

**Original article****Hematological and Anthropometric features of patients with Knee Osteoarthritis**Hafiz Qazi Muhammad Amir<sup>1</sup>, Zohra Jabeen<sup>2</sup>, Sulhera Khan<sup>3</sup>, Sarwat Sultana<sup>4</sup>, Marium Khan<sup>5</sup>, Anas Bin Tariq<sup>6</sup>**Abstract**

**Objectives:** Osteoarthritis (OA) is leading cause of decline in physical activity. The study objectives were to evaluate hematological and anthropometric features in knee OA. **Methodology:** This case control study from March 2019 to August 2019 on patients attending general outpatient department of Naz Memorial Hospital Karachi. Patients above 18 years of either gender, diagnosed as either knee OA on X-ray knee were included. Patients with positive family history, heavy lifting workers, and women on hormonal replacement therapy were excluded. SPSS version 23.0 was used for data analysis. Chi-square test was applied OA and control group keeping p-value of <0.05 as significant. **Results:** From 100 OA patients, 22 were below 50 years, 37 between 51-60, 31 patients between 61-70 and 10 patients above 71. Mean age of patients was  $56.77 \pm 11.26$  years. Mean BMI of OA and control group was  $30.24 \pm 8.98$  kg/m<sup>2</sup> and  $26.64 \pm 6.24$  kg/m<sup>2</sup> (p=0.04). Mean hemoglobin of OA and control group were  $11.20 \pm 1.24$  gm/dl and  $13.3 \pm 2.24$  gm/dl (p=0.04). Mean total cholesterol of OA and control group was  $158.34 \pm 47.83$  mg/dl and  $137.25 \pm 51.22$  mg/dl (p=0.05). Mean low density lipoprotein of OA and control group was  $123.78 \pm 27.29$  mg/dl and  $111.31 \pm 24.39$  mg/dl (p=0.05). **Conclusion:** Age, obesity, hemoglobin, total cholesterol, low density lipoprotein and blood glucose was found to be substantially higher among OA patients when compared with that of controls. Females and older aged patients with bilateral joint involvement were reportedly more frequently with OA.

**Keywords:** Knee Osteoarthritis; Age; Obesity; Gender

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**Introduction**

Osteoarthritis is known as one of the leading cause of reduced physical activities because of pain or stiffness in joints. It is a degenerative disease of joints which is complex disorder, having multifactorial causes between biomechanics and biochemistry having been observed as the most commonly self-reported

cause for disability<sup>1</sup>. Osteoarthritis exerts remarkable effect on the physical as well as functional abilities of patients. OA is the most commonly reported musculoskeletal disease, affecting millions all over the globe. OA is too reported to progress, as in increase in its frequency as a person ages<sup>2</sup>. It is a disorder in which evidence exists where the disease

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is reported higher among females when compared with the frequencies observed in males<sup>3</sup>.

Prior to the age of 50 years, the incidence of OA in some researchers have been reported to be higher in males in comparison to females, however above the 50 years age mark, the prevalence dramatically changes to higher females being affected with OA as compared with males<sup>4</sup>. Another important but modifiable characteristic involved in OA development is obesity. Obesity is a well-known risk factor for OA<sup>5</sup>. National Institute of Health states that since more females than males are obese, having BMI of 30 kg/m<sup>2</sup> or higher, the chances for OA also rise among females more than in males. The frequency has almost doubled in last 10 to 15 years. Nonetheless, for some time it was thought that if the cause of overweight / obesity was the cause of OA or as a result of immobility and disability because of OA<sup>6</sup>.

Current researches have reported that being overweight / obese is a risk factor, leading to OA<sup>7</sup>. Moreover, being overweight / obese has shown to increase risks for progression of OA. A study observed that females that lost a mean of 11 lbs. weight had 50 % less chances or risk for developing OA<sup>8</sup>. Another research reported substantial correlations in-between OA and obesity<sup>9</sup>. The prevalence of OA amongst rural Chinese population is around 13.5 % with obesity being a major modifiable risk factor for OA in addition to gender, age, occupation, dietary habits and cardiovascular disease status<sup>10</sup>. Studies have concluded that a sedentary lifestyle with obesity is a well-established risk factor for OA<sup>11</sup>. Nonetheless the evidence between physical activities and OA has remained inconclusive. Intervening development of obesity especially in early stages of adulthood might help in limiting magnitude of OA along with its prevalence, where disability is directly related to advancing age<sup>12</sup>.

Other than obesity, an imbalance between the enzymes causing cartilage regeneration and degradation is also involved in OA pathogenesis<sup>13</sup>. Genetic predisposition and history of joint trauma or abnormal mechanical forces acting on the joint such as heavy lifting etc. can lead to OA<sup>14</sup>. Among Asians and Pacific residents, the most common rheumatic disorder reported is OA. In India and Bangladesh, the reported incidence of OA is 5.78 % and 10.2 % respectively<sup>15,16</sup>. Researches in Pakistan have reported higher prevalence of knee OA, i.e. 28 % in urban and 25 % in rural population<sup>17</sup>.

Several studies have been conducted regarding knee OA throughout the world but very few have been conducted in Pakistan. Searching local literature regarding OA has therefore remained scarce in exploring factors linked with OA. Therefore objectives of this research were to evaluate the hematological and anthropometric features of patients with knee OA.

## Methodology

This case control observational study was carried out using non-probability convenient sampling technique for a period of 6 months from March 2019 to August 2019. Patients attending the general out-patient department of Naz Memorial Hospital Karachi were included in the study after taking informed consent from patients selected via the inclusion criteria. Patients above 18 years of age of either gender, diagnosed as a case of either knee OA on X-ray knee of either joint or giving consent to participate in the study were included. Patients having a positive family history, mill workers, farmers, jack-hammer operators (heavy lifting workers), and women on hormonal replacement therapy and hemochromatosis patients were excluded from the study.

Main variables associated with OA included age, gender, obesity (using weight and height), hemoglobin, total leukocyte count, platelets, lipid profile, random blood glucose, joint involvement and severity of disease. Data was analyzed using SPSS 23.0v. For continuous variables like age, weight, height, BMI and hematological parameters, mean and standard deviation was reported while for categorical variables such as for gender, joint involvement and disease severity, frequency and percentages were recorded.

**Ethical clearance:** This research was approved by Ethical Review Committee of Naz Memorial Hospital, Karachi.

## Results

From the 100 OA patients in the study, 22 were below the age of 50 years, 37 patients were between 51-60 years of age while 31 patients were between 61 and 70 years and 10 patients were above 71 years of age [Figure I].

The mean age of patients was  $56.77 \pm 11.26$  years with mean weight of  $73.60 \pm 7.90$  kg and mean height of  $1.56 \pm 0.44$  m. The mean BMI of OA patients was  $30.24 \pm 8.98$  kg/m<sup>2</sup> while in the control group the mean BMI was significantly lower i.e.  $26.64 \pm 6.24$

kg/m<sup>2</sup> (p=0.04). The mean hemoglobin of OA patients was 11.20 ± 1.24 gm/dl, mean total leukocyte count was 8.27 ± 3.12 mm<sup>3</sup> and mean platelets was 254.62 ± 82.51 mm<sup>3</sup>. Mean hemoglobin in control group was 13.3 ± 2.24gm/dl (p=0.04), mean total leukocyte count was 7.9 ± 4.91 mm<sup>3</sup> (p=0.12) and mean platelets were 250.54 ± 86.65 mm<sup>3</sup> (p=0.23). The mean total cholesterol of the OA patients was reported to be 158.34 ± 47.83 mg/dl and 137.25 ± 51.22 mg/dl in control group (p=0.05). Mean high density lipoprotein of the OA patients was found to be 40.42 ± 9.22 mg/dl and 40.94 ± 8.34 mg/dl in control group (p=0.76). The mean low density lipoprotein of OA patients reported was 123.78 ± 27.29 mg/dl and 111.31 ± 24.39 mg/dl in control group (p=0.05). The mean random blood glucose levels of OA patients were recorded to be 137.19 ± 53.18 and 121.46 ± 51.17 mg in the control group (p=0.05) [Table I].

**Table I:** Baseline demographics of osteoarthritis patients vs controls

Variables	Osteoarthritis group (n=100) Mean ± Standard Deviation	Control group (n=100) Mean ± Standard Deviation	p-value
Age (years)	56.77 ± 11.26	48.43 ± 9.67	0.05
BMI kg/m <sup>2</sup>	30.24 ± 8.98	26.64 ± 6.24	0.03
Hemoglobin gm/dl	11.20 ± 1.24	13.3 ± 2.24	0.04
Total Leukocyte Count mm <sup>3</sup>	8.27 ± 3.12	7.9 ± 4.91	0.12
Platelets mm <sup>3</sup>	254.62 ± 82.51	250.54 ± 86.65	0.23
Total Cholesterol mg/dl	158.34 ± 47.83	137.25 ± 51.22	0.05
High Density Lipoprotein mg/dl	40.42 ± 9.22	40.94 ± 8.34	0.76
Low Density Lipoprotein mg/dl	123.78 ± 27.29	111.31 ± 24.39	0.05
Random Blood Sugar mg/dl	137.19 ± 53.18	121.46 ± 51.17	0.05

Among the total of 22 patients below 50 years, 07 % were males and 15 % females. In the 51-60 year age group, from total 37 patients, 14 % were males and 23 % females. Among 31 patients that were in the 61-70 years age group, 13 % were males while 18 % females. From the total of 10 patients above 71 years of age, 04 % were males while 06 % were females. 18 % of patients below the age of 50 years reported unilateral knee joint involvement in OA while 04 % were observed to have bilateral involvement. In the 51-60 years age group, 13 % patients had unilateral

joint involvement while 24 % had bilateral joint involvement. 08 % patients that were between 61-70 years reported unilateral joint involvement while 23 % showed bilateral involvement. 01 % patient above 71 years had unilateral involvement while 09 % had bilateral knee joint involvement in OA. In patients below the age of 50 years, 04 % patients reported mild OA, 15 % moderate OA while 03 % severe OA. In the 51-60 years age group, 12 % had mild, 19 % had moderate while 06 % showed severe OA. In the 61-70 years age group, 07 % had mild, 13 % had moderate while 11 % showed severe OA. In the patients above 71 years of age, 02 % had mild, 03 % had moderate while 05 % reported severe OA [Table II].

**Table II:** Age wise distribution of patients having joint involvement and disease severity

Variable		<50 years n=22	51-60 years n=37	61-70 years n=31	>70 years n=10
Gender	Male	07	14	13	04
	Female	15	23	18	06
Joint involvement	Unilateral	18	13	08	01
	Bilateral	04	24	23	09
Disease severity	Mild	04	12	07	02
	Moderate	15	19	13	03
	Severe	03	06	11	05

## Discussion

According to the results of the study, a significant difference between mean BMI and obesity was reported between OA patients and the control group (p=0.03). This showed that body weight and / or obesity tends to have a strong co-relation with OA. Similar results have also been published in other studies as well where a significant association between obesity i.e. increased BMI with OA was reported<sup>18</sup>. In our study, in addition to BMI, mean hemoglobin, total cholesterol, low density lipoprotein and random blood glucose were also reported to be significantly higher among OA patients, as compared with controls.

A study by Al-Afraj et al reported a significantly higher BMI among OA patients. The study added that OA of knee in general and generalized in females was associated with higher frequencies of obesity among the Saudis<sup>19</sup>. Widmyer et al in another study also found a strong relation between OA and obesity, regarding inflammation and biochemical variation in

the joint and its surroundings lead to pathogenicity of OA<sup>20</sup>. In yet another study, Martin et al reported that occupational and mechanical stress leads to increasing chances for OA development and through adaptation of healthier, physically more active lifestyle can help to alleviate this problem<sup>21</sup>.

Unilateral joint involvement was observed to be higher among the below 50 years age group in our study. However as the age increased, joint involvement was more frequently reported to be bilateral. Similarly, other studies have also reported the same where in a study, 85.7 % of all OA cases between 40-50 years of age reported unilateral joint involvement while as the age increased to about 71-80 years, joint involvement progressively increased to both the knees<sup>22</sup>.

Our study also reported that OA presented in older aged patients since it is regarded as the disease of old age. Though regarded as progressive disorder, our study showed that most patients were between 51 to 70 years of age. Likewise, other studies such as Muraki S et al observed that majority of the women having OA were between 45 to 65 years of age<sup>23</sup>. Similarly, Suri P et al also reported that old age was a major and one of the most vital risk factor for developing and progressing of OA<sup>24</sup>. Another study observed that the population above the age of 55 years reported far more cases of OA than compared with younger age groups<sup>25</sup>. Similarly another research reported OA patients being present in older age groups<sup>26</sup>.

Studies have reported that not only increasing age and obesity tend to be a risk factor for OA development or progression but in addition, gender, leisure time activities, family history / genetic predisposition, history of smoking, metabolic syndrome and physical activities also play a part in OA<sup>27</sup>. Some researchers have reported that smoking tends to increase risks for developing OA. Nonetheless, the pathogenicity or mechanism behind this increased risk is not yet known. Regarding gender, higher ratios of females with OA have been reported as compared with males. The difference could partly be due to lack of physical activities, social isolation, immobility and prevalence of obesity being higher among females generally. Similar to the findings of our study, Soomro et al in their research in Pakistan reported as high as 92.8 % of OA patients being females and over 50 % belonging to rural areas. The study concluded that majority of the patients lacked knowledge regarding OA<sup>28</sup>.

A case report from Bangladesh reported an

uncommon case of gouty arthritis in a 16 year old boy showing that joint pain among pediatric age group is common due to overuse and traumatic injuries, however diagnosing arthritis can be diagnostically a challenge since multiple site joint pain, recurrent or persistent can sometimes suggest other diagnoses as well. Therefore it is vital to diagnose arthritis for early management and prompt rehabilitation from debilitation (29). Likewise in a study it was observed that OA patients were found to be in middle between fibromyalgia and somatization in most cases, however there were no significant findings with respect to the psychological symptoms of OA patients after eliminating confounding factors (30).

The main factor causing limitations in the study were limited sample size being selected from a single secondary care center where usually patients presented with mild to moderate OA. Thus the bias for determining results of more severe cases was compromised. In addition, the study was not immune from selection, observer and re-call bias. The study was also not designed to determine any temporal relationship or biological plausibility. A single centered study with limited sample size would be better if more multi-centered studies with larger sample size are carried out to be able to generalize the results to other centers as well. Due to lack of resources, this study could not do so.

### Conclusion

According to the results of the study age, obesity, hemoglobin, total cholesterol, low density lipoprotein and blood glucose was found to be substantially higher among OA patients when compared with that of controls. In addition, females and older age group patients with bilateral joint involvement were reportedly more frequently with OA.

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### Author Contribution:

Dr. Hafiz Qazi Muhammad Amir: Study design, editing and approval of final draft

Dr. ZohraJabeen :Idea owner of study, editing and approval of final draft

Dr. Sulhera Khan: Writing, editing final draft

Dr. Sarwat Sultana: Idea owner of study, study design

Marium Khan: Study design, editing final draft

Dr. Anas Bin Tariq: Data gathering, writing and submitting manuscript



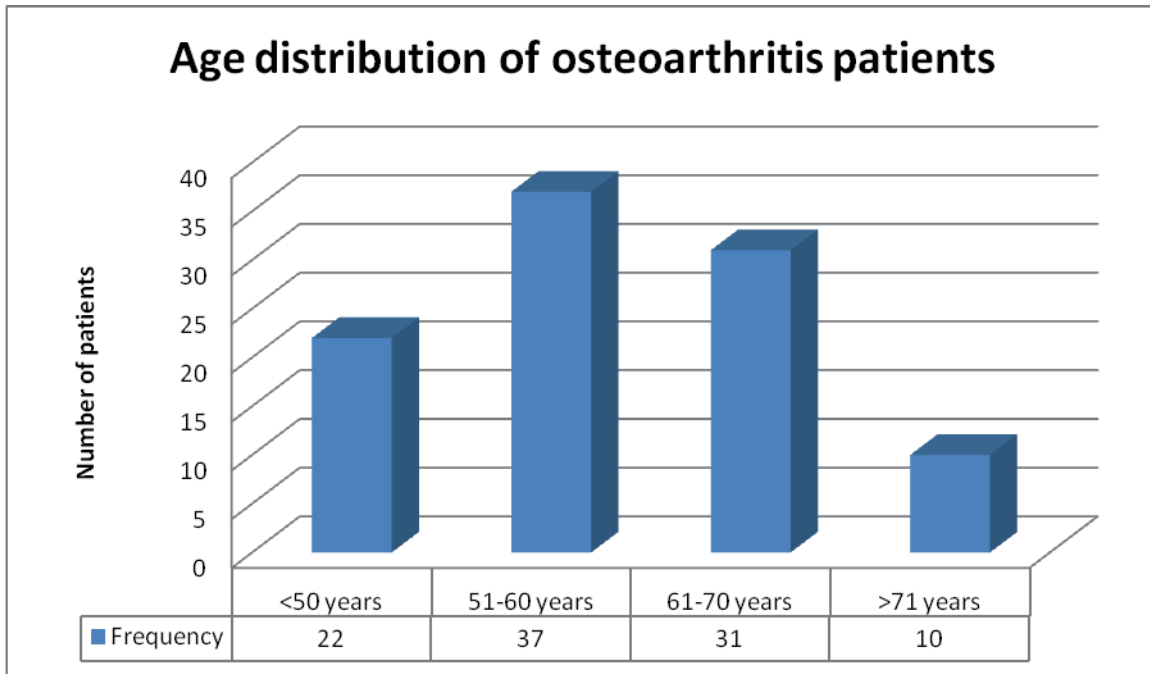


Figure I: Age distribution of patients with knee osteoarthritis

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