IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 4, Issue 6 Ver. III (Nov. - Dec. 2015), PP 53-62
www.iosrjournals.org

Efficacy of patient education and supervised exercise in Elderly patients with knee Osteoarthritis at Assiut University Hospital

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Abstract: *Elders' population is progressively increasing and will reach one third of total population in 2025. Elders are suffering from knee osteoarthritis as most prevalent rheumatic diseases worldwide.* ***Aim:*** *determine self management effect in improvements of pain, stiffness, physical function and predict osteoarthritis elderly at risk to fall.* ***Subjects and method:*** *Quasi- Experimental was conducted for one year at orthopedic outpatient clinics of Assiut University Hospital. It included systemic random sample of 80 elders were divided into two equal groups (Study and control). Assessment was conducted at the beginning, next at 8th week and after 6th months of training,* ***study tools;*** *structure interview questionnaire, Western Ontario and McMaster Universities osteoarthritis index, faces pain rating, single leg balance and arthritis self-efficacy scale.* ***Results:*** *statistically significant was found between baseline data and post test in pain and knee stiffness among study group. While, no statistical significant was found among control group throughout program phases.* ***Conclusion:*** *Osteoarthritis elderly patient's responsiveness to exercise interventions and need to identify strategies for maintenance of long-term exercise.* ***Recommendation:*** *Knee osteoarthritis elderly patients participate in self-management programs and physical activity consistent with national guidelines*

Key words: *osteoarthritis, ageing, self-efficacy, physical function,*

I. Introduction

Musculoskeletal conditions are an important public health problem [(1)]. The population burden from arthritis is considerable with an estimated 48 million people in the US, 8 million in the UK and 108 million across Europe suffering from some form of this condition [(2, 3)]. The implications of this burden are poor quality of life, restrictions in daily activities and disability [(4)]. Population projections from the US estimate that by the year 2030, the prevalence of self-reported doctor-diagnosed arthritis will increase from 47.8 million in 2005 to nearly 67 million, with 25 million reporting arthritis-attributable activity limitations [(3)].

Osteoarthritis (OA) is one of the commonest medical conditions in elderly persons. It is also the most common reason for restricted daily activity and can significantly impact on quality of life. Worldwide estimates suggest that 9.6% of men and 18.0% of women aged 60 years have symptomatic OA of the hips or knees [(5)].

Enhancing self-efficacy has become an essential feature of many arthritis management interventions because of its robust relationships with health behaviors and health status. Empirical studies document that self-efficacy predicts health behaviors such as physical activity, eating behaviors and pain coping strategies. In addition to evidence that self-efficacy is associated with health behaviors, current and future health status, and adherence to health recommendations, the fact that self-efficacy can change through efficacy-enhancing interventions makes it a rich target of arthritis interventions [(6)].

Lifestyle modification, particularly exercise and weight reduction is a core component of osteoarthritis management. Non-loading activities such as swimming and weight-bearing exercises have been shown to reduce symptoms, increase mobility and reduce continuing damage from osteoarthritis. Physical or occupational therapist can teach patients how to exercise safely and protect joints while doing daily living activities. Weight loss reduces OA-associated pain and improves physical activity [(7, 8)].

II. Aim Of The Study

1. To determine the effect of self-management in achieve and maintain clinically meaningful improvements in pain, stiffness and physical function in elderly with knee osteoarthritis (OA).
2. To predict/ identify elderly osteoarthritis individuals who are at risk to fall.

III. Subjects And Method

Systemic random sample of 80 osteoarthritis elderly patients from both sexes, aged 60 years and more were included. Moreover the total numbers sample were divided into two equal groups as the following; 40 patients for study group which attended OAKP sessions and other 40 patients for control group not included in application of program and used only for comparison. The study was carried out in orthopedic outpatients' clinics of main Assiut University Hospital. Quasi-Experimental design was used in this study to implement and evaluate the osteoarthritis knee program for osteoarthritis elderly patients.

Five tools were utilized to collect pertinent for this study, these are:

Tool 1:

A structured interview questionnaire was constructed after reviewing the relevant literature to assess a comprehensive and accurate scocio-demographic characteristic of osteoarthritis elderly patients. It includes personal data as name, age, address, sex' marital status' level of education and occupation....etc "This tool was done only one time".

Tool 11:

Western Ontario and McMaster Universities osteoarthritis index (WOMAC) was used in the present study to assess pain, stiffness and physical function in patients with knee osteoarthritis (OA), which consists of 24 items divided into 3 subscales:

- **Pain intensity (5 items):** during walking, using stairs, in bed, sitting or lying, and standing
- **Knee joint Stiffness (2items):** after waking and later in the day
- **Physical Function (l7items):** stair use, rising from sitting, standing, bending, walking, getting in / out of a car, shopping, rising from bed, heavy and light household duties. . . .etc.

The score System is summed for items in each subscale, with possible ranges as follows: pain= 0-20, stiffness = 0-8, physical function = 0 - 68. While the activities response in each category according to the degree of difficulty: 0= none, l =mild, 2=moderate, 3 =Severe, 4= extremely. This scale was constructed by **[9, 10].**

Tool III:

Wong-Baker Faces Pain Rating Scale used in the present study to evaluate pain (severity, type, and duration), determine a treatment plan and evaluate the effectiveness of treatment **[11].**

Tool IV: Timed Single Leg balance Test:-

This is a good predictor of falls in the elderly, that assesses the difficulty a person has standing on one leg. The score is the total time in seconds to a maximum of 30 seconds standing on one leg, which average balance time-based real elderly age as the following 4 seconds, 5 seconds, 7 seconds, (respectively) for 70 Yrs. 65 Yrs and 60 Yrs old of studied elderly age **[12, 13].**

Tool V:

8-item Arthritis Self-Efficacy Scale (ASES) is used to indicate the level of certainty that studied elderly can perform each task. Each question is scored on numeric rating scale ranging from 4 = very uncertain, 5 - 6 = moderately uncertain, and 10 = very certain. Each item is scored separately by taking the mean of its. Higher scores indicate higher self-efficacy. This scale is available in **[14, 15].**

These tools were done three times for both elders groups, the first time at the 1st week before OAKP intervention, the second time at 8th week after application of OAKP and the third time after 6th months from application.

- **The Stanford Osteoarthritis of the Knee Program (OAKP):**

The program has been developed by the researcher based on review of relevant literature, available resources and revision by professor and assistant professor as well as expert in the field of orthopedic surgery, medical surgical nursing and community health nursing. According to the opinions of experts necessary modifications were made. It was delivered over a six-week period with studied elderly patients group attending one day of one and a half hours per week, after that; the researcher reassessed both study and control groups at eight week and after six months from starting.

General objectives of the program:

1) Improvements of knee physical function and knee pain.
2) Teach elders how to cope with osteoarthritis and measure used for joint protection.
3) Motivate elders toward modification of their behavior and practice about their disease.

4) Decrease the risk of fall among elderly with knee osteoarthritis.

Assessment:

Based on the experience and general knowledge of researcher about the impact of osteoarthritis on physical and general health of elderly; the researcher developed this program to improve elder's physical health through teach them how to perform physical exercise and achieve self-management skills for relieving pain and reduce the impact of functional deficits on their life. Also, based on pretest assessment of elder's physical function and quality of life which denotes physical function deficit and reduced self efficacy; so the program media were prepared.

Planning stage:

The arrangement of conducting the program done during this stage; the sessions and time of the program decided. The study group sample were attending one session of one and a half hours per week for six weeks period in a variety of numbers ranged between (l-3) in each day according to the date of first interview. Other facilities were checked and arranged during this phase as the teaching place and handout book ...etc.

The time of application was decided according to the attendance of participants in the orthopedic outpatients' clinics and the coordination between the researcher and elders. The program was conducted in the orthopedic outpatients' clinics. It was important before implementing the program to prepare simple teaching methods; as discussion and role play as picture and handouts. The knee osteoarthritis program was conducted in one year; which it was delivered over a six weeks with study elderly patients group attending one day per week, after that; the researcher reassessed both groups (study &control) at eight week and after six months from starting. The evaluation was done through:

A) Post test which done at 8^{th} week after implementing and completing OAKP to assess elder's physical health and function.

B) Follow up which was done after 6^{th} months of completing the osteoarthritis knee program,

- ***The teaching program included organization of the program sequence***

Data collection phase:

Before the application of the program, The patients were evaluated by assistant lecturer and senior resident of the orthopedic clinics to exclude diseases interfering with gait such as; cervical spondylosis, hip problems and other neurological disorder as, dementia and parkinsonism. After that; the researcher introduced herself to participants to establish the necessary rapport, gain their attention and interest, an orientation to the program and its purpose was done and the elderly were informed about the time and place of session taken; Pretest was done before the implementing program to assess the elderly physical and mental health, each session started by a summary about what was given during the previous session and the objectives of the new topics. The post test at 8^{th} week and finally follow up test done after 6^{th} months for both groups were implemented by repeating the same format of the Pretest to determine the effect of the program. The educational program conducted in the period from end of July 2012 to end of August 2013.

Statistical analysis:

The data obtained were reviewed, prepared for computer entry, coded, analyzed and tabulated. Statistical analysis was done using the SPSS version 16 & 19, Descriptive statistics in the form of frequencies and percentages for qualitative variables. While means and standard deviations for quantitative variables. Chi-square, fissure exact test, ANOVA test and T-test, tests used to compare differences in the distribution of frequencies among different groups. It is considered significant when P-values were less than 0.05 ($P < 0.05$).

Every elderly have ethical rights to agree or refuse to participate in the study. An oral consent was taken from the elderly to participate in the study after informing them that the information obtained will be confidential and used only for the purpose of the study.

IV. Results

Table (1) distribution of osteoarthritis elderly regarding the socio demographic characteristics, clear that nearly half (47.5%) of the study group their age ranged between 60 < 65 years, while (37.5%) of control group aged 65 < 70 years. And about two-third (65%) of the study group were male and 62.5% of control group were female, 62.5% of both groups comes from rural areas. Concerning to educational status found that 67.5% and 87.5% were illiterate from both study and control groups, respectively.

Table (2): Indicates that there is statistical significant difference was observed between baseline and post test assessment in pain during walking and rest among study group.

Table (3): show statistical significant in relation between baseline and post test in early and late knee stiffness (p-value[1].0.010 and p-value[2] 0,004) respectively, among study group. While there is not statistical difference was observed of knee stiffness at early after waking in control group.

Table (4): Revealed that statistically significant difference was found between pretest (1st week) prior to implementation of program with post test assessment at 8th week regarding to descending stairs, rising from sitting, standing, walking on flat surface, getting in/ out of a car, lying in bed, getting in/ out of bath, and sitting (P-value[1] < 0.026, P-value[1] <0.008, P-value[1] < 0.042. P-value[1] < 0,031, P-value[1]< 0.041, P-value[1] < 0.027, P-value[1] < 0.010, and P-value[1] < 0,033) respectively, among study group. More else, there is no statistical significant difference throughout program was observed among control group regarding to the physical function among control group of elderly.

Table (5): Clear that there is statistical significant was found between pre test and post test in pain, Stiffness and Physical function of WOMAC scale for study group (P-value[1]< 0.025, Pvalue1< 0.002 and P-value[1]< 0,010) respectively. On the other hand, regarding to total WOMAC score there is statistical significant differences was found at post and follow-up test in relation among both study and control group (p-value < 0.001 and p-value < 0'014) respectively.

Figure (1): Show that there is no statistical significant difference among both study and control groups throughout of program phases regarding Wong-baker faces pain rating scale (P-value > 0.05).

Table (6): Display the impact of OAKP among the study and control group regarding One-leg eye-closed balance test. It clear that more than one quarter (27.5%) of study elders group who reach normal range of balance regarding their age in pre-test (Ist week) compared to (50.0%) of them in post test (after 8st weeks). The differences in this relation are statistically significant (Pvalue[1]
< 0.039). In addition, elderly of control group had not able to reach normal range of balance was observed in more than four-fifth (82.5%) in Ist week of assessment compared to (22.5%) from them who reached normal range in post test. With not a statistically significant difference (P-value[1] < 0.576).

Figure (2): Reveals that highly statistical significant difference at post test (8th weeks) and follow-up (6th months) with P-value < 0.000 according to Arthritis Self-Efficacy (ASE) score between study and control group.

V. Discussion

The ageing process is accompanied by a decline in the function of all systems that are responsible for the control of balance. The presence of knee OA may cause changes that speed up the deterioration of these systems or compound the effects of ageing **(16).** So that; several protocols are available for management of knee osteoarthritis with the aim of improving both patient complaints and overall functional activities. These protocols include traditional exercises programmers' with a variety of strength training, flexibility exercises and range of motion exercises. Nevertheless patient complaints often persist and function activities levels cannot be fully restored **(17).**

Concerning socio demographic characteristics of the sample, two groups (study and control) were included in this study with no a statistical significant difference found between them regarding age. Moreover, the current study agree with the result of study conducted in Cairo by Ahmed **(18)** about Effect of sensorimotor training on balance in elderly patients with knee osteoarthritis and reported that there were no significant differences between the groups with respect to age. The above findings are confronted with the published results of the study conducted in Saudi Arabia by Alrushud, **(19)** about Impact of knee osteoarthritis on the quality of life among Saudi elders, who reported that their sample aged between 60-70 years with mean ± SD (64.5 ± 3.03).

The findings are also in accords with the findings of the study conducted in America by Maly **(20)** who reported that the mean age of his studied sample are (66,3 ±8.7) and ranged 50: 89 years. This study revealed that the ratio of male to female was 65.0: 350% in study group and 37.5:62.5% control group. However limitations should be noted when interpreting the previous findings. Such as, the participants of this study included a greater proportion of men than those originally interviewed to participate. However, many of female patients come only to take medication and believe that their age, sex, and more physically active lifestyle pattern are risk factor of disease. These results disagree with that reported by study conducted in New York by Marks **(21),** that higher percentage of sample was female.

This results is contradicted with Coleman **(22)** who implemented their study at randomized controlled trail of a self-management education program for osteoarthritis of the knee delivered by health care professionals, they found that the majority of sample were female with the following male to female ratio; (23:52 in control and 14:57 in OAK). Also, our finding is contradicted with study conducted by Cho **(23)** about

gender and prevalence of knee osteoarthritis types in elderly Koreans which reported that men had lower prevalence than women for radiographic and severe radiographic OA. These findings are confronted with the findings of the study conducted in Tokyo by Muraki, **(24)** who reported that the Female sex was a strong risk factor even in the subgroup without radiographic knee OA.

As regard effect of program, the mean findings of this study were that the study group demonstrated significant improvement of their knee pain and physical function at post-exercise test and 6th month's follow-up compared with pre-exercise intervention and compared to control group. This may be due to the nature of arthritis symptoms and its effect on social, occupational and physical activities. This results accords with that of Coleman **(22)** who observed the OAK group demonstrated better improvements in WOMAC pain of 23o/o between pre- and post-intervention and of 13.7o from pre-intervention to 6 months. By contrast, at the same time points, the control group had improvements of 23% and 7o/o in WOMAC pain.

The current finding was supported with study results of Deyle, **(25)** about Effectiveness of manual physical therapy and exercise in Osteoarthritis of the Knee who reported that osteoarthritis of the knee who were treated with manual physical therapy and exercise experienced clinically and statistically significant improvements by 55.8% in self-perceptions of pain, stiffness and functional ability related to WOMAC scores and in minute walk distances had improved by l3.lVo over baseline values in the treatment group.The finding of present study also concurs with observations of Maly **(20)** for The Western Ontario and McMaster Universities Osteoarthritis scores where the condition indicated that their subjects had relatively lower levels of pain and impairment.

Concerning items in the WOMAC subscales; findings of this study displayed that a statistically significant difference between baseline assessment and post test at (8th week) in pain during walking and rest (sitting or lying) among study group, While there is no statistical significant difference was observed between pre test 1st week assessment with post test 8th week and follow-up regarding to pain in various activity (during walking, stairs climbing, nocturnal in bed, rest (sitting or lying) and weight bearing or standing) among control group.

In the present study, the knee stiffness subscales showed significant difference between baseline assessment and post test in knee stiffness at early after waking and later in the day among study group. While concerning physical function subscales for study group, a statistically significant difference was found between pretest (1st week) prior to implementation of program with post test assessment at 8th week regarding to descending stairs, rising from sitting, standing walking on flat surface, getting in/ out of a ear, lying in bed, getting in/out of bath and sitting.

Pain was considered as a major determinant loss of function in individuals with OA. They limit their functional activities to avoid movements that exacerbate pain **(26).** In the current study findings, the study group demonstrated mild improvement in severity of pain throughout program phases but with no a statistical difference among both groups. On the other hand, these findings are contrasted with Coleman **(22)** who mentioned that pain decreased 30% during the 8th week intervention in OAK group and the control group had 17% increase in pain during the same phase with a statistical difference for both groups. In this context, Ahmed (27) reported that the least visual analogue scale (VAS) score among women with unilateral left knee involvement was (57.5), with considered the score of <40 mm at rest and <50 mm on movement as the acceptable symptomatic state in patients with lower limb OA.

Osteoarthritis places substantial limits on daily activity and quality of life. About 25% of people with knee OA have pain on walking and have difficulty doing major activities of daily living (ADLs) such as walking, climbing stairs and kneeling or stooping. In addition" l5% has to use an assistive device such as a cane or crutch for walking. Annually, nearly one million years are lived with disability from hip and knee OA, making it the third leading cause of years lived with a disability (YLD) in the U.S **(28).**

Regarding self-efficacy, this study demonstrated improvement in the confidence that studied elderly abilities to perform a specific task with a significant difference was observed at 8th week post intervention and 6th month follow-up among study group compared to control group. Moreover, the current findings revealed a statistical difference between study and control group during post intervention and 6th month follow-up phases of program. A similar finding also was presented in the study conducted in Denmark by Gains **(29)** which documented that a significant relationship between the functional self efficacy (FSE) and self-reported performance in 29 women with knee OA. No significant relationship was found in the men, who participated.

Moreover, the current study results agree with the same results of study conducted by Sharma **(30)** and Harrison**, (31)** reported that high levels of self-efficacy resulted in decreased odds of poor observed performance of a sit to stand task over the span of 3 years in people with knee OA. On the other hand, the previous results are supported with the published results conducted by Maly **(20)** who mentioned that it is important to note that the self-efficacy scores in these other studies are much lower (indicating poorer levels of self-efficacy) than those obtained in their sample.

Unfortunately, the present findings indicated that most of studied elders their scocio-demographic characteristic had more effect throughout program phases. However, regarding to the relation between patient age, gender, residence, educational level, physical exercise, elders medical conditions with research scales; study group demonstrate better improvement in their self-efficacy, single leg balanced and severity of pain. Also, elders within age group 60 ≤ 65 years, not suffering from chronic disease and doing physical exercise who achieved normal health level in time-up and go test, 2-minute step test and single leg balance at post assessment phase and follow-up phase (6^{th} month) of program. This means that the young older adults is the age of beginning of health problems and reflect the serious effect of age related changes on the health status among elderly people. So that, early enhancing self-efficacy has become an essential feature of many arthritis management interventions because of its robust relationships with health behaviors and health status.

VI. Recommendations

Based on the study results, the following recommendation are suggested implementation of self management education (SME) should be expanded as a community based intervention with supportive tools, evaluation and strategies for promoting the maintenance of long-term exercise.

VII. Conclusion

Based on the findings of the current study, it can be concluded that the osteoarthritis of knee program (OAKP) have a significant impact on the physical activity of elderly patients. However, assessments of the study group at posttest (8^{th} weeks) phase of program after exercise interventions indicate that the significant improvements regarding arthritis self-efficacy scale, While these improvements slightly decrease at 6^{th} months follow-up assessments.

Acknowledgements

Special thanks are due to all the elderly patients who have agreed to participate in the study.

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Table (1): Distribution of the osteoarthritis (OA) elderly patients regarding to their socio-demographic characteristics in outpatient clinics at Assiut university hospital (2013):

Socio-demographic characteristics	Study (n= 40)		Control (n= 40)	
	No.	%	No.	%
Age:				
60 < 65 years	19	47.5	13	32.5
65 < 70 years	12	30.0	15	37.5
≥ 70 years	9	22.5	12	30.0
Mean ± SD	66.05 ± 5.84		68.0± 6.45	
Sex:				
Male	26	65.0	15	37.5
Female	14	35.0	25	62.5
Residence:				
Rural	25	62.5	25	62.5
Urban	15	37.5	15	37.5
Marital status:				
Married	31	77.5	34	85.0
Widow	9	22.5	6	15.0
Level of education:				
Illiterate	27	67.5	35	87.5
Read & write	6	15.0	2	5.0
Primary	1	2.5	0	0.0
Secondary	3	7.5	2	5.0
University	3	7.5	1	2.5
Occupation:				
Housewife	14	35.5	24	60.0
Skilled worker	4	10.0	1	2.5
Employee	6	15.0	5	12.5
Free business	2	5.0	3	7.5
Farmer	9	22.5	4	10.0
Not working	5	12.5	3	7.5

Table (2): Distribution of studied (OA) elderly patients regarding to the degree of pain according to Western Ontario and McMaster Universities Osteoarthritis (WOMAC) throughout program phases (pre, post 8th week and follow up when 6th month) in outpatient clinics at Assiut university hospital (2013):

Items of pain subscale	Groups	Pre	Post	Follow-up	P-value1	P-value2
		Mean ± SD	Mean ± SD	Mean ± SD		
During walking	**Control**	2.35 ± 1.25	1.87 ± 0.94	2.12 ± 0.94	0.059	0.237
	Study	2.23 ± 1.44	1.45 ± 1.04	1.72 ± 1.18	0.007*	0.271
Stairs Climbing	**Control**	3.35 ± 0.92	3.32 ± 0.86	3.38 ± 1.01	0.900	0.812
	Study	2.90 ± 1.13	2.50 ± 1.09	2.80 ± 1.04	0.110	0.211
Nocturnal in bed	**Control**	2.18 ± 1.24	1.97 ± 1.07	2.10 ± 1.06	0.443	0.601
	Study	1.70 ± 1.31	1.28 ± 0.99	1.40 ± 1.11	0.104	0.595
Rest (sitting or lying)	**Control**	2.07 ± 1.05	1.82 ± 0.93	1.92 ± 0.89	0.263	0.624
	Study	1.90 ± 1.32	1.38 ± 0.90	1.62 ± 0.98	0.040*	0.237
Weight bearing or standing	**Control**	2.70 ± 1.24	2.53 ± 1.24	2.67 ± 1.19	0.531	0.582
	Study	2.18 ± 1.38	1.90 ± 1.24	2.13 ± 1.16	0.350	0.404

Paired samples t-test.

***There are statistical significant differences at P < 0.05.**
P-value1: between pre test and post test, P-value2: between pre test and follow-up test.
Number of study group equal 40 and control group= 40.

Table (3): Distribution of knee stiffness among studied sample according to Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) throughout program phases (pre, post 8th week nd follow up when 6th month) in outpatient clinics at Assiut university hospital (2013):-

knee stiffness items	Group	Pre	Post	Follow-up	P-value[1]	P-value[2]
		Mean ± SD	Mean ± SD	Mean ± SD		
Early after waking	Control	3.00 ± 0.99	2.70 ± 1.07	2.85 ± 0.95	0.196≠	0.508≠
	Study	2.98 ± 1.14	2.32 ± 1.07	2.55 ± 1.15	0.010*	0.369≠
Later in the day	Control	1.80 ± 1.45	1.13 ± 1.02	1.25 ± 1.24	0.018*	0.623≠
	Study	1.85 ± 1.44	1.00 ± 1.11	1.35 ± 1.21	0.004*	0.181≠

Paired samples t-test. (*) statistical significant differences at P < 0.05 and (≠) no statistical significant differences at P > 0.05. P-value1: between pre test and post test and P-value2: between pre test and follow-up test. Number of study group equal 40 and control group= 40.

Table (4): Distribution of osteoarthritis elderly patients sample regarding the effect of OA on Physical Function in (WOMAC) Index at three phases of program (pre-post 8th week- follow up when 6th month) in outpatient clinics at Assiut university hospital (2013):-

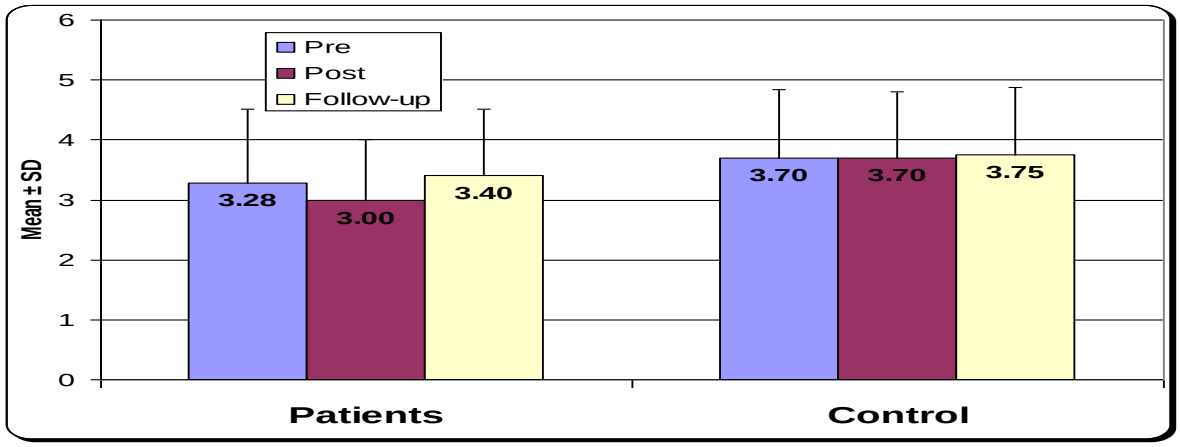
Physical Function Items	Groups	Pre	Post	Follow-up	P-value[1]	P-value[2]
		Mean ± SD	Mean ± SD	Mean ± SD		
Descending stairs	Control	3.15 ± 1.03	3.30 ± 0.91	3.38 ± 0.87	0.492	0.707
	Study	2.80 ± 1.11	2.25 ± 1.06	2.57 ± 1.06	0.026*	0.173
Ascending stairs	Control	3.38 ± 0.90	3.35 ± 0.89	3.47 ± 0.78	0.901	0.508
	Study	2.83 ± 1.17	2.42 ± 1.04	2.85 ± 1.00	0.110	0.066
Rising from sitting	Control	2.60 ± 0.96	2.33 ± 0.92	2.50 ± 0.93	0.193	0.400
	Study	2.88 ± 1.18	2.20 ± 1.04	2.35 ± 1.00	0.008*	0.514
Standing	Control	2.32 ± 1.05	2.15 ± 1.05	2.22 ± 0.97	0.458	0.742
	Study	2.20 ± 1.09	1.75 ± 0.84	1.98 ± 0.89	0.042*	0.249
Bending to floor	Control	2.47 ± 1.20	2.45 ± 1.04	2.52 ± 0.99	0.921	0.741
	Study	2.05 ± 1.28	1.65 ± 1.10	1.85 ± 1.10	0.138	0.418
Walking on flat surface	Control	1.78 ± 1.25	1.62 ± 1.08	1.62 ± 1.10	0.567	1.000
	Study	1.72 ± 1.22	1.18 ± 1.01	1.35 ± 0.98	0.031*	0.433
Getting in/ out of a car	Control	2.57 ± 1.06	2.57 ± 1.08	2.55 ± 1.04	1.000	0.916
	Study	2.65 ± 1.27	2.08 ± 1.21	2.30 ± 1.32	0.041*	0.429
Going shopping	Control	2.40 ± 1.24	2.40 ± 1.19	2.40 ± 1.19	1.000	1.000
	Study	2.12 ± 1.29	1.70 ± 1.14	1.92 ± 1.23	0.121	0.398
Putting on socks	Control	2.67 ± 1.25	2.75 ± 1.06	2.90 ± 1.08	0.773	0.532
	Study	2.45 ± 1.26	2.10 ± 1.19	2.30 ± 1.20	0.206	0.458
Taking off socks	Control	2.68 ± 1.25	2.73 ± 1.13	2.90 ± 1.11	0.852	0.486
	Study	2.35 ± 1.21	1.98 ± 1.05	2.15 ± 1.15	0.143	0.478
Rising from bed	Control	2.15 ± 1.15	1.90 ± 0.98	1.97 ± 1.00	0.298	0.736
	Study	1.55 ± 1.06	1.25 ± 0.84	1.42 ± 0.93	0.165	0.380
Lying in bed	Control	2.45 ± 1.11	2.25 ± 1.01	2.32 ± 0.97	0.401	0.735
	Study	2.38 ± 1.28	1.80 ± 0.99	1.90 ± 1.11	0.027*	0.671
Getting in/ out of bath	Control	2.28 ± 1.24	2.13 ± 1.11	2.20 ± 1.14	0.571	0.766
	Study	2.45 ± 1.15	1.80 ± 1.04	2.10 ± 1.06	0.010*	0.205
Sitting	Control	2.47 ± 1.20	2.22 ± 1.00	2.38 ± 1.10	0.314	0.526
	Study	2.02 ± 1.07	1.55 ± 0.88	1.70 ± 0.94	0.033*	0.462
Getting on/ off toilet	Control	3.27 ± 1.01	3.28 ± 0.93	3.35 ± 0.95	1.000	0.722
	Study	2.90 ± 0.96	2.65 ± 0.98	2.85 ± 1.03	0.250	0.374
Light household duties	Control	2.07 ± 1.19	1.77 ± 0.97	1.85 ± 1.03	0.220	0.738
	Study	1.82 ± 1.20	1.40 ± 0.96	1.60 ± 1.01	0.083	0.365
Heavy household duties	Control	3.10 ± 1.11	3.02 ± 1.23	3.05 ± 1.24	0.775	0.928
	Study	2.90 ± 1.06	2.57 ± 1.01	2.62 ± 0.90	0.164	0.816

Paired samples t-test. (*) statistical significant differences at P < 0.05.
P-value1: between pre test and post test. P-value2: between pre test and follow-up test.
Number of study group equal 40 and control group equal 40.

Table (5): Distribution of studied sample according to Western Ontario and McMaster Universities Osteoarthritis (WOMAC) scale throughout three phases of program (pre-post 8th week- follow up when 6th month) in outpatient clinics at Assiut university hospital (2013):-

WOMAC subscales	Groups	Pre (1st week)	Post (8th week)	Follow-up (6th month)	P-value[1]	P-value[2]
		Mean ± SD	Mean ± SD	Mean ± SD		
Pain	Study	10.90 ± 5.30	8.50 ± 3.99	9.68 ± 4.41	0.025*	0.264
	Control	12.65 ± 4.68	11.53 ± 4.18	12.20 ± 4.00	0.260	0.645
	P-value	0.121	0.001*	0.009*		
Stiffness	Study	4.83 ± 2.34	3.33 ± 1.93	3.90 ± 2.15	0.002*	0.069
	Control	4.80 ± 2.24	3.83 ± 1.88	4.10 ± 2.00	0.058	0.145
	P-value	**0.961**	**0.244**	**0.667**		
Physical function	Study	40.08 ± 13.78	32.33 ± 12.29	35.83 ± 13.35	0.010*	0.165
	Control	43.83 ± 14.44	42.23 ± 13.93	43.60 ± 13.62	0.615	0.943
	P-value	**0.238**	**0.001***	**0.012***		
WOMAC score	Study	55.80 ± 20.02	44.15 ± 16.83	49.40 ± 18.87	0.006*	0.145
	Control	61.28 ± 20.33	57.58 ± 18.84	59.90 ± 18.59	0.401	0.753
	P-value	**0.229**	**0.001***	**0.014***		

P-value[1]& P-value[2] by Paired samples t-test. P-value: by Independent samples t-test.
(*) statistical significant differences at P < 0.05.
P-value[1]: between pre test and post test and P-value[2]: between pre test and follow-up test
P-value: for each sub scale throughout program phases between both group, No. of each group = 40.

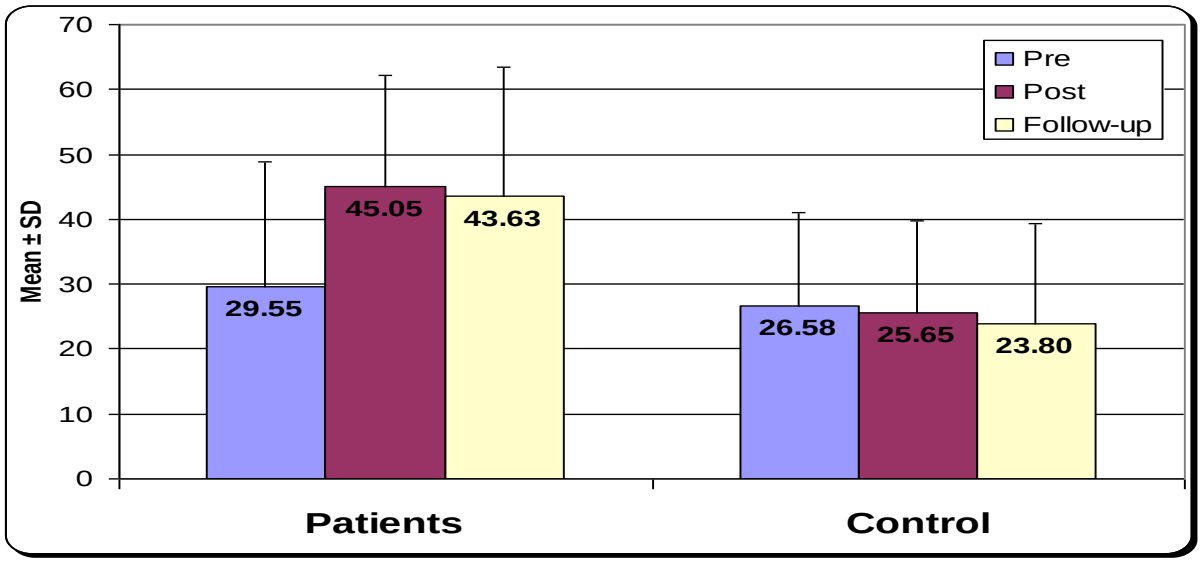


Paired samples t-test was used.
Figure (1): Show that there is no statistical significant difference among both study and control groups throughout of program phases regarding Wong-baker faces pain rating scale (P-value > 0.05).

Table (6): Impact of osteoarthritis knee program (OAKP) among the study and control group regarding One-leg eye-closed balance test throughout program phases in outpatient clinics at Assiut university hospital (2013):-

One-leg eye-closed balance test	Pre (n= 40)		Post (n= 40)		Follow-up (n= 40)		Test	P-value[1]	P-value[2]
	No.	%	No.	%	No.	%			
Study group:							Chi-Square test.	**0.039***	**0.469**
Normal	11	27.5	20	50.0	14	35.0			
Abnormal	29	72.5	20	50.0	26	65.0			
Control group:								**0.576**	**0.330**
Normal	7	17.5	9	22.5	4	10.0			
Abnormal	33	82.5	31	77.5	36	90.0			

(*) Significant at P < 0.05.
P-value[1]: between pre test and post test
P-value[2]: between pre test and follow-up test



***Paired samples t*-test & independent samples t-test was used.**

Figure (2): Reveals that highly statistical significant difference at post test (8th weeks) and follow-up (6th months) with P-value < 0.000 according to Arthritis Self-Efficacy (ASE) score between study and control group.