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Multidisciplinary Lifestyle Behavioral management in Patients with Knee Osteoarthritis: a randomized controlled study from Iran

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Background: Knee osteoarthritis (OA) is a major public health problem leading to chronic pain and increased years lived with disability This study aimed to assess lifestyle behavioral management in patients with Knee osteoarthritis among Iranian patients up to 6 months.
Methods and Materials: This study conducted at the Rheumatology Research Center of Tehran University of Medical Sciences (TUMS) in Tehran, Iran. In this educational controlled trial study, 130 eligible participants took part in control group (n = 66) and received just prescribed medications, or intervention group (n = 64) who received the lifestyle behavioral management plus medication. The program involved three two-hour and two one-hour group sessions over a one-week period. Data based on demographic characteristics and risky behaviors questionnaire as well as Functional Knee Assessment Test (FKAT) were collected at initial, 3-, and 6-month follow ups and analyzed by using $SPSS_{18}$.
Results: Of 130 participants, five individuals from intervention and eight individuals from control group were excluded over 6 months. Totally, 117 eligible participants in two groups of intervention (n = 59), and control (n = 58) completed the study. The mean age of participants in intervention and control group at base line was 59. 03 ± 6. 13 and 57. 85 ± 9. 31 years respectively. Despite being the same at initial time (P > 0. 05), Repeated Measure ANOVA test showed Significantly better improved disability in intervention group over time (P < 0. 001). Compared with control group, preventive behaviors were improved significantly in intervention group (P < 0. 05)
Conclusions: This study revealed that the multidisciplinary program could significantly reduce risky behaviors and disability up to six months in intervention group. Thus, due to lack of lifestyle behavioral management in health care system of Iran, to embedding this program into clinical practice for managing knee OA pain is recommended.
Keywords: Life style, Behavioral change, Osteoarthritis Management

Introduction

Knee osteoarthritis (OA) is a major public health problem leading to chronic pain and increased years lived with disability (YLDs) globally (Haq & Davatchi, 2011, Davatchi et al., 2008).

Many evidences report chronic pain (Nunez et al., 2007) and knee osteoarthritis (OA) (Jack Farr et al., 2013) cause decreased health-related quality of life (HRQoL) of the sufferer patients.

In COPCORD study that has been conducted in Iran, a total of 10, 291 adults from an urban community were examined for any rheumatologic symptoms. The findings revealed that 25. 5% of studied participants were suffering from knee symptoms during the past week, among them 15. 3% being identified as knee osteoarthritis (Davatchi et al., 2008).

For many years, knee osteoarthritis pain has traditionally been assessed in view points of a biomedical perspective that considers pain just as a physical symptom (Keefe & Somers, 2010). Within this viewpoint, the physicians/health care providers were prescribing medication to relief pain or recommending just a kind of lifestyle modification as rehabilitative physical behaviors

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like knee joint specific exercises, physical fitness, doing daily activities in ergonomic position (Bijlsma & Knahr, 2007). Furthermore, to reduce mechanical pressure on knee joint during daily activities, applying weight loss strategies to reduce pain and disability for OA patients were being advised (Bijlsma & Knahr, 2007). However, many evidences have shown that beyond physical factor, worse mental health is significantly associated with more severe knee OA pain and disability (Wise et al., 2010). Sinikallio and co workers have found pain self-efficacy, fear of movement, as well as anxiety were associated with pain and disability among OA patients (Sinikallio et al., 2014). Francis and co workers (2010) verified emotional, cognitive, behavioral and social variables have led to the understanding and development of psychological approaches for managing knee OA pain management (Keefe and Somers, 2010). Many existed evidences recommended multimodal biopsyhoaocial approaches could manage knee OA pain (Keefe & Somers, 2010) during longer time. The long term efficacy of multidisciplinary approaches

Rather than mono disciplinary style was reported somewhere else (Somers et al., 2012). Regarding the important role of patient education in inhibiting knee OA pain and disability (Barlow, 2001), ongoing studies are exploring ways to insert multimodal approaches for managing arthrosis pain into clinical practice (Keefe and Somers, 2010).

In spite of these efforts, yet in health care system of Iran the biomedical view regarding knee OA treatment is predominant. A large community based study conducted in Iran (Dahaghin et al., 2009)-within a biomedical context without considering psycho-social potential risk factors-highlighted risky behaviors like prolonged squatting and cycling as well as knee bending as the most prevalent risk factors for knee pain due to OA among Iranian patients.

The present study aimed to explore the probably more benefits of multidisciplinary lifestyle behavioral management compared with current treatment (medication only) to improve healthy behaviors and control disability among patients with knee osteoarthritis.

Methods and Materials

This study conducted at the Rheumatology Research Center of Tehran University of Medical Sciences (TUMS) in Tehran, Iran. Participants recruited from eligible patients refer to this research center and rheumatology clinic. To be eligible for the study, patients have to be aged ≥35 years and suffering from knee osteoarthritis with established OA of one or both knees. The operational definition for OA is knee osteoarthritis diagnosed either by clinical examination or by radiological (X-Ray) evidence. The participant required to have a referral and a definitive diagnosis of OA made by a rheumatologist in order to be eligible to participate in the study. In addition, the American Rheumatology Association Clinical Classification Algorithm applied for OA diagnosis. Participants did not exclude from the study on the basis of severity of symptoms. They required to be Farsi speaking and to provide consent to randomization as demonstrated by signed written authority. Participants with rheumatoid arthritis or other inflammatory joint disease, serious comorbidities, those who plan to have knee surgery within 6 months of commencing the study or who have physical impairments that preclude fulfillment of the requirements of either program were excluded. The study was approved by the ethics committee of Tehran University of Medical Sciences and ethical principles were adhered to throughout the study. Participants were provided informed consent, confirmed in writing, after explaining of the purpose and procedures of the study. They were advised of their right to withdraw at any point without any impact on their care being provided. Prior to entry into the study, eligibility was confirmed by a single rheumatologist, who also provided study treatment through comprehensive clinical assessment. Participants were assigned to the intervention or control groups using random permutation blocking of every 6 participants. This kind of randomization was used to ensure close balance of numbers in each group. The allocation sequences were concealed from the rheumatologist who assessed eligibility. The people responsible for random allocation of consented patients were masked to participant clinical and demographic characteristics. The physician and statistical analyst were masked to the group assignment. While the patients were instructed to say nothing about their group assignment to the physician, no further measures were undertaken to ensure masking of the physician. Because of the nature of the

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intervention, full masking of patients was impractical. A total of 168 eligible participants were randomized into control group (n = 83) and received just prescribed medications, or intervention group (n = 85) and received the group based lifestyle Behavioral Management plus medication. Except for intervention, pain management was the same in each group. Figure 1 shows the flowchart of participants' assignment and follow ups. This trial has been designed using controlling knee osteoarthritis rather than medication. The fourth two-hour session was conducted by a clinical psychologist who addressed psychological issues linked to Pain. The session was designed to facilitate understanding of the effects of stress and coping on pain. Furthermore, she supported the awareness of different stressors or threatening events, perception of one's ability to control.

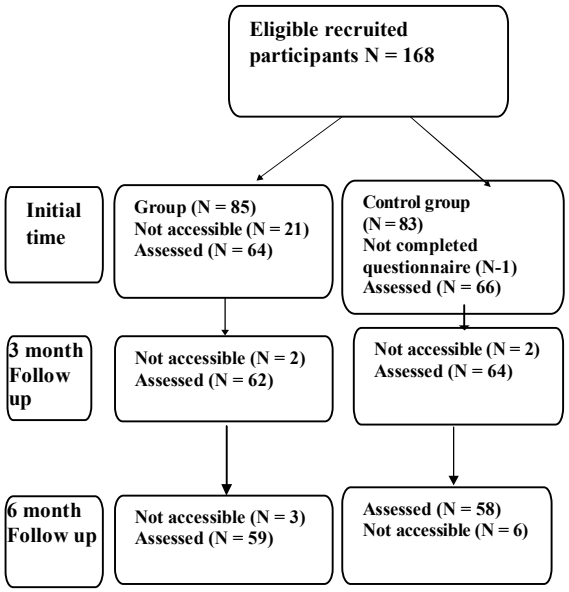

Figure 1. Trial flow of recruited participants at initial time and two time point follow ups.

Study Intervention

The intervention was a group based lifestyle behavioral management program which involved relevant specialists. The program involved three two-hour and two one-hour group sessions over a one-week period, each was delivered by different specialists. These classes (described further below) were followed by bimonthly booster sessions and monthly telephone counseling to encourage participants to maintain behavioral improvement. A previous study verified that continued encouragement of individuals to maintain their healthy behaviors could lead to embedding improved behavior over time (Vong et al., 2011). The initial classes were as follows: one 1-hour class in which a physiotherapist explained the anatomy and physiology of the knee, lifestyle factors that could moderate the knee osteoarthritis process and techniques which could be used to prevent knee osteoarthritis. Participants taught how incorrect posture of knee joint such as squatting, sitting on the floor, cycling, kneeling, climbing stairs and lifting heavy load in wrong position could damage knee joints and leading to osteoarthritis progress initiation.

The second two-hour class, was conducted by the same physiotherapist, in which he firstly evaluated the participants' skills regarding maintenance of correct biomechanical posture of their knee as well as performing stretching and strengthening exercises for the muscles of knee joint. Participants were then taught to maintain correct posture of the knee while walking, sitting, standing, sleeping and bending. Participants also received instructions in specific exercises for knee also explained the strategies for problem management, focus on problem solving or changing stressful situations. Emotional regulation strategies to changing the way participants thought or felt about stressors, as well as relaxation techniques were also described and practiced in this session.

The fifth one-hour class was conducted by a nutritionist in which she focused on the role of obesity on the process of knee osteoarthritis. Also she described that how health diets could be resulted in weight control. The nutritionist calculated the normal BMI for the participants and encouraged them to manage their weight through healthy.

The sixth two-hour session were conducted by a health education specialist who focused on cognitive behavioral interventions for knee OA. In this class the educator aimed to re-conceptualize the beliefs of patients regarding knee osteoarthritis, and to enable participants to replace maladaptive thinking with adaptive thinking patterns and replaced maladaptive behavior patterns with functional alternatives such as exercise participation, relaxation skills and fear avoidance of movements that would be critical to adjust with pain and injury.

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Bimonthly, in-person booster classes and monthly telephone counseling were facilitated by the health education specialist. These sessions involved active motivational counseling. During these sessions, the educator explored the knowledge, perception, beliefs and motivations of the participants in relation to knee pain, the contributions of their non-healthy behaviors in developing knee pain and their approaches to The third one-hour session was conducted by a rheumatologist who explained the process of developing knee osteoarthritis, the characteristics of knee osteoarthritis as well as the effect of risk factors on pain severity. Different methods of diagnosis and treatments of knee osteoarthritis were also explained in this class. He also confirmed the risky behaviors management in worked with participants to motivate adoption of more healthy behaviors and compliance with specific exercises for knee osteoarthritis. Moreover, during counseling, the educator encouraged participants to actively manage stressors in order to achieve successful adaptation and to apply tools which had been learned in the psychological session to manage their stress and anger. If any questions by participants required more information from different team specialists, the health education asked the question and then provided the participants with an appropriate response.

Usually, the participants in both groups were evaluated every 3 months by the rheumatologist who carried out the initial assessment but they also were able to see the physician earlier on request. Throughout the study medications such as analgesics, NSAIDs, and antidepressant drugs were prescribed for participants in control and intervention groups as necessary. Since the physicians were masked to group assignment, the types and dosages of prescribed for both groups were based only on the clinical findings. Participants in both groups were encouraged to take their medications as prescribed by their physician in the monthly booster sessions. The multidisciplinary group-based lifestyle behavioral management were administered only to the intervention group.

Researcher-made questionnaire

Regarding healthy behaviors of sedative consumption, nutrition, stress management and doing knee specific injury/knee exercise that was scaled with two options of Yes and No.

Functional Knee Assessment Test (FKAT)

This is a standard questionnaire that measures the time consumed for moving a 6-meter interval twice. All these scales were completed at three time points of 0. 3 and 6 month follow up.

A basic demographic questionnaire

Including age, weight, socioeconomic status and pain characteristics such as duration of pain and treatment was completed just at baseline.

Statistical analysis

All data analyses were conducted according to the pre-established analysis plan. Proportions were compared by using the chi–square (the Fisher's exact test where necessary). Mean scores were analyzed through the independent t test. A repeated measure ANOVA was performed to compare scores between groups over time. In this study, the CONSORT guidelines (Moher et al., 2001) were considered.

Results

Totally, 130 eligible participants in two groups of intervention (n = 64), and control (n = 58) entered into the study at initial time. Figure 1 shows the study flow from enrollment to 6-month follow up for the participants. The mean age of participants in intervention and control group at base line was 59. 03 ± 6. 13 and 57. 85 ± 9. 31 years respectively. The rest characteristics of both groups are shown in Table 1. Preventive behaviors among intervention and control groups over initial time, 3-and 6-month follow ups are demonstrated in Table 2. As this table shows, the majority of participants improved their nutrition behavior and knee specific injury preventive behavior/knee exercise over six in intervention group who underwent the multidisciplinary program (P < 0. 01). Knee function among both groups over time are shown in Table 3. According to the result of this table the mean score of Functional Knee Assessment Test (FKAT) in intervention group was decreased that made the differences between two groups over six months significant (time and group interaction P value < 0. 001).

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Table 1. Demographic characteristic of both groups at the initial of the study.

Characteristics	Intervention group (N = 64) N (%) Mean ± SD	Control group (N = 66) N (%) Mean ± SD	P value
Age (yrs)	59. 03 ± 6. 13	57. 85 ± 9. 31	0. 44
Weight (kg)	72. 67 ± 10. 63	74. 43 ± 11. 25	0. 35
Height (CM)	158 ± 5. 19	160 ± 7. 26	0. 24
Gender			
Female	62 (96. 9)	61 (92. 4)	0. 26
Male	2 (3. 1)	5 (7. 6)	
Marital status			
Married	49 (76. 6)	48 (72. 7)	0. 63
Single	2 (3. 1)	3 (4. 5)	
Widower/Divorce	13 (20. 4)	15 (22. 7)	
Income			
High	10 (15. 6)	4 (6. 1)	0. 09
Moderate	43 (62. 7)	46 (69. 7)	
Low	11 (17. 2)	16 (24. 2)	
Occupation status			
Occupied	16 (25)	14 (21. 2)	0. 61
Housewife	48 (75)	53 (78. 8)	
Duration of pain	8. 33 (5. 81)	9. 71 (7/56)	0. 24
Duration of treatment	6. 29 (4. 68)	7. 15 (6. 21)	0. 37
Regular medicine consumption (yes)	60 (93. 8)	64 (97)	0. 38
Healthy nutrition behavior (yes)	38 (59. 4)	42 (63. 6)	0. 61
Stress management (yes)	20 (31. 2)	22 (48. 5)	0. 04
Doing knee specific injury preventive behavior/knee exercise (yes)	28 (43. 8)	37 (56. 1)	0. 16

Table 2. Distribution of healthy behaviors in both groups over time.

Variables	Time follow up	Control N (%)	Intervention N (%)	X^2	P-value
Sedative consumption behavior	Initial time	64 (97)	60 (93. 8)	0. 75	00. 38
	3-month follow up	61 (95. 3)	57 (89. 1)	0. 59	0. 43
	6-month follow up	57 (98. 3)	52 (81, 2)	4. 68	0. 03
Nutrition behavior	Initial time	42 (63. 6)	38 (59. 4)	0. 24	0. 61
	3-month follow up	35 (54. 7)	50 (78. 1)	9. 59	0. 002
	6-month follow up	35 (60. 3)	48 (75)	8. 21	0. 013
Stress management behavior	Initial time	32 (48. 5)	20 (31. 2)	3. 99	0. 04
	3-month follow up	33 (51. 6)	38) 59. 4)	1. 2	0. 27
	6-month follow up	43 (74. 1)	39 (60. 9)	0. 89	0. 34
Doing knee specific injury preventive behavior/knee exercise	Initial time	37 (56. 1)	28 (43. 8)	1. 95	0. 16
	3-month follow up	40 (62. 5)	55 (85. 9)	11. 57	0. 001
	6-month follow up	47 (81)	53 (82. 8)	1. 80	0. 17

Table 3. Mean score of Knee pain and knee function in both groups over time.

Studied variables	Control group (N = 73) (Mean ± SD)			Intervention Group (N = 73) (Mean ± SD)			P value*		
	Initial time	3-month follow up	6-month follow up	Initial time	3-month follow up	6-month follow up	Group	Time	Time/group Interaction
***FKAT**	14. 61 (3. 00)	14. 76 (3. 30)	16. 13 (4. 53)	16. 99 (4. 56)	14. 65 (3. 05)	15. 17 (3. 11)	0. 452	0. 649	< 0. 001

Functional Knee Assessment Test*

Discussion

This study assessed the effects of a multidisciplinary group based behavioral management program on life style behavior change and knee disability reduction of Iranian patients suffering from knee osteoarthritis. What were educated and

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practiced within this multidisciplinary program by different specialists, included life style behavior changes like healthy nutrition behaviors, stress management, Doing knee specific injury preventive behavior/knee exercise, and analgesic medication consumption. At the beginning of the study all the life style behaviors of two groups were the same except for stress management behaviors that were better in control group. Within 3 months of the program, the participants' nutrition and knee exercise behavior were significantly improved in intervention group compared with control group.

It means, the majority of participants who took part in the program initiated lifestyle changes that were consistent with what were educated and practiced in due sessions managed by physiotherapist and nutritionist. In other hands, many participants complied the program, modified their risky behaviors such as kneeling and squatting behaviors, climbing stairs, and lifting/carrying heavy loads with bended knee. In addition, majority of participants who underwent the program stated that they made the behavior changes like knee muscles strength training exercise, physical fitness exercise and joint specific exercises in their lifestyle. Therefore, it could be concluded that the physiotherapist' interventional section of the program could help patients to modify their life style in order to reduce the extra pressure on disordered knee joints. Previous research that has been done in Iran reported two behaviors such as prolonged squatting and cycling as well as knee-bending as the most prevalent risky behavior for knee osteoarthritis and consequence knee pain/disability (Dahaghin et al., 2009).

Although, these life style modifications were obviously stated by majority participants in intervention group up to 3 months after initial classes, some participants in this group refused to continue these behaviors up to 6-month follow up. This suggests that continued education by motivational interview through telephone counseling as reminder or cues to action is needed for prolong maintenance of program effects. The prolong effects of continued educational program has been discussed somewhere else (Vong et al., 2011).

Since previous studies showed just minority adults suffering from osteoarthritis being educated to become more physically active by health professionals (Fontaine et al., 2005, Grindrod et al., 2010), it seems this lack of educational support in Iran's health care system is more obvious. Thus, development of knee arthritis management programs that address early multidimensional knee OA management, is guaranteed.

In contrast with the studies that showed the compliance with exercise-based interventions is often low (Grindrod et al., 2010), the findings of present study revealed that many individuals initiates exercise-based lifestyle early after being educated.

One interesting finding of the present study was that the most participants who underwent the nutritionist' recommendations of the multidisciplinary program, stated that they continued weight-loss nutrition behaviors in their life style up to six months in order to earn weight reduction. These behavior changes were significantly better modified in multidisciplinary program group rather than the other group.

This finding supports this claim that the decision to initiate/modify healthy nutrition behaviors rooted from the nutritionist's recommendations of the program and significantly continued up to six months after initial intervention. However, the majority of participants in present study was overweight and may have already been motivated to continue nutrition behavior change for longer time compared with other behaviors. Comprehensive Behavioral Weight Management (BWM) programs have confirmed that self efficacy is an important factor to reduce weight for overweight people though they have not been assessed for OA specifically (Somers et al., 2012). In medication group, who were just underwent physician treatment, there were much less behavior changes than multidisciplinary group. Although, in present study, there is no data to show whether physician actually did recommend lifestyle modifications to control group, it may assume that the less behavior change in this group who just have physician visit may be due to patient's motivation to change their own risky behaviors in order to improve their health problem.

This discuss has been presented elsewhere (Grindrod et al., 2010, Roos et al., 2006). Anyhow, based on the reality of limited multidimensional educational support of Iranian OA patients, it is an important consideration for the development of a comprehensive OA management program that could target early disease management in this country. As no cure is advisable for knee osteoarthritis

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(Dahaghin et al., 2009), the rheumatologist who was a member of multidisciplinary program team in the present study, insisted on preventing risk factors of this health problem as the first line of treatment. Therefore, the rheumatologist in his own educational session confirmed non pharmacological interventions for preventing knee osteoarthritis progress. Complying with this recommendation, the majority studied participants who took part in the program-compared with control participants-significantly reduced their analgesic consumption up to six months after intervention. This is a significant finding, because in some evidences it has been discussed that the decision to consume more analgesic for knee pain relief has been often made on own patients or on their family or friends advice (Grindrod et al., 2010).

Another interesting finding of the present study was the significantly better changed disability reduction trend over 6 months in intervention group. This result was earned through FKAT analysis. This result is in the line of previous evidence that reported multimodal approaches did significantly better benefit than single intervention in terms of psychological disability (Barlow, 2001).

The current study has several limitations. First, it was limited to patients who referred to rheumatology research center and did not provide information on whether these behavioral interventions would provide benefits to general people. Future work should examine the efficacy of the protocol for patients who referred to multi centers in different geographic region of Iran. Next, in this study there were no possibilities to completely inhibit patients from using other probably medication/ interventions beyond physician or health care providers 'recommendations.

Future work should investigate methods of controlling these probably interventions. Additionally, all instruments except for FKAT were self reported that may cause recall bias in collected data. However, the results of this study indicated the significant benefits were provided by multidisciplinary program regarding disability reduction subsequently to life style behavior change among knee OA patients over the course of six months.

Conclusion

This study revealed that the program could significantly reduce risky behaviors and disability up to six months in intervention group. Thus, due to lack of lifestyle behavioral management in health care system of Iran, to embedding this program into clinical practice for managing knee OA pain is recommended.

Conflict of interest

There is no conflict of interest for this study.

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Authors ' contribution

SST: conducted whole study and had full access to all of the data for analysis. Also she was involved in drafting the article

ARJ: assessed the patients and confirmed their eligibility for the study. He took responsibility for conducting the study and the integrity of the data and the accuracy of the data collection.

FJ: participated in conducting the study.

All authors approved the final version of the manuscript.

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