

Effect of Health Behavior Modification Based on Trans Theoretical Model among Osteoarthritis Patients

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Abstract

Background: Osteoarthritis is an inflammatory condition of a synovial joint in which the cartilage is damaged over time until pressure between the bones causes pain. **The aim** of this study aimed to evaluate the effect of health behavior modification based on trans theoretical model among osteoarthritis patients. **Research design:** A quasi experimental design was utilized in this study. **Setting:** This study was conducted at Orthopedic Outpatient Clinic affiliated at Benha University Hospital in Benha City, Egypt. **The sample:** A purposive sample used in this study involved 112 patients with osteoarthritis. **Tools: Two tools were used I):** A structured interviewing questionnaire which consists of three parts **1):** Demographic characteristics and medical history, **2):** Patients' knowledge regarding osteoarthritis and trans theoretical model and **3):** Patients' behaviors **II):** Questionnaire of the trans theoretical model of behavior modification through the stages of modified change. **Results:** 81.3% of the studied patients had good knowledge while 72.8% accepted healthy behaviors and 79.5% of the studied patients applied trans theoretical model. There were statistically positive correlations between behaviors and trans theoretical model pre and post application. **Conclusion:** The trans theoretical model succeeded to improve behaviors of the studied patients. **Recommendations:** Further studies are recommended to explore the effect of trans theoretical model on behavior modification through stages of change.

Key words: Health Behaviors, Osteoarthritis, Patients, Trans Theoretical Model

Introduction:

Osteoarthritis (OA) is an inflammatory condition of a synovial joint in which the cartilage is damaged over time until pressure between the bones causes pain. In normal joints hyaline cartilage covers the end of each bone. Hyaline cartilage provides a smooth, gliding surface for joint motion and acts as a cushion between the bones. In OA, the cartilage breaks down, causing pain, swelling and problems of moving (Quinn, 2020).

Behavior modification is the process of changing patterns of human behavior over the long-term using various techniques or models as Trans Theoretical Model (TTM). Behavior modification works with just about everyone and has many potential applications, from improving behavior to encourage people to become healthier (Saura et al., 2021).

Trans theoretical model is developed by James Prochaska and Carlo Diclemente in the 1970s, the TTM recognizes what patients can be at different levels of readiness in the behavior change process depending on the

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stage of change. Prochaska and Diclemente also developed a model based on the body of work studied. Because the model emerged from reviewing multiple psychological and behavioral theories about how change occurs (Bates, 2021).

Community Health Nurse (CHN) plays a vital role for patients with OA. Nurses are ideally positioned to promote management of OA in primary care settings as well as in specialty rheumatology and orthopedic settings. The nursing role provided to OA patient will help the patient recover safely and quickly by using evidence based. Making sure that patients are educated on the signs and symptoms of complications of OA. Guiding the patient and educating about what to expect. Prepared patient physically, mentally and emotionally then provide patient self-care education so patients are safe at home. Teach patients about all precautions (Elizabeth et al., 2019).

Significance of the Study:

Osteoarthritis is one of the most common rheumatologic diseases and the most prevalent form of arthritis. Osteoarthritis is one of the most common causes of disability. The prevalence of OA in Middle East which include Egypt about 22 million patients and particularly in Egypt about 3,656,548. OA negatively affects the life for many, but often patients don't discuss symptoms with the healthcare providers until has progressed to severe pain or disability (Shamekh et al., 2022).

This study is important because OA is a worldwide highly prevalent chronic joint disease which causes pain, disability, and loss of function. OA is progressive to the extent which makes getting around more difficult. OA affect one's ability to remain independent particularly when the disease reaches the more

severe stages and increase risk for surgical operations such as replacement operations. OA is listed as the fastest growing major health condition and ranked second as the cause of disability.

Aim of the study:

To evaluate the effect of health behavior modification based on trans theoretical model among osteoarthritis patients.

Research hypothesis:

Behavior of patients with osteoarthritis will be improved after application of behavior modification which based on trans theoretical model.

Subjects and Method

Research design:

A quasi-experimental research design was utilized to conduct this study.

Setting:

This study was conducted at Orthopedic Outpatient Clinic affiliated at Benha University Hospital in Benha City, Egypt.

Sample:

Purposive sample used in this study and involved 112 patients with osteoarthritis at Orthopedic Outpatient Clinic at Benha University Hospital for 12 months from beginning of January 2022 to end of December 2022 with the following criteria: Diagnosed with osteoarthritis, free from any handicap and accepting to participate in the study.

Tools for data collection:

Two tools were used to collect the data

Tool I: A structured interviewing questionnaire: It was developed by the researchers based on reviewing related literature and past available national and international references related literature

about osteoarthritis by using journal, text book and internet searcher and revised by supervisors. It was written in simple clear Arabic language and composed of three parts to assess the following:

First part a: It was concerned with demographic characteristics of patients with osteoarthritis involved in the study. It included 8 closed end questions age, sex, marital status, level of education, occupation, residence, monthly income and type of family.

B: It was concerned with the medical history of patients with osteoarthritis, which included 3 closed end questions; duration of osteoarthritis, the aid devices which patients use during walking and the co-morbid diseases.

Second part a: It was concerned with the knowledge of patients with osteoarthritis which included 9 closed end questions; meaning of osteoarthritis, causes of osteoarthritis, risk factors, types of osteoarthritis, symptoms and signs, measures for diagnosis of osteoarthritis, treatment of osteoarthritis, the goals of treatment of osteoarthritis and complications of osteoarthritis.

B: It was concerned with the knowledge of trans theoretical model for health behavior modification, it was included 3 closed end questions; meaning of the trans theoretical model for health behavior modification, the stages of the trans theoretical model for health behavior modification, the goals of applying the trans theoretical model to modify healthy behavior and source of information.

Scoring system of the studied patients' knowledge was adapted as following:

The scoring system of knowledge for patients with osteoarthritis was calculated as follows two score for correct and complete answer, while one score for correct and incomplete answer, and don't know was scored zero. For each area of knowledge the score of items was summed– up and the total divided by the number of items giving the mean score for the part. These score were converted into a percent score.

The total knowledge score was (=24 points-) considered good if the score of the total knowledge $\geq 75\%$ (≥ 18 points), while considered average if it equals 50–<75% (12–<18 points) and considered poor if it is <50% (12 points).

Third part: It was concerned with the healthy behaviors adapted from (McKay et al., 2019), which included 10 questions; setting goals to motivate health development, making a plan to follow the health system, ready to do whatever it takes to restore vital and daily functions, understanding the relationship between behavior now and the results in the future, assessing healthy behavior through daily activities, finding improvement in health by continuing healthy behaviors and practices, making alternatives to resist the obstacles encounters, avoiding everything that distracts from paying attention to health, sharing healthy actions with others and restructuring the physical or social environment to suit health capabilities

Scoring system of healthy behaviors as following:

The scoring system is graded according to the items of questionnaire. The scoring system of healthy behaviors for patients with osteoarthritis score was calculated as one

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scores for accepted, zero scores for not accepted. The score of items was summed-up and the total divided by the number of items giving the mean score for the part. These score were converted into a percent score equal 100%.

Healthy behaviors was (=10 points-) considered accepted if the score equals $\geq 60\%$ and more (6 points), while considered unaccepted if it is $< 60\%$ less (6 points).

Tool (II): Questionnaire of the trans theoretical model of behavior modification through the stages of modified change adapted from (**Hashemzadeh et al., 2019**).

- **Precontemplation stage which included 10 items:** Avoiding changing lifestyle, taking a lot of effort to perform healthy behaviors work hours and need additional time to perform tasks, seeing that adopting healthy behaviors is a waste of time, missing the ability to stick to a certain routine, seeing that health will deteriorate because of these practices, have tried many methods, but no positive result achieved, it's better to watch TV than to exercise, missing the motivation that drives me to healthy practices, staying away from healthy behaviors because of the fear of failure and lacking of self-confidence to adhere to certain practices.

- **Contemplation stage which included 7 items:** Know that healthy behaviors improve the quality of life, healthy behaviors and practices require a little time and effort, healthy behaviors increase self-confidence and sense of self, healthy behaviors reduce feelings of negativity, healthy behaviors increase enjoyment of life with others, healthy behaviors and practices improve pain and healthy behaviors increase task completion at work and at home.

- **Preparation stage which included 4 items:** Preparing self for good behaviors and healthy practices, planning to go to the gym, getting ready to eat a proper diet and planning to follow up regularly and follow the doctor's instructions.

- **Action stage which included 10 items:** Practicing all healthy behaviors that improve joint health, participating in healthy behaviors and practices and adhere to them because feeling of becoming a burden on family, following a proper diet, eating foods that reduce arthritis, avoiding actual or passive smoking ,doing exercises that are suitable for joint stiffness, doing relaxation exercises and sit in a quiet place, taking medicine regularly, following the instructions given by the doctor and doing follow up regularly.

- **Maintenance stage which included 4 items:** adhering to all healthy practices and behaviors for more than 6 months, have been exercising for more than 6 months, have been following a healthy diet for more than 6 months and avoid situations and stress that lead to relapse.

Scoring system of trans theoretical model of behavior modification through the stages of modified change as following: The scoring system is graded according to the items of questionnaire. The scoring system of stages of trans theoretical model for patients with osteoarthritis score was calculated as one scores for not accepted, zero scores for accepted in pre contemplation stage. The score was calculated in contemplation, preparation, action and maintenance stage as one scores for accepted, zero scores for not accepted. For each stage of trans theoretical model the score of items was summed-up and the total divided by the number of items

giving the mean score for the part. These score were converted into a percent score equal 100%.

Trans theoretical model of behavior modification through the stages of modified change was considered not applied if the score of the pre contemplation stage equals $\geq 60\%$ and more (6 points), while considered applied if it is $< 60\%$ less (6) points.

Trans theoretical model of behavior modification through the stages of modified change was (= 25 points-) considered applied if the score of the contemplation, preparation, action and maintenance stages equals $\geq 60\%$ and more (15 points), while considered not applied if it is $< 60\%$ less (15 points).

Content validity:

The tools validity was done by five of Faculty's Staff Nursing experts from the Community Health Nursing Specialties who reviewed the tool for clarity, relevance, comprehensiveness, and applicability and easiness for administration, implementation and according to their opinion minor modifications were required.

Reliability:

The reliability of tools was applied by the researchers for testing the internal consistency of the tools reliability was measured by using structured interviewing questionnaire. The reliability proved to be high based on the values of cronbach alpha co-efficient test. The reliability for behavior was 0.790 and the reliability for TTM was 0.746

Ethical considerations:

Approval of the Faculty Ethics Committee of Scientific Research was obtained for the fulfillment of the study, oral consent was being obtained from each patient

before conducting the interview and given them a brief orientation to the purpose of the study. Patients with osteoarthritis were also reassured that all information gathered would be treated confidentially and used only for the purpose of the study. The patients had right to withdraw from the study at any time without giving any reasons. No names were required on the forms to ensure anonymity and confidentiality.

Pilot study

The pilot study was carried out on (10%) 12 patients in the last two weeks in December 2021. The pilot study was aimed to assess the tool clarity, applicability and time needed to fill tools, completing the sheet consumed about 30- 40 minutes. No modifications were done, so the pilot study sample was included in the total sample.

Application of health behavior modification based on trans theoretical model among osteoarthritis patients.

The researchers implemented the trans theoretical model through 4 phases as the following:

(I) Preparatory and assessment phase: In this phase, preparation of the study design and data collection tools was based on extensive review of the current and past available national and international references related to the research title. Assessed patients through collection and analysis of baseline data from the filled tools. In this phase the researcher did the pre- test.

(II) Planning phase: The researchers identified the important needs for target group, set priorities of needs, goals and objectives were developed as follow:

General objective:

By the end of application of trans theoretical model, patients abled to improve knowledge, practices and behavior about osteoarthritis.

Specific objectives:

- Identify osteoarthritis.

Patients

- Enumerate risk factors of osteoarthritis.
- List causes of osteoarthritis
- Mention types of osteoarthritis.
- Explain methods of diagnosis of osteoarthritis.
- List signs and symptoms of osteoarthritis.
- Explain treatment of osteoarthritis.
- Recognize indications of treatment of osteoarthritis.
- Explain complications of osteoarthritis.
- Identify trans theoretical model
- Mention phases of trans theoretical model
- Recognize aim of application trans theoretical model
- Apply healthy behaviors
- Apply phases of trans theoretical model.

(III) Implementation phase: In this phase the researcher applied the study for osteoarthritis patients. The process of data collection was two days per week (Saturday and Tuesday) from 9 am to 12 pm to collect data from patients with osteoarthritis. These days are chosen because these days are days of follow up for patients with osteoarthritis. The average time needed for the sheet was around 30-40 minutes for each patient, the average number interviewed at the Outpatient Clinic were 2-4 patients/day depending on the responses of the interviewers and illustrated booklet guideline was distributed to patients. To ensure that the patients exposed to the same learning experience the researchers implemented study through six session 4 hours (2 hours theoretical, 2 hours practical), conducted in: 6 sessions (3 theoretical and 3 practical). Each session was 40 minutes.

First session: At the beginning of the first session, the researchers welcomes and introduce selves to patients, an orientation to the study was given, take oral informed consent of patients after explaining the aim, and the nature of the study. The researchers

provide a trust, warm and secure atmosphere to relieve anxiety, tension, and increase the motivation to participate in all sessions of the study. Provide introduction about osteoarthritis and its definition, risk factors of osteoarthritis, causes of osteoarthritis and types of osteoarthritis taking into consideration the use of clear and simple language. Discussion during session was used to enhance learning. Inform the patients that each session started by summary about the previous session and objectives of new topics.
Second session: Covered methods of diagnosis of osteoarthritis, signs and symptoms of osteoarthritis, explain treatment of osteoarthritis and indications of treatment of osteoarthritis.

Third session: Covered complications of osteoarthritis, definition of trans theoretical model, mention stages of trans theoretical mode and recognize aim of application trans theoretical model

Fourth session: Covered construction the appropriate diet for patients with osteoarthritis and apply types of exercise.

Fifth session: Covered demonstration compliance of medication regimen and follow up and apply general practices for improvement of osteoarthritis.

Sixth session: Covered application of healthy behaviors and stages of trans theoretical model.

Teaching methods:

All patients received the same content using the same teaching methods, there were:

- Illustrated discussion
- Demonstration
- Re-demonstration
- Presentation

Teaching aids: Suitable teaching aids were specially prepared as: colored pictures, handout, and videos.

Phase (IV): Evaluation phase: Evaluation of the application was done immediately by using the post- test questionnaire which was the same formats of pre- test in order to compare the change in the studied patients' behavior after the application of the study.

Statistical analysis:

All data collected were organized, tabulated and analyzed by using the Statistical Package for Social Science (SPSS) version 21, which was used frequencies and percentages for qualitative descriptive data, and chi-square coefficient (χ^2) was used for relation tests, mean and standard deviation was used for quantitative data, linear regression coefficient (r) and matrix correlation to detect the relation between the variables (P value).

The observation difference and associations were considered as the following: (p-value)

Highly Significant (HS)	$P < 0.001^{**}$
Significant (S)	$P < 0.05^*$
Not Significant (NS)	$P > 0.05$

Results:

Table (1): Shows that; 57.1% of the studied patients were aged 50 years or more with a mean age of 52.03 ± 15.28 years, 64.3% of them were females. Regarding to their educational level; 53.6% of the studied patients had university education or more, 39.3% of them were employed, 53.6% of them had enough monthly income per month and 71.4% of them lived in nuclear family.

Table (2): Shows that; 46.4% of the studied patients suffered from osteoarthritis since one year and more, while 48.2% of them used crutch and 57.1%, of studied patients suffered from hypertension.

Figure (1): Illustrates that; 27.7% of studied patients had good knowledge pre application of TTM which increased to 81.3% post application of TTM, while 38.4% of them had poor knowledge at pre application of TTM, and then this percentage decreased to 7.1% post application of TTM.

Figure (2): Illustrates that; 16.7% of the studied patients accepted health behaviors pre application of TTM, and then this percentage increased to 72.8% post application of TTM.

Figure (3): Illustrates that; 30.4% of the studied patients applied TTM pre application of TTM and this percentage increased to 79.5% after application of TTM.

Table (3): Reveals that; there were statistically positive correlations between knowledge, behaviors and TTM pre and post application of TTM.

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Table (1): Frequency distribution of the studied patients with osteoarthritis regarding their demographic characteristics (n=112).

Demographic characteristics	No.	%
Age/year		
<30	8	7.2
30-	12	10.7
40-	28	25.0
50 -	64	57.1
Mean ± SD	52.03±15.28	
Sex		
Male	40	35.7
Female	72	64.3
Educational level		
Can't read and write	12	10.7
Read and write	14	12.5
Basic education	14	12.5
Secondary education	12	10.7
University education or more	60	53.6
Occupation		
Employee	44	39.3
Free business	16	14.3
Retired	14	12.5
House wife	34	30.4
Not working	4	3.5
Monthly income		
Enough and saving	20	17.9
Enough	60	53.6
Not enough	32	28.5
Type of family		
Individual	2	1.8
Nuclear	80	71.4
Extended	30	26.8

Table (2): Frequency distribution of the studied patients with osteoarthritis regarding their medical history (n=112).

Medical history	No.	%
Onset of the osteoarthritis		
< 6 months	26	23.2
6 months- one year	34	30.4
One year and more	52	46.4
The aid devices which patients use		
Treadmill	14	12.5
Crutch	54	48.2
Knee support	18	16.1
Don't use a tool	26	23.2
*The co-morbid diseases		
Low immunity	10	8.9
Rheumatic diseases	22	19.6
Diabetes mellitus	29	25.9
Hypertension	64	57.1

*Answers are not mutually exclusive

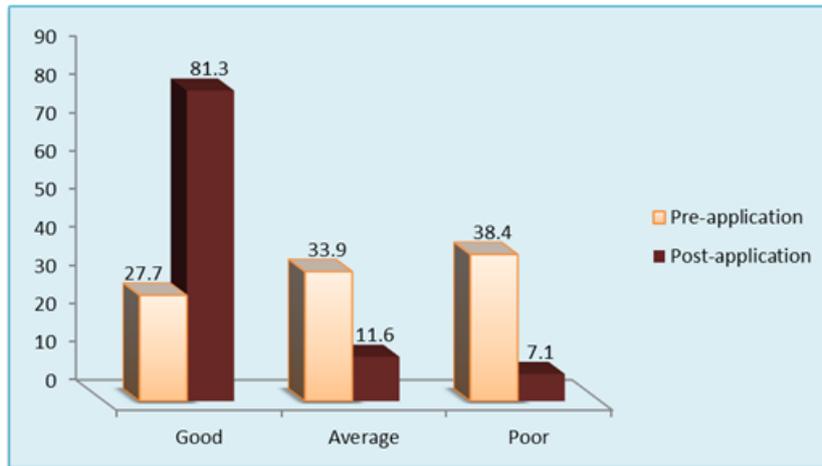


Figure (1): Percentage distribution of the studied patients regarding their total knowledge level regarding osteoarthritis pre and post application of trans theoretical model (n= 112).

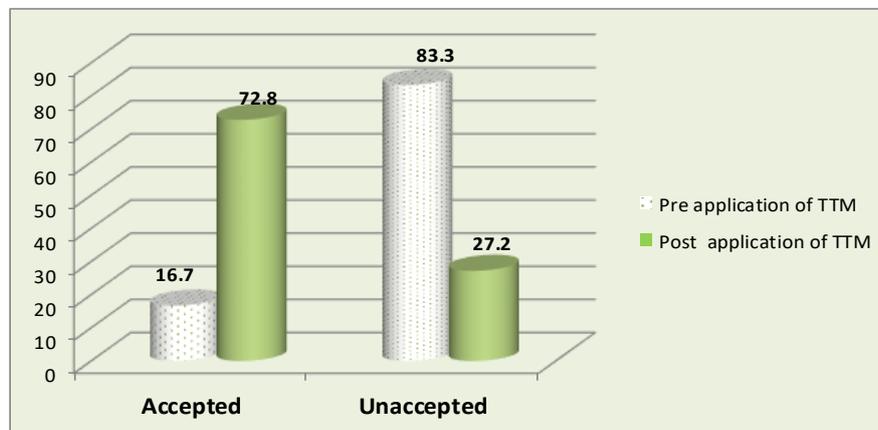


Figure (2): Percentage distribution of the studied patients' total health behaviors pre and post application of trans theoretical model (n=112)

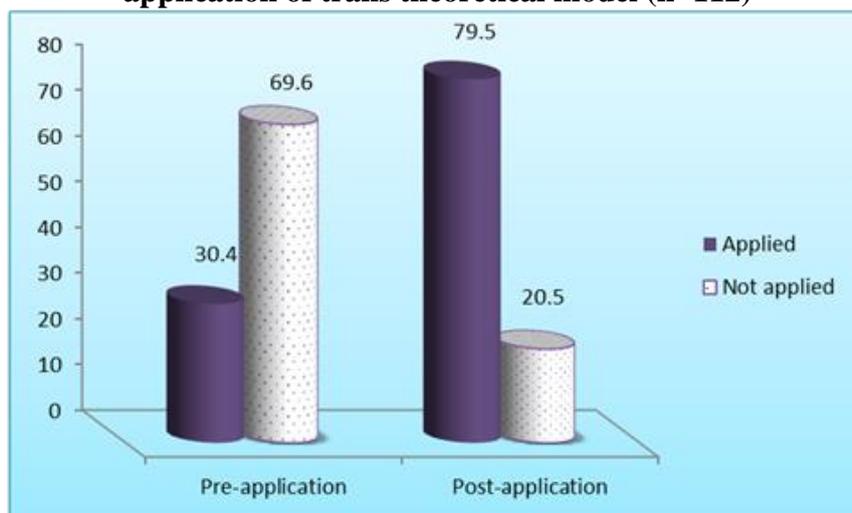


Figure (3): Percentage distribution of studied patients regarding their level of application of trans-theoretical model pre and post application (n=112).

Effect of Health Behavior Modification Based on Trans Theoretical Model among Osteoarthritis Patients

Table (3): Correlation matrix between total knowledge, behavior and trans-theoretical model pre and post application among studied patient (n=112).

		Pre			Post		
		Knowledge	Behavior	TTM	Knowledge	Behavior	TTM
Knowledge	r	1	.619	.484	1	.629	.509
	p-value		.047	.067		.005*	.023*
	n	112	112	112	112	112	112
Behavior	r	.619	1	.131	.629	1	.198
	p-value	.047		.016*	.005*		.036*
	n	112	112	112	112	112	112
TTM	r	.484	.131	1	.509	.198	1
	p-value	.067	.016*		.023*	.036*	
	n	112	112	112	112	112	112

Discussion:

According to demographic characteristics of the studied patients, the current study revealed that; more than half of the studied patients aged from 50 and more years old, with mean age was 52.03 ± 15.28 . This finding was in agreement with **Hassan et al. (2022)**, who studied the cardiovascular, risk factors and metabolic syndrome in patients with knee osteoarthritis, Qena, Egypt, (n=200), and reported that the mean age of the participants was 56.7 ± 10.3 years. Also this finding was in the same line with **Refaat et al. (2022)**, who studied the ultrasonography findings in symptomatic knee osteoarthritis in relation to pain, Benha, Egypt, (n = 50), and reported that the mean age of osteoarthritis patients was more than half (57.1 years). From the researchers point of view, this might be due to over time, the cartilage that covers the ends of bones in normal joints may wear away, greatly decreasing its ability to act as a shock absorber and the cartilage deteriorates.

As regards past medical history, the current study revealed that; approximately two fifths

of the studied patients suffered from osteoarthritis since more than one year. This study finding agreed with **Alqarni et al. (2021)**, who studied the knowledge, attitude, and practice regarding osteoarthritis among Saudi adults in Tabuk, Saudi Arabia, (n=240), and found that majority (88%) of the studied patients suffered from osteoarthritis within more than one year. From the researchers point of view, this might be due to the studied patients suffered from osteoarthritis long period of time and become chronic disease that affect functions of joints.

Regarding to total knowledge of the studied patients, the present study revealed that; more than one third of the studied patients had poor knowledge pre application of the model and majority of the studied patients had good knowledge post application of model. This finding was consistent with **El-Adham et al. (2019)**, who studied the effect of nursing education program on knowledge, uncertainty, mastery, pain, and quality of life for knee osteoarthritis patients, Egypt, (n= 80), and reported that 17.5 of the study participants had

good knowledge pre instruction and 82.5% of the study participants had good knowledge post instruction. From the researchers point of view, this might be due to that the application of the study helped the studied patient to acquire knowledge about OA.

Regarding to total healthy behaviors of the studied patients, the present study revealed that; less than one fifth of the studied patients accepted healthy behaviors pre application of the model and increased to more than two thirds post application of model. This finding was in the same line with **Jormand et al. (2022)**, who performed a study of the self-care behaviors in older adults suffering from knee osteoarthritis: Application of theory of planned behavior, Shiraz, Iran, (n=200), and they indicated significant enhancement in every construct of health behaviors. From the researchers point of view, this might be due to that the application of the study helped the studied patient to see the positive results from application of health behaviors and they will not spend useless time or money for healthy life.

Regarding to total trans theoretical model items, the present study revealed that; less than two thirds of the studied patients applied TTM pre application of model and this percentage increased to more than three quarter post application of model. This finding was in the same line with **Pirzadeh et al. (2017)**, and reported that TTM applied with in minority (4.3) and the percentage increased to more than two fifths (47.8). From the researchers point of view, this might be due to TTM achieved their aim in improving patients` health.

Concerning correlation between the studied patients` total knowledge, behavior and TTM; the present study revealed that there was a

positive statistically significant correlation between the studied patients` knowledge, behavior and TTM pre and post application of TTM (Table 3). From the researcher point of view, this might be due to attributed to the fact that appropriate knowledge and the steps that taken to apply TTM facilitate modification of behaviors and affect positively on health of patients.

Conclusion:

The trans theoretical model succeeded to improve knowledge and behaviors of the studied patients. Majority of the studied patients had good knowledge post application of trans theoretical model compared by less than third pre application of trans theoretical model, more than two thirds of the studied patients accepted healthy behaviors post application of trans theoretical model compared by less than one fifth pre application of trans theoretical model. More than three quarters of the studied patients applied trans theoretical model compared by more than one fifth pre application of trans theoretical There were statistically positive correlations between behaviors and TTM pre and post application of TTM.

Recommendations:

- 1- Continuous application of trans theoretical model for patients with osteoarthritis to enhance patients` knowledge and behaviors.
- 2-Rehabilitation program should be held to meet the osteoarthritis patient`s needs.
- 3-Further studies are recommended to explore the effect of trans theoretical model on behavior modification through stages of change.

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تأثير تعديل السلوك الصحي علي أساس النموذج النظري العابر لمرضي خشونة المفاصل

أماني عصمت عبدالحفيظ - محبوبة صبحي عبدالعزيز - أحلام الاحمدي محمد - هدي عبدالله مرسي

خشونة المفاصل هي حالة من الالتهاب الذي تحدث في المفصل الزليلي حيث يتلف الغضروف بمرور الوقت و يسبب الضغط بين العظام الألم. لذا هدفت هذه الدراسة إلى تقييم تأثير تعديل السلوك الصحي علي أساس النموذج النظري العابر لمرضي خشونة المفاصل. و تم استخدام تصميم شبه تجريبي في هذه الدراسة. وقد أجريت هذه الدراسة في عيادة العظام الخارجية التابعة لمستشفى بنها الجامعي في مدينة بنها ، مصر. على عينة غرضية وشملت 112 مريضاً مصاباً بخشونة المفاصل. واطهرت النتائج بان 72.8% من المرضى طبقوا السلوكيات الصحية و 79.5% من المرضى الذين خضعوا للدراسة طبقوا النموذج العابر النظري. كانت هناك ارتباطات إيجابية إحصائياً بين سلوكيات المرضى و النموذج النظري العابر قبل تطبيق النموذج النظري العابر وبعده. كما اوصت الدراسة بإجراء مزيد من الدراسات لاستكشاف تأثير النموذج النظري العابر على تعديل السلوك من خلال مراحل التغيير.