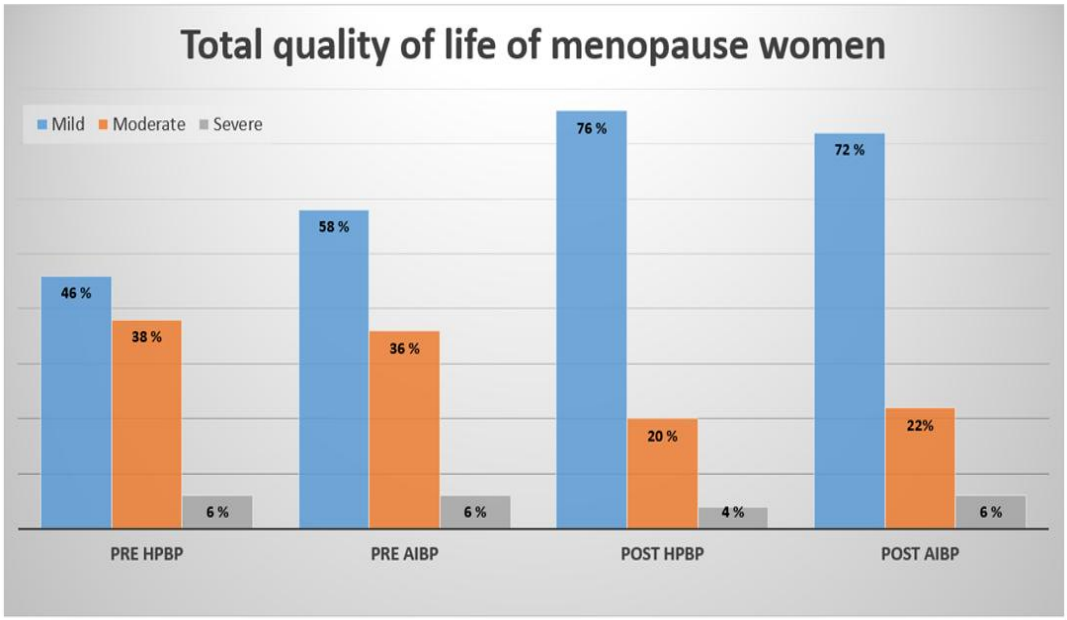
N.B. ^ independent T test *Significant (p≤ 0.05).

Table (5): Comparisons between health promoting based group and artificial intelligence based group regarding of vasomotor, psycho social domain and sexual domain of quality of life

menopausal symptoms	Pre- artificial intelligence based program (50)	Pre- Health Promoting based-Program (50)	Post- artificial intelligence based program (50)	Post- Health Promoting based-Program (50)
	Mean & SD	Mean & SD	Mean & SD	Mean & SD
Vasomotor domain				
hot flushes or flashes	1.44±.675	1.48±.677	1.34±.557	1.22±.418
night sweats	1.34±.519	1.44±.677	1.26±.487	1.18±.388
Total	6.53±1.78	6.40±1.88	6.21±1.25	5.92±1.12
T-test & P value	T= 8.382 (p=0.628) NS		T= 5.291 (p=0.823) NS	
Psycho social domain				
dissatisfaction with my personal life	1.52±.580	1.48±.614	1.46±.646	1.24±.517
feeling anxious or nervous	1.38±.530	1.44±.577	1.30±.544	1.20±.418
poor memory	1.54±.579	1.42±.609	1.48±.614	1.34±.539
accomplishing less than I used to	1.40±.571	1.48±.677	1.40±.535	1.22±.418
feeling depressed, down or blue	1.50±.580	1.40±.535	1.34±.479	1.18±.482
being impatient with other people	1.40±.639	1.32±.587	1.38±.624	1.30±.544
feelings of wanting to be alone	1.36±.598	1.36±.525	1.34±.457	1.28±.454
decrease in stamina	1.42±.538	1.38±.567	1.36±.631	1.32±.551
Total	8.76±1.28	7.52±1.20	8.20±1.22	5.98±.967
T-test & P value	T= 12.024 p=0.891 NS		T= 16.572 p=0.047*	
Sexual domain				
decrease in my sexual desire	1.50±.614	1.48±.580	1.50±.614	1.47±.574
vaginal dryness	1.48±.580	1.40±.571	1.36±.485	1.24±.476
Avoiding intimacy	1.40±.571	1.48±.580	1.40±.626	1.38±.574
Total	8.22±1.53	8.13±1.34	8.18±1.50	8.10±1.30
T-test & P value	T= 8.756 p=0.321 NS		T= 7.911 p=0.471 NS	

N.B. ^ independent T test *Significant (p≤ 0.05) *NS. (p> 0.05)

Figure (1): Comparison between total menopause specific quality of life pre/post HPBP group versus AIBP group.



Items	AI based group (50)		HP based group (50)	
	Yes		Yes	
	No	%	No	%
Health promoting program content was easy and written in a simple language	43	86%	47	94%
Health promoting program content answered all .questions regarding menopause	48	96%	50	100%
Health promoting program content was beneficial, and applicable	50	100%	49	98%
Mean ± SD	**48.66 ± 1.52**		**46.00 ± 2.64**	

Discussion

Having the right information as utilization of the health promoting based program provide direct communicated with women, provide more explanation, sharing women experience and allow more feedback regarding menopause period **(Brandão, etal., 2024).**

Artificial intelligence powered menopause management begins with personalized symptom tracking. By analyzing individual health data,

including hormonal fluctuations, lifestyle factors, and reported symptoms .This personalized approach enables women to better understand and manage specific challenges associated with menopause**. (Malik, Garg, & Malik, 2024).**

So quasi-experimental (pre/post-test) design utilized to investigate the effectiveness of health promoting based program versus artificial intelligence based program on knowledge and quality of life among menopausal women.

Regarding socio-demographic characteristics of the studied women the present study revealed that more than half of studied women their age ranged between 50-55 years, with mean age 53.732 ± 4.471 years and most of them were married.

The previous finding was in accordance with **(Keye,Varley& Patton, (2023)** who studied systematic review of the impact of menopause education on quality of life among menopausal women and stated that the participants were aged between 40 and 60 years. The fact that the natural menopause normally happens between the ages of 45 and 55 may be the reason for the similarities between the two studies. Furthermore, more than half of them were intermediate education and were lived in a rural area. Besides two third of the studied women were not working. In the opinions of the researchers, the most of Egyptian women seeking care and treatment at governmental hospitals which provided them with medical care with affordable prices and encompassing variety of specialty in women health with highly qualified health care team.

Meanwhile, this was not in accordance with **(Kamal and Seedhom, 2022)** who conducted research on the quality of life among postmenopausal women visiting gynecological outpatient clinics at Beni Suef University Hospital and found that one-third of the women had a university degree and that more than half of the women were employed, this differences between two studies may related to differences of geographic area life style and culture of both study sample specially the current study revealed that more than half of participant come from rural area which culturally not support women working .

Regarding to medical history, the most of studied women had menopausal symptoms, more than one third of them had hypertension, less than half of them their weight ranged between 50-79k with mean &SD 89.7± 6.28 (**Table 2**). This result may related to that the Mean± SD of studied women age was 53.732 ± 4.47 it has been well established that the incidence of chronic disease rises sharply with age and that the most of chronic ailment are occur with the middle age specially associated unhealthy life style.

This finding was in accordance with **(Chen, etal, 2021)** who studied a meta-analysis of the impact of mindfulness-based interventions on menopausal symptoms and quality of life in women going through the menopause: demonstrated that menopause raises the risk of cardiovascular disease and early osteoporosis. In the sam line to (**Tabatabaei-Malazy,et al, 2018)** who conducted a systematic review meta-analysis study to determine the prevalence rate of metabolic syndrome (MetS) among women going through menopause in the Middle East. They noted that the conditions that make up the metabolic syndromecentral obesity, hypertension, dyslipidemia, and hyperglycemia have become more prevalent as people age. Given that menopause is recognized as a contributing factor in the accelerated aging of chronic vascular diseases in women.

In the opposite side(**The British Diabetic Association, 2024)** stated that

the per-menopause and the menopause don't cause diabetes, in addition to **(Anagnostis, etal,2022)** who investigated the relationship between menopause and the risk of cardiovascular disease in England and found that although the epidemiological evidence points to an increase after menopause, it's unclear if this is a result of aging or menopause because older ages are associated with higher rates of atherosclerosis and reduced vascular elasticity.

From the researchers point of view, this differentiation between this studies may attributed to differentiation between the sample cultural and variety of their level of adoption to healthy life style and their level of exposure to risk factors as stress ,obesity, unhealthy food and obesity which consider as a potent associated health problems with women age.

Furthermore, the current study concluded found that most of women had correct response regarding the onset of menopause post artificial intelligence based program and post health promoting based program, also most of women had correct response regarding effect of menopause on their quality of life post AIBP and post HBBP .beside there are less than three quarter of women had correct response regarding measures that should be taken to deal with the symptoms of menopause post AIBP compared to the most of them post HBBP with $P < 0.302$ post-program implementation.

From researchers explanation for this result the knowledge of participants improved in HPBP more than AIBP but also improved with post AIBP implementation **(35.56+4.57**) compared to pre AIBP implementation which was (33.48 +4.31) this result may related to that the researchers adopt the communication skills, use face to face communication, eye contact, and The brainstorming technique was used as a group problem-solving approach. It entails a thorough, unstructured discussion in which each member of the group is encouraged to think aloud and provide as many ideas as they can based on their varied areas of expertise. It also constantly allows for participant explanations pertaining to the knowledge items. and allow to them to recall individually the correct knowledge, all of this may contributed with enhancement of participant level of knowledge in HBP group than AIB group.

This result agreement with **(Rathnayake, etal, 2020)** who evaluated effect of health-promoting lifestyle modification education on knowledge, attitude, and quality of life of postmenopausal women in Sri Lanka and revealed a positive impact of a health promoting based program on women knowledge. Meanwhile this was not in accordance with **(Alshogran, Mahmoud &Alkhatatbeh, 2021)** who conducted a study aimed to examine awareness, knowledge, and perception of menopause and menopause hormone therapy among per-menopausal females in Jordan and reported that less than half of participants weren't knowledgeable about several aspects of menopause. This difference in the demographics of the participants in the two studies accounts for the discrepancy with the current results as the other study reported, that mean ± standard deviation age of participants was 29.1 ± 6.3 years. Also these differences may attributed to the nature of the study design and aim which was descriptive in its nature while the current study quasi-experimental study which evaluated menopausal women knowledge post implementation of program quasi experimental nature

Meanwhile, this result was in accordance with **(Brandão, et al, 2024),**

who mentioned that AI-drive- Apps can educate women about menopause, its symptoms, and treatment options and it has vast potential to revolutionize modern medicine, including affordable access to quality menopause information and treatment for the many (not just the few) and AI evolves to engage with humans more naturally, it's crucial to enhance its cultural understanding.

According to total knowledge pre AIB group was 33.48±4.31, while pre HPB group was 31.12±3.98 with no statistically difference between two groups (p. value < 0.154).while the mean ±SD of total knowledge of post AIBP was 35.56±4.57 while post HPBP was 37.89±4.86 with statistically difference between two groups(p value < 0.042).**Table(3)**

This result may attributed to that the women knowledge pre both program implementation was the same which reflect women need to more information regarding menopause and reflect the shortage of information system and community support system to this age group.

This result was in the same line to **(Rathnayake, et al, 2020)** who proved that education intervention focused on health-promoting lifestyle management was effective in improving women total knowledge.

A similar finding was represented by (**Gebretatyos,etal ,2020)** whom assess women health information needs in menopausal age and found that more than half of the participants rated their level of knowledge about menopause as 'somewhat' (n=155, 51.5%).Less than half of the respondents indicated that they 'rarely' needed to search for information about menopause (n=136, 45%).

This result was not agree with **(Abd Elwahed ,2018)** who investigated knowledge and attitude towards menopause among women aged 40-60 years attending primary health care centers in Cairo, Egypt, and reveled that there was low level of good knowledge and necessitates more efforts for creating mass awareness about this issue.

This result was in accordance with **(Gebretatyos, etal, 2020)** that studied effect of health education on knowledge and attitude of menopause In Eritrea and stated that the mean scores of the knowledge were significantly higher at immediate post intervention than per-intervention (p < 0.0001), at 3 months follow up than per-intervention (p < 0.000) and immediate post-intervention than 3 months follow up (p = 0.004).

Regarding QOL the current study illustrates that there was no statistically significant difference between pre HPBP and pre AIBP related physical domain of QOL while there was statistically significant difference between two group related physical menopausal domain of QOL with (p>0.025). **(Table 4).**

This result was in the same line with **(Javadivala,et al, 2020)** who examined intervention strategy of physical activity promotion for reduction of menopause symptoms at Tabriz city, Iran and reported that menopausal women whose had sleep problems and joint discomfort rated severe/very severe declined from 28% to 6.5% and joint discomfort rated severe or very severe was reduced from 52.7% to 4.4%, respectively and joint discomfort rated severe or very severe was reduced from 52.7% to 4.4%, respectively.

On the other hand, **(Diaz, et al, 2019)** who conducted a systematic review of the personalized menopausal solutions using artificial intelligence and concluded that the field is still in its early stages of AI implementation. Deep learning (DL) models are being used to treat conditions like osteoporosis, which is a common skeletal symptom during

and after menopause. AI could help doctors manage symptoms and health outcomes by enhancing the performance of diagnostic and prognostic models for the identification of menopausal health issues and women at risk of developing complications.

Also the current study documents no statistically significant difference between two group preprogram implementation related total vasomotor domain of QOL also there was no statistically significant difference between HPB group and AIB group with (p>0.823) post program implementation related to vasomotor domain of QOL.

And there was documents no statistically significant difference between two group preprogram implementation related to psycho-social domain while there was statistically significant difference between HPB group and AIB group with (p>0.074) post program implementation psychosocial domain of QOL

Also there was no statistically significant difference between two groups preprogram and no statistically significant difference between two group post program implementation regarding sexual **domain of QOL. (Table 5)**.

From researchers point of view this result may related to that AIBP has the same effect of HPBP on women QOL and reflect that AI program may improve the women practices regarding menopause which reflect on their QOL regarding menopausal measures especially and when two program contained the same scientific knowledge and as the current study finding the AI program may empower HPBP and use as an educated tool for menopause women with combination with HPBP.

This result was in accordance with **(Horesh, etal, 2022)** who studied the virtual reality combined with artificial intelligence improves psychological well-Being in women with breast and ovarian cancer in New York and found that there was a significant difference between the two groups in total quality of life and vasomotor level of perceived stress ,comparison of the mean and SD of quality of life and its dimension pre/ post-intervention in the experimental and control groups .

On the other hand, This findings agreed with that of **(Kashfi, etal ,2021)** carried out the study on assess the effectiveness of education about physical activity via social networks on the quality of life of menopausal women in Iran, they found that there was no significant difference between the experimental and control groups in the quality of life and its dimensions.

Also the current study clarified that there are less than half of them had mild QoL, more one third of them had moderate QoL and few of them had severe QoL pre HPBP implementation and more than half of them had mild QoL, more than one third of them had moderate QoL and few of them had severe QoL pre AIBP implementation.

While less than three quarter of them had moderate QoL, less than one third of them had mild QoL and few of them had severe QoL post AIBP implementation while less than three quarter of them had mild QoL , less than one third of them had moderate QoL and few of them had severe QoL post HPBP implementation **(Figure: 1).**

This result was in the same line with **(Şener, & Taşhan, 2021)** who studied the effects of mindfulness stress reduction program on postmenopausal women's menopausal complaints and their life quality in Turkey and proved that there was a significant difference in the physical and psycho- social, domains and total scores between the experimental and control groups (p <

0.05). In the post test of the women in the experimental and control groups, a significant difference was found between these groups in the MENQOL with ($p < 0.05$).

In addition to **(Kaya,Şayık,& Bilgin,2021)** whom studied the effect of an educational program on the knowledge level of menopause in Turkey and added that it can be said that the health training which provided increased the knowledge of women about menopause, enabled them to experience fewer menopausal symptoms, and made a positive change to the quality of life and sleep

In the other side **(Shah, et al, 2024)** who studied the prevalence of non-communicable chronic diseases among menopausal women in rural India and mentioned that several studies have been conducted on menopause using artificial neural network (ANN) prediction models. It is ideal to use it to predict the prevalence of diseases in women during menopause, there are many studies that analyzed different artificial intelligence (AI) methods to help in clinical decision-making and the prediction of assessment of health risks in pre- and postmenopausal women.

In the same line **El-Hosary, E., & El-Salam, A. (2018)** who measured the effect of health promoting lifestyle modifications on quality of life among menopausal women in Menoufia and concluded that there were statistically significant differences between the control and intervention groups regarding promoting life quality and improving health promotion behaviors before and after the nursing intervention.

This discrepancy between the previous studies may attributed to AIBP dependent on self-learning method which let to participants to understand and use it according to their ability to understand, their ideal use of videos how much they replay it and also may attribute to how deal with AIBP and dependent on their compliance with involved information rather than HPBP which the responsibility of it depended on the researchers ability to recall gain feedback and discussed the information with participant in class.

But both program achieved improvement in knowledge and QoL to all participant.

Also the present study displays that the mean ± SD of satisfaction of AIB group was 48.66 ± 1.52 while it was 46.00 ± 2.64 for HPB group **(Table 6)**

From researcher opinion this result attributed to that the AI program easy to deliver and a watched unlimited time also it attractive for women related to its containing the real researcher voice, containing animation and easily to send for many people.

The current study hypothesis H1**: Implementation artificial intelligence based program will improve knowledge of menopausal women compare to health promotion based program** was NOT proved.

From the researchers explanation there was also improved in women knowledge with AIBP implementation but less than HPBP to dissemination of menopause related information either by AI technology or by face to face interactive lecture method help the women menopause period to deeply understand the right information and correct the misunderstanding the fault information, learn the correct standardized measure to reduce menopause related symptom which reflect on women knowledge and practices in order to enhance their quality of life domain.

Another researcher's opinion, regarding the current study result the This result may related to that the HPB

group let the women share their experience regarding menopause related symptom and active participation for all women involved in the HPB group in which the researchers let to open discussion and ask question and careful answer the question individually according to participants need, also researchers seek to motivated the women to adopted healthy measure involved in the HPB group to increase quality of women life. Meanwhile all this factors not available in AIBP that was designed as episodes depend on self-learning methods.

While H: 2 not approved as the Implementation of artificial intelligence based program will be improve quality of life of menopausal women compare to health promotion based program, Except in two quality of life domain which were vasomotor and sexual domain of QOL which the current study proved that there were no statistically significant differences between HPBP & AIBP which reflect that the AIBP was also improved women QOL in some aspect or domain and can useful for uses as a model of nursing education toward menopause and have to use with a combination with in class education as an educational attractive model and easily to handle.

Conclusion

-Based on the findings of the present study revealed that implementation of health promoting based program associated with improve menopausal women knowledge compared to. Implementation of artificial intelligence based program.

-Implementation of health promoting based program associated with improve menopausal QoL compared to. Implementation of artificial intelligence based program.

Recommendations:

The present study recommended that, the health promoting based program have be applied at all women health care setting as the best methods and a template for teaching women about the menopause, pre-menopause beside AIBP with dissemination of printed material containing all health promoting menopause instruction.

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Limitation of study: The researchers not found the similar finding as implementation of AI program to enhance menopausal women knowledge in order to support the current study finding in current study discussion also all studies supported the current study was to investigate AI technology toward assessing symptoms and association menopause problem.

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