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## Effect of Applying Health Belief Model on Osteoarthritis Preventive Behaviors in Middle-Aged Women

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### ABSTRACT

**Background:** Osteoarthritis (OA) is among the most prevalent musculoskeletal disorders and devastating diseases and is the fourth contributing cause of disability in the world. Also, it carries excess mortality as well as financial encumbrance both on societal level and to women inflected with it. **Aim:** assess the effect of applying health belief model on osteoarthritis preventive behaviors among women in their middle age. **Subjects and Method: Design:** quasi-experimental research design with one group pre/post-test approach. **Setting:** at five primary health care centers within the city of Port Said. **Subjects:** purposive sample of 147 women attending the five mentioned setting. **Tools:** the tools used were counted as three: *Tool I:* Women's Assessment Questionnaire about Osteoarthritis Prevention. *Tool II:* The Osteoarthritis Health Belief Model (HBM) Scale. *Tool III:* Osteoarthritis Preventive Behaviors. **Results:** pre-program intervention (89.1%) had an unsatisfactory level of knowledge while only (11.6%) post program intervention. (94.6%) of study women had a low level of preventive behaviors pre-program intervention compared to (24.5%) post program intervention. **Conclusion:** The study concluded that a statistically significant enhancement was evident between the health belief model scale category before and after program intervention ( $p = 0.001$ ). In addition to that, a highly statistically significant difference present between total knowledge, osteoarthritis health belief model & level of preventive behaviors regarding osteoarthritis before and after program intervention ( $p = 0.001$ ). **Recommendations:** The continuing education

program is needed about osteoarthritis that is directed to women to raise awareness. Long-term follow-up (3 months after the intervention) to investigate the intervention's impact on the continuation of behavior.

**Key words:** Health Belief Model, Middle-Aged Women, Osteoarthritis, Preventive Behaviors.

## **INTRODUCTION**

Osteoarthritis (OA) is considered as one of the major prevalent musculoskeletal complaints and overwhelming diseases and is the 4<sup>th</sup> top cause of disability worldwide causing severe pain, declined function, reduced social interaction, and eventually woman's quality of life (Dashtyan, Tavafian, Karimzadeh & Yazdanpanah, 2022).

Osteoarthritis carries an additional mortality and societally and individual financial burden (Palazzo, Nguyen, Lefevre-Colau, Rannou & Poiraudau, 2016). Osteoarthritis is a primary leading factor to the worldwide disability burden (Safiri et al., 2020). About 7% of the global population are affected by osteoarthritis, more than 500 million people all over the world, with women disproportionately have the disease. From 1990 to 2019 about 114.5% increase in individuals lived with disability due to OA (Roth, 2018; Vos et al., 2020). Women in midlife usually go through several challenges on the social, psychological and biological aspects (Thomas, Mitchell & Woods, 2018). Women possess a higher prevalence of OA than men with greater severity (Dashtyan et al., 2022). The prevalence of osteoarthritis between men and women was 17.6% and 14.5%, in respective manner (Zhou et al., 2018).

The health belief model (HBM) considers one of the most effective models for behavior change, that considers behavior as a function of one's knowledge and attitude (Salahodinkolah et al., 2020). Health belief model-based education is an efficacious approach for enhancing women's knowledge and behavior. This model is based on six elements involving perceived susceptibility, perceived severity, perceived barriers, perceived benefits, perceived threat, cues to action (Eldardery, El-Sayed, Safwat & Eldien, 2022).

Management of OA should be directed to lower the burden of the disease (Ikuta et al., 2020; Caneiro et al., 2020). Early management depends on the prevention of the OA disease (Magni et al., 2021). Preventing or decreasing the severity and symptoms of OA can be achieved by lifestyle modifications, weight loss, and movement modification prior to osteoarthritis incidence (Norozi, Nazari & Moodi, 2020).

The nurse is the cornerstone in avoidance of osteoarthritis owing to being a vital cog in the healthcare delivery system. Community health nurses have a major role as a partner within a team of professionals in public health and other disciplines to enhance

the population health. Role of the community health nurse include teacher, advocator, manager, coordinator, communicator, researcher, counselor, motivator (World Health Organization, 2017).

Nursing management aims to prevent and decrease occurrence of the disease and this is done by health education about the disease also, to sustain healthy, positive adaptation in osteoarthritis women. Teaching is the principal of successful disease treatment and the nurse plays the most important role as a patient educator (Elshamy, Abdelhamed & Sadawy, 2018).

### **Significance of the study**

Osteoarthritis is the commonest rheumatic disease in Egypt, with a prevalence of 8.5%. In a study done in Egypt most of the patients with Osteoarthritis were female (74.9%) (Afifi et al., 2018). The Health Belief Model has been utilized for decades to help produce behavior change interventions. Research suggests that the Health Belief Model can be helpful for designing strategies to help promote healthy behaviors and to improve the prevention and treatment of health conditions (Costa, 2020). There are few studies in Egypt about effect of applying HBM on Osteoarthritis preventive behaviors in women in their middle age so this study aimed to assess the impact of applying HBM on Osteoarthritis preventive behaviors in middle-aged women.

### **AIM OF THE STUDY**

To assess the effect of applying Health Belief Model on Osteoarthritis preventive behaviors in middle-aged women.

### **Objectives**

1. Determine women knowledge regarding osteoarthritis.
2. Identify women belief regarding osteoarthritis.
3. Develop osteoarthritis health belief model educational intervention for middle-aged women.
4. Implement osteoarthritis health belief model educational intervention for middle-aged women.

5. Evaluate the effect of applying Health Belief Model on osteoarthritis preventive behaviors in middle-aged women.

### **Research hypothesis**

The women's level of knowledge, beliefs and preventive behavior regarding osteoarthritis will be enhanced following application of Health Belief Model program.

## **SUBJECT AND METHOD**

### **I. Technical Design**

#### **Research design**

The study used a quasi-experimental research design with one group pre/post-test approach.

#### **Setting**

The present study was conducted at 5 primary health care centers within the city of Port Said. These settings are affiliated with Egypt health care authority hospitals in Port Said which is accessible all days of the week from 9 a.m. to 10 p.m. There are five districts located at Port Said namely; Elzhour district, Eldawahey district, Elarab district, Elmanakh district and Elshark district. One family planning and gynecological clinics were chosen randomly from each district as follows; Elgwhara health care center, El Qabouty health care center, Elarab health care center, Physical therapy health care center, and El Esraa unit respectively. All health care centers mentioned within Egypt health care authority hospitals in Port Said.

#### **Subjects**

147 Women attending to the previous mentioned setting.

#### **Inclusion Criteria**

1. Women aged from 18 to 46 year.
2. Women are not diagnosed with osteoarthritis.
3. Women who agree to participate in the study.

## Sample Size Calculation

The size of sample was determined by utilizing the following equation.

$$\text{Sample Size (n)} = \frac{Z^2}{\Delta^2} P (100 - P) \text{ (Dobson, 1984).}$$

### Where

P: The expected prevalence of osteoarthritis among reproductive age women =21.9% (*El Miedany, 2021*).

Z: A percentile of standard normal distribution determined by 95% level of confidence = 1.96

Δ: The width of the confidence interval = 7.

$$\text{Sample Size (n)} = \frac{1.96^2}{[7]^2} 21.9 \times (100 - 21.9) = 134 \text{ women.}$$

- The calculated sample size was 134 women. Because of the effects of the design (1.25), expected non-participating rate (10%).
- The final size of sample was 147 women.

## Data Collection Tools

In this study, three tools were utilized which included:

### Tool I: Women's Assessment Questionnaire about Osteoarthritis Prevention

It comprises of three parts

#### ▪ Part 1: Demographic Characteristics of the Studied Women

This part was developed by the researcher and used to collect data regarding demographic features of studied women was carried out using this part. it included six items as age, marital status, residence, educational level, occupation, and monthly income.

### ▪ **Part 2: Medical and Obstetrical History of the Studied Women**

This part was developed by the researcher and used to assess medical and obstetrical history of the studied women. It included eleven items regarding medical and obstetrical history of the studied women. Medical history included 3 items (history of steroid/hormonal therapy use, trauma, chronic disease while reproductive and obstetrical health history included date of first menstrual period, if woman has regular menses or not, age at puberty, age during the first pregnancy, numbers of gravidity and parity, number of living infants, breastfeeding, family history of osteoarthritis

### ▪ **Part 3: Women's knowledge about Osteoarthritis**

It was utilized to evaluate women's knowledge about Osteoarthritis. It was adopted from Alyami et al., (2020). It comprised 20 questions in a three-choice format (Yes-No- or I don't know) to avoid guessing, 1 is assigned for each yes, and a 0 for each no and I don't know, focusing on osteoarthritis general facts, symptoms, cause, risk factors, diagnosis, preventive behaviors, and osteoarthritis treatment options. It included items like (osteoarthritis is a chronic problem, osteoarthritis is rare, different joints can be affected by osteoarthritis, osteoarthritis is caused by cold, damp weather, it is developed by a microorganism, pain is the only symptom of osteoarthritis, stiffness is a symptom of osteoarthritis).

### **Scoring system**

The overall score of knowledge was done by addition of the scores for each correct answer. The greater scores reflected satisfactory levels of knowledge in terms of prevention of osteoarthritis. The total score was converted into a percent. It was classified into satisfactory level  $\geq 60\%$  of the total scores and unsatisfactory level  $< 60\%$  of the total scores.

### **Tool II: The Osteoarthritis Health Belief Model (HBM) Scale**

It was used to assess women's osteoarthritis health belief model. It was adopted by Norozi et al., (2017); Khani et al., (2015). It was translated into Arabic language then it was back translated to English. The questionnaire included 6 subcategories including 37 items; the first subcategory is perceived susceptibility including (5 items). The second

subcategory is Perceived severity including (9 items). The third subcategory is perceived benefits including (4 items). The fourth subcategory is perceived barriers including (8 items). The fifth subcategory is perceived self-efficacy which involve (8items). The last subcategory is cues to action including (3 items).

### **Scoring system**

The answers were set as a 5-choice Likert-type scale (strongly agree to strongly disagree) corresponding to 5 through 1 score. The total possible score varied from 37 to 185. It was classified into: Positive attitude  $\geq 60\%$  of the total scores and negative attitude  $< 60\%$  of the total scores.

### **Tool III: Osteoarthritis Preventive Behavior**

It was used to assess studied women osteoarthritis preventive behaviors. It was developed by Norozi et al., (2017) and translated into Arabic. It consists of 13 items include Yes and No questions related to preventive behaviors of osteoarthritis.

### **Scoring system**

a score of one for being yes and zero for being no, the higher scores reflect higher level of preventive behaviors and lower scores reflect lower level of preventive behaviors. It was classified into lower level of preventive behaviors  $< 60\%$  of the total scores and higher levels of preventive behaviors  $\geq 60\%$  of the total scores.

## **(II) Operational Design**

### **Content Validity**

It was asserted by a panel of five experts in the field of Family and Community Health Nursing for reviewing the tools for clarity, relevance, understanding, comprehensiveness and applicability.



**Reliability**

Cronbach's  $\alpha$  coefficient was used for assessing the developed tool reliability by evaluating internal consistency. Reliability of the first tool (knowledge) = 0.771. Reliability of the second tool (health belief model) = 0.792. Reliability of the third tool (preventive behaviors) = 0.81.

**Pilot Study**

A pilot study was performed on 10 % of each center randomly chosen. Total of (13) women to test the clarity, applicability, and simplicity of the tools and to estimate the required time for each questionnaire. An exclusion of the participants from the pilot study were conducted from the primary sample.

**Field of work**

There were 4 phases through which the study was performed: assessment, training sessions development, implementation, and evaluation. Data collection lasted seven months from 1<sup>st</sup> of January 2022 till the end of July 2022 (one month for the permission, one month for the pilot study collection, and four months for implementation of the program).

**Phase (1): Assessment (Pre-planning program)**

Collection of pre-program data for baseline assessment was included in this phase. The researcher met the women and fill out the questionnaire to evaluate the knowledge regarding osteoarthritis, health belief model in addition to medical history. Each questionnaire was filled in 30 minutes. The data collected was used as the basis for the educational program designing (preprogram).

**Phase (2): Program Planning**

The researcher developed the educational program under supervisor's guidance based on the information from the initial assessment, and the recent literature. The objective of educational intervention based on the health belief model was to promote early identification of risk factors and to encourage the adoption of risk-reducing behaviors in women on osteoarthritis prevention in middle age women. The educational

intervention included general content about osteoarthritis, people at risk, early symptoms of the disease, presenting various methods for early detection and diagnosis of osteoarthritis, preventive behaviors, and finally treatment of osteoarthritis. The training intervention was based on the constructs of the health belief model. A booklet was designed for women comprising all items correlated with osteoarthritis.

The educational booklet was written in a simple Arabic language with a variety of descriptive pictures to improve the process of learning process as well as facilitating women's comprehension.

### **Phase (3): Implementation of the program**

Before conducting the study an oral consent has been taken from women to participate. The educational program was carried out in five primary healthcare centers within the city of Port Said. The researcher attended each center from 9 am to 12 pm to collect the data and apply the educational intervention. The researcher attended El Qabouty health care center (3 weeks), Elarab health care center (3 weeks), Physical therapy health care center (3 weeks), El Esraa unit (3 weeks), and Elgwhara health care center (one month).

Division of the studied women were performed into small groups (10 groups), and each group contained twelve to fifteen women divided according to the number of women in the primary health care center.

There were a total of 6 sessions throughout the program; each group participated through the 6 sessions over the course of 3 weeks (2 sessions per week), and each session lasted approximately 15 minutes. For one group, a duration of 1 hours was dedicated to fulfil objectives of the program.

Various methods of learning as well as teaching were utilized through the sessions including; interactive lectures, group discussion, demonstration, and instructional media including, pictures and printed handout. The duration of program implementation was four months (from the first of March till the end of June 2022).

### **Phase (4): Evaluation**

After the implementation of the educational intervention, a post-test was done

immediately to assess the impact of a health education intervention on the prevention of osteoarthritis by using the same tools utilized in the pretest.

### **(III) Administrative Design**

Prior the initiation of the study, an official letter from the dean of the Faculty of Nursing at Port Said University to the director of Egypt health care authority hospitals in Port Said

that explain the objective of the study was issued. Before the initial interview, informed oral consent was obtained from every woman in the study.

### **Ethical Consideration**

Approval was taken from the Scientific Research Ethics Committee in the Faculty of Nursing at Port Said University. Assurance to the participants that the information obtained is confidential and used only for the purpose of the study. The researcher informed women that they have the right to withdraw from the study at any time during conducting the study.

### **(IV) Statistical Analysis**

The SPSS software (Statistical Package for the Social Sciences, version 23, SPSS Inc. Chicago, IL, USA) was used to analyse the collected data. For comparison between two groups using number and percent (frequency) was done using the Wilcoxon Signed Ranks test (z). For comparison between two groups of parametric data was used p-value of paired t-test (t) was calculated after mean and standard deviation measurement while comparing between more than two groups of parametric data was used pp-value of ANOVA test (f). Significance was adopted at  $p < 0.05$  for statistically significant interpretation of results of tests of significance. Spearman's correlation test was adopted to test the correlation among variables. Regression analysis also help in describing the variables of scale.

## RESULTS

**Table (1)** demonstrates the distribution of the studied woman in accordance with their demographic's characteristics. More than one quarter (26.5%) of the studied woman was in the age group of  $35 \geq 40$  years old. Regarding occupation, more than half (55.8%) of the studied woman are working.

In relation to their education, it was observed that more than one-third (38.8%) of the studied women had university education. Regarding the marital status the majority (78.2%) of the studied woman were married. Also, about half (50.3%) of the studied women reported that their monthly income is not enough. Finally, about three quarter (74.8%) of the studied women live in urban.

**Figure (1)** shows women's knowledge about osteoarthritis prevention before and after program intervention. It should be pointed out that pre-program intervention (89.1%) had unsatisfactory level of knowledge. While after implementing program only 11.6% of the studied women had unsatisfactory level of knowledge.

**Table (2)** shows that there is a statistically significant improvement between all categories of health belief model perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, and cues of action before and after program intervention ( $p = 0.001$ ).

**Figure (2)** shows osteoarthritis health belief model before and after program intervention. It should be pointed out that the majority of women has positive beliefs after implementation of program intervention than before.

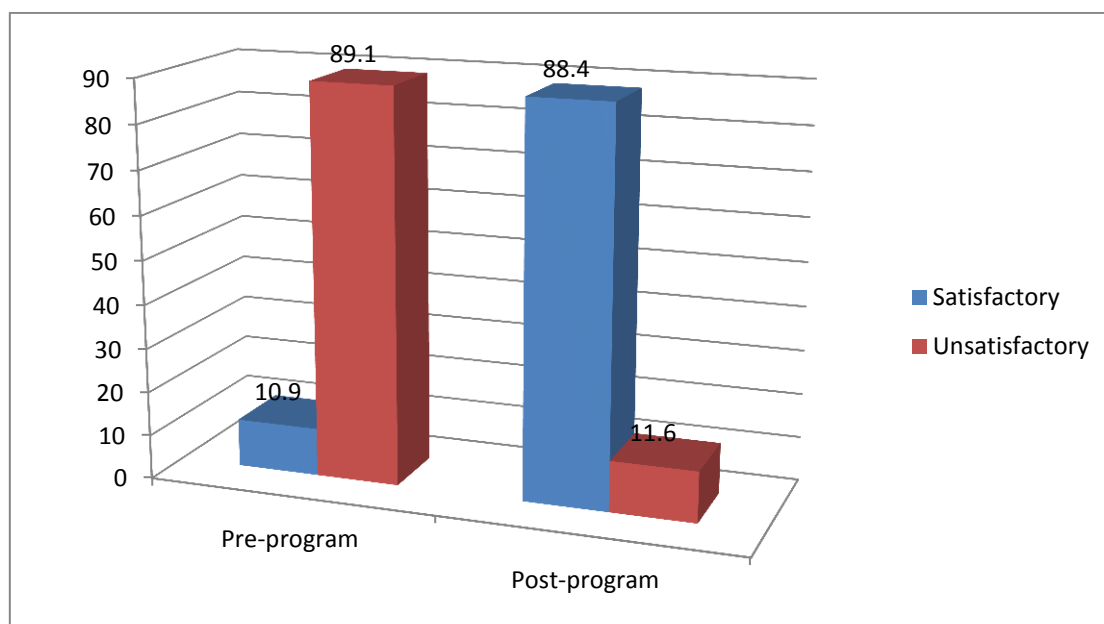
**Figure (3)** shows preventive behaviors regarding osteoarthritis before and after program intervention. It is obvious that most (94.6%) had a low level of preventive behaviors compared to (24.5%) in post-test. This means that program intervention is very effective in increasing the level of preventive behavior.

**Table (3)** demonstrates that a highly statistically significant difference was evident between total knowledge, osteoarthritis health belief model & level of preventive behaviors regarding osteoarthritis before and after program intervention ( $p = 0.001$ ).

**Table (4)** illustrates correlation between women's knowledge and health belief in terms of osteoarthritis after program intervention among the studied women. It demonstrates that a significant relation is evident between Health Belief and women's knowledge ( $p= 0.009$ ). also, there is a significant relation between women's knowledge and level of preventive behaviors ( $p= 0.011$ ).

**Table (1):** Distribution of the Studied Woman According to Their Sociodemographic Characteristics (n=147).

Item	Number	Percent (%)
<b>Age</b>		
25<20:	8	5.4
30<25:	29	19.7
35<30:	28	19.0
40<35:	39	26.5
45<40:	35	23.8
50<45:	8	5.4
<b>Occupation</b>		
Work	82	55.8
Not- Work	65	44.2
<b>Level of Education</b>		
Illiterate	3	2.0
Read and Write	18	12.2
Primary Education	5	3.4
Preparatory Education	25	17.0
High School or Equal	39	26.5
University – College	57	38.8
<b>Marital Status</b>		
Married	115	78.2
Widowed	22	15.0
Divorced	10	6.8
<b>Income</b>		
Enough	43	29.3
Not-Enough	74	50.3
Enough and Save	30	20.4
<b>Residence</b>		
Rural	37	25.2
Urban	110	74.8

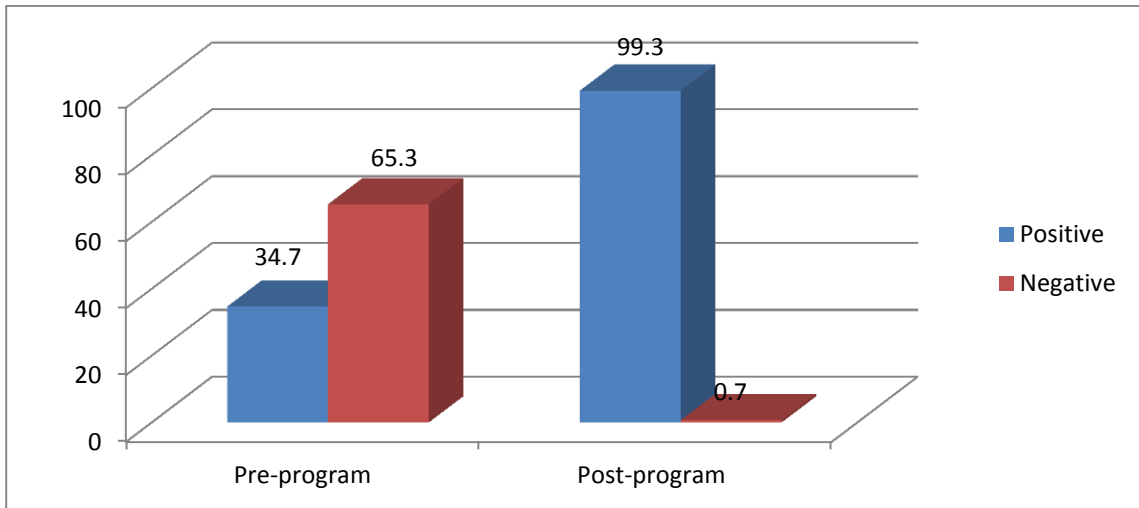


**Figure (1):** Women’s Knowledge of Osteoarthritis Prevention before and after Program Intervention

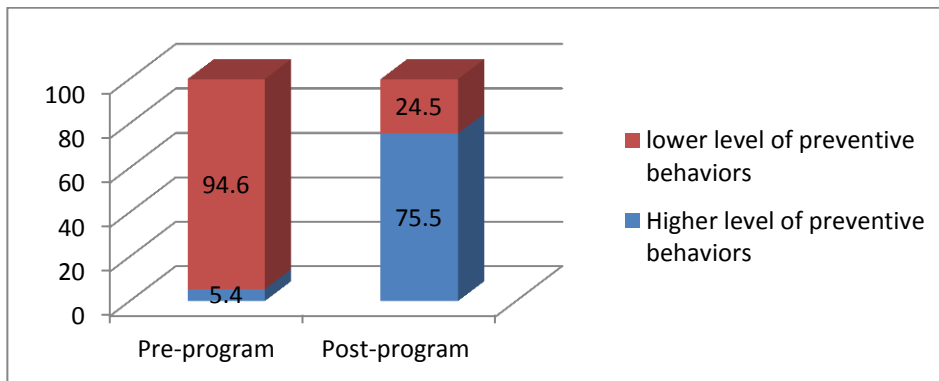
**Table (2):** Assessing the Osteoarthritis Health Belief Model (HBM) before and after Program Intervention among Studied Women (n=147).

Item	Pre-Program				Post-Program				Z	P
	Positive		Negative		Positive		Negative			
	N	%	N	%	N	%	N	%		
Perceived Susceptibility	61	41.5	86	58.5	131	89.1	16	10.9	7.379	0.001**
Perceived Severity	41	27.9	106	72.1	144	98.0	3	2.0	10.052	0.001**
Perceived Benefits	20	13.6	127	86.4	133	90.5	14	9.5	10.63	0.001**
Perceived Barriers	0	0	147	100	134	91.2	13	8.8	11.576	0.001**
Perceived Self-Efficacy	31	21.1	116	78.9	136	92.5	11	7.5	9.966	0.001**
Cues of Action	52	35.4	95	64.6	137	93.2	10	6.8	8.814	0.001**

\*Significant (P<0.05)    \*\* Highly Significant (P≤0.001)    Z= Wilcoxon Signed Ranks test.



**Figure (2):** Osteoarthritis Health Belief Model (HBM) before and after Program Intervention.



**Figure (3):** Preventive behaviors regarding osteoarthritis before and after Program Intervention.

**Table (3):** Assessing totals of Knowledge, Osteoarthritis Health Belief Model & Level of preventive behaviors regarding Osteoarthritis before and after Program Intervention among Studied women (n=147).

Item	Pre-Program		Post-Program		Z	P
	No	%	No	%		
<b>Total Knowledge</b>						
Satisfactory	16	10.9	130	88.4	10.677	0.001**
Unsatisfactory	131	89.1	17	11.6		
<b>Health Belief Model</b>						
Positive	51	34.7	146	99.3	9.747	0.001**
Negative	96	65.3	1	0.7		
<b>Level of Preventive Behaviors</b>						
Higher Level	8	5.4	111	75.5	10.149	0.001**
Lower Level	139	94.6	36	24.5		

\*Significant (P<0.05)    \*\* Highly Significant (P≤0.001)    Z= Wilcoxon Signed Ranks test.

**Table (4):** Correlation between women's Knowledge and Health Belief regarding Osteoarthritis after Program Intervention among the Studied Women (n=147).

Items	Health Belief	Level of Preventive Behaviors
<b>Women's Knowledge</b>	R = 0.214	R = 0.209
	P = 0.009*	P = 0.011*
*Significant (P<0.05)		spearman's correlation



## **DISCUSSION**

Osteoarthritis (OA) is a major public health problem. It is a chronic and degenerative joint disease that affect women on the reproductive age (Sun et al., 2019). The present study was carried out to assess the effect of applying the health belief model on osteoarthritis preventive behaviors in middle-aged women. It is attributed to osteoarthritis is the commonest rheumatic disease in Egypt, with a prevalence of 8.5%. In a study done in Egypt most of the patients with osteoarthritis were female (74.9%) (Afifi, et al., 2018).

Regarding women's knowledge related to OA. The present study pointed out that program intervention had a statistically significant effect on improving the knowledge of the studied women after implementation of program intervention. This might be due to the content of the educational program which included general information, causes, risk factors, manifestations, and management regarding osteoarthritis. This result was supported by Hidarnia, Kashfi, Ghasemi & Askari, (2016) conducted in Iran on two group 120 women found that prior to the intervention there was no significant difference between the two groups regarding knowledge. Also, an Indian study conducted by Dar, Qadir & Srinagar, (2022) on studied women aged between 31-35 Years and found more than half of the study subjects had average pre-test knowledge and post-test knowledge scores of the study subjects showed that two-thirds of the study subjects had adequate post-test knowledge. This indicates that there is a significant increase in the knowledge of women regarding the prevention of osteoarthritis after the planned teaching program.

The current study reported that there was a significant difference between the perceived susceptibility of osteoarthritis health belief model before and after the program. This might be due to the application of the health belief model on women raised their subjective perception of the risk of acquiring a disease. This result is consistent with an Egyptian study conducted by Ali, Mekhamier & El Sayed, (2020) which examined 90 women and reported that the mean scores of perceived susceptibility of osteoporosis prevention were significantly higher after the program.

The present study clarified that there was a significant difference between the perceived benefits of the osteoarthritis health belief model before and after program. This

might be due to unhealthy nutritional habits in Egyptian culture and the women thought that this problem had nothing to do with eating a healthy diet, and more than half of the studied women worked with not enough income. This result was supported by, an Iranian study made by Norozi, Nazari & Moodi, (2020) and reported that the mean score of perceived benefits significantly increased after educational program.

The present study evidenced that there was a significant difference between the perceived barriers of the osteoarthritis health belief model before and after program intervention. Similarly, an Iranian study done by Lakeh, Dakheliparast, Leili & Mahdavi-Roshan, (2019) who studied the health belief model in female health volunteers of health care centers in Rasht and showed that, when people feel they are at risk of a disease, better the preventive behaviors. These are supported by Jeihooni, Hidarnia, Kaveh, Hajizadeh & Askari, (2016), who illustrated that the program could markedly affect the subjects' beliefs regarding disease.

There is a significant difference between the perceived self-efficacy of the osteoarthritis health belief model before and after program intervention. This result was supported by Mousaviasl, Renani, Gheibizadeh & Malehi, (2016) in 172 Iranian females and found that there was a significant improvement in the percentages of all the items of the self-efficacy scale post-intervention.

The current study clarified that there was a significant difference between the cues of action for the osteoarthritis health belief model before and after program intervention. This might attribute to the effectiveness of educational intervention in adopting behaviors that promote joint health, prevention, and reduction of OA.

A previous study showed interventions and policies to change behavior can be usefully characterized by means of behavior change wheel which is a new method for characterizing and designing behavior change interventions (Kok, 2018). Correct training and regular training programs, behavior change techniques such as encouraging patients to participate in the management of disease symptoms, are more effective than passive techniques such as providing information and counseling (Tavafian, 2023).

The present study clarified that there was a significant difference between the frequency of preventive behaviors before and after program intervention. This is might be explained by the effect of program intervention on improving preventive behaviors

regarding osteoarthritis which increase awareness of studied women about preventive behaviors. This result was supported by Jeihooni, Fereidouni, Bahmandoost & Harsini, (2021) in Iran and found there was a significant difference between both groups in terms of the scores for attitude, subjective norms, perceived control behavior, preventive behavior before and after the intervention.

The present study showed that there was a statistically significant difference between all subscales of the health belief model perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, and cues of action before and after program intervention. This may be attributed to acquiring a better awareness of a patient's health beliefs, consequently, this may lead to treatment choices more acceptable to the patient's expectations and needs.

The current study showed that the majority of women has positive beliefs after the implementation of program intervention than before. This result is consistent with an Egyptian study made by Ali, Mekhamier & El Sayed, (2020) which examined 90 women and reported that about two-fifths of women have positive health belief model score prior program implementation, however, after program implementation more than two thirds.

The present study illustrated that a highly statistically significant difference was evident between total knowledge, osteoarthritis health belief model & level of preventive behaviors regarding osteoarthritis before and after program intervention. This may be due to HBM assumes the fact that messages will attain optimal behavior change in case they target perceived barriers, benefits, self-efficiency, and threat in successful manner. This is consistent with El Hage, Hallit, Akel & Dagher, (2019), who studied 560 Lebanese women aged 40 years and above, and demonstrated a remarkable difference in variables of knowledge, perceived severity, perceived self-efficacy, cues to action, perceived benefits and intake of Calcium after program intervention.

It has been demonstrated by the present study that a remarkable relation between health beliefs and women's knowledge was evident, in addition to that, a significant relation between women's knowledge and level of preventive behaviors was evident. This result was supported by Sharifikia et al., (2019) who found that a significant alteration was evident in the mean scores acquired by a woman in the group of

intervention for knowledge and the entire HBM assembles from the phases of pretest to posttest.

## CONCLUSION

In the present study, about (89.1%) of women who were within the scope of study had an inadequate level of knowledge while only 11.6% of them has unsatisfactory level post-program intervention. Most of studied women (94.6%) had a low level of preventive behaviors pre-program intervention compared to (24.5%) post-program intervention. There is a significant improvement between the frequency of preventive behaviors before and after program intervention. It demonstrates that a highly statistically significant difference was evident between total knowledge, osteoarthritis health belief model & level of preventive behaviors regarding osteoarthritis before and after program intervention ( $p=0.001$ ). It demonstrates that a significant relation was evident between health belief and women's knowledge ( $p= 0.009$ ). also, there is a significant relation between women's knowledge and level of preventive behaviors ( $p= 0.011$ ).

## RECOMMENDATIONS

*In the light of the present findings, the following recommendations could be suggested:*

1. The continuing education program is needed about osteoarthritis that is directed to women to raise awareness.
2. Study should be replicated on large sample and at different setting.
3. Developing extensive screening programs about osteoarthritis for all women in middle age.
4. Structured teaching program on osteoarthritis preventive behavior considering gender differences.
5. Implement/ develop educational program promoting regular physical exercise.

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## تأثير تدخل تعليمي مبني على نموذج المعتقد الصحي للوقاية من التهابات المفاصل بين النساء في سن الإنجاب

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### الخلاصة

**المقدمة:** التهابات المفاصل هي واحدة من الاضطرابات العظمية الهيكلية الأكثر شيوعاً وتدميراً وهي رابع سبب رئيسي للعجز في العالم. كما أنها تمثل عبئاً مالياً على الفرد والمجتمع بالاضافة على انها تزيد من نسبة الوفيات. **الهدف من الدراسة:** تقييم تأثير تدخل تعليمي مبني على نموذج المعتقد الصحي للوقاية من التهابات المفاصل بين النساء في سن الإنجاب. **العينة:** ١٤٧ سيده يتراوح عمرهم من ١٨-٤٦ سنة. **الأدوات:** تم استخدام ثلاث أدوات لجمع البيانات: الأداة الأولى: استمارة قياس معلومات النساء تجاه التهاب المفاصل. الأداة الثانية: مقياس نموذج الاعتقاد الصحي لالتهابات المفاصل. الأداة الثالثة: السلوك الوقائي لمرضى التهاب المفاصل. **النتائج:** نسبة (٨٩.١%) من النساء كان لديهم مستوى غير مرضٍ من المعلومات قبل تطبيق البرنامج التعليمي بينما (١١.٦%) فقط بعد التطبيق. (٩٤.٦%) من النساء لديهم مستوى منخفض من السلوكيات الوقائية قبل تطبيق البرنامج التعليمي مقارنة بـ (٢٤.٥%) بعد تطبيق البرنامج. **الخلاصة:** خلصت الدراسة إلى وجود تحسن معتد به إحصائياً بين جميع عناصر نموذج الاعتقاد الصحي قبل وبعد تدخل البرنامج. يوجد أيضاً فرق ذو دلالة إحصائية عالية بين المعرفة الكلية ونموذج المعتقدات الصحية لمرض هشاشة العظام ومستوى السلوكيات الوقائية فيما يتعلق بهشاشة العظام قبل وبعد تدخل البرنامج. هناك علاقة ذات دلالة إحصائية بين الاعتقاد الصحي ومعرفة المرأة. **التوصيات:** ضرورة المتابعة طويلة الأمد للتأكيد من تأثير التدخل التعليمي على استمرار السلوك الإيجابي. هناك حاجة الى تقوية إستراتيجية وخدمات للوقاية من هشاشة العظام مثل تطوير برامج فحص شاملة لجميع النساء في منتصف العمر.

**الكلمات المرشدة:** نموذج المعتقد الصحي، السيدات في منتصف العمر، التهاب المفاصل، السلوكيات الوقائية.