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Application Of An Educational Program On Self-Efficacy Of Women At Climacteric Period: Utilization Of PRECEDE – PROCEED Model

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Abstract

Background: Climacteric Phase represents a critical life stage encompassing a range of physiological and psychosocial changes that require adaptions to optimize health and functioning.
Aim of this study was to evaluate the effect of applying an Educational program on self-efficacy of Women at Climacteric Period: utilization PRECEDE-PROCEED model.
Design: Quasi-experimental equivalent study.
Sitting: Administrative Building of Benha University hospitals.
Sample: a purposive sample was selected according to inclusion and exclusion criteria. The sample consisted of two groups (Study group comprising 55 Climacteric women who received the educational intervention and control group comprising 54 Climacteric women who didn't not receive).
Tools: Two tools of data collection: Tool I: a structured interviewing questionnaire sheet , PRECEDE-PROCEED model (predisposing "knowledge and attitude", reinforcing and enabling factors) and Tool II: self-efficacy scale
Results: there was a highly statistically significant difference was observed in predisposing factors, reinforcing factors, enabling factors and self-efficacy of the study group compared with the control group after six months of PRECEDE - PROCEED model application ($p < 0.001$).
Conclusion: The PRECEDE - PROCEED model provided an excellent framework for health intervention programs especially in enhancing self-efficacy.
Recommendations: PRECEDE - PROCEED model must be applied in the process of education by considering all effective personal, environmental, social and supportive factors for future health promotion program development for women.

Key words: Climacteric phase, self-efficacy, PRECEDE- RECEDE model.

Introduction:

Women's health at different age groups is an important issue to reach the efficiency to perform all duties according to responsibilities and to increase the productive capacity which will consequently promote the national economy. One of these health problems affecting women is the period of climacteric phase which can influence the personal satisfaction and well-being **(Falkingham et al.,2020).**

Climacteric phase is defined as the transition prior to the last menstrual cycle, when a woman may experience variable or

irregular menstrual cycles, hormonal fluctuations, and 12 months after the final menstrual period. Climacteric phase is the stage after menarche but before entering menopausal stages with normal fertility function during this phase (**Ko and Kim, 2020).**

Climacteric phase represents a delicate transition period of a woman's life during which physiological, affective, psychological, and social changes mark progression from a woman's fertile life to Climacteric Phase, with wide sexual hormones fluctuations until the onset of hyper gonadotropic amenorrhea. During this stage, because of the decreases or fluctuations of sex hormones caused by recession of ovarian function, women undergo a series of psychological and physical symptoms, clinically called perimenopausal syndrome **(Huang, et al., 2020).**

There has been increasing interest in non-hormonal and non-medication-based approaches to managing Climacteric Phase symptoms and optimizing post-reproductive health. Lifestyle which is non-hormonal management of perimenopausal symptoms may be a new choice for women with mild to moderate perimenopausal syndrome **(Marshall and Rees, 2020).**

Reinforcing factors provide continuing reward or incentive for a good behavior. The model starts from the assumption that if a health promotion intervention is to be functional, the population has to have an active role and indicate which factors hamper the efficacy of planned interventions (**Saulle et al., 2020).**

The model asserts that predisposing, reinforcing, and enabling factors influence the likelihood that behavioral and environmental change will occur. Predisposing factors are antecedents to behavior that provide the motivation for that behavior including individuals' knowledge, attitudes, and self-efficacy, as well as certain socio-demographic characteristics. Enabling factors are antecedents to behavior that allow the motivation to be transformed into achievement, such as cost, availability of transportation, and other environmental issues (**Chaboksavar et al.,2020).**

Also, **Moshki et al., (2018)** conducted a study on the self-efficacy and self-acceptance of menopausal women and demonstrated that PRECEDE–PROCEED model has been introduced as an effective model for creating and providing the necessary phases to enhance health and quality of life. The model has been implemented in most health-promotion programs.

The role of the nurse specialist in managing and supporting peri-menopausal women has been defined to take account of the need to facilitate a better understanding and the potential health implications of a well-managed climacteric phase among all nurses coming in contact with women, lead and develop specialist climacteric phase services, support services linked with all areas of care **(Royal College of Nursing,2019).**

Aim of the study:

This study aimed to evaluate the effect of applying an Educational program on self-efficacy of Women at Climacteric Period: utilization PRECEDE-PROCEED model.

Research hypotheses:

H1: Self-efficacy of perimenopausal women who received an educational intervention by utilizing PPM model will be enhanced than those who didn't.

H2: Predisposing factors (knowledge and attitude) of perimenopausal women who received an educational intervention by utilizing PPM model will be improved and positively changed than those who didn't.

H3: Reinforcing factors and enabling factors of perimenopausal women who received an educational intervention by utilizing PPM model will be enhanced than those who didn't.

Subjects and Method

Research design:

Quasi-experimental equivalent study was followed to fulfill the aim of the study.

Setting:

This study was conducted at Administrative Building of Benha University hospitals.

Type of Sample: A purposive sample

Sample Size: All administrative women at climacteric phase (122) working at Benha University hospitals. After application of inclusion and exclusion criteria, the final sample size was 109 women.

-Inclusion criteria:

Age (43-55) years, natural climacteric phase, being married.

- Exclusion criteria:

Having severe stressors such as the death of close relatives during the last three months, women who were under medication for anti-depressants, hypnotics, phytoestrogens and HRT, and those with a mental illness, Abnormal mass in the breast and/or any abnormality in the thyroid, History of hysterectomy and oophorectomy.

Tools for data collection:

Tool I- A structured interviewing Questionnaire was designed by the researcher after reviewing related literature **(Moshki et al., 2017; Azar et al., 2018)** .It was written in an Arabic language in the form of close and open- ended questions. The questionnaire included two parts:

The first part included:

- Socio-demographic characteristics (8 items) such as (age, level of education, residence, age at marriage, duration of marriage, natural of work, number of work years and monthly income).

- Menstrual and obstetrics history (4 items) such as (age of menarche, status of menstruation, interval and Natural of menstruation.).

The second part included: PPM constructs: the questions was designed according to educational-ecological assessment phase to determine predisposing, enabling and reinforcing factors.

1: Predisposing factors: included 2 sections (knowledge and attitude)

Section (I): Assessment of women's knowledge towards Climacteric phase through (31 items) written in Arabic language in the form of multiple-choice questions.

Knowledge's scoring system: -

All knowledge variables were weighted according to items included in each question. Each item was given a score (2) when the answer was complete correct answer, a score (1) when the answer was incomplete correct answer and a score (0) when the answer was (I don't know). The score of total knowledge was classified as the following:

- Good: (≥ 75% correct answers).

- Average: (50 - < 75% correct answers).

- Poor: (< 50% correct answers).

Section (II): women's attitude (20 items) towards perimenopause and lifestyle that was designed as Likert scale. This scale was adapted from **Ghaderi et al., (2010)**.

Scoring system:

Each item had 3-point Likert's scale ranging from (3) if the response was "agree", (2) if it was "sometimes", and (1) if it was "disagree ". The total score was calculated for each subject through summing up the points of the responses to each question. 10 items are positively worded (items 1-10) and 10 items are negatively worded (items 11-20). The score ranged from 20- 60. High score indicates the favorable attitude of women towards peri-menopause and lifestyle.

The total score of attitude was classified into:

- Positive attitude: ≥ 50 %

-Negative attitude: < 50%

2: **Reinforcing factors**: (6 items) included questions to measure support and encouragement of husband, family, friends, healthcare staff and society.

3: Enabling factors (6 items) included access to information sources, attending workshops or seminars, skills to understand different methods of treatment control complications, having enough time daily to read and make exercises.

Scoring system:

The answer choices to these questions were yes, no, and to some extent. A "no" answer was allocated a score of (1), "to some extent" was allocated a score of (2), and "yes" was allocated a score of (3). The total score of reinforcing and enabling factors ranged from (6-18). The total score is further classified into two levels: poor for the range 6-11 and strong for the range 12-18.

Tool II- Climacteric phase health self-efficacy scale: This scale is adapted from **Reece and Harkless (2002)** and is a (19-items) Likert-style scale generated to measure self-efficacy in coping with health issues germane to mid-life women.

Scoring system:

Each item was structured to measure the strength of a woman's belief that she could carry out a particular activity. Degrees of assurance for each item ranging from (1-3). (1) If the response is "I can't", (2) if the response is "I can do some extent" (3) if the response is "I can't". Range of possible mean self-efficacy scores rated from (17-51). Higher scores imply higher peri-menopausal health self-efficacy.

The total score of self-efficacy was classified into:

- High self-efficacy: ≥75%

-Moderate self-efficacy: 50%<75%

- Low self-efficacy: < 50%

- **Validity and reliability of tools:**

The tool was developed and translated into Arabic after reviewing the current and past national and international relevant literature related to PPM, climacteric phase and self-efficacy, by using local and international books, journals, periodicals and computer searches then tool was reviewed by 3 jury experts in the field of obstetrics and woman's health nursing. Cronbach's alpha coefficient test was calculated to assess the reliability that indicated that tool consisted of relatively homogenous items as indicated by the moderate to high reliability.

Ethical Considerations:

- An official permission from the selected study setting was obtained for the fulfillment of the study. The aim of the study was explained to each woman before applying the tools at the beginning of interview and time throughout the study to gain her confidence and trust. The researcher took oral consent from each woman to participate in the study and withdraw when she needs.

- **Pilot Study:**

A pilot study has been conducted on 10% of the total sample (11) women before starting data collection to test the clarity and applicability of study tools, asses the feasibility of the fieldwork and determine the time needed to fill in the questionnaire. There were no modifications done. Thus, women involved in the pilot study were included in the study.

Field work:

The study was conducted through PPM phases. It was carried out from the beginning of July, 2020 and completed at the end of March, 2021 covering 9 months. The researcher visited the previously mentioned setting three days/week (Mondays, Wednesdays and Thursdays) from 9.00 Am to 2.00 Pm.

Phase 1: Social assessment:

In this phase, factors affecting health of climacteric phase women were evaluated by use of different data collection tools such as reviewing literature, holding private sessions, and establishing focus groups. At the beginning of interview, the researcher

introduced herself, greeted each woman, explained the aim of the study, scheduled times and frequency of counseling sessions to selected women to assure adherence to selected interventions. The researcher took oral consent from women to participate in the study.

The researcher interviewed the Climacteric women to collect women's socio-demographic data, menstrual, obstetrics data, present perimenopause symptoms and PPM model constructs (pretest). The average time required for completion of the questionnaire was around (30-40 minutes). The number of interviewed women per week was 6-5 women.

Phase 2: Educational and ecological assessment

In this phase, predisposing, enabling, and reinforcing factors were reviewed. In a primary review of the literature by the researcher, knowledge, attitude, and self-efficacy were chosen as predisposing factors. Enabling factors included access to databases and attending educational courses. Reinforcing factors included family support by the husband and friends and verbal encouragement.

Phase 3: Administrative and policy assessments

In this phase, researchers selected a location and prepared a timetable for the activity of the personnel, budget, and responsibilities and did the necessary coordination of educational and environmental interventions. These items were collected via interviewing the participants. Components of the program, educational goals, educational content, educational messages, and concepts were all determined based on the opinion of experts and according to the existing scientific resources.

Based on results obtained from pre-intervention assessment of women's predisposing, reinforcing, enabling factors during climacteric phase, and review of relevant literature, the researcher designed a booklet in an Arabic language supported by figures. The educational intervention was developed using PPM as a guideline, sessions number and its contents, different methods of teaching, and instructional media were determined accordingly to study group. Telephone number and detailed address were obtained from women to facilitate contact in cases women did not attended their planned program schedule**.**

Phase 4: Implementation

A group-based educational intervention according to PPM was conducted to study group through five sessions over a period of 22 weeks. Participants (study group) were classified to 11 groups; each group consisted of 5 women. The duration of the educational program lasted 2 weeks for each group. Total time for all sessions took about four hours and half, each session took about 45-60 minutes.

- **The first session:** at the beginning of the first session, the researcher gave the women the educational booklet and introduced an orientation to the program, introduction about climacteric phase, causes, risk factors, short term, mid-term, and long-term climacteric peroid symptoms, methods of climacteric period management.

- **The second session** focused on PPM, its phases and predisposing factors, reinforcing factors and enabling factors during perimenopause.

Phase 5: Assessment of process

Process evaluation occurs during implementation of the program and was used to evaluate the process by which the program was being operated. In this phase, achieving the educational objectives was measured. In this study, process evaluation includes evaluating the program components such as the program staff, methods, materials used, and activities.

Phase 6: Assessment of impact

In this study, impact evaluation consisted of assessing changes in predisposing, reinforcing, and enabling factors which affects the behavior after the intervention, participants were followed up by phone

contact, sending text messages, and brochures prepared by the researcher.

Phase 7: Assessment of outcome

During this phase, the effect of educational intervention was evaluated six months after the intervention application by using the same format of tools (posttest) which were used before the program implementation for both groups. The (posttest) format of tools was used to evaluate the women's predisposing, reinforcing, enabling factors and self-efficacy as indicators of this program. At almost time the researcher followed women via telephone. The participants in the control group were given the booklet.

Statistical analysis:

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. was used for that purpose, followed by data tabulation and analysis. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Paired t-test and Chi-square test. coefficients were used. A significant level value was considered when $p \leq 0.05$. And A highly significant level value was considered when $p < 0.00$.

Result:

Table (1): Distribution of control and study groups according to socio-demographic characteristics (n=109):

No statistical significant difference (p > 0 .05) t= independent t test € Fisher Exact Test

Group / Socio-demographic characteristics	Control group (n=54)		Study group (n=55)		X^2	P - value
	No	%	No	%		
Age (years)						
▪ 43 - < 47	13	24.1	18	32.7		
▪ 47 - < 51	23	42.6	17	30.9	1.803	0.406
▪ 51 - ≤ 55	18	33.3	20	36.4		
Mean ± SD	**48.51 ± 3.34**		**47.69 ± 3.64**		t=1.235	0.220
Residence						
▪ Rural	34	63	40	72.7	1.192	0.275
▪ Urban	20	37	15	27.3		
Educational level						
▪ Primary education	5	9.3	4	7.3		
▪ Secondary education	30	55.6	28	50.9	0.552€	0.759
▪ University education	19	35.2	23	41.8		
Duration of marriage (years)						
▪ 10 - < 20	2	3.7	6	10.9	2.080€	0.271
▪ 20 – ≥ 30	52	96.3	49	89.1		
Mean ± SD	**28.44 ± 4.45**		**26.83 ± 5.43**		t=1.673	0.097
Nature of work						
▪ Physical	4	7.4	2	3.6		
▪ Physical and psychological	13	24.1	10	18.2	1.499€	0.473
▪ psychological	47	68.5	43	78.2		
Number of work years						
▪ 1- < 10	3	5.6	2	3.6		
▪ 10- <20	10	18.5	15	27.3	1.305€	0.521
▪ ≥ 20	41	75.9	38	69.1		
Mean ± SD	**23.07 ± 6.021**		**23.60 ± 6.96**		t=0.431	0.667
Monthly income						
▪ Enough	12	22.2	19	34.5	2.033	0.154
▪ Not enough	42	77.8	36	65.5		

and 21.01±3.5 respectively, moreover the mean duration of marriage of control and study groups were 28.44 ± 4.45 and 26.83 ± 5.43 respectively. Regarding nature of work, 68.2% of the control group and 78.2 % of the study group had psychological nature of work. Also, the mean number of work years of control and study groups

Table (1) shows that the mean age of control and study groups were 48.51 ± 3.34 and 47.69 ± 3.64 years respectively. Regarding residence, 63% of the control group and 72.7% of the study group live in rural areas. More than half of both groups had secondary education. The mean age at marriage of control and study groups 20.20 ± 2.07

income. There was no statistically significant difference between both groups regarding personal characteristics (p > 0.05). The two groups under study were homogeneous.

was 23.07 ± 6.021 and 23.60 ± 6.96 respectively. Most of both groups had no enough monthly income, whereas only 22.2% of the control group and 34.5% of the study group had enough monthly

Table (2): Distribution of control and study groups according to menstrual history (n=109):

Group / Menstrual history	Control group (n=54)		Study group (n=55)		X^2	P - value
	No	%	No	%		
Age of menarche						
Mean ± SD	**12.166 ± 1.041**		**11.83 ± .897**		t =1.774	0.079
Menstruated						
▪ **Yes**	46	85.2	42	76.4	1.363	0.355
▪ **No**	8	14.8	13	23.6		
Interval (days)	**n=46**		**n=42**			
▪ ≤ 20	5	10.9	7	16.6	2.017	0.569
▪ 21- 35	16	34.8	13	31		
▪ ≥ 36	25	54.3	22	52.4		
Mean ± SD	**39.75 ± 18.03**		**37.47 ± 19.11**		t =0.642	0.522
Nature of menstruation						
▪ Liquid blood	39	84.8	34	80.9	1.591	0.451
▪ Clotting blood	7	15.2	8	19.1		

interval of menstruation, the mean interval of control group were (39.75 ± 18.03) days respectively. Most of both groups had liquid blood. Also there was no statistically significant difference between the studied groups regarding menstrual history (P > 0.05).

Table (2) clarifies that mean age of menarche of both control and study groups were (12.166 ± 1.041 and 11.83 ± .897) years respectively. Regarding status of menstruation more than three quarters of control and study groups (85.2% and 76.4% respectively) were menstruated. Regarding

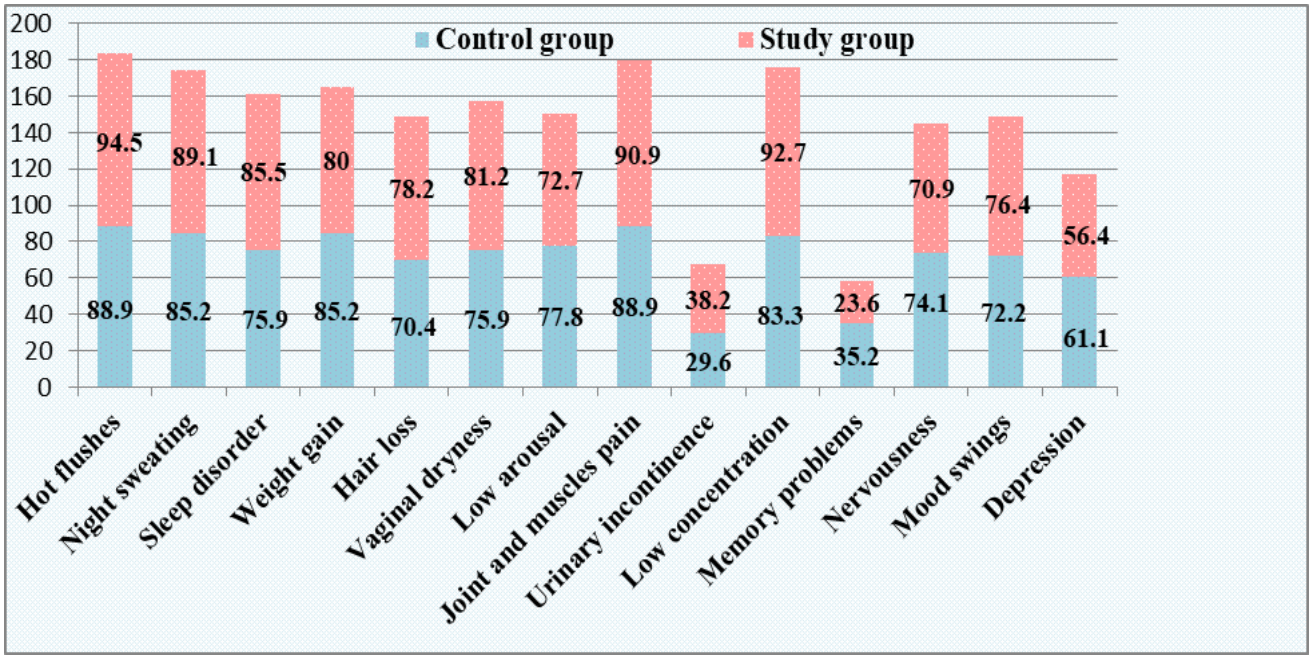

Figure (1) Distribution of control and study groups in relation to present history of perimenopausal symptoms.

Phase groups / Items	Maximum score	Before program application		t test	P - value	6 months after program application		t test	P - value
		Control group n = 54	Study group n = 55			Control group n = 54	Study group n = 55		
		Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Positive attitude	30	14.87 ± 2.47	15.43 ± 1.53	1.438	0.153	14.90 ± 2.13	24.96 ± 3.85	16.801	0.000 **
Negative attitude	30	17.79 ± 3.67	17.90 ± 2.63	0.184	0.854	18.31 ± 3.17	26.61 ± 2.93	14.173	0.000 **
Total score	60	32.66 ± 4.83	33.34 ±2.86	0.894	0.374	33.33 ± 3.86	51.43 ± 6.77	17.105	0.000 **

Table (3): Comparison between the mean attitude scores of control and study groups towards perimenopause and lifestyle through times of assessment (n=109):

**A high statistical significant difference ($P \leq 0.001$) No statistical significant difference ($P > 0.05$)

Table (3) reveals that there was no statistically significant difference in the mean scores of positive, negative and the total attitude between the two groups before the program application ($P > 0.05$). However, after six months of program application, the mean scores for positive, negative and total attitude of the study group were significantly higher than the mean scores of the control group ($P < 0.001$).

Table (4): Comparison of the mean scores of educational and ecological assessment phase structures of PRECEDE - PROCEED model and the total self- efficacy of the studied groups through times of assessment (n=109):

Phase groups / Items	Maximum score	Before program application		t test	P - value	6 months after program application		t test	P - value
		Control group n = 54	Study group n = 55			Control group n = 54	Study group n = 55		
		Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Knowledge	62	17.40 ± 4.80	19.59 ± 5.97	1.760	0.081	20.78 ± 5.46	46.80 ± 6.40	22.421	0.000 **
Attitude	60	32.66 ± 4.83	33.34 ±2.86	0.894	0.374	33.33 ± 3.86	51.43 ± 6.77	17.105	0.000 **
Reinforcing factors	18	11.61± 1.81	11.40 ± 1.88	0.596	0.553	11.46 ± 1.81	14.43 ± 1.53	9.244	0.000 **
Enabling factors	18	10.81 ± 1.31	11.00 ± 1.57	0.665	0.508	11.37 ± 1.36	14.85 ± 1.69	11.818	0.000 **

Total Self-efficacy	57	30.85 ± 4.64	31.87 ± 3.66	1.907	0.060	31.50 ± 3.26	48.56 ± 5.46	19.738	0.000 **

efficacy before PRECEDE - PROCEED model application (P > 0.05). However, there was a highly statistically significant difference was observed in the mean scores of predisposing factors, reinforcing factors, enabling factors and self-efficacy of the study group compared with the control group after six months of PRECEDE - PROCEED model application (P < 0.001).

No statistical significant difference (P > 0.05) *Statistically significant (P ≤ 0.05) **A high statistical significant difference (P ≤ 0.001)

Table (4) clarifies that there was no statistically significant difference between control and study groups in the mean scores of predisposing factors, reinforcing factors, enabling factors and self-

Table (5): Comparison between the mean self-efficacy scores of control and study groups towards perimenopause women through times of assessment (n=109):

Phase groups / Items	Maximum score	Before program application		t test	P - value	6months after program application		t test	P - value
		Control group n = 54	Study group n = 55			Control group n = 54	Study group n = 55		
		Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Cognition/decision making	18	9.29 ± 1.50	9.87 ± 1.94	1.731	0.086	9.70± 1.66	16.09 ± 1.80	18.403	0.000 **
Mobilizing resources/ coping behaviors	15	8.25± 1.15	8.63 ± 1.20	1.688	0.098	8.50 ± 1.32	12.81 ± 1.80	14.198	0.000 **
Control over health	18	9.25 ± 1.81	9.61 ± 1.64	1.078	0.284	9.98 ± 1.64	14.96 ± 2.09	13.784	0.000 **
Enhancement of health behaviors	6	3.33 ± 1.21	3.36 ± 1.20	0.131	0.896	3.38 ± 1.23	4.70 ± 1.11	5.856	0.000 **
Total score	57	30.85 ± 4.64	31.87 ± 3.66	1.907	0.060	31.50 ± 3.26	48.56 ± 5.46	19.738	0.000 **

No statistical significant difference (P > 0 .05) . **A high statistical significant difference (P ≤ 0.001).

Table (5) shows that there was no statistically significant difference in the mean scores of the total self-efficacy and its dimensions between the two groups before the program application (P > 0.05). However, after six months of program application, the mean scores for the total self-efficacy and its dimensions of the study group were significantly higher than the scores of the control group (P < 0.001).

Table (6): Correlation between total self-efficacy score and educational and ecological assessment phase structures of

PRECEDE – PROCEED model of both groups through times of assessment (n=109):

Phase groups / Items	Total self-efficacy score											
	Control group						Study group					
	Before program application				6 months after program application		Before program application				6 months after program application	
	r	P-value			r	P-value	r	P-value			r	P-value
Predisposing factors												
Total knowledge score	0.435	0.001*			0.395	0.004*	0.468	0.000**			0.745	0.000**
Total attitude score	0.400	0.003*			0.465	0.000**	0.440	0.001**			0.576	0.000**
Reinforcing factors	0.250	0.019*			0.295	0.011*	0.262	0.016*			0.496	0.000**
Enabling factors	0.332	0.012*			0.382	0.003*	0.298	0.011*			0.467	0.000**

No statistical significant difference (P > 0.05)
*Statistically significant (P ≤ 0.05) **A high statistical significant difference (P ≤ 0.001).

Table (6) clarifies that there that there was a highly statistically significant positive correlation between total **self-efficacy** score and educational and ecological assessment phase structures of PRECEDE – PROCEED model (predisposing, reinforcing, and enabling factors) of both groups before, after six months of program application (P < 0.00).

Discussion:

General characteristics of the studied groups:

Regarding socio-demographic characteristics of the studied groups, the results of the present study cleared that there was no statistically significant difference among the studied groups regarding their personal characteristics (age, level of education, residence, age at marriage, duration of marriage, nature of work, and monthly income). This may be due to homogeneity of the study population.

This result is in accordance with **Afshari et al., (2020)** who studied "Menopause uncertainty: the impact of two educational interventions among women during menopausal transition and beyond" and reported that the two groups had no significant differences in demographic characteristics such as age, and education. This result also agrees with **Narjes et al.(,2020)** who studied **"**the effects of menopausal health training for spouses on women's quality of life during menopause transitional period" and reported that the two groups had no significant differences in demographic characteristics such as age, residence and education level

The world health organization defines climacteric phase as a period (2-8 years) before menopause and one year after the last menstrual period resulting from loss of ovarian follicular activity **(Who, 2018)**. The results of the current study revealed that more than one third of the studied groups were 47 - < 51 years old with a mean age of control and study groups were 48.51 ± 3.34 and 47.69 ± 3.64 years respectively. This result comes in the same line with **Willi et al., (2020)** who studied "Prior depression affects the experience of the perimenopause - findings from the Swiss Perimenopause Study" and concluded that the mean age of perimenopausal women was 48.6 ± 3.9.

Regarding residence, more than half of control and study groups lived in rural areas and had secondary education**.** The most frequent influencing factors of peri-menopausal symptoms were educational level, residence, monthly income. This result is consistent with **Faraji et al., (2018)** who studied "Could a Midwife Leading Health Behavior Counseling Improve Self-Care of Women During Perimenopause?" who reported that more than half of the studied women had secondary education. Also this result is nearly similar to **Gebretatyos et al., (2020)** who studied **"**Effect of health education on knowledge and attitude among middle-age" and found that more than half of the studied women had moderate level of education.

In relation to duration of marriage, the results of the present study clarified that duration of marriage of more than three quarters of the studied groups was 20 – ≥ 30 years. This result nearly agrees with **Koçak and Beji, (2019)** who studied "Effect of Health Promoting Lifestyle Education Program on reducing the menopausal symptoms of women in Turkey" and mentioned that duration of marriage of more than half of the women in the control and intervention group was (33-44 years).

As regards monthly income, the results of the present study demonstrated that most of both groups had no enough monthly income. This result is nearly similar to **Gebretatyos et al., (2020)** who reported that more than half of the studied women had moderate level of monthly income. This result also agrees with **Sis Çelik and Pasinlioğlu (2019)** conducted a study on "Effects of imparting planned health education on hot flush beliefs and quality of life of climacteric women" who found that two thirds of the studied groups had medium income level. So, poverty, low level of education, and early marriage age are other contributing factors that can lead to sedentary lifestyle.

In relation to menstrual history, the results of the present study clarify that there was no statistically significant difference among the studied groups regarding menstrual history ($p>0.05$). The two groups under study were homogeneous. This result is in accordance with **Afshari et al., (2020)** who found that there was no statistically significant difference among the studied groups regarding age of menarche and interval of menstruation.

The results of the present study indicates that mean age of menarche of both control and study groups were 12.166 ± 1.041 and 11.83 ± .897 respectively. **Farland, et al.,**

(2017) made a study on "Menstrual cycle characteristics and steroid hormone, prolactin, and growth factor levels in premenopausal women" and found that the majority of women were 12 or 13 years old at menarche.

Regarding status of menstruation, the results of the present study clarifies more than two thirds of the control and study groups were menstruated This result nearly agrees with **Ebrahimi and Rahimi, (2019)** who conducted a study on **"**The effect of self-efficacy counseling on the management of menopausal symptoms in psychological dimension in perimenopause women" who found that nearly two thirds of the intervention and control groups were menstruated.

Regarding interval and natural of menstruation, the mean interval of control group were 39.75 ± 18.03 respectively, but the mean interval of study group were 37.47 ± 19.11 respectively. Most of both groups had liquid blood.

Yisma, et al., (2017) studied "Prevalence and severity of menopause symptoms among perimenopausal and postmenopausal women aged 30-49 years in Gulele sub-city of Addis Ababa, Ethiopia" and mentioned that peri-menopausal status included women experiencing irregular menses within the last 12 months or an absence of menstrual bleeding for more than 3 months but less than 12 months. Based on the results of **Bae, et al., (2018)** who studied **"**Factors associated with menstrual cycle irregularity and menopause" and concluded that women (≥25 kg/m2 BMI) showed higher risk of irregular menstruation than normal-weight women (25- < 30 kg/m2).

As regards present history of perimenopausal symptoms, the results of the present study illustrate that more than half of women in the control and study groups complained of multiple symptoms as hot flushes, night sweating, sleep disorders, irregular menstruation, weight gain, hair loss, vaginal dryness, low arousal, joint and muscles pain, low concentration, nervousness, mood swings, and depression. This result agrees with **Du, et al., (2020)** who studied **"**Menopausal Symptoms and Perimenopausal Healthcare-Seeking Behavior in Women Aged 40–60 Years"and concluded that the prevalence of most symptoms, such as hot flushes/sweating, fatigue, and emotional disorder among the participants in the perimenopausal period was significantly higher than in the women in the pre- and post-menopausal periods.

This result is congruent with **Ong et al., (2020)** who studied "Experiences and Needs of Perimenopausal Women with Climacteric Symptoms in Singapore: A Qualitative Study" and found that more than half of the studied women complained of hot flushes, insomnia, mood changes, skin dryness, muscle and joint pain, vaginal dryness, and low sexual desire.

Predisposing factors (knowledge and attitude) reinforcing factors and enabling factors of the studied groups:

Concerning knowledge about climacteric period, the results of the present study reveals that there was no statistically significant difference in the mean scores of the total knowledge and its parts (climacteric period, and overcoming symptoms between the two groups before the intervention ($p > 0.05$). However, after six months of intervention, the mean difference scores for the total knowledge and its parts (climacteric period and overcoming symptoms in the study group were higher than the scores in the control group ($p < 0.001$).

this result is similar to **A fshari et al.,(2020)** who reported that there was no significant difference between the two groups in items of climacteric period before the intervention ($p = 0.34$) and the score increased one month after intervention, and these changes were statistically significant ($p < 0.001$). This result also is in accordance with **Sis Çelik, and Pasinlioğlu, (2019)** who stated that there was no significant difference between the control and experimental groups regarding level of knowledge about climacteric period before intervention. Also **moshki et al.,(2018)** conducted a study on "The effectiveness of a group-based educational program on the self-efficacy and self-acceptance of menopausal women" pointed out that the mean of knowledge score about menopausal symptoms in the two groups (test and control) before and after the intervention indicated the significant effect of intervention on the level of knowledge of the participants in the test group ($P = .02$).

Contradicting to the results, an Iranian study of **Taherpour et al.,(2015)** on "Menopause knowledge and attitude among Iranian women" reported that there was no significant change in the mean score of knowledge from pre-intervention (10.52) to post-intervention (15.14) .This difference in findings might be due to the different educational materials utilized and the presence of study participants with a lower educational level in the comparative study.

Concerning attitude about climacteric period this result reveals that there was no statistically significant difference in the mean scores of positive, negative and total attitude between the two groups before the intervention ($p > 0.05$). However, after six months of intervention, the mean difference scores for positive, negative and total attitude in the study group was higher than the scores in the control group ($p < 0.001$). This result may be explained by that, when people have a good knowledge about menopause and its health problems and how to deal with it, they have more positive attitude towards it. Increased levels of knowledge and health education usually lead to a change of attitudeThis study is nearly in

This result is consistent with **Orabi, (2017)** who conducted a study on **"**effect of Health Education Intervention on Knowledge, and attitude regarding Menopausal Period among Premenopausal Female Employees" and concluded that there was significant improvement in all attitude parameters after intervention. The highest percent of improvement is for counseling a doctor which changed from 7.5% to 90%. As well as **Batool, et al.,(2017)** added that there is significant improvement in total attitude about menopause after intervention. Peri-menopausal nurses have more positive attitude towards menopause than peri-menopausal teachers.

Whereas the results of this study isn't in accordance with **Taherpouret al.,(2015)** who pointed out that there was no significant change in attitude after the educational intervention. In this study knowledge of the participants was not affected by the education given so the unchanged attitude of the participants towards menopause is highly expected

The present study clarifies that there was no statistically significant difference between control and study groups regarding predisposing, reinforcing, and enabling factors before PPM application ($p > 0.05$). However, there was a highly statistically significant difference was observed in predisposing, reinforcing, and enabling factors of the study group compared with the control group after six months of PPM application ($p < 0.001$). This may be due to that the increase of the knowledge level and creation of a positive attitude was expressed as the effect of intervention based on the PPM on the behavior changes.

This result is in agreement with **Pourhaji, et al., (2020)** who studied "Effects of educational program based on Precede-Proceed model in promoting low back pain behaviors in health care workers" and pointed out that the mean score of predisposing factors enabling, and reinforcing factors increased in intervention group ($p < 0.05$, $p < 0.001$), but no significant change in mean score of predisposing factors reinforcing factors, enabling factors in the control group ($P > 0.05$) .Also this result is in agreement with **Khani et al., (2021)** who studied "The Application of PRECEDE Model on Preventing Osteoporosis in Women, Clinical Nursing Research " revealed that before educational intervention, there were no significant differences between the two groups in predisposing factors, reinforcing factors, and enabling factors, however, 1 year after intervention, intervention group had significant enhancement in mentioned variables, whereas the control group had no changes.

Self-efficacy of the studied groups:

The present study indicates that there was no statistically significant difference in the mean scores of the total self-efficacy and its dimensions between the two groups before the intervention ($p > 0.05$). This may be due to that low level of knowledge, negative attitude towards perimenopause and increased stress during this period are associated with a low self-efficacy.

However, after six months of intervention, the mean scores for the total self-efficacy and its dimensions of the study group were significantly higher than the scores of the

control group ($p < 0.001$). This can be explained that use of intervention based on the self-efficacy can play an important role of women in climacteric period which plays a very important role in promoting sustainable development.

In accordance with **Teja et al., (2019)** who made a study on "The correlation between knowledge, body image perception and self-efficacy with anxiety among per menopausal women", concluded that knowledge and self-efficacy are also significantly correlated and the correlation direction is positive which means the higher knowledge score, the higher self-efficacy score.

This study is in agreement with **Khani Jeihooni et al., (2021)** who conducted a study on "Health Literacy Intervention and quality of life in Menopausal Women: a Randomized Controlled Trial" This study also revealed hat there was highly significant improvement in the total self-efficacy score after the educational intervention. As well as, this finding was nearly in line with the findings of **a Khandehroo et al., (2020)** who conducted a study on "Health Literacy Intervention and quality of life in Menopausal Women: A Randomized Controlled Trial" and revealed that the mean scores of the total self-efficacy in the experimental group before intervention, after intervention and follow up (32.45±19.3, 37.03±12.03, 43.45±9.01) compared to the control group (38.84±9.04, 42.61±10.97, 37.41±8.17).

The results of the present study clarifies that there was positive statistically significant correlation between self-efficacy score and total knowledge score, total attitude score, , reinforcing factors, enabling factors in both groups before intervention, and after six months of intervention ($P \leq 0.00$).

This result is nearly consistent with **Rabiee et al.,(2019)** who concluded that pearson correlation coefficient test results showed that there was a positive and significant relationship between total lifestyle score with psychological well-being, menopausal symptoms severity and its three domains, that is, with increasing each of these variables, total lifestyle score increases. This result also comes in the same line with **Moshki et al., (2017)** who reported that pearson correlation test indicated a positive and significant relationship between psychological wellbeing and predisposing factors (knowledge, attitude towards menopause), environmental behavioral factors, enabling factors and reinforcing factors ($P < 0.01$).

Conclusion:

Based on the results of the present study it is concluded that; The PPM provided an excellent framework for health intervention programs especially in enhancing self-efficacy, and improved the variables such as predisposing factors, reinforcing factors and enabling factors. And also the conclusions of the present study support hypothesis and aim of the study.

Recommendation:

PRECEDE - PROCEED model must be applied in the process of education by considering all effective personal, environmental, social and supportive factors for future health promotion program development for women.

Educational programs intended for women in the climacteric period must be extended about menopause, symptoms, long term consequences, and effective ways of dealing with it and such education should be supplemented with an educational manual or similar materials.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics:

Ethical approval was taken from Faculty of Nursing's Ethical Committee, Benha University, this research was conducted. Written and verbal informed consent was taken from the participants before collecting data and participants' privacy and confidentiality were maintained during data collection and publication

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