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RESEARCH ARTICLE

COMPARATIVE STUDY: INTEGRATED HOME-BASED NURSING INTERVENTION FOR WOMEN WITH KNEE OSTEOARTHRITIS VERSUS HOSPITAL CARE INTERVENTION

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ABSTRACT

Background : Osteoarthritis (OA) is one of the most common chronic disability diseases which affect patients with high prevalence especially women in Arab world.
Aim of the study, first, to evaluate the effectiveness of integrated home-based nursing intervention on osteoarthritis outcomes among women with knee osteoarthritis versus hospital care intervention. Second, to examine the relationship between work activity levels and osteoarthritis scores among studied women.
Subjects and Methods: A Quasi-experimental study was used .It conducted in physical medicine and rheumatology outpatient clinic in Menoufia University Hospital. A simple random sample of 150 women with bilateral knee osteoarthritis was included. These women were divided into three groups randomly and matched for age.
Results: Regarding to total WOMAC scores, an improvement was among the three groups, however, the improvement was statistically significant was noticed among group II (hospital group). But using walk and balance scales, the improvement of walk and balance scores were much higher in group III (home group). Concerning work activity levels for hospital group, the total WOMAC and balance scores improved among women those with high activity. But women with sedentary life activity scored high in walk scale. While for home group, the total WOMAC and walk, balance scores were improved among women those with high work activity.
Conclusion: Although Home-based interventions and Hospital care interventions were successful programs in caring of women with knee osteoarthritis, however, continuation with integrated Home-based nursing interventions after hospital care interventions were efficient programs in managing pain, sign and symptoms for women with knee osteoarthritis.
Recommendation: Health education sessions for osteoarthritis patients in out-patient clinics implemented by nurses are needed. Design an illustrated booklet to demonstrate different interventions and modalities for osteoarthritis patients. Demonstrate the patient's role in managing osteoarthritis at their homes.

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INTRODUCTION

Osteoarthritis (OA) is a chronic and degenerative disease characterized by pain and gradual loss of joint cartilage (Asokan *et al*., 2011). It has multifarious origins and may be present in various joints where biochemical, metabolic and morphological changes take place (Bar-Ziv *et al*., 2010). It is characterized by a loss of normal configuration, crackling during movement, bone deformities, the formation of bone spurs, the presence of inflammatory process, the accumulation of synovial fluid, weakness of the quadriceps and sensorimotor loss (Bautch *et al*., 1997).

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Osteoarthritis affects more than 80% of the population of older adults (Bellamy *et al*., 1988) with women affected more often than the men (Bennell *et al*., 2010), including a 35-45% prevalence in those 65 years of age (Bohannon, 2006). Borjesson *et al*., (1996) and Srikanth *et al*. (2005) verified in a meta-analysis that women have a significantly higher risk of developing knee and hand OA than men. Most often affects middle aged and older people over 50 years of age, in particular in women (Cheon, 2005). Although prevalence of osteoarthritis rises in frequency with age, it does affect substantial numbers of people of working age.

Although the reasons for higher prevalence in women are not clear, several factors can be cited: the hormonal, including post-menopausal, remodeling of cartilage (Cho *et al*., 2011),

which occurs at around 50 years-old and is followed by decreasing levels of estrogen, a hormone that provides chondral protection (Bennell *et al*., 2010), muscle weakness and poor lower limb alignment (of the femur in relation to the tibia, obesity and lower volumes of joint cartilage in women than men (Coleman *et al*., 2008). During the pathological process of osteoarthritis, degenerative changes occur in the knee joint, causing knee joint laxity, reduced muscle activation. It becomes difficult to compensate body weight during the gait cycle; body tends to keep the next step to overcome the difficulty as a result reducing the step length. Reduced step length cause reduction in walking velocity and cadence. It affects joints that support weight unloading and, among them, the knee is the most affected. Abnormal and excessive loads are important factors that can result in OA of the knee, a joint whose function is essential in many activities of daily living (ADL) such as ascending and descending stairs, getting up from a chair and walking (Dean and Hansen, 2014)

Strengthening exercise programs are used for increasing muscle strength, and facilitate techniques that used for improving the proprioceptive function. Proprioception is an important sensory system that enables patients to perceive joint position and movement as well as strength (Denegar *et al*., 2010). Home based management exemplify the "first, do no harm" principle that is fundamental to nursing, and several studies have been shown to have significant efficacy in patients with knee OA. Weight loss significantly decreases knee joint loads in obese and overweight patients with knee OA. Results from controlled clinical trials repeatedly have shown that diet, exercise, and weight loss are associated with decreased symptom severity and functional improvement in patients with knee OA (Deyle *et al*., 2005) Nurses are responsible to empower the patient and family with teaching knowledge and skills necessary to reach optimal safe performance to manage pain and disability of osteoarthritis (Deyle *et al*., 2000).

A comprehensive nursing assessment is crucial to developing a safe, appropriate, individualized plan of care for patients with knee OA. A nurse, can play a key role in providing a complementary management of knee OA. Exercise is the key to non-pharmacologic treatment for OA, regardless of the patient's age, co-morbidities, pain severity, and disability. Encourage patients to stay active and participate in an exercise program tailored to their exercise capacity and physical limitations. Teach patients about a healthy diet and the importance of losing weight. Other nursing non-pharmacologic interventions include resting the knee joint between exercise sessions, getting adequate restorative sleep, applying thermal heat alternating with ice or cooling therapy, and using assistive devices (Dillon *et al*., 2006).

Significance of study

The degenerative conditions around the world will rise in the future years and the burden to the family, society as well to the world will increase dramatically, as well as , prevalence of chronic diseases including osteoarthritis among Arab women is increasing and mainly linked to obesity and poor lifestyles activity (Dillon *et al*., 2006). Osteoarthritis is not only the most common multi-factorial non communicable disease, but also the most prevalent form of arthritis among women and the elderly, causing physical disability and impaired quality of life.

The aim of the study: First, to evaluate the effectiveness of integrated home-based nursing intervention on osteoarthritis outcomes including (pain, stiffness, functional performance, balance and walking) among women with knee osteoarthritis versus hospital care intervention. Second, to examine the relationship between work activity levels and osteoarthritis scores among studied women.

Subjects and Methods

Study design: Quasi-experimental study (pre -post design) was used.

Study setting

The study was conducted in physical medicine and rheumatology outpatient clinic in Menoufia University Hospital for recruiting cases with knee osteoarthritis either for hospital care or for home care.

Sampling: a simple random sample of one hundred fifty women with bilateral knee osteoarthritis was included according to the revised criteria of the American College of Rheumatology (ACR) for knee OA. These women were divided into three groups randomly and matched for age.
Group I: Fifty women with knee OA who received medication only.
Group II: Fifty women with knee OA who received medication in-addition to hospital exercise program hospital and care.
Group III: Fifty women with knee OA under medication in-addition to home-based intervention program.
Inclusion criteria: If the patients met our inclusion criteria, they were offered the opportunity to participate in the study. The main inclusion criterion was a diagnosis of osteoarthritis of the knee
Exclusion criteria: the study excluded a patient with a known or past history of knee trauma, fracture, surgery or knee arthroplasty. Patients diagnosed with any rheumatic disease affecting the knee joint were also excluded. Patients who were intra- articularly injected by steroids or hyaluronic acid were also excluded.

The work activity levels

The researchers categorize the work activity levels in the study according to type of occupation that the patient works currently and their age, as follow:
High work activity level: woman who works as farmer, labor workers. Moderate work activity level: women who works as employees and administrative workers, doctors. Sedentary work activity level: women who works as house holds.

Study Intervention

Group I (Control group): included patients who received medical treatment for knee OA which included Non Stroidal Anti Inflammatory Drugs (NSAIDs) and Chondro-Protectives.

Group II (Hospital group): included patients who received treatment for OA as previous, in-addition to hospital exercise program (calf and hamstring stretch exercises, quadriceps muscle strengthening using the quadriceps chair, knee and hip range of motion exercises). The amount of time directly spent with the treating therapist was approximately 30 minutes for each patient. This group underwent physical sessions 3 times per week for 8 weeks duration.

Group III (Home intervention group): included patients who received treatment for OA including home exercise program (standing calf stretch, prone quadriceps stretch and strengthening exercise) 3 times per day with an approximate duration of about 30 minutes for each patient for 8 weeks, in-addition to provision of integrated home-based nursing intervention.

Study measures

The following tools were used

Tool I: A structured interviewing questionnaire: the studied groups were assessed for collecting data about (basic, socio-demographic, medical……). Clinical examination and radiological investigations (plain x-ray of both knees) were also assessed.

-Weight and height were also measured to calculate BMI.

Tool II: Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score (Diracoglu *et al*., 2005): this scale was used to asses' disease activity which comprises three components: pain, stiffness, physical functions which can be reported separately or as an overall index. Accordingly, a WOMAC score ranges from 0-20 for pain, 0-8 for stiffness and 0-68 for physical function. Lower WOMAC scores indicate better health status.

Tool III: Timed Up and Go (TUG) test **(**Doi *et al*., 2008**)**: The patients' balance was examined using this test. It is a simple test used to assess a person's mobility. It uses the time that a person takes to rise from a chair, walk three meters, turn around, walk back to the chair, and sit down. It was scored "normal" if the patient gave no evidence of being at risk of falling during the test or at any other time. It was scored as "intermediate" if there is presence of any indicators of the possibility of falling. It is scored "abnormal" if the patient appeared at a risk of falling during the test. Lower TUG scores indicate better balance status consequently lower risk for falling.

Tool IV: The Timed 6-minute walk test (Durham *et al*., 2014): It measures the distance a patient walks in 6 minutes and has been demonstrated to be a reliable measurement of functional exercise capacity. A higher 6-minute walk test scores indicate better efficacy of intervention program.

Tool V: Visual Analouge scale (VAS) (Felson, 2005): it is a pain measurement tool to measure a characteristics and intensity of pain. This rating scale starting from 0-100. The score of 0-30 means mild pain. 40-60 means moderate pain, finally 70-100 means sever pain.

METHODS

Validity and Reliability

The study tools WOMAC, TUG, The Timed 6-minute walk test and VAS were translated by the researchers to Arabic language and tested for its content validity by group of five experts in the community, physical therapy and medical surgical medicine and nursing. The required modifications were carried out accordingly and then test-retest reliability was applied. The tools proved to be strongly reliable.

Pilot Study

Pilot study was carried out before starting data collection; this was done to check the content validity, clarity, applicability and relevance of the tools. The pilot study was conducted on 10 subjects and then they were excluded from the total sample. Based on the results of the pilot study, the necessary corrections and modifications were carried out.

Ethical consideration

This work was approved by the ethics Committee on the Faculty of Medicine and Faculty of Nursing Menoufia University. An official written approval was obtained from the Dean of Faculty of Nursing forwarded to the director of Menuofia University Hospital to conduct the study. An informed (oral) consent was obtained from all studied women who met the inclusion criteria after informing them about the purpose and nature of the study. All data collected was strictly confidential and the data would be used for scientific purposes only.

Field work

Preparatory phase

- Between November 2014 and May 2015, the base line assessment of all participated women was carried out to collect data about history, clinical examination and radiological investigations.
- General advice**s:** A simple verbal explanation concerning knee pain and knee OA was given to group II & group III study subjects before randomization. All subjects were advised on the importance of losing weight or not becoming overweight, wearing training shoes/air filled soles and maintaining fitness by walking.
- Exercise description: A graded exercise program was devised. The following exercises were included:

1- Isometric quadriceps contraction in full extension held for five seconds (subject sits on floor with back supported and legs extended, with rolled up towel under one knee and contracts quadriceps by pushing into the floor against towel)
2- Isotonic quadriceps contraction held in mid flexion for five seconds (subject sits in a chair, lifts lower leg to partially extended position and holds)
3- Isotonic hamstring contraction (subjects lies on front or side and bends knee bringing foot towards body)

4- Isotonic quadriceps contraction with resistance band held for five seconds as for exercise 2
5- Dynamic stepping exercise (walking up and down one step/stair)

Exercises were started in the above order and increased to a maximum of 20 repetitions on each leg. Exercises were performed at home on a daily basis, having been taught by the nurse.

Implementation phase

- After random assignment of the study groups, all women were assessed for the WOMAC score, TUG test, VAS and 6 minute walk test at study baseline.
- During this period, the intervention muscle strength exercise intervention was initiated immediately after assigning the study work groups.
- The participated women were followed up for 8 weeks period and asked to implement the designed protocol of exercise and intervention, then post data was collected.
- The physical medicine therapist applied the hospital exercise program for group II in outpatient clinic department in Physical Medicine and Rehabilitation at Menoufia University Hospitals.
- After training by the physiatrist, the community researcher trained Group III to perform the home exercise program. This group performed the assigned home exercise program and instructed to perform the integrated Home-based Nursing intervention at their homes
- The community researcher demonstrated the exercise for the women and allowed women to redemonstrate it again with them. To ascertain more compliance, the researcher distributed an educational videos related to managing osteoarthritis to all home group.
- The Compliance to the nursing intervention group to home program was ascertained either by periodic hospital outpatient visits (per 2 weeks) or by telephone calling for the patient or caregiver(s) to assure adherence to nursing protocol (Instructions and guidelines).

The integrated Home-based Nursing intervention

- Besides the exercise program that implemented in patients homes it contained:
- Best practices guidelines for Nutrition specific to osteoarthritis (Focht *et al*., 2005).

• Eating a well-balanced diet is essential. Cut extra calories: by taking smaller portions, avoiding sugary foods and drinks, and eating mostly plant-based foods. Losing extra weight is beneficial
• Eat more fruits and vegetables: it loaded with 1 antioxidants. Add Omega-3 Fatty Acids: reducing inflammation in the body. Some of the best sources are trout, salmon, mackerel, herring, tuna, and sardines. Use olive oil in place of other fats .Get enough vitamin C that helps build collagen and connective tissue.
• Watch High Cooking Temperatures: by cutting back on grilled, fried, broiled, and microwaved meats. It's also helpful to limit processed foods, as they are often cooked at high temperatures.
• Foods to avoid with osteoarthritis: Saturated and trans fats found in foods like butter, meats, and processed foods such as cookies and candy, saturated and trans fats raise cholesterol and may contribute to inflammation. Salt or sodium found primarily in processed foods, salt can elevate blood pressure. Sugars found in processed foods and sodas, sugars offer no nutrition.

Best practices guidelines of home knee Joint protective measures and prevention of falling for osteoarthritis

Which include proper footwear, bracing and walking aids, avoid cross legs, and lifting heavy objects. Other nursing advices included resting the knee joint between exercise sessions, getting adequate restorative sleep, applying thermal heat alternating with ice or cooling therapy, and using assistive devices (Fransen and McConnell, 2008)

Heat and Ice Intervention: (Dean and Hansen, 2014) Ice: When there is a joint inflammation in the knee, applying ice for 20 - 30 minutes can be helpful. If an ice pack is not available, a package of frozen vegetables works just as well. Heat Treatments: Soaking in a warm bath or applying a heating pad may help relieve stiffness and pain).

Statistical analysis

The collected data was organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 16, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison between two groups and more was done using Chi-square test (χ^2). For comparison between more than two means of parametric data, F value of ANOVA test was calculated for parametric data, where scheffe test was performed to compare between each two means if F value was significant. For comparison between more than two means of non-parametric data, Kruskal-Wallis (X^2) was calculated. For comparison between means of two groups of non-parametric data of independent samples, Z value of Mann-whitney test was used. Significance was adopted at $p<0.05$ for interpretation of results of tests of significance(r) (Dawson and Trapp, 2001)

RESULTS

Table (1) showed the basic data of studied women with bilateral knee osteoarthritis. It revealed that, the higher percent of studied women in three groups control, hospital and home groups (48%, 38% and 40%) respectively were house holding women and were illiterates (54%, 46% and 48 % respectively). Regarding to work activity, the higher percent of studied women in hospital and home groups (50%, and 40% respectively) assumed a high work activity level. While, 56% assumed moderate level of work activity. The table also showed that, the higher percent of control and home group (50% and 74%) had positive history to OA, while 66% among hospital group had a negative history to OA. Also, all groups had a moderate family income (52%, 50% and 68% respectively).

Table 1. Basic data of the studied women with knee osteoarthritis (n=150)

Basic data		Studied women with knee osteoarthritis(n=150)					
		Group (I) (n=50) Control group		Group II (n=50) Hospital group		Group III (n=50) Home group	
		n	%	n	%	n	%
▪Occupation:							
Employee		6	12.0	9	18.0	13	26.0
Farmer		4	8.0	2	4.0	4	8.0
Crafts worker		4	8.0	1	2.0	0	0
Trader man		0	0	1	2.0	0	0
House holding		24	48.0	19	38.0	20	40.0
Not work		12	24.0	18	36.0	13	26.0
▪Education:							
Illiterate		27	54.0	23	46.0	24	48.0
Moderate educ.		19	38.0	20	40.0	19	38.0
High educ.		4	8.0	7	14.0	7	14.0
▪Work activity:		19	38.0	25	50.0	20	40.0
High work load		28	56.0	14	28.0	19	38.0
Moderate work load		3	6.0	11	22.0	11	22.0
Low work load							
▪Family history of (OA)							
Yes		25	50.0	17	34.0	37	74.0
No		25	50.0	33	66.0	13	26.0
▪Income level:							
High		0	0	1	2.0	0	0
Moderate		26	52.0	25	50.0	34	68.0
Low		24	48.0	24	48.0	16	32.0
▪BMI:		4	8.0	5	10.0	6	12.0
Normal	(18.5-<25)	23	46.0	11	22.0	9	18.0
Overweight	(25-<30)						
Obese	(≥30)						
Class I obesity	(30-<35)	10	20.0	14	28	10	20.0
Class II obesity	(35-<40)	7	14.0	10	20.0	20	40.0
Class III obesity	(≥40)	6	12.0	10	20.0	5	10.0
Range		21-58		22-51		22-47	
Mean±SD		31.08±7.38		33.70±7.39		33.94±7.01	
F-value				2.386			
P				0.096			
▪Disease duration /years:		3	6.0	5	10.0	6	12.0
< 2		19	38.0	9	18.0	6	12.0
3-< 5		28	56.0	36	72.0	38	76.0
> 6							

*Significant (P<0.05)
Group I=Patients under medication only.
Group II=Patients under medication and hospital exercise program (3x/week)
Group III=Patients under medication+ home exercise program (3x/ day) + Integrated home-based intervention.

Table 2. Visual analogue scale (VAS) of the studied patients with osteoarthritis pre and post intervention (n=150)

Visual analogue scale (VAS)	The studied women with knee osteoarthritis (n=150)			F-value P	Scheffe test
	Group (I) (n=50)	Group II (n=50)	Group III (n=50)		
	Range Mean±SD	Range Mean±SD	Range Mean±SD		
Pre-intervention	4-9 7.14±1.32	4-10 6.90±1.45	5-9 7.02±1.48	0.358	
Post-intervention	3-9 6.32±1.56	1-10 5.58±1.75	3-8 5.20±1.52	0.700	GI vs GIII, P=0.003*
Paired t-test	6.162	4.858	14.355	6.224	
P	0.0001*	0.0001*	0.0001*	0.003*	

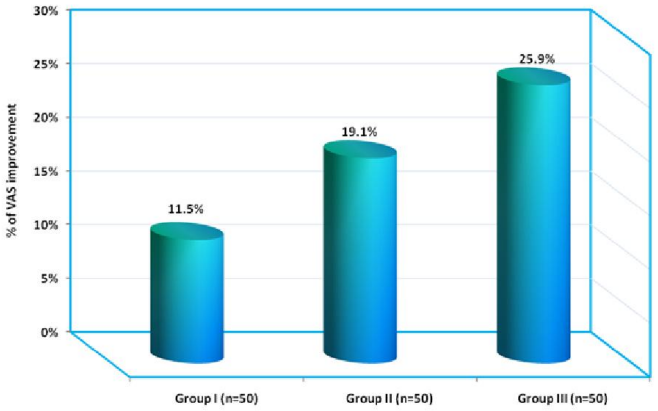
*Significant (P<0.05)

Regarding to BMI, the three groups control, hospital and home groups, showed overweight (46%, 22% and 18% respectively). Concerning obesity, the higher percent of home group (40%) had class II obese (35-< 40) but the mean score among three groups home, hospital and control were nearly equal (33.94±7.01, 33.70±7.39 and 31.08±7.38 respectively). In relation to disease duration, the higher percent of home, hospital and control groups (76%, 72% and 56 % respectively) were had osteoarthritis since more than 6 years.

Table (2) Displayed visual analogue scale of studied women with knee osteoarthritis pre and post intervention. There was a highly statistically significant difference between VAS among studied groups pre and post intervention. An improvement in pain severity was revealed among home group than other

groups, the mean score of pain was decreased from7.02±1.48 to become 5.20±1.52.

Figure (1) showed that, the higher improvement percent (25.9%) regarding VAS was appeared among home group compared to control and hospital group which was (11.5% and 19.1 % respectively).



Group I=Patients under medication only.
Group II=Patients under medication and hospital exercise program (3x/week)
Group III=Patients under medication+ home exercise program (3x/ day) + Integrated home-based intervention.

Figure 1. Mean percent of improvement of Visual analogue scale (VAS) of the studied women with knee osteoarthritis post intervention (n=150)

the other hand, although there was an improvement in the stiffness among three groups, however, the improvement was much higher in group II (hospital group). Despite there was an improvement in the function in the three groups, however, the improvement was much higher in group III (home group). Regarding to total WOMAC scores, the table showed an improvement among the three groups, however, the improvement was statistically significant among group II (hospital group)

Table (4) represented the walk and balance scales of studied women with knee osteoarthritis pre and post intervention. Although there were a statistically significant difference between the three groups regarding the 6 minute walking test, however the improvement was much higher in group III (home group) compared to group I and II. Likewise, concerning balance scale, there was an improvement in the balance scale in the three groups, however, the improvement was much higher in group III (home group).

Table (5) it showed the relationship between work activity levels and mean change of knee osteoarthritis scores among studied women (Hospital group). VAS scale revealed that, the level of pain decreases with an increase the level of activity. Likewise, the WOMAC pain revealed the same relation. Regarding stiffness, work activity level affected the stiffness, where women with sedentary life improved more than moderate and high activity level

Table 3. WOMAC scale items of studied women with knee osteoarthritis pre and post intervention (n=150)

*Significant (P<0.05)

WOMAC scale items Pre & post-intervention		The studied women with knee osteoarthritis (n=150)			F-value P	Scheffe test
		Group (I) (n=50)	Group II (n=50)	Group III (n=50)		
		Range Mean±SD	Range Mean±SD	Range Mean±SD		
•WOMAC scale						
▪Pain	Pre	3-15	2-16	5-20	1.360	
		8.62±3.31	8.06±3.52	9.26±4.05	0.260	
	Post	0-6	0-6	0-5	1.674	
		2.56±1.65	2.30±1.62	2.00±1.29	0.191	
▪Stiffness	Pre	2-15	0-16	1-10	4.731	GI vs GIII,
		6.86±2.84	6.80±3.94	5.18±2.82	0.010*	P=0.028*
	Post	0-6	0-6	0-8	2.107	
		3.60±1.84	2.92±1.54	3.50±1.96	0.125	
▪Function	Pre	12-72	17-75	25-100	4.517	GI vs GIII,
		37.08±15.73	42.58±14.84	47.46±20.68	0.012*	P=0.013*
	Post	11-51	9-68	8-53	2.772	
		29.54±11.00	30.34±15.11	24.80±11.65	0.066	
Total WOMAC scale	Pre	19-82	19-85	26-112	2.590	
		46.36±15.69	51.68±15.49	54.64±23.09	0.078	
	Post	16-72	11-75	23-96	3.486	GII vs GIII,
		41.72±15.39	35.96±16.02	44.96±20.01	0.033*	P=0.036*

Group I=Patients under medication only.
Group II=Patients under medication and hospital exercise program (3x/week)
Group III=Patients under medication+ home exercise program (3x/ day) + Integrated home-based intervention.

Table (3) represented WOMAC scale items of studied women with knee osteoarthritis pre and post intervention. The table showed that, the lower mean score 2.00±1.29 of pain of WOMAC scale was among home group post intervention, compared to control and hospital group (2.56±1.65 and 2.30±1.62 respectively). The difference was insignificant. On

As regards to function, it improved among those with high activity than the other two groups. Total WOMAC scores improved among those with high activity than the other two groups.

Table 4. Walk and balance scales of the studied women with osteoarthritis pre and post intervention (n=150)

Walk and balance scales Pre & post-intervention		The studied women with knee osteoarthritis(n=150)				
		Group (I) (n=50)	Group II (n=50)	Group III (n=50)	F-value P	Scheffe test
		Range Mean±SD	Range Mean±SD	Range Mean±SD		
	Pre	190-410	190-480	40-150	0.332	
		335.00±59.42	345.80±61.71	339.80±76.78	0.718	
▪Walk scale	Post	240-560	260-590	240-580	14.773	GI vs GII, P=0.001*
		349.40±61.19	408.80±84.38	432.60±88.20	0.0001*	GI vs GIII, P=0.0001*
	Pre	7-14	7-15	8-15	9.106	GI vs GII, P=0.026*
		10.40±1.77	11.40±1.88	11.94±1.83	0.0001*	GI vs GIII, P=0.0001*
▪Balance scale	Post	6-13	7-13	6-14	0.777	
		9.06±2.06	9.14±1.71	8.70±1.84	0.461	

*Significant (P<0.05)
Group I=Patients under medication only.
Group II=Patients under medication and hospital exercise program (3x/week)
Group III=Patients under medication+ home exercise program (3x/ day) + Integrated home-based intervention.

Table 5. Relationship between work activity levels and mean change of knee osteoarthritis scores among studied women (Hospital group) n=50

Osteoarthritis scales scores	Work activity level of studied women with knee osteoarthritis (Hospital group) (n=50)				
	Sedentary (n=11)	Moderately Active (n=14)	Highly active (n=25)	χ^2 value	P
	Range Mean±SD	Range Mean±SD	Range Mean±SD		
•VAS	6-0	5-4	6-2	1.081	0.582
	2.09±1.97	1.24±0.94	0.86±1.92		
•WOMAC scale:					
	12-3	10-2	10-1	0.922	0.631
▪Pain	6.45±2.46	5.57±2.34	5.56±2.86		
	3-9	1-14	1-11	2.156	0.340
▪Stiffness	2.96±3.19	4.57±4.78	5.09±3.61		
	6-40	12-53	26-50	0.079	0.961
▪ Function	19.64±15.23	17.72±19.56	15.43±22.97		
Total WOMAC scale	26-51	20-70	6-39	0.220	0.896
	18.27±15.06	15.32±24.16	14.43±24.57		
• Walk scale	40-190	10-130	30-260	1.554	0.460
	79.09±48.26	56.43±62.95	59.60±77.59		
•Balance scale	1-4	0-5	0-4	0.300	0.861
	2.24±0.97	2.43±1.65	2.09±1.37		

χ^2 value of Kruskal-Wallis Test
Group II=Patients under medication and hospital exercise program (3x/week)

Table 6. Relationship between work activity levels and mean change of osteoarthritis scores among studied women (Home group) n=50

Osteoarthritis scales scores	Work activity level of the studied women with osteoarthritis (Home group) (n=50)				
	Sedentary (n=11)	Moderately active (n=19)	Highly active (n=20)	χ^2 value	P
	Range Mean±SD	Range Mean±SD	Range Mean±SD		
•VAS	3-0	4-0	1-1	2.979	0.226
	1.93±0.88	1.70±0.92	1.00±0.00		
•WOMAC scale:					
	11-11	11-3	18-12	4.261	0.119
▪Pain	11.00±0.00	5.57±2.34	5.56±2.86		
	1-7	2-4	1-1	7.416	0.025*
▪Stiffness	4.57±4.78	2.96±3.19	1.00±0.00		
	27-27	12-67	6-24	11.935	0.003*
▪ Function	27.00±0.00	17.72±19.56	15.43±22.97		
Total WOMAC scale	5-39	12-12	2-17	7.537	
	12.25±7.09	12.00±0.00	7.83±4.16		0.023*
• Walk scale	100-210	10-490	160-160	3.057	
	68.50±70.66	107.24±99.82	160±0.00		0.217
•Balance scale	0-7	0-7	3-3	0.524	
	3.38±1.78	3.05±1.79	3.00±0.00		0.769

*Significant (P<0.05) χ^2 value of Kruskal-Wallis Test
Group III=Patients under medication+ home exercise program (3x/ day) + Integrated home-based intervention.

But 6 minute walk test clarified that, women with sedentary life activity scored high in walk scale than the other two groups. Finally with the balance scale, women with high activity achieved better in balance scale more than the other two groups.

Table (6) it clarified the relationship between work activity levels and mean change of knee osteoarthritis scores among studied women (Home group) .VAS scale revealed that, the level of pain decreases with increase the level of activity. Likewise, the WOMAC pain revealed the same relation. Regarding stiffness, work activity level affected the stiffness, where women with high activity level improved in their stiffness more than moderate and sedentary activity levels. The difference was significant

As regards to function, it improved among those with high activity than the other two groups, the difference was significant. Total WOMAC scores improved among those with high activity than the other two groups, the difference was significant. But 6 minute walk test clarified that, women with high activity level scored high in walk scale than the other two groups. Finally with the balance scale, women with high activity achieved better in balance scale more than the other two groups.

DISCUSSION

Osteoarthritis (OA) is a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. OA is commonly observed in the clinic, and it is one of the most frequently encountered problems of knee pathology. There are various rehabilitative approaches to treat knee OA. It is important to improve physical performance while decreasing pain (Hunter, 2010). Although obesity increases the mechanical stress in a weight-bearing joint (Hurley *et al*., 2007), the present study revealed that , by using BMI scale, the mean score among three groups home, hospital and control were nearly equal at study base line, this due to the matching that was conducted among study groups. In our study, there was a significant (p= 0.0001) decrease in pain intensity measured by VAS in all studied groups after therapeutic and nursing intervention. The study found a significant improvement (p=0.003) in pain measured by VAS in group III patients compared with the control group post intervention with 25.9% improvement percent. This was in agreement with Jadelis *et al.*, (2001) and Yilmaz *et al.* (2013) who conducted a study on 52 patients with knee osteoarthritis and declaring to perform home exercise program regularly. They found a significant improvement in VAS scores after treatment. In a study performed on 113 knee osteoarthritis patients, O' Reilly *et al*. (1999) (Jan *et al.*, 2009) performed a home exercise program including 6-week quadriceps strengthening exercises and determined a significant decrease in pain at the end of treatment. Likewise, a marked decrease in pain was reported by Shakoor *et al* (2008) and Lyytinen *et al*., (2010) who studied the home exercise program with 8-weeks quadriceps strengthening exercises on 38 knee osteoarthritis patients. Some researchers ascertain that, home exercise programs when performed regularly, were reported to have positive effects on muscle strength and functional capacity in knee osteoarthritis patient.

The aim of the exercise training given in the current study was to achieve reduction in pain and improvement of functional status of the patient. Strengthening exercises were given together in the treatment in order to improve functional activities. Improvement was observed in both groups post treatment. The improvement rate in total WOMAC values during activities was observed to be greater in the group of patients who were admitted to the functional treatment program in the hospital than it was in the group of patients who followed the home program. The reason for these results were achieved in the hospital-based group was the fact that the patients included in hospital based treatment program completed the exercise program under supervision.

In a high strength study by Coleman *et al.* (2012) (McKnight *et al*., 2010) patients in a 6-week self management program demonstrated a statistically significant improvement in VAS, WOMAC pain, stiffness, function and total scores at 8 weeks as compared to a wait listed controls. These results were similar to those obtained by Deyel *et al.* (2005) (Mizusaki *et al*., 2012) that performed the study on 120 patients (60 subjects in clinic treatment group) and 60 subjects in home exercise group. The study found that there was a significant improvement in both groups regarding the WOMAC scores. Although both groups improved by one month, subjects in the clinic treatment group achieved about twice as much improvement in WOMAC scores than subjects who performed similar unsupervised exercises at home.

It is important to evaluate the decreased performance during functional movements in OA in order to determine the effect of treatment on daily life activities. Standing up from a sitting position is one of the activities, which causes an increase in the symptoms of patients with OA. The TUG test is described mostly in evaluating the functional levels of patients with OA. The activities of sitting, standing up quickly, and walking fast use a combination concentric and eccentric muscle contractions (O'Reilly *et al*., 1996). The TUG test used in our study is an important test in terms of the assessment of decreased walking performance due to pain, muscle weakness, and decreased muscular endurance. Improvement in patient performance during functional activities was achieved in our study. We found a significant improvement in all groups regarding the TUG test post-therapeutic and nursing intervention. There was a statistically significant relationship between controls and group II (p= 0.026) and group III and controls (p=0.0001)). More improvement was noticed among home group. Also, In a study performed by Mizusaki (2012) (Patil *et al*., 2012) who compare the exercise group with the control group, a statistically greater TUG test improvement (p= 0.0008) was observed in the exercise group as compared to the control group.

In our present study, we found an improvement in all groups regarding the 6-minute walk test after treatment. We also found a significant association (P=0.0001) between control group and home group regarding the 6-minute walk test after nursing intervention. This was similar to the results obtained by Deyle

et al. (2005) (Mizusaki *et al*., 2012) who found a significant differences between control group and home exercise group after 4 weeks regarding the 6-minute walk test distances. Recent research has suggested that a sedentary lifestyle in general may have adverse health effects even if you do the recommended amounts of moderate exercise (Shakoor *et al*., 2007). A sedentary lifestyle may still increase your risk of obesity, diabetes, heart disease and cancer.

It is not certain why this study and further research is needed. However, it is thought perhaps to be related to the effect that sitting down too much has on certain enzymes in the body which help to process fat and sugar. Heavy physical activity and occupational load are important risk factors for the incidence of knee OA. Heavy physical activity may increase the risk of especially among obese individuals. On the other hand, regular and moderate physical exercise has been shown to be associated with a decrease in the development of knee OA (Simkin *et al*., 2002). However, most of the clinical or epidemiological studies have concluded that jogging exercise at moderate intensity or recreational physical activity do not increase the risk for knee or hip OA, provided that the weight-bearing joints have not been injured (Srikanth *et al*., 2005). The increased risk for knee OA is also associated with those occupations that entail prolonged or repeated knee bending. The risk may be even higher in those activities containing both knee bending and mechanical loading (Troosters *et al*., 1999).

Likewise, in current study, among the participated 150 women. The study found that 71 women with moderate work load and 64 women with strenuous work load were had increased incidence and affection with bilateral knee osteoarthritis than those with low work load (15 patients only). A study performed by Patil *et al.* (2012) (Hurley *et al*., 2010) showed that 80.4% were with moderate work load. Persons with knee problems are often obliged to change jobs. It is possible that they are more likely to change work if their occupation involves e.g. a lot of climbing. This tendency may lead to the "healthy worker effect", which could have caused an underestimation of the association between the exposure and knee OA (Troosters *et al*., 1999).

In the current study, the dietary osteoarthritis guidelines were instructed to studied women. These instruction was proved to be efficient intervention for the diseased women and was in line with a study conducted by Cheon (2005) (Tunay *et al*., 2010) who reported that, a Self-management program that consisted of dietary education and nutritional management in home-based exercise; walking and resistance exercise can be used as an efficient nursing intervention for women with knee osteoarthritis. Thermotherapy was applied in the current study to studied women at home as a supportive nursing intervention beside exercise intervention .It involves applying heat or cold to joints to improve the symptoms of osteoarthritis and can be done with packs, towels and wax. Heat may work by improving circulation and relaxing muscles, while cold may numb the pain, decrease swelling, constrict blood vessels and block nerve impulses to the joint. Thermotherapy can be used in rehabilitation programs especially at home (Welch *et al*., 2001). Exercise programs and physical therapy exercise has been shown to reduce pain and increase function. Individuals may need convincing that controlled and targeted exercise is an effective form of therapy, however, as many individuals incorrectly believe that any form of exercise will exacerbate their condition, especially if they find that rest eases their symptoms of pain. Most individuals will not have any increase in their symptoms if undertaking controlled exercise (Wewers and Lowe, 1990).

Protective measures including footwear, bracing and walking aids were instructed to home intervention group in the present study. There is an evidence to suggest that aids such as braces, walking aids and footwear supports which alter joint mechanics can provide relief from the symptoms of osteoarthritis, and possibly decrease disease progression (Yilmaz *et al*., 2013) Appropriate Education may be required to support the use of such aids. For example, it is common for individuals to purchase a walking cane, but this is often incorrectly used and of the incorrect height for the individual. A cane or walking aid should be used on the side opposite to the affected joint, not alongside. Heel lifts have been shown to provide dramatic pain relief for individuals with osteoarthritis of the hip (Yilmaz *et al*., 2013)

Conclusion

The study suggested that although Home-based interventions and Hospital care interventions were successful programs in caring of women with knee osteoarthritis, however, continuation with integrated Home-based nursing interventions after hospital care interventions were efficient programs in managing pain, sign and symptoms for women with knee osteoarthritis.

Recommendations

1. Hold a health education sessions for osteoarthritic patients implemented by nurses in hospital outpatient clinics that increase awareness about its definition, characteristics and ways to management.
2. Design an illustrated booklet which contain different interventions and modalities to assist osteoarthritis patients to deal with the pain, signs and symptoms of the disease.
3. Continuous medical monitoring and follow-up for osteoarthritis patients.
4. Further nursing studies using different modalities are needed to get evidence based management for knee osteoarthritis.
5. Demonstrate the patient's role in managing knee osteoarthritis at their homes.

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REFERENCES

Asokan, GV, Hussain MS, Hussain A, Ali EJ, Awate RV, Khadem ZK, and Safwan ZA. Osteoarthritis among Women

in Bahrain: A Public Health Audit. *Oman Med J*., Nov; 26(6): 426–430. doi: .%.%..10.5001/omj.2011.108. 2011.

Bar-Ziv Y, Beer Y, Ran Y, *et al*. A treatment applying a biomechanical device to the feet of patients with knee osteoarthritis results in reduced pain and improved function: a prospective controlled study. *BMC Musculoskelet Disord*., 2010;11:179. PMID: 20698991

Bautch JC, Malone DG, Vailas AC. Effects of exercise on knee joints with osteoarthritis: a pilot study of biologic markers. *Arthritis Care Res*., 1997 Feb;10(1):48-55. PMID: 9313390.

Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. *J Rheumatol.,* 15:1833-40. 1988.

Bennell KL, Hunt MA, Wrigley TV, *et al*. Hip strengthening reduces symptoms but not knee load in people with medial knee osteoarthritis and varus malalignment: a randomised controlled trial. *Osteoarthritis Cartilage*, May;18(5):621-8. Epub 2010 Feb 6.(5):621-8. 2010.

Bohannon RW. Reference values for the Timed Up and Go Test: A Descriptive Meta-Analysis. *Journal of Geriatric Physical Therapy*, 2006;29(2):64-8.

Borjesson M, Robertson E, Weidenhielm L, *et al*. Physiotherapy in knee osteoarthrosis: effect on pain and walking. *Physiother Res Int*., 1(2):89-971996. PMID: 9238726.

Cheon EY (2005).The effects of a self-management program on physical function and quality of life of patients with knee osteoarthritis, J Rheumatol., 35(3):514-25

Cho HJ, Chang CB, Kim KW, Park JH, Yoo JH, Koh IJ, *et al*. Gender and prevalence of knee osteoarthritis types in elderly Koreans. *J Arthroplasty*., 2011.

Coleman S, Briffa NK, Carroll G, Inderjeeth C, Cook N, McQuade J: Effects of self-management, education and specific exercises, delivered by health professionals, in patients with osteoarthritis of the knee..*BMC Musculoskeletal Disorders*, 9:133. 2008.

Dawson B D and Trapp R G: Reading the medical literature : Basic & Clinical Biostatistics. Lange Medical Book/ McGraw – Hill. Medical Publication Division, New York. 3rd ed., Ch. 7-9, PP 161-218 and Ch. 13, PP 305-314, 2001.

Dean E and Hansen RG . Prescribing Optimal Nutrition and Physical Activity as "First-Line"Interventions for Best Practice Management of Chronic Low-Grade Inflammation Associated with Osteoarthritis: Evidence Synthesis. Department of Physical Therapy, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada V6T 1Z3. Arthritis 12/2012; 2012:560634. DOI: 10.1155/2012/560634 .2014.

Denegar CR, Saliba E, Saliba S. Therapeutic Modalities for Musculoskeletal Injuries. Champaign IL: Human Kinetics;. *Cold and Superficial Heat*; pp. 122–123. 2010.

Deyle GD, Allison SC, Matekel RL, *et al*. Physical therapy treatment effectiveness for osteoarthritis of the knee: a randomized comparison of supervised clinical exercise and manual therapy procedures versus a home exercise program. *Physical Therapy,* 85(12):1301–17. 2005.

Deyle GD, Henderson NE, Matekel RL, *et al*. Effectiveness of manual physical therapy and exercise in osteoarthritis of the knee. A randomized, controlled trial. *Annals of Internal Medicine*, 132(3):173-81. PMID: 10651597. 2000.

Dillon CF, Rasch EK, Gu Q, *et al*. Prevalence of knee osteoarthritis in the United States: arthritis data from the Third National Health and Nutrition Examination Survey 1991-94. *J Rheumatol*., Nov;33(11):2271-9. PMID: 17013996. 2006.

Diracoglu D, Aydin R, Baskent A, Celik A. Effects of kinesthesia and balance exercises in knee osteoarthritis. *J Clin Rheumatol*, 11(6):303-10. 2005.

Doi T, Akai M, Fujino K, *et al*. Effect of home exercise of quadriceps on knee osteoarthritis compared with nonsteroidal antiinflammatory drugs: a randomized controlled trial. *Am J Phys Med Rehabil*., 87(4):258–69. 2008.

Durham CO, Fowler, T and Edlund B. Managing knee osteoarthritis in older adults. *American Nurse Today Journal*, July 2014 Vol. 9 No. 7. 2014.

Felson DT. Relation of obesity and of vocational and avocational risk factors to osteoarthritis. *J Rheumatol*, 32(6):1133-5. 2005.

Focht BC, Rejeski WJ, Ambrosius WT, *et al*. Exercise, self-efficacy, and mobility performance in overweight and obese older adults with knee osteoarthritis. *Arthritis Rheum.* Oct 15;53(5):659-65., PMID: 16208674. 2005.

Fransen M, McConnell S. Exercise for osteoarthritis of the knee. *Cochrane Database Syst Rev*., (4):CD004376., PMID: 18843657. 2008.

Hanna FS, Wluka AE, Bell RJ, Davis SR, Cicuttini FM. Osteoarthritis and the postmenopausal woman: epidemiological, magnetic resonance imaging, and radiological findings. *Semin Arthritis Rheum.*, 34(3):631-6. 2004.

Hunter D. 'Focusing osteoarthritis management on modifiable risk factors and future therapeutic prospects' Ther Adv Musculoskel Dis 1(1) 35:47 2009. Full text accessed at http://tab.sagepub.com/cgi/reprint/1/1/35 accessed January 2010.

Hurley MV, Walsh NE, Mitchell HL *et al*. Clinical effectiveness of a rehabilitation program integrating exercise, self-management, and active coping strategies for chronic knee pain: a cluster randomized trial. Arthritis & Rheumatism 57 (7): 1211–9. 2007 .as cited NCCCC - National Collaborating Centre for Chronic Conditions. Osteoarthritis: national clinical guideline for care and management in adults. London: Royal College of Physicians, 2008 accessed at www.nice.org January 2010.

Jadelis K, Miller ME, Ettinger WH Jr, *et al*. Strength, balance, and the modifying effects of obesity and knee pain: results from the Observational Arthritis Study in Seniors (oasis) *Journal of the American Geriatrics Society*, Jul; 49(7):884–91. 2001.

Jan MH, Lin CH, Lin YF, *et al*. Effects of weight-bearing versus nonweight-bearing exercise on function, walking speed, and position sense in participants with knee osteoarthritis: a randomized controlled trial. *Arch Phys Med Rehabil*., 90(6):897-904. PMID: 19480863. 2009.

Lyytinen T, Liikavainio T, Bragge T, Hakkarainen M, Karjalainen PA, Arokoski JP. Postural control and thigh

muscle activity in men with knee osteoarthritis. *J Electromyogr Kinesiol.*, 20(6):1066-74. 2010.

McKnight PE, Kasle S, Going S, Villanueva I, Cornett M, Farr J, *et al*. A comparison of strength training, self-management, and the combination for early osteoarthritis of the knee. *Arthritis Care Res.,* (Hoboken).; 62(1):45-53. 2010.

Mizusaki A, Oliveira I, Peccin; Kelson MS, da Silva, NG, Teixeira[I] LE, Virgínia Trevisani VF. Impact of exercise on the functional capacity and pain of patients with knee osteoarthritis: a randomized clinical trial. *Rev. Bras. Reumatol*., vol.52 no.6 São Paulo Nov./Dec. 2012.

O'Reilly SC, Muir KR and Doherty M .Screening for knee pain in osteoarthritis: which question? *Ann Rheum Dis*., 55:931–933. 1996.

Patil PS, Dixit UR, Shettar CM. Risk factors of Osteoarthritis knee - A Cross-sectional Study. *IOSR- JDMS*, Nov-Dec; 2(5):08-10. 2012.

Shakoor MA, Taslim MA, Hossain MS. Effects of activity modification on the patients with osteoarthritis of the knee. *Bangladesh Med Res Counc Bull*., Aug; 33(2):55-9. PMID: 18481439. 2007.

Simkin, P.A., de Lateur, B.J., Alquist, A.D., Questad, K.A., Beardsley, R.M. Esselman, P.C. Continuous passive motion of osteoarthritis of the hip: a pilot study. *Journal of Rheumatology*; 26: 1487-1491. 2002.

Srikanth VK, Fryer JL, Zhai G, Winzenberg TM, Hosmer D, Jones G. A meta-analysis of sex differences prevalence, incidence and severity of osteoarthritis. *Osteoarthritis Cartilage*, 13(9):769-81. 2005.

Troosters T, Gosselink R, Decramer M. Six minute walk distance in healthy elderly subjects. Eur Respir J., 14: 270-274. 1999.

Tunay VB, Baltaci G, Atay AO. Hospital-based versus home-based proprioceptive and strengthening exercise programs in knee osteoarthritis. *Acta Orthop Traumatol Turc*., 44(4):270-277. ,PM:21252603 .2010.

Welch, V., Brosseau, L., Peterson, J., Shea, B., Tugwell, P., Wells, G. Therapeutic ultrasound for osteoarthritis of the knee. *Cochrane Database Systematic Reviews*, 3:132. 2001.

Wewers M.E. and Lowe N.K. A critical review of visual analogue scales in the Measurement of clinical phenomena. *Research in Nursing and Health*, 13, 227-236. 1990.

Yilmaz H, Erkin G, Kucuksen S. Akkurt E Effectiveness of home exercise program in patients with knee osteoarthritis. *Eur J Gen Med.,* 01/; 10(2):102-107. 2013.

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