Effect of an Endometrial Cancer Preventive Program on Menopausal Women's Health Behaviors Utilizing Health Beliefs Model

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Abstract

Background: Menopause is closely associated with an increased risk of endometrial cancer. Understanding the relationship between physiological changes during menopause and risk for endometrial cancer is essential for early detection and prevention, particularly in women with identifiable risk factors. Prevention can be achieved through health beliefs model and adopting health behaviors **Aim:** the study aimed to investigate the effect of an endometrial cancer preventive program on menopausal women's health behaviors utilizing health beliefs model. **Study design:** a Quasi-experimental research design. **Study setting:** The current study was conducted at the administrative building of Benha University Hospitals. **Study sample:** a purposive sample of 74 menopausal women was selected according to inclusion criteria and divided equally in to two groups (37 menopausal women in each group). **Tools of data collection:** three tools were used: tool (1) a structured interviewing questionnaire, tool (2) health beliefs model scale and tool (3) health promotion lifestyle profile-II. **Results:** there was statistical significant improvement in all items of knowledge, health beliefs and behaviors regarding endometrial cancer prevention in the study group compared to control group (P ≤0.001). Also, there was a highly statistical significant positive correlation between total scores of knowledge, health beliefs and health behaviors at pre and post intervention (P ≤0.001). **Conclusion:** Based on the results of the current study, it was concluded that; preventive program utilizing health beliefs model was effective in improving menopausal women's knowledge, health beliefs and health behaviors. Therefore, the study aim was achieved and the study hypotheses were supported. **Recommendation:** disseminate an educational booklet about endometrial cancer prevention targeting menopausal women across diverse settings to enhance awareness and promote positive health beliefs.

Keywords: Menopause, Endometrial cancer, Health beliefs model, Health behavior

Introduction

Menopause is the permanent cessation of menstruation, marking the end of reproductive capacity due to the loss of ovarian follicular activity. Menopause is confirmed after 12 consecutive months of amenorrhea without any physiological or pathological causes. The global average age for onset ranges between 45 and 55 years. Various demographic, menstrual and reproductive history, genetic and lifestyle factors play a significant role in determining the age of menopause. Factors influencing the age of menopause may also contribute to the risk of developing certain health conditions such as endometrial cancer *(Garg, 2024).*

Endometrial cancer is a malignant tumor originating from the endometrium. The exact etiology of endometrial cancer remains uncertain. Endometrial cancer has many risk factors such as obesity, diabetes mellitus, early menarche, late menopause, family history, polycystic ovarian syndrome, parity, breast feeding, gravidity, hormone replacement therapy and exposure to infertility treatment. The most common symptom is postmenopausal vaginal bleeding.

In more advanced stages, additional symptoms such as pelvic pain and abdominal distension may develop *(Ierullo, 2025; Pados, 2024)*.

Currently, there is no standardized screening test for endometrial cancer, which limits early detection. Women typically seek medical help only after experiencing symptoms. Surgical removal of the uterus is the primary treatment, curing most women. However, adjuvant therapy is recommended for women at high risk of recurrence. Immunotherapy, have shown promise in treating advanced or recurrent endometrial cancer by utilizing the body's immune system *(Bosse, 2024)*.

Prevention is more effective than treatment. Prevention can decrease the risk of developing endometrial cancer based on changing risk factors as possible. Primary prevention should focus on promoting a healthier lifestyle such as maintaining a healthy body weight, engaging in regular physical activity and adopting a balanced diet can significantly lower endometrial cancer risk *(Baker-Rand and Kitson, 2024)*.

Menopause is a significant life transition influenced by cultural beliefs, social norms and personal lifestyle choices. Women who perceive menopause negatively often experience more severe symptoms. One of the models that used to explain health behaviors is the health beliefs model which focuses on endometrial cancer prevention and shows the relationship between beliefs and behaviors *(Aljunaid et al., 2024)*.

Health beliefs model (HBM) highlights key factors such as perceived susceptibility, severity, benefits, barriers, self-efficacy and cues to action, all of which influence a woman's willingness to engage in health behaviors. By applying health beliefs model, interventions can be tailored to address women's concerns, empower women to take control of health and encourage preventive measures, ultimately reducing the risks

associated with menopause and prevention of endometrial cancer *(Lv et al., 2025)*.

Health behaviors refer to actions influencing overall health during menopause. Intentional or unintentional actions can either promote or harm health. Examples include substance use, diet, physical activity, sleep quality, sexual practices, healthcare service utilization and adherence to medical treatments. Adoption of healthy behaviors reduces the risk of endometrial cancer, enhances well-being, increases life expectancy and lowers healthcare costs *(Tabrizi et al., 2024)*.

Nurses serve as the first point of contact for women and play a key role in endometrial cancer prevention. Nurses play a crucial role in promoting health and addressing misconceptions about endometrial cancer. Nurses' expertise extends to both primary prevention, such as lifestyle modifications, secondary prevention through screening and early detection and tertiary prevention. Nurses also assist menopausal women in making informed health decisions and overcoming barriers to endometrial cancer prevention. Nurses' close connection with communities allows to enhance health literacy, provide vital information and empower women to take an active role in healthcare *(Naito, 2024)*.

More over nurses' responsibilities span the entire endometrial cancer care continuum, from health promotion and prevention to treatment and end-of-life care. Nurses provide essential support, education, and symptom management, ensuring women receive proper guidance throughout endometrial cancer journey. Additionally, nurses coordinate care and offer psychosocial support, helping women and families navigate the challenges of diagnosis and treatment *(Parreira et al., 2024)*.

Significance of research:

Endometrial cancer is the most common gynecologic malignancy in the western world and the second most common malignancy in women after breast cancer. Worldwide, endometrial cancer rank as the ٦th most common malignancy in women, and are the 14th leading cause of death in women. The incidence and mortality rates of endometrial cancer are rising, with 65,950 new diagnoses expected in 2022. Endometrial cancer has an estimated incidence of 19.5 cases for 100,000 women and a mortality rate of 2.1 for 100,000 women. The incidence of endometrial cancer is only expected to rise in the near future *(Chukkalore et al., 2023; Banning et al., 2023).*

According to the latest statistics for 2023, there are approximately 400,000 new women and over 80,000 deaths per year globally. Although most endometrial cancers can be diagnosed early and treated with surgery, leading to an overall good prognosis, some women develop aggressive tumors. Tumors greatly increase the risk of progression and death if tumors recur or metastasize *(Yang et al., 2025).*

In Egypt, the incidence of endometrial cancer has considerably grown and about 60 % of the women had an early stage of endometrial cancer with a good prognosis. On the other hand, high-grade endometrial cancer shows advanced disease with a poor prognosis. Endometrial cancer is the fifth most prevalent cancer among females in developed countries *(Ahmed et al., 2025).*

Selecting menopausal women is crucial in prevention as the prevalence of endometrial hyperplasia and cancer is higher in older women compared to younger ones, yet the most significant risk factor is the duration of exposure to estrogen without progesterone counterbalance *(SWETHA et al., 2024).*

The best of our knowledge, some studies conducted by *(Abd-Elhameed et al., 2023; Jacobs et al., 2022; Cheewakriangkrai et al., 2020; Karadeniz et al., 2020; Peigné et al., 2020)* focus on knowledge and attitudes toward endometrial cancer. However, limited attention has been given to the implementation of the health beliefs model as a framework for promoting preventive behaviors and improving health-related beliefs regarding endometrial cancer. In light of this gap, this study was conducted to investigate the effect of an endometrial cancer preventive program on health behaviors among menopausal women, utilizing the health beliefs model.

Aim of research:

The study aimed to investigate the effect of an endometrial cancer preventive program on menopausal women's health behaviors utilizing health beliefs model.

Research Hypotheses:

H1: Menopausal women who received endometrial cancer preventive program utilizing health beliefs model would exhibit improve knowledge than those who didn't receive it.

H2: Menopausal women who received endometrial cancer preventive program utilizing health beliefs model would exhibit positive health beliefs than those who didn't receive it.

H3: Menopausal women who received endometrial cancer preventive program utilizing health beliefs model would exhibit higher engagement in healthy behaviors than those who didn't receive it.

Subjects and Method:

Research design:

A quasi-experimental study design (non-equivalent groups design) was utilized to fulfill the aim of this study.

Research setting:

This study was conducted at the administrative building of Benha university hospital.

Research sampling:

Sample type: A purposive sample was used to fulfill the aim of the study.

Sample size: A 74 menopausal women were recruited in the current study. The sample size was computed using the formula *Yamane (1967)*. Wherever: n=sample size, N=population size (90) according to Personnel Affairs at Benha University Hospital in the year of 2023. e=Margin of errors which is = 0.05

$$n= \frac{N}{1+N(e)^2}$$

Sample was selected according to the following inclusion criteria: amenorrhea for more than one year at least, age 45-60 years old, no history of endometrial cancer and willing to participate in the study.

Tools of data collection:

Three tools were used in this study: **Tool I: A structured interviewing questionnaire** This questionnaire was designed by the researchers after reviewing related literatures (*Abd Elrafea et al., 2023; Li et al., 2023; El-Kurdy et al., 2021*), it was written in Arabic language in the form of close ended questions and contained the following five parts: **Part 1: Personal characteristics of the studied menopausal women;** it included (age, level of education, marital status and place of residence) as well as anthropometric measures such as weight, height and body mass index.

Part2: Menstrual and contraception history; it included (age of menarche, age of menopause, gravidity, parity, previous use of contraceptive method, period of using method of contraception and experiencing any symptoms while using contraceptives).

Part3: Medical history; it included (suffering from any chronic disease, and suffering from any type of cancer).

Part 4: Family history; it included (having relatives suffering from endometrial cancer and the degree of kinships).

Part 5: Assessment of menopausal women's knowledge about endometrial cancer; it was designed to assess menopausal women's knowledge about endometrial cancer, it included 8 items (meaning of endometrial cancer, risk factors, symptoms, diagnosis, complications, prevention and treatment).

Scoring system: -

Each knowledge item was given a score (2) when the answer was correct, a score (1) when the answer was incorrect or don't know. The total score of knowledge was calculated by summation of the scores of all items which ranged from 8 to 16. The level of total knowledge score was classified as the following:

Good knowledge: $\geq$ 75% of total score (12 $\leq$ 16)

Average knowledge: 50 - < 75% of total score (8 < 12)

Poor knowledge: < 50% of total score (1< 8)

Tool II: Health beliefs model scale (HBM):

The health beliefs model scale was devolved by *Kloeblen and Batish, (1999)*. HBM was translated into Arabic language and adapted by the researcher to evaluate health beliefs of menopausal women regarding endometrial cancer prevention. It composed of 36 items including six subscales; perceived susceptibility (5 items), perceived severity (8 items), perceived benefits (6 items), perceived barriers (7 items), perceived self-efficacy (5 items) and perceived cues to action (5 items).

Scoring system:

Each item was rated based on a three-point Likert scale varying between 3 = agree, 2 = uncertain and 1 = disagree. Total score of health beliefs model was calculated by summation of all subscales, which was ranged from 36 to 108. For the five subscales, higher scores were indicated positive healthy beliefs. but for the subscale concerning perceived

barriers, higher scores were indicated more negative health beliefs. The level of total score of HBM was classified into:

- Positive health beliefs: ≥ 75% of total score   (81- 108)
- Negative health beliefs: < 75%   of total score   (1 < ٨١)

Tool III: Health Promotion Lifestyle Profile-II (HPLP II):

It was devolved by *Walker et al, (1987)*. HPLP II was translated into Arabic language and was adapted by the researcher to assess menopausal women's health behaviors related to endometrial cancer prevention. It was composed of 47 items in six subscales; health responsibility (8 items), physical activity (6 items), nutrition (9 items), spiritual growth (8 items), interpersonal relations (8 items) and stress management (8 items).

Scoring system

Each item was rated based on a three-point likert scale varying between 3 = often, 2= sometimes and 1 = never. The total HPLP II was scored by summing all subscales; with a higher score was indicated greater engagement in healthy behaviors regarding endometrial cancer prevention. The level of total score ranged from 47 – 141 and categorized into:

High engagement of healthy behaviors: ≥ 75% of total score   (106 ≤ 141)
Moderate engagement of healthy behaviors: 50 - < 75% of total score   (71 < 106)
Low engagement of healthy behaviors: < 50% of total score   (1 < 71)

Tools validity and Reliability

The tools were reviewed by three jury experts in the field of Obstetrics and Gynecology nursing, Benha University for content validity. Based on the experts' comments, the required modifications were made including rephrasing of some sentences such as (complications of endometrial cancer). Cronbach's alpha coefficient test was calculated to assess the reliability that indicated that tools were consisted of relatively homogenous items as indicated by the moderate to high reliability. The internal consistency of knowledge was α =0.75, the internal consistency of HBM scale was 0.76. and reliability for six subscales ranged from 0.73 to 0.94, the internal consistency of HELPII scale was 0.91 and reliability for six subscales ranged from 0.79 to   0. 87. Value equal or greater than 0.70 considered satisfactory.

Ethical considerations:

Ethical aspects were considered before starting the study as the following: approval from the Scientific Research Ethics Committee at the faculty of nursing Benha university was obtained for the fulfillment of the study, an official permission from the selected study settings was obtained for the fulfillment of the study, the aim of the study was explained to each woman before applying the study to gain confidence and trust, the researcher took oral consent from women to participate in the study, the data was collected and treated confidentially , each woman was free to withdraw at any time of data collection without obligation, the educational booklet was given to the control group at the end of the study to benefit through life.

Administrative approval:

An official approval to conduct this study was obtained from the dean of faculty of nursing and the director of Benha university hospital to conduct the study.

Pilot study:

The pilot study was conducted on 10% of the total sample (7) menopausal women to assess the clarity, objectivity, feasibility, relevance and applicability of the tools and to find out the possible obstacles and problems that might face the researcher and interfere with data collection. Also, it helped to estimate the time needed for data collection. No modifications were done, thus, women in

the pilot study were included in the main study sample.

Field work:

The process of data collection was carried out from beginning of May to the end of November 2024, covering period of seven months. This study was conducted through the following sequential phases:

Interviewing and Assessment phase:

This phase encompassed interviewing women to collect baseline data at the beginning of interview the researcher introduced herself, greeted each woman, explained the aim of the study, scheduled times and frequency of sessions for selected women to assure adherence to selected interventions. The researcher took oral consent from women to participate in the study. The researcher weighed each woman and measured height to estimate body mass index.

The researcher distributed a structured interviewing questionnaire (tool I) to assess personal data, menstrual, contraception history, medical and family history and menopausal women's knowledge regarding endometrial cancer. The average time required for completion of the questionnaire was around (10-15 minutes).

Then, the researcher distributed the health beliefs model scale (tool II) to evaluate health beliefs of menopausal women regarding endometrial cancer prevention. The average time required for completion of the scale was around (15-20 minutes).

Finally, the researcher distributed the health promotion lifestyle profile-II (tool III) to assess menopausal women's health behaviors related to endometrial cancer prevention. The average time required for completion of the questionnaire was around (20-25 minutes).

The average time required for completing of the questionnaires was around (45- 60

minutes) depending on the responses of the women.

The interviewing process was done in 2 days/ week starting from 9 to 2 pm. Each woman was interviewed individually. The number of interviewed women per week was 4-5 women.

The collected pretest data were used as a baseline for further comparison to evaluate the effect of the preventive program based on health belief model on knowledge, beliefs and behaviors of menopausal women.

Planning Phase

Based on the results obtained from the pretest assessment of women's knowledge, health beliefs and behaviors regarding endometrial cancer prevention. The researcher designed booklet about endometrial cancer prevention utilizing health beliefs model in simple Arabic language **(Appendix IV)** contained information about menopause and endometrial cancer (meaning, causes, risk factors, signs and symptoms, diagnosis, treatment, complications, effect on quality of life and prevention) and preventive health behaviors of endometrial cancer. This booklet was supported by different illustrated pictures. In addition, the program's sessions number and its contents were determined about prevention of endometrial cancer.

Implementation phase:

The control group: the group who didn't receive the preventive program about endometrial cancer prevention. There was no structured plan for the education. Otherwise, the researcher answered any menopausal women's questions about the educational topics as needed.

For the study group: the researcher implemented the preventive program at the pre mentioned setting. Women were divided into 5 groups, consisted of 7 – 8 menopausal women in each group. The duration of the preventive program lasted 2 weeks for each group, the program was divided into 5 sessions, and each session lasted 45-60

minutes included periods of discussion according to women's achievement and feedback.

At the beginning of *the first session,* women were oriented with the program contents then the researcher explained meaning of menopause and menopausal symptoms. Then took women's feedback about endometrial cancer prevention. The researcher discussed menopausal women's perceptions of sensitivity and vulnerability to endometrial cancer (perceived susceptibility), followed by a comprehensive understanding of the seriousness and negative effects of endometrial cancer (perceived severity), by providing detailed information regarding endometrial cancer as (meaning of endometrial cancer, risk factors, symptoms, diagnosis, complications, prevention and treatment).

Each subgroup was informed about the time of the next sessions at the end of session. The subsequent session started by feedback about the previous session and the objectives of the new session, using simple Arabic language to suit women's level of understanding. Various educational methods (group discussion, role-playing, demonstration and re-demonstration) and materials (power point presentation, video film about stress management techniques and exercise during menopause and a designed booklet) were used. At the end of each session; women's questions were discussed to correct any misunderstanding and false beliefs. After completing the first session, women were handed an educational booklet.

The second session discussed the value and necessity of compliance with the applicability of preventive behaviors (perceived benefits) were highlighted by explaining and demonstrating preventive behaviors as the eating of a balanced diet, modifying unhealthy nutritional behaviors. As

well as, following a planned exercise program during menopause.

The third session focused on importance of social support and spending time with close friends and settling conflicts with other through discussion and compromise. Also taught stress management measures to minimize and cope with stress, training about relaxing activities such as slow and deep breathing exercises.
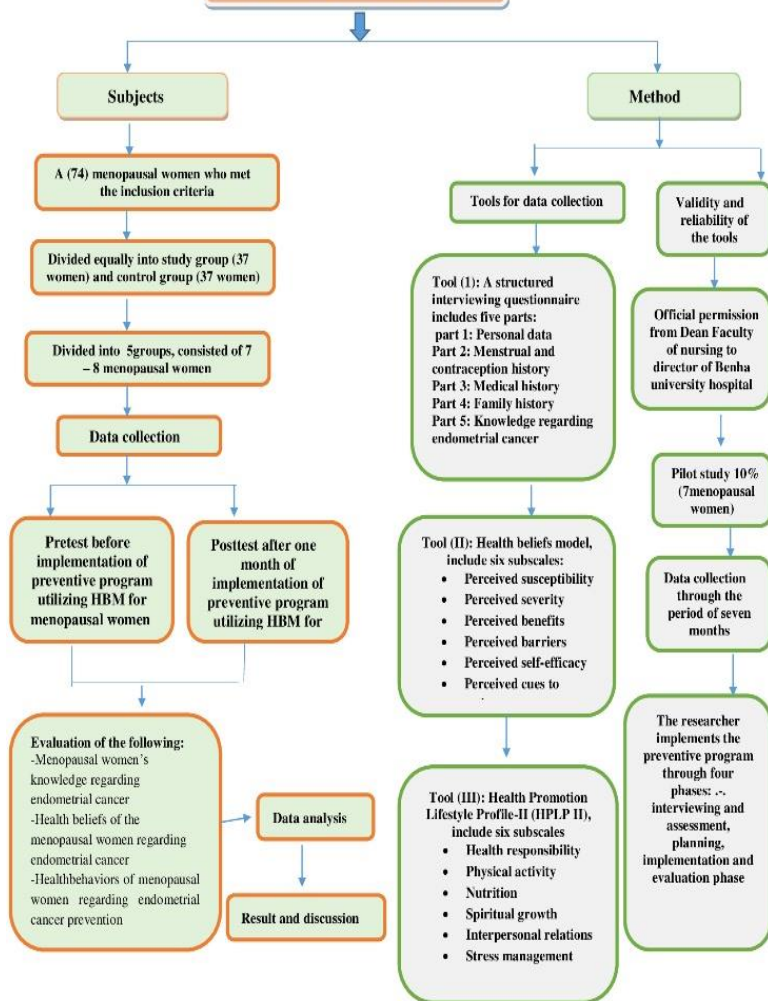
The fourth session, women identified the challenges and obstacles to adopting preventive behaviors. The researcher then facilitated a group discussion to present ways of overcoming and resolving these issues (perceived barriers).

The fifth session focused on empowering women to believe in abilities to prevent endometrial cancer by applying healthy preventive behaviors. Additionally, menopausal women's readiness to engage in endometrial cancer preventive health behaviors when holding appropriate beliefs (perceived self-efficacy). One of the cues to action was an internal stimulus, as worry about getting endometrial cancer, while the others were external stimuli such as an educational booklet, media, and family (cues to action).

Evaluation phase:

After one month of implementing the program, the researcher used the same format of tools to both groups; tool I part 5 to assess menopausal women's knowledge regarding endometrial cancer, tool II health beliefs model scale to evaluate health beliefs of menopausal women regarding endometrial cancer prevention and tool III health promotion lifestyle Profile-II to assess menopausal women's health behaviors related to endometrial cancer prevention.

Methodology flowchart (I)

Subjects

A (74) menopausal women who met the inclusion criteria

Divided equally into study group (37 women) and control group (37 women)

Divided into 5groups, consisted of 7 – 8 menopausal women

Data collection

Pretest before implementation of preventive program utilizing HBM for menopausal women

Posttest after one month of implementation of preventive program utilizing HBM for

Evaluation of the following:
-Menopausal women's knowledge regarding endometrial cancer
-Health beliefs of the menopausal women regarding endometrial cancer
-Healthbehaviors of menopausal women regarding endometrial cancer prevention

Data analysis

Result and discussion

Method

Tools for data collection

Validity and reliability of the tools

Tool (1): A structured interviewing questionnaire includes five parts:
part 1: Personal data
Part 2: Menstrual and contraception history
Part 3: Medical history
Part 4: Family history
Part 5: Knowledge regarding endometrial cancer

Official permission from Dean Faculty of nursing to director of Benha university hospital

Pilot study 10% (7menopausal women)

Tool (II): Health beliefs model, include six subscales:
• Perceived susceptibility
• Perceived severity
• Perceived benefits
• Perceived barriers
• Perceived self-efficacy
• Perceived cues to

Data collection through the period of seven months

Tool (III): Health Promotion Lifestyle Profile-II (HPLP II), include six subscales
• Health responsibility
• Physical activity
• Nutrition
• Spiritual growth
• Interpersonal relations
• Stress management

The researcher implements the preventive program through four phases: .-. interviewing and assessment, planning, implementation and evaluation phase

Statistical analysis:

Data was verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 26.0) was used for that purpose, followed by data tabulation and analysis. Descriptive statistics were applied (e.g., mean, standard deviation (SD), frequency, and percentages). Inferential statistics as test of significance (Chi-square test (x^2), Fisher exact test (FET) and independent t-test). Pearson correlation coefficients (r) were used to test correlation between quantitative data.

‒ No statistical significance difference was considered when p > 0.05.
‒ A statistical significance difference was considered when p ≤ 0.05.
‒ A highly statistical significance difference was considered when p ≤ 0.001.

Results:

Table (1) clarifies that 48.6% and 51.3% of the study and control groups were in age group 50 - < 55 years with a mean age of 50.05 ± 3.18 years and 50.38 ± 2.96 years respectively. Concerning level of education, 70.3% and 78.4% of study group and control groups had secondary education respectively. As regards marital status, 81.1% and 86.5% of the study and control groups were married respectively. Also, 59.5% and 67.6% of the study and control groups lived in urban area respectively. There was no statistically significant difference between both groups regarding personal characteristics (p > 0.05).

Figure (1): clears that before implementation of preventive program utilizing health beliefs model, 85.4% and 82.2 % of the study and control group respectively had poor level of knowledge while after implementation of preventive program utilizing health beliefs model 77.1% and 6.2 % of the study and control group respectively had good level of knowledge.

Table (2) clarifies that before program implementation, there was no statistical significant difference in total health beliefs scores between study and control group ٦٣.04 ± 5.43 and 61.46 ± 6.56 (p > 0.05). On the other hand, after program implementation the mean scores of the overall health beliefs model and subscales namely perceived susceptibility, perceived severity, perceived benefits, perceived self-efficacy as well as cues to action were significantly increased (P≤ 0.001), while the mean score of perceived barriers was markedly lower in the study group versus in the control group. The mean score of total health beliefs model was ٨٥.24

± 6.24 in the study group compared to ٦٣.٣٨ ± 6.90 in the control group (p ≤ 0.001).

Table (3) clarifies that before program implementation, there was no statistical significant difference in all health behaviors subscales between study and control group 68.97± 8.63 in the study group compared to 67.78 ± 10.45 in the control group (p > 0.05). On the other hand, after program implementation there was statistical significant improvement in mean score of all health behaviors subscales in the study group compared to control group related to health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management respectively. The mean score of total health behaviors was 116.29 ± 7.49 in the study group compared to 69.61±10.69 in the control group (p ≤ 0.001).

Table (4) shows that, there was highly statistical significant positive correlation between total knowledge, health beliefs and health behaviors scores between the studied menopausal women in both groups regarding endometrial cancer prevention before and after program implementation (p ≤0.001).

Table (5) shows that, there was highly statistical significant positive correlation between total health beliefs and health behaviors scores between the studied menopausal women in both groups regarding endometrial cancer prevention before and after program implementation (p ≤0.001)

Table (1): Distribution of the studied menopausal women in both groups according to personal data (n=٧٤).

Groups / Variables	Study group n=٣٧		Control group n=٣٧		FET/X^2	P- value
	No.	%	No.	%		
Age (years)						
45 - < 50	17	46.0	17	46.0	8.786$^£$	0.553 ^{ns}
50 - < 55	18	48.6	19	51.3		
55 - ≤ 60	2	5.4	1	2.7		
Mean ± SD	**50.05 ± 3.18**		**50.38 ± 2.96**		**t=0.454**	**0.650 ^{ns}**
Level of education						
Primary education	8	21.6	3	8.1	3.542$^£$	0.189 ^{ns}
Secondary education	26	70.3	29	78.4		
University education	3	8.1	5	13.5		
Marital status						
Married	30	81.1	32	86.5	1.442$^£$	0.603 ^{ns}
Divorced	6	16.2	3	8.1		
Widowed	1	٧2.	2	5.4		
Place of residence						
Rural	15	40.5	12	32.4	.525٠	0.469 ^{ns}
Urban	22	59.5	25	67.6		

^{ns} no statistical significant difference (p > 0.05) X^2=Chi-square test   FET= Fisher Exact Test   t= independent t test
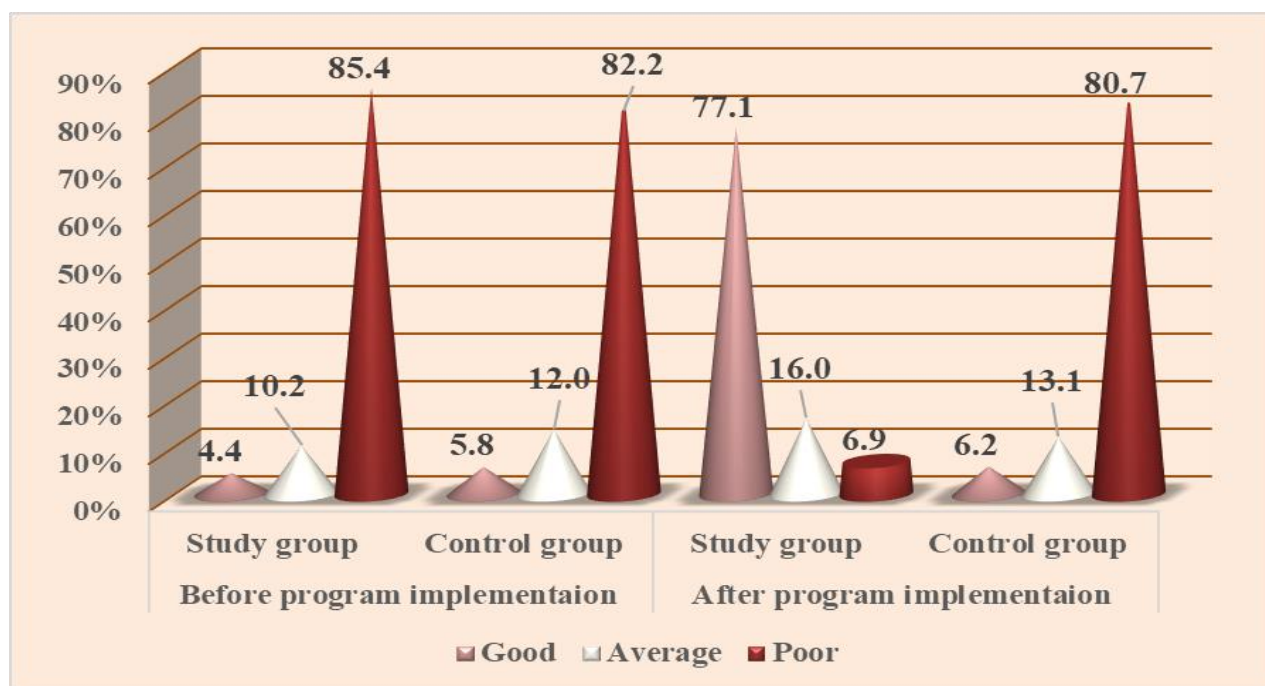
Figure (1): Percentage distribution of the studied menopausal women in both groups according to level of total knowledge about endometrial cancer before and after program implementation (n=74).

Table (2): Comparison of mean subtotal and total scores of health beliefs among the studied menopausal women in both groups regarding endometrial cancer prevention before and after program implementation (n=74).

Health beliefs model subscales	maximum score	Before program implementation			After program implementation		
		Study group n= 37	Control group n= 37	t test P-value	Study group n= 37	Control group n= 37	t test P-value
		Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Perceived susceptibility	15	7.89 ± 2.12	7.59 ±1.73	0.743 0.461 ^{ns}	12.64 ± 1.54	7.78 ± 1.79	12.470 0.000**
Perceived severity	24	11.78±2.45	11.94 ± 2.17	0.301 0.764 ^{n}	20.02 ± 2.88	12.67± 2.66	11.388 0.000**
Perceived benefits	18	10.08 ± 2.71	9.67 ± 2.14	0.713 0.478 ^{ns}	15.00 ± 1.92	9.94 ± 2.03	١١.٨٩٨ 0.000**
Perceived Barriers	21	17.87 ± 3.18	17.11± 2.35	0.827 0.368 ^{ns}	13.24 ± 2.35	17.33 ± 2.03	6.63٩ 0.000**
Perceived self-efficacy	15	8.10 ± 2.01	8.05± 2.15	0.111 0.912 ^{ns}	12.29± 1.45	8.37± 2.96	15.484 0.000**
Perceived cues to action	15	7.32± 1.93	7.10 ± 1.36	0.556 0.580 ^{ns}	12.05 ± 1.54	7.29 ± 1.89	11.82٣ 0.000**
Total score	٨1	63.04 ± 5.43	61.46 ± 6.56	0.144 0.152 ^{ns}	85.24 ± 6.24	63.38 ± 6.90	21.87١ 0.000**

**A Highly statistical significant p ≤ 0.001   t= independent t test ^{ns} no statistical significant difference (p > 0.05)

Table (3) Comparison of mean subtotal and total scores of health behaviors among the studied menopausal women regarding endometrial cancer prevention before and after program implementation (n=74).

Health behaviors subscales	maximum score	Before implementation			After implementation		
		Study group n= 37	Control group n= 37	t test P-value	Study group n= 37	Control group n= 37	t test P-value
		Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Health Responsibility	24	11.40± 2.20	11.29 ± 2.17	0.463 0.641 ns	19.43 ± 1.86	11.33 ± 2.27	18.146 0.000**
Physical Activity	18	7.89 ± 1.79	8.18 ± 1.74	0.802 0.425 ns	14.81 ± 1.68	8.57 ± 1.96	17.270 0.000**
Nutrition	27	13.89 ± 2.56	13.27 ± 2.79	0.817 0.415 ns	21.89 ± 2.90	13.67 ± 2.86	12.683 0.000**
Spiritual Growth	24	12.54± 2.14	11.67 ± 2.32	1.874 0.064 ns	20.00 ± 2.47	12.02 ± 2.47	17.260 0.000**
Interpersonal Relations	24	12.27 ± 2.50	11.75 ± 2.35	2.441 0.170 ns	20.18 ± 1.85	12.00 ± 2.57	19.049 0.000**
Stress Management	24	10.97 ± 2.26	11.59 ± 2.37	0.708 0.480 ns	19.89 ± 2.00	12.02 ± 2.57	14.503 0.000**
Total score	141	68.97 ± 8.63	67.78 ± 10.45	1.345 0.181 ns	116.29 ± 7.49	69.61 ± 10.69	23.107 0.000**

ns no statistical significant difference e ($p > 0.05$)   **A Highly statistical significant $p \leq 0.001$ t= independent t test

Table (4): Correlation coefficient between total knowledge, health beliefs and health behaviors scores of the studied menopausal women in both groups regarding endometrial cancer prevention before and after program implementation (n=٧٤).

Variable		Total knowledge score							
		Study group n= 37				Control group n= 37			
		Before program implementation		After program implementation		Before program implementation		After program implementation	
		r	P	r	P	r	P	r	P
Total health beliefs score	Before program implementation	0.562	0.000**	——	———	0.325	0.000**	——	———
	After program implementation	——	———	0.698	0.000**	——	———	0.413	0.000**
Total health behaviors score	Before program implementation	0.654	0.000**	——	———	0.754	0.000**	——	———
	After program implementation	——	———	0.726	0.000**	——	———	0.863	0.000**

**Correlation is significant at the 0.01 level

Table (5): Correlation coefficient between total health beliefs and health behaviors scores of the studied menopausal women in both groups regarding endometrial cancer prevention before and after program implementation (n=٧٤).

Variable		Total health beliefs score							
		Study group n= 37				Control group n= 37			
		Before program implementation		After program implementation		Before program implementation		After program implementation	
		r	P	r	P	r	P	r	P
Total health behaviors score	Before program implementation	0.814	0.000**	——	——	0.649	0.000**	——	——
	After program implementation	——	———	0.832	0.000**	——	———	0.595	0.000**

**Correlation is significant at the 0.01 level

Discussion

Menopause is associated with a significantly increased risk of developing endometrial cancer. Understanding physiological changes during menopause and the association with increased endometrial cancer risk is essential, particularly in the presence of identifiable risk factors in women. Preventive strategies, guided by the health beliefs model and the adoption of positive health behaviors, can play a key role in reducing endometrial cancer risk *(Szatkowski et al., 2025; Percival, 2025).*

The study aimed to investigate the effect of an endometrial cancer preventive program on menopausal women's health behaviors utilizing health beliefs model. Regarding the genera characteristics of menopausal women nearly half of the study and control groups were in age group 50 - < 55 years with a mean age of 50.05 ± 3.18 years and 50.38 ± 2.96 years respectively. The focus on this midlife age range is significant, as this period is often associated with increased health awareness and risk for endometrial cancer, which may influence menopausal women receptiveness to educational interventions.

This result agreed with *Abdel Razek, (2023*) in Egypt and found that the mean age of the studied group was 53.02 ± 3.04 years.

Concerning level of education, it was clear that nearly three quarters of study group and control groups had secondary education respectively. This result was in the same line with *Ishak et al., (2021)* in Malaysia and found that most of menopausal women had secondary education.

As regards marital status majority of both study and control groups were married respectively. Furthermore, about two-thirds of women in both groups resided in urban areas. These results were in accordance with a study done by *Abd Elmoneem et al., (2024)* in Egypt and showed that majority of the population were married and lived in urban areas.

Concerning personal characteristics of the studied women, the present study cleared that there was no statistically significant difference between the studied groups regarding (age, level of education, marital Status, Place of Residence).

This result was in accordance with *Elkheshen, (2022)* in Egypt and found that there was no statistically significance difference between study and control group regarding socio-demographic characteristics. Also, this result was agreed with *John et al., (2022)* in India and showed that there were no significant differences between the two groups regarding socio demographic variables.

This result also nearly came in the same line with *Li et al., (2023)* in China and reported that the two groups had no significant differences in demographic characteristics such as age, and education level. Additionally, *Hyvärinen et al., (2022)* in Finland and stated that there were no significant differences regarding demographic characteristics.

Regarding knowledge of the studied menopausal women about endometrial cancer before and after program implementation, the results of current study found that, the majority of menopausal women in the study and control groups had poor level of knowledge about endometrial cancer before implementation of the preventive program. This may be due to lack of awareness among Egyptian women about early detection of endometrial cancer. also, woman don't have information about endometrial cancer before.

Meanwhile, more than two thirds of the study group compared to minority of the control group had good level of knowledge about endometrial cancer after implementation of the preventive program. These results may be due to positive effect of the program on improving menopausal women's level of knowledge about endometrial cancer. Women were interested in contents used during the educational sessions that help to acquire knowledge about endometrial cancer.

These results were supported the research hypotheses(I) which stated that "Menopausal women who received endometrial cancer preventive program utilizing health beliefs model would exhibit improve knowledge than those who didn't receive it".

These results were in accordance with a study carried out by *Abd-Elhameed et al., (2023)* in Egypt and stated that instructional guidelines implantation had a positive effect on women's knowledge regarding endometrial cancer.

These results were in accordance with a study carried out by *Abd Elrafea et al., (2023)* in Egypt and reported that total mean knowledge increased at post intervention, with highly statistically significant.

Also, these results were in consistent with a study carried out by *Mansori et al., (2025)* in Malaysia and concluded that an educational intervention based on health belief model was effective in increasing women's knowledge of endometrial cancer and improving women screening intentions.

These results came in the same line with a study carried out by *Rosenthall, (2023)* in united states and showed a significant improvement in women's knowledge about endometrial cancer, including risk factors, symptoms, and treatment options after completing the educational program.

These results were in accordance with a study carried out by *Kuru Alici et al., (2024)* in Turkey and showed improvement in women knowledge after intervention.

These results were in accordance with a study carried out by *ToSr and Ashwini, (2024)* in Bangalore and the results suggested that thorough training program women knowledge about the prevention of endometrial cancer improved.

These results were disagreed with a study carried out by *Ghayth et al., (2023)* in Egypt and stated that majority of the studied women had low knowledge levels after intervention.

These results were disagreed with a study carried out by *Cheewakriangkrai et al., (2020)* in India and did not demonstrate an improvement in knowledge, therefore, the health education training did not lead to a proven increase in knowledge.

Concerning health beliefs of the studied menopausal women regarding endometrial cancer prevention before and after program implementation, the results of the current study revealed that the majority of menopausal women in the study and control groups respectively had negative health beliefs about endometrial cancer prevention before implementation of the preventive program. This may be due to low level of knowledge and awareness among women. Additionally, the homogeneity of the sample in terms of demographic characteristics, along with the absence of previous exposure to similar preventive programs, may have contributed to the similarity in health beliefs and perceptions before the implementation of the program.

On the other hand, more than two thirds of the study group compared to more than one fifth of the control group had positive health beliefs about endometrial cancer prevention after implementation of the

preventive program. These results may be due to improving menopausal women's knowledge regarding endometrial cancer by an effective implementation of the program which in turn enhanced positive health beliefs.

These results were supported the research hypotheses(II)which stated that "Menopausal women who received endometrial cancer preventive program utilizing health beliefs model would exhibit positive health beliefs than those who didn't receive it".

Also, these results were in accordance with a study carried out by *El-Sayed et al., (2022)* in Egypt and revealed that there was no significant difference between the mean scores of the various structures of health beliefs model in two groups before the intervention, However, after the intervention there were significant increase in mean score of all variables of HBM in the intervention group.

These results were in agreement with a study carried out by *Doll et al., (2020)* in united states and highlighted the importance of strengthening health beliefs, as they play a crucial role in improving symptom recognition and encouraging early healthcare-seeking behaviors, which may lead to earlier diagnosis and better health outcome.

These results were in consistent with a study carried out by *Sidenius et al., (2019)* in Denmark and highlighted the significant impact of tailored interventions on women's health beliefs. By addressing misconceptions and providing clear information, the intervention helped shift women's beliefs from fear and uncertainty toward a more accurate understanding of endometrial cancer.

These results were agreed with a study carried out by *Kuru Alici et al., (2024)* in Turkey and showed improvement in women

beliefs. This improvement in health beliefs is crucial for promoting preventive behaviors and encouraging timely healthcare-seeking among the women.

Concerning health behaviors of the studied menopausal women regarding endometrial cancer prevention before and after program implementation, the results of the current study revealed that the majority of menopausal women in the study and control groups had low engagement in healthy behaviors about endometrial cancer prevention before implementation of the preventive program. This result may be due to low level of knowledge, personal and social culture and the negative and incorrect beliefs.

While, after program implementation more than two thirds and minority of menopausal women in the study and control groups had high engagement in healthy behaviors about endometrial cancer prevention. This improvement could be attributed to the effectiveness of the preventive program in enhancing women's awareness, motivation, and self-efficacy toward adopting healthier behaviors. The structured content, repeated engagement and focusing on practical health strategies may have empowered the study group to implement positive changes, unlike the control group that did not receive similar intervention.

These results were supported the research hypotheses (III) which stated that "Menopausal women who received endometrial cancer preventive program utilizing health beliefs model would exhibit higher engagement in healthy behaviors than those who didn't receive it".

This result came in the same line with a study done by *Soleimani et al., (2021)* in Iran and revealed that mean life style scores increased significantly in the experimental

group during the measurement times but remained unchanged in the control group.

This result was similar to a study done by *Arthur et al., (2019)* in united states and confirm the importance of maintaining an overall healthy lifestyle to lower risk of endometrial cancer.

This result was agreed with a study done by *Yaşar and Şeker, (2025)* in Turkey and highlighted the importance of raising women's knowledge of gynecological cancer awareness and the need to promote healthy lifestyle behaviors among women.

This result was similar to *Elkheshen et al., (2022)* in Egypt who clarified that there was no statistically significant difference between study and control groups regarding all items of health promotion lifestyle behaviors pre intervention. Meanwhile, there was a highly statistically significant difference regarding all health promotion lifestyle behaviors items post intervention.

This result disagreed with *Mohammadi et al., (2024)* in Iran and stated that there was no significant difference in healthy behaviours pre- and post-intervention for the experimental and also the control group.

Correlation coefficient between total knowledge, health beliefs and health behaviors scores of the studied women in both groups regarding endometrial cancer prevention before and after program implementation, the result of current study clarified that there was highly statical significant positive correlation between knowledge, health beliefs and health behaviors between the studied women in both groups regarding endometrial cancer prevention before and after program implementation.

From the researcher's point of view, the implementation of the preventive program based on the health beliefs model contributed significantly to enhancing women's knowledge and ability to change healthy beliefs and adopting healthy behaviors. Accordingly, health beliefs model demonstrated a positive impact on the health behaviors of menopausal women.

This result was in agreement with *Elkheshen et al., (2022)* in Egypt who stated that regarding correlation the present study findings revealed that there was positive statistically significant correlation between health promotion and knowledge after intervention and during follow up.

This result was in agreement with *Eldardery et al., (2022)* in Egypt and demonstrated that there was a significant positive correlation between health beliefs and preventive behaviors among elderly women.

This result was agreed with *Richard-Davis e t al., (2022)* in united states who studied and mentioned a significant relationship between women's beliefs and behaviors during the menopause transition.

This result was agreed with *Liu et al., (2021)* in China and found a positive and clear correlation between health beliefs, as framed by the health belief model and behaviors among elderly women with malignant gynecological tumors.

Conclusion

Based on the findings of the current study, it was concluded that the preventive program, which was based on the health beliefs model, was effective in improving menopausal women's knowledge, health beliefs, and health behaviors. Prior to the program implementation, many menopausal women exhibited poor knowledge, negative health beliefs, and unhealthy behaviors regarding endometrial cancer prevention. However, following the implementation of the program, there were statistically significant improvements in menopausal women knowledge, health beliefs, and

healthy behaviors. Moreover, a highly statistical significant positive correlation was observed between total knowledge, health beliefs, and health behaviors among the studied menopausal women in both groups before and after the program implementation. These findings confirm that the study's aim was achieved and the proposed hypotheses were supported.

Recommendations:

In the light of the findings of the current study, the following recommendations are suggested:

- Integrate the prevention of endometrial cancer into existing women's health programs at the primary health care level to promote early detection, risk reduction, and equitable access to preventive services.
- Disseminate an educational booklet on endometrial cancer prevention targeting menopausal women across diverse settings to enhance awareness and promote positive health beliefs.

Recommendations for further studies:

- Replication of the study on large sample size in different setting to generalize the results.
- Create a personalized risk assessment tool that help menopausal women to understand the individual risk factor for endometrial cancer
- Implement nurses training to proactively discuss endometrial cancer prevention with menopausal women

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