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Impact of Age and BMI on Osteoarthritis in postmenopausal females

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Abstract

Background: In general, women present for treatment in more advanced stages of Osteoarthritis (OA) and have debilitating pain. This study was conducted to see the impact of age & body mass index with Osteoarthritis in postmenopausal females.

Material & methods: This cross sectional study was conducted in the department of Orthopaedics from 1st July to 31st July 2020 at Varun Arjun Medical College, Shahjahanpur, U.P., India in100 females in the age group of 40 to 65 years. Considering the upper limit of menopause being 52 years, women were divided in two groups as 40-52 years & 53-65 years to evaluate the effect of age & BMI of postmenopausal females on OA.

Results: In this study, in 50 study subjects of 40-52 years age group, only 2(4%) were underweight, majority i.e. 32 (32%) were of normal body mass index, 8 (16%) were overweight while 8(16%) were obese. In 50 females in 53-65 years age group, only 1(2%) subject was underweight, 13 (26%) were of normal body mass index, 17(34%) were overweight while 19(38%) were obese.

In 40-52 years age group, 12(24%) subjects had Osteoarthritis & majority i.e 38(76%) were not suffering from Osteoarthritis.

In 53-65 years age group, majority i.e. 35(70%) of subjects had proven Osteoarthritis while only 15(30%) were not suffering from Osteoarthritis.

Conclusion: Osteoarthritis has become one of the commonest diseases of advanced age. In our study, over weight and older age were strongly associated with OA. Weight reduction can reduce the disease process. There is high cost of surgical treatment. Preventive measures can decrease the requirements for replacement surgery

Keywords: Women, Knee, Osteoarthritis, Treatment, Total Knee Arthroplasty, Elderly

Introduction

Osteoarthritis (OA) is one of the major problems producing significant morbidity. It is a chronic degenerative disorder of joints causing loss of articular cartilage, hypertrophy of bone at the margins and subchondral sclerosis.[1]

Etiology of OA is multi factorial affecting joints of extremities and spine particularly of weight bearing

joints. OA of knee is a common cause of pain and disability in elderly people.[1]

There is strong relationship between knee OA and obesity.[2]

In India, 65% of cases of OA are in the age group of 51-65 years.[3]

Increasing age is a one of the strongest risk factors for OA of all joints probably due to cumulative exposure to various risk factors and biologic changes that occur with aging. This may make a joint less able to cope with adversity.[4]

Obesity and overweight are potent risk factors for OA, especially OA of the knee.[4]

Postmenopausal women who take estrogen replacement therapy have a decreased chance of developing radiographic evidence of knee arthritis. The protective effect of estrogen replacement therapy increases with the duration of the therapy.[5]

Weight-loss decreases pain and disability in established knee OA.[6]

Patients are usually over the age of 50. They complain of pain and stiffness in the affected joint(s). Pain exacerbates with activity and relieved by rest. Early morning stiffness is seen for less than 30 minutes.[7]

Joint tenderness and crepitus on movement can be present. Swelling may be due to bony deformity like osteophyte formation, or effusion caused by synovial fluid accumulation. Systemic symptoms are absent. Erythrocyte sedimentation rate is normal.[7]

Symptomatic OA is defined by the presence of pain, aching, or stiffness in a joint with radiographic signs of OA. [8]

OA can be defined pathologically, radiographically as well as clinically. Radiographic OA is considered the reference standard. The most common method for radiographic diagnosis is the Kellgren-Lawrence (K/L) grading. This defines OA by the presence of a definite osteophyte (Grade≥2), and more severe grades by the successive appearance of joint space narrowing, sclerosis, cysts, and deformity.[9]

Kellgren and Lawrence classification [14-]

Grade 0 (none): definite absence of x-ray changes of osteoarthritis

Grade 1 (doubtful): doubtful joint space narrowing and possible osteophytic lipping

Grade 2 (minimal): definite osteophytes and possible joint space narrowing

Grade 3 (moderate): moderate multiple osteophytes, definite narrowing of joint space and some sclerosis and possible deformity of bone ends

Grade 4 (severe): large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformity of bone ends

Osteoarthritis is deemed present at grade 2 although of minimal severity.

Not all persons who have radiographic OA have clinical disease, and not all persons who have joint symptoms demonstrate radiographic OA.[10]

Still, radiographic measurement of joint space width remains the method of choice for evaluation of efficacy of disease modifying drug.[11]

Persons having severe radiographic OA are having joint pain more than those with milder radiographic abnormalities.[12]

The non-operative management of osteoarthritis is multimodal, and may include exercise, weight loss, physiotherapy, bracing, non-steroidal anti-inflammatory drugs, corticosteroid injections, viscosupplementation injections. Exercise can reduce pain and increase function in a patient with early arthritic changes.[13]

Considering the upper limit of menopause being 52 years, women were divided in two groups as 40-52 years & 53-65 years to evaluate the effect of age & BMI of postmenopausal females on OA.

Aims and Objectives

- To estimate the prevalence of knee osteoarthritis among women in the age group of 40 to 65 years
- To evaluate the effect of age and body mass index (BMI) in postmenopausal women on knee osteoarthritis.

Material & methods

This cross sectional study was conducted in the department of Orthopaedics at Varun Arjun Medical College, Shahjahanpur, U.P., India. A convenient sample of 100 females in the age group of 40 to 65 years was included in the study. Considering the upper limit of menopause being 52 years, women were divided in two groups as 40-52 years & 53-65 years to evaluate the effect of age & BMI of postmenopausal females on OA. Verbal consent was taken from all study participants. Study duration was one month i.e 1st July to 31st July2020. Pre-Tested & validated questionnaire was used.

Inclusion criteria

- Females between age 40-65 years
- Females with non traumatic knee pain
- Willingness to participation

Exclusion criteria

- Females <40 years
- Females >65 years
- Secondary OA
- Not willing to give consent.

Statistical analysis was done with percentages and chi square test. Data were analyzed using statistical package for the social sciences (SPSS) software

Results

Table 1-Age distribution of study subjects n=100

Age group	No. of subjects	Percentage
45-52 years	50	50%
53-65 years	50	50%

In present study, considering the upper limit of menopause, 50 (50%) subjects were in 40-52 years age group while 50 (50%) subjects were in 53-65 years age group. (Table 1)

Table 2: Body mass index of study subjects n=100

BMI	No. of subjects 40-52 years n=50	No. of subjects 53-65 years n=50
<18 Underweight	2 (4%)	1 (2%)
18-23 Normal	32 (32%)	13 (26%)
23-25 Overweight	8 (16%)	17 (34%)
>25 Obese	8 (16%)	19 (38%)

Pearson Chi square test (df=3)=16.0770, p=0.001 Highly significant

In present study, out of 50 subjects from 40-53 years age group, only 2(4%) were underweight, majority i.e. 32 (32%) were of normal body mass index, 8 (16%) were overweight while 8(16%) were obese.

In present study, out of 50 subjects from 53-65 years age group, only 1(2%) subject was underweight, 13 (26%) were of normal body mass index, 17(34%) were overweight while 19(38%) were obese.

Thus, majority of subjects from older age group were overweight & obese. The association of age & BMI was significant. (Table 2)

Table 3: Prevalence of Osteoarthritis in study subjects

Osteoarthritis	No. of subjects 46-52 years	No.of subjects 53-65 years
Absent	38(76%)	15(30%)
Present	12(24%)	35(70%)

Pearson Chi square test (df=1) = 21.2365, p=0.001 Highly significant

Prevalence Odd Ratio (OR) =0.79 95% Confidence Interval 2.80-19.83

In present study, out of 50 subjects from 40-52 years age group, 12(24%) subjects had Osteoarthritis & majority i.e 38(76%) were not suffering from Osteoarthritis.

In present study, out of 50 subjects from 53-65 years age group, majority i.e. 35(70%) of subjects had proven Osteoarthritis while only 15(30%) were not suffering from Osteoarthritis. (Table 3)

A strong positive association between prevalence of OA with increasing has been demonstrated as OR=7.39 indicates that women of 53-65 years age group are almost carrying 7 times more risk of OA as compared to women in the age group of 40-52 year. The association has been proven to be statistically significant.

Table 4-Knee replacement needed in study subjects

Knee replacement done	No. of subjects 46-52 years	No. of subjects 53-65 years
Yes	1(2%)	18(36%)
18	49 (98%)	32(64%)

Pearson Chi square test (df=1) = 18.7784, p=0.001 highly significant

Odds Ratio (OR) = 27.56, 95% Confidence Interval=13.87-1171

In present study, out of 50 subjects from 40-52 years age group, only 1(2%) subject needed knee replacement while from 53-65 years age group, 18(36%) subjects needed knee replacement. (Table 4)

A strong positive association between knee replacement & increasing age has been demonstrated as OR=27.56 indicates that women in 53-65 years age group are carrying a very high risk i.e.27 times more risk of OA as compared to women in the age group of 40-52 years for knee replacement. The association has been proven to be statistically significant.

Discussion

In present study, considering the upper limit of menopause, 50 (50%) subjects were in 40-52 years age group while 50 (50%) subjects were in 53-65 years age group.(Table 1)

Roy MK et al found that among 100 participants, mean age of the participants was 56.24±6.34. 39 (39%) participants were in age group of 46 to 55 years and 61 (61%) were in age group of 56 to 65 years. Total 65 (65%) participants were affected by knee osteoarthritis. 29.2% were in the younger age group. 78.2% were in advanced age group. [14]

In present study, out of 50 subjects from 40-53 years age

group, only 2(4%) were underweight, majority i.e. 32 (32%) were of normal body mass index, 8 (16%) were overweight while 8(16%) were obese.

In present study, out of 50 subjects from 53-65 years age group, only 1(2%) subject was underweight, 13 (26%) were of normal body mass index, 17(34%) were overweight while 19(38%) were obese.

Thus, majority of subjects from older age group were overweight & obese. Pearson Chi square test (df=3) =16.0770, p=0.001 highly significant. (Table 2)

Roy MK et al also found that compared to normal weight, overweight increased the risk of OA. Amongst participants with BMI (≥25) 56 (81.8%) participants

were affected by knee osteoarthritis which is significantly more (81.8% versus 18.2%; p=0.000). [14]

A. Shmagel et al found that BMI of knee osteoarthritis participants was 15.4% (≤18.5), 15.4% (18.51-24.99) and 69.2 % (≥25) respectively.[14]

A. Shmagel et al found that majority of the 2548 Osteoarthritis Initiative subjects with baseline radiographic knee OA (analytical cohort) were between 45 and 69 years old (72.7%), female (57.8%), Caucasian (77.2%) and overweight (mean BMI 29.6). [15]

Pearson Chi square test (df=1)=21.2365, p=0.001 Highly significant

Prevalence Odd Ratio (OR)=0.79 95% Confidence Interval 2.80-19.83

In present study, out of 50 subjects from 40-52 years age group, 12(24%) subjects had Osteoarthritis & majority i.e 38(76%) were not suffering from Osteoarthritis.

In present study, out of 50 subjects from 53-65 years age group, majority i.e. 35(70%) of subjects had proven Osteoarthritis while only 15(30%) were not suffering from Osteoarthritis. (Table 3)

A strong positive association between prevalence of OA with increasing has been demonstrated as OR=7.39 indicates that women of 53-65 years age group are almost carrying 7 times more risk of OA as compared to women in the age group of 40-52 year. The association has been proven to be statistically significant. (Table 3)

M.J.W. Van der Oest et al found that the prevalence of radiographic OA for the 50-year-old participants was 7.3%.[16]

S.Swain et al found that the incidence of any OA in 2017 was 6.8 per 1000 person-years (95% CI 6.7 to 6.9) and prevalence was 10.7% (95% CI 10.7–10.8%). The incidence of any-OA decreased gradually in the past 20 years at an annual rate of −1.6% (95%CI -2.0 to −1.1%). The prevalence of any-OA increased gradually at an annual rate of 1.4% (95% CI 1.3–1.6%). [17]

Pearson Chi square test (df=1)=18.7784, p=0.001 Highly significant

Odds Ratio (OR)=27.56, 95% Confidence Interval=13.87-1171

In present study, out of 50 subjects from 40-52 years age group, only 1(2%) subject needed knee replacement while from 53-65 years age group, 18(36%) subjects needed knee replacement. (Table 4)

A strong positive association between knee replacement & increasing age has been demonstrated as OR=27.56 indicates that women in 53-65 years age group are carrying a very high risk i.e.27 times more risk of OA as compared to women in the age group of 40-52 years for knee replacement. The association has been proven to be statistically significant. (Table 4)

S.T. Skou et al found that In the trial of 100 patients eligible for TKR, 2-year follow-up data were available for 47/50 (94%) in the non-surgical treatment group and 43/50 (86%) in the TKR followed by non-surgical treatment group. 16/50 patients (32%) from the non-surgical treatment group had a TKR before the 2-year follow-up, mean duration 8.7 (2.6–21.5) months; three patients had TKR between 1 and 2 years). [18]

Limitations

- Single center study
- Small sample size. So, the findings might not reflect the true prevalence
- This is a merely a hypothesis generating study. A case control study might be better design to study nature & strength of association rather than the cross-sectional design used in this stidy.

Conclusion

Due to increase in life expectancy worldwide, Osteoarthritis has become one of the commonest diseases of advanced age. It keeps large burden on public health services. In our study, over weight and older age were strongly associated with OA.

Weight reduction can reduce the disease process. There is high cost of surgical treatment. Preventive measures can decrease the requirements for replacement surgery

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