Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2017; 5(7B):2621-2624 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2017.v05i07.025

Original Research Article

Correlation between Balance, Fear of fall and Quality Of Life in Osteoarthritis Knee

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Abstract: Osteoarthritis (OA) is a chronic, progressive musculoskeletal disorder characterized by gradual loss of articular cartilage. Fear of fall and balance impairment in people with osteoarthritis of knee joint is a major cause of loss of independence, which has an effect on quality of life. The aim of this study was to find a correlation between balance, fear of fall and quality of life in knee osteoarthritis patients. 65 subjects of age group 45-60 years, diagnosed with knee osteoarthritis on the basis of American college of Rheumatology (ACR) criteria were recruited. Balance was assessed by berg balance scale (BBS), fear of fall was assessed by the modified fall efficacy scale (MFES) and the quality of life was assessed by the SF-36 Questionnaire. The study showed a positive correlation between fear of fall and balance. It demonstrated a positive correlation between balance, fear of fall and physical component summary (PCS) and mental component summary (MCS) of quality of life. Hence, balance training and strategies to prevent fall should be included in rehabilitation protocol of OA knee patients for a holistic and multimodal approach.
Keywords: Osteoarthritis, balance, fear of fall, quality of life, knee joint.

INTRODUCTION

Osteoarthritis (OA) is a common and progressive musculoskeletal condition affecting the community. It is a chronic degenerative joint disease that is characterized by a degradation of articular cartilage, sclerosis of subchondral bone and osteophyte formation. It mainly affects the weight bearing joints like hip, knee and ankle. Osteoarthritis knee is the most common condition that mainly affects the middle aged and elderly population. It has an effect on the entire joint, not only the knee joint synovial lining but also the cartilage, bone, tendons and ligaments around the knee joint structure. It is associated with breakdown of the cartilage, bony changes of the joints, deterioration of tendons and ligaments, and various degrees of inflammation of the synovium [1]. The osteoarthritis knee symptoms vary greatly among patients depending upon the severity of the disease. The common symptoms include knee joint pain, stiffness, swelling, reduced muscle strength, grinding noise with joint movement, difficulty in walking, climbing stairs and squatting activities. These symptoms start gradually and progress that leads to discomfort [1]. It leads to difficulty in performance of activities of daily living and thus poses a socioeconomic burden on the individual and the society. This in turn has an effect on the quality of life of the individual [2, 3]. There are multiple causative factors that lead to occurrence of knee osteoarthritis– namely systemic and local. Systemic factors like age, gender, obesity and local factors like any joint injury, malalignment and biomechanical factors trigger the pathogenesis of OA knee [3].These factors interplay and leads to occurrence of knee osteoarthritis.

Balance is the most important component of physical functioning and performance of daily activities. Balance is a very complex function that involves various neuromuscular processes. It is based on interaction of the three components – sensory input, central processing and motor output. Sensory input is provided by the vestibular, visual and somatosensory systems from which the information is received. These systems provide the input on the location and movement of the body. This information is processed centrally that results in coordinated neuromuscular responses.

Effective control of balance is brought about by motor output via accurate timely response of strong muscles and thus helps to maintain the relationship between base of support and center of mass. Balance is categorized into two – static & dynamic. Static balance refers to maintenance of equilibrium in static postures like standing or sitting whereas, dynamic balance involves maintenance of equilibrium during motion and is required in activities like walking and climbing stairs [3, 4]. OA knee leads to proprioception loss which contributes to postural instability and impaired balance and thus increasing the risk of fall [4, 5].

According to the World Health Organization, "Quality of Life" is described as an individual's perception of his/ her position in life in the context of the culture and value systems in which he lives and in relation to his goals, expectations, standards and concerns [6]. In patients with knee osteoarthritis, pain leads to reduced physical function which in turn has an impact on their activities of daily living. This takes a toll on economic burden, as well affecting the leisure, social life, and affecting them psychologically, leading to reduction in their quality of life. As all the components appear to be interlinked with each other, they form important perspectives to be looked upon during assessment and management of patients with knee osteoarthritis.

Hence the study aimed to evaluate a correlation between balance, fear of fall, physical function and quality of life in OA knee subjects, which will help us provide wider understanding and give a holistic approach towards the patient for the enhancement of treatment to improve the overall functioning of the individual.

MATERIAL AND METHODS

A cross-sectional study was conducted after the approval of institutional research review committee. 65 subjects in the age group of 40 to 60 years diagnosed with Osteoarthritis knee on the basis of American College of Rheumatology **(ACR) Clinical Classification Criteria for Osteoarthritis of the knee** [7]. Subjects with history of any knee surgery, traumatic injury to knee or on steroidal injection were excluded from the study. Subjects were explained about the nature of the study in the language best understood by them. A duly signed written informed consent was taken from the subjects who were willing to participate in the study. The demographic information of participants, such as, age, gender and dominance were recorded. Balance was assessed using Berg Balance Scale (BBS). It is a 14-item measure that evaluates static and dynamic activities. It has been used in OA knee population to assess balance [8]. The fear of fall was assessed by the Modified Falls Efficacy Scale (MFES) It is a14-item questionnaire which is different from Falls Efficacy Scales as it includes outdoor activities and assess the level of independence in individual not only in protected environment bust also in challenged places [9]. The Quality of Life was evaluated by the 36-Item Short Form Health Survey questionnaire (SF-36). The components are grouped as physical component summary (PCS) and mental component summary (MCS). PCS includes physical functioning, role limitations due to physical functioning, fatigue and pain whereas MCS includes role limitations due to emotional problems, emotional well-being, social functioning and general health [10].

The data collected was analyzed using a SPSS Software (Version 20). Kolmogorov Smirnov test was used for normality analysis of the data which indicated that the data is not normally distributed. Non-parametric test for correlation i.e. spearman's correlation was used for the data analysis to evaluate correlation between the variables. A 5% level of probability was used to indicate statistical significance.

RESULTS

The present study included 65 OA knee patients in the age group of 40 to 60 years. Out of which 17 were males and 48 were females**.** Mean values of age, BBS score, MFES score, PCS score and MCS score are shown in Table 1. Table 2 shows positive correlation between BBS and MFES scores. Table 3 shows positive correlation between BBS, MFES and PCS & MCS scores.

Table−1. Mean and Standard Deviation values of variables

	Mean	Std. Deviation
Age	53.62	4.5
BBS	45.92	5.76
MFES	8.82	0.85
PCS	46.08	17.37
MCS	56.03	17.93

Table−2. Correlation between BBS& MFES

	BBS

MFES	$r = 0.501^{**}$ $p = 0.00$

Table-3. Correlation between BBS, MFES & QOL (PCS & MCS)

	BBS	**MFES**
PCS	$r = 0.417^{**}$ $p = 0.001$	$r = 0.485^{**}$ $p = 0.000$
MCS	$r = 0.416^{**}$ $p = 0.001$	$r = 0.431^{**}$ $p = 0.000$

DISCUSSION:

Osteoarthritis is a progressive musculoskeletal condition. It leads to pain, movement dysfunction and difficulty in performance of daily activities which affects the wellbeing of an individual. The present study aimed to find correlation between balance, fear of fall, and quality of life in individual with knee osteoarthritis. It showed there is positive correlation between balance & fear of fall which indicates that poor the balance, higher is the chance of fear of fall. Balance is an integral component required for the performance of daily activities. Static and dynamic balance is equally necessary for independence of individual. It is noted that balance deficits have been linked to the risk of falling. Aging, a natural process, leads to neuromuscular changes and thus attributes to balance impairments. However, there is occurrence of various neural and muscular deficits in patients diagnosed with osteoarthritis knee. These changes are beyond the normal neuromuscular changes experienced with healthy aging and are linked to the disease [11]. Neuromuscular deficits seen in knee OA patients include increased muscle weakness, impaired proprioception, altered postural control and reduced knee joint range of motion. These deficits alter the static and dynamic balancing capacity of an individual. Pain, a common symptom of OA knee, plays a key role in balance dysfunction. The presence of pain leads to reflex inhibition of muscles around the knee joint that compromise the effective and timely motor responses crucial in postural control. Also, it is noted that pain may result in reduced loading of the affected joint which may jeopardize an individual's ability to maintain their center of mass within the base of support. All these factors lead to impaired balance control. This induces lack of confidence and dependency in the individual. Balance impairments induce fear of fall and reduce the performance of difficult activities leading to reduced physical function [5, 12-14].

According to World Health Organization (WHO), Quality of Life is defined as individual's perception about their life in the perspective of their culture, value systems, goals, expectations, standards and concerns. It is based on various factors like personal physical health, mental status, and level of independence in performance of daily activities, social relationships and environment. The 36-Item Short Form Health Survey questionnaire (SF-36) is an instrument used for evaluating Health-Related Quality of Life [15]. The SF-36 comprises of eight components: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH).It has been reported that SF-36 component analyses two distinct concepts - Physical Component Summary (PCS) and Mental Component Summary (MCS).PCS, a physical dimension, includes the scores of physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), whereas MCS, a mental dimension comprises of vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH) [15].

Impairment of balance in Osteoarthritis knee patients lead to difficulty in maintaining postural stability while performance of various functions such as stair climbing, squatting, sitting and walking [2]. This affects the functional performance and reduces the mobility of the individual [3]. Reduced functional mobility due to presence of physical symptoms related to chronic disease like OA knee leads to decline in quality of life. Due to pain, limitation in the physical function, impaired balance and fear of fall, these individuals face physical, emotional and psychosocial problems. This has an effect on the physical health, social functioning, emotional well-being and general health. This results in decline in quality of life in OA knee patients [2, 5, 12, 16].

CONCLUSION

The study showed that there is a correlation between balance, fear of fall and quality of life in OA knee. Hence, these components should be included during assessment which will provide a holistic and multimodal approach towards the understanding, planning and enhancement of management of OA knee patients. Rehabilitation protocol for OA knee should incorporate exercises to improve balance and also focus on strategies to reduce fear of fall.

Acknowledgements (if any): The authors would like to thank all the participants in this study.

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