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Association between increasing age, obesity and heredity with osteoarthritis of knee joint among middle aged and old aged population

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ABSTRACT

Osteoarthritis is one of the major problems that are faced by the people in developed countries but also present all over the world. There are so many factors that affect the cause of osteoarthritis, majorly it is found to be age, sex, occupation and much more. The increase in BMI can increase the probability of development of osteoarthritis. The study has been conducted among the Chennai population involving 100 participants. Self-administered questionnaire is circulated through online mode and the responses have been collected. It was observed that the majority of the people participated were aware of osteoarthritis and many think that obesity, heredity and age are the major cause of osteoarthritis of the knee joint. It is concluded that people though have awareness of osteoarthritis, the knowledge about the risk factors, the effects and future problems caused by knee joint osteoarthritis remains sparse among the population. Hence the probable risk factors of knee osteoarthritis such as age, sedentary lifestyle and obesity, unhealthy diet and heredity seems to play a key role in knee OA and has to be considered seriously for the prevention and management of this disease. Upon considering these aspects people can have a good approach towards the disease and its management which serves as the basic requirement of proper lifestyle for betterment of life.

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INTRODUCTION

Osteoarthritis (OA) is a joint disorder that contains multi cause etiology including both systemic and local causes. The etiological causes include age, sex, change in hormone and also genetic factors that assess the susceptibility of a person (Riyazi, 2008). Characteristics of osteoarthritis include loss of articular cartilage at the margin of hypertrophy of bone, subchondral sclerosis, range of biochemical and morphological alterations of the synovial joint membrane and capsule (Pal, 2016).

Osteoarthritis is the major problem in the developed countries. It is relatively more consistent in women (Hart and Spector, 1993). Aging is the primary risk factor for the development of osteoarthritis (Loeser, 2013). Elderly females along with obesity are the major risk factors for OA. Maintenance of weight decreases the risk of OA and the actual grading is based on the X-ray, the major problem for the

hip and knee replacement.

Osteoarthritis forms the link with obesity features (Minafra, 2014). OA of the knee joint is the most common type of arthritis. Increase in 5 units of body mass index increases the risk up to 35% of the knee OA (Jiang, 2012). Though osteoarthritis is a common disease of joints affecting all joints in the body, it affects more on the joints of hands, knee, hip and even the vertebral column. It is most common among elderly people and people with work conditions involved in more joint usage like carrying heavy weights, etc. These types of work related damage can affect the joints in the body and become wear and tear earlier and faster when compared to common people.

Based on the previous studies done on marital status, increased BMI, short stature for men and heavy physical labour in females is the important factor for the high risk of familial OA. The association between overweight, obesity in different age groups increases the risk of osteoarthritis of the knee joint (Ismail *et al.*, 2006). The radiograph diagnosis is being done to confirm the presence of OA commonly in females above 45 years and below 45 years in males are the risk factors. The study also highlights the importance of the multidisciplinary and the translational medical approach (Subashri and Thenmozhi, 2016). The major challenge that was faced by the previous researchers was that there has been misclassification due to the multiple sites affected and the intervention for obesity where the younger life may affect the outcome.

Previously our Institution has conducted and published several somatometric studies and anthropometric studies (Nandhini, 2018). The current study has sprouted from these areas of research which stimulated to carry out survey studies on common prevalent diseases in the society. Our college has also done pioneering research on various in vivo animal studies (Seppan, 2018) and survey based studies. The present study has emerged from these multidisciplinary areas of research, which gave an interest to carry out research on epidemiological surveys.

Necessity of the research is to compare the old aged and the middle-aged population and the decrease the disability of OA of knee and to assess the factors affecting OA (Johnson, 2020). This research fulfills the intervention for obesity and younger life. The aim of this study was to determine the association between increasing age, obesity and heredity with osteoarthritis of knee in middle-aged and old aged population- a survey based study.

MATERIALS AND METHODS

The study has been conducted through an online setting and the population involved is the Chennai population. The research approval has been done by the institutional review board approval is obtained and no human and animal ethical approval is needed. The sample size included 100 participants and the questionnaire was distributed through online mode.

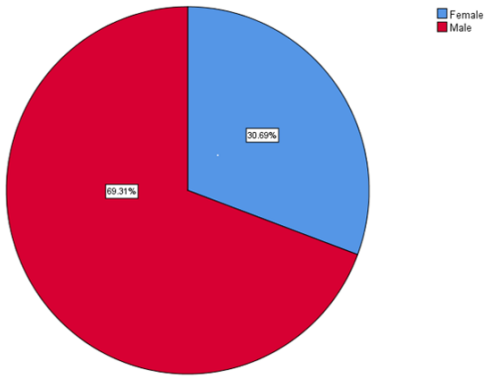

Figure 1: Pie chart shows the percentage distribution of gender of the survey participants

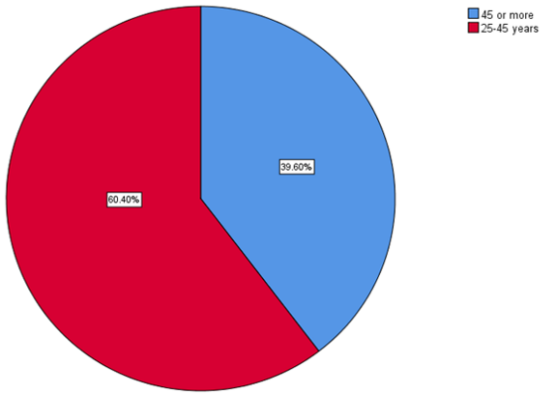

Figure 2: Pie chart shows the percentage distribution of age of the survey participants

This study sampling method is random sampling and the measures taken to minimize the bias is randomization including age, obesity, heredity etc. the internal validity is that the questions are pre-tested including the health condition status and is collected through the email. External validity includes the cross verification along with the existing study. The statistical test done was descriptive statistics with frequency distribution. The statistical software used was SPSS version 20.0. To analyze association between the variables Chi square test was performed. The independent variable includes the demographic factors such as gender and occupation. A Dependent variable includes heredity of knee OA, obesity and age.

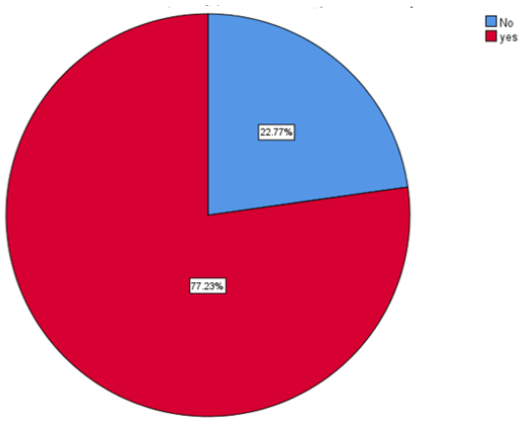

Figure 3: Pie chart shows the percentage distribution of awareness of osteoarthritis among the survey participants

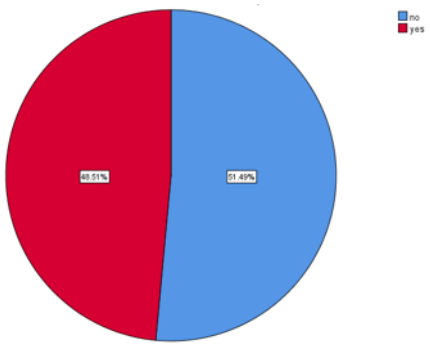

Figure 6: Pie chart shows the percentage distribution of obesity among the survey participants

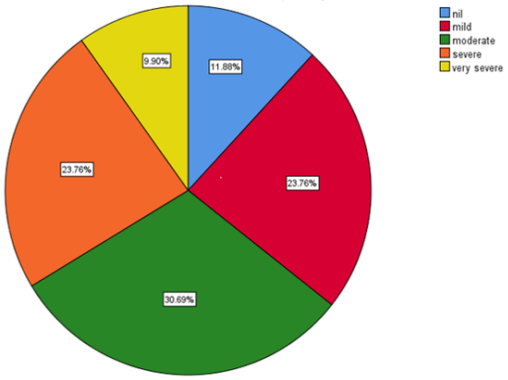

Figure 4: Pie chart shows the percentage distribution of knee joint pain among middle aged and old aged population

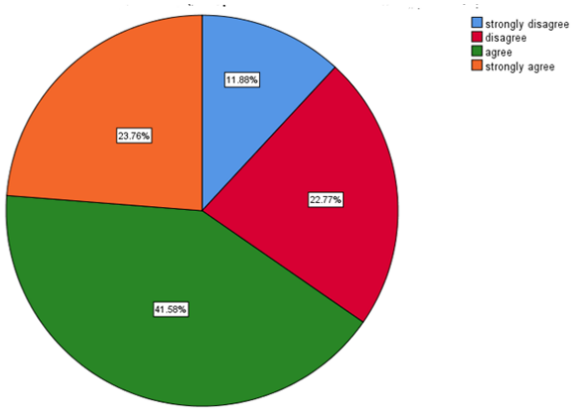

Figure 7: Pie chart shows the percentage distribution of obesity as a factor for osteoarthritis among the survey participants

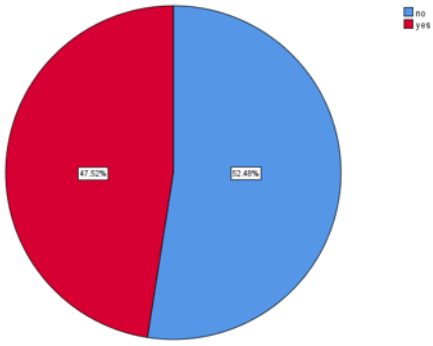

Figure 5: Pie chart shows the percentage distribution of diagnosis of osteoarthritis among the survey participants

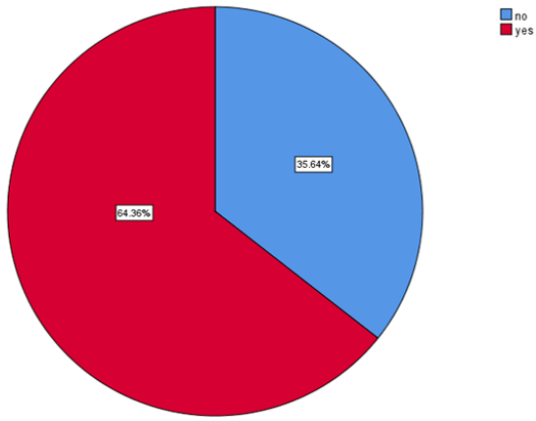

Figure 8: Pie chart shows the percentage distribution of family members with osteoarthritis among the survey participants

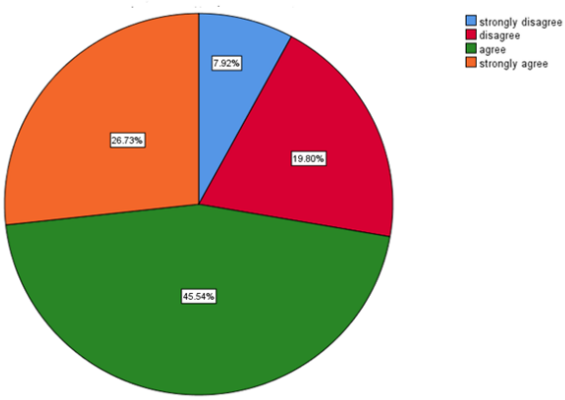

Figure 9: Pie chart shows the percentage distribution of heredity as a factor of osteoarthritis among the survey participants

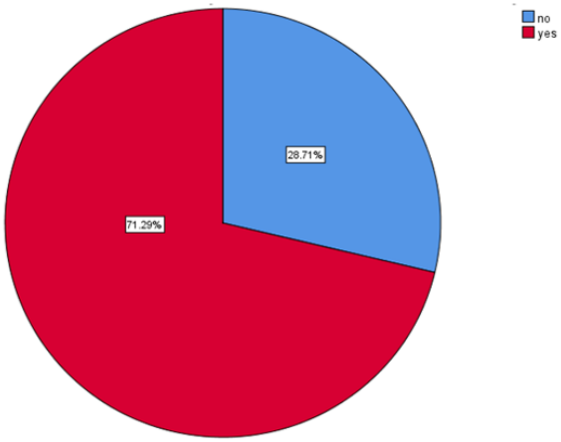

Figure 10: Pie chart shows the percentage distribution of responses on whether reduced weight decreases the probability of osteoarthritis among the survey participants

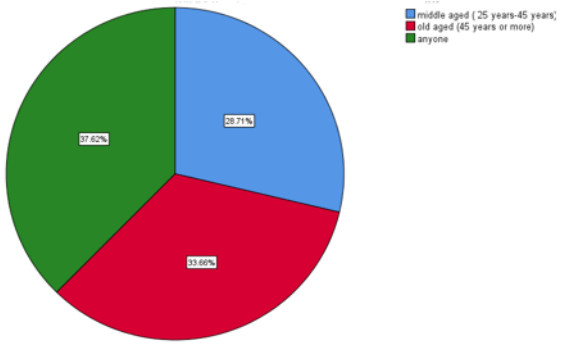

Figure 11: Pie chart shows the percentage distribution of responses on the age at which osteoarthritis is more prone among the survey participants

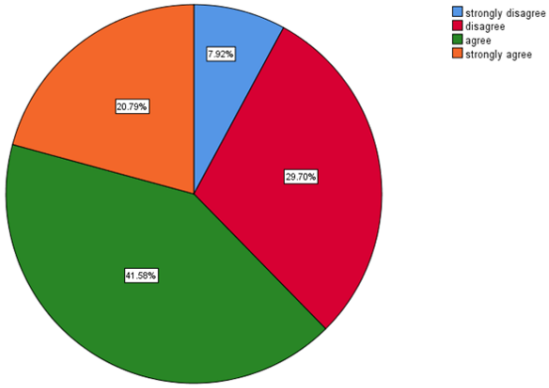

Figure 12: Pie chart shows the percentage distribution of previous injury and osteoarthritis among the survey participants

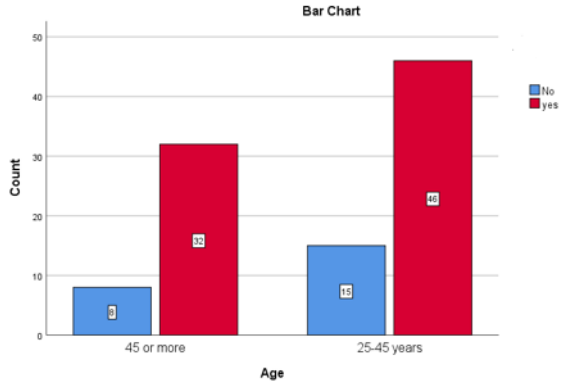

Figure 13: Showing association between age and awareness of knee osteoarthritis

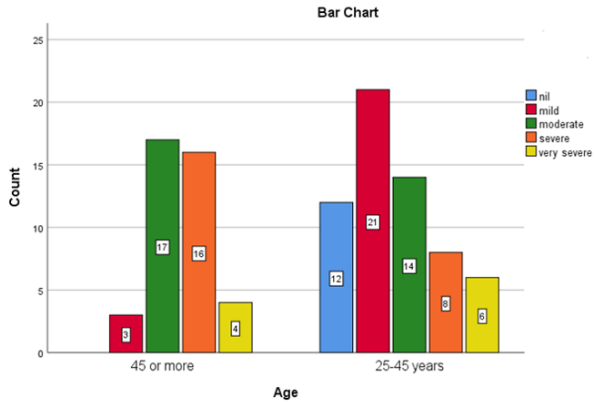

Figure 14: Showing association between age and knee joint pain

RESULTS AND DISCUSSION

Based on the gender of the survey study, male participants were predominant than females. The males were 69.31% and females were 30.69% (Figure 1). The age of the participants ranged from 25-45 years was 60.40% (Figure 2). From the survey study it was observed that 77.23% of the people were aware and 22.77% were not aware of OA (Fig-

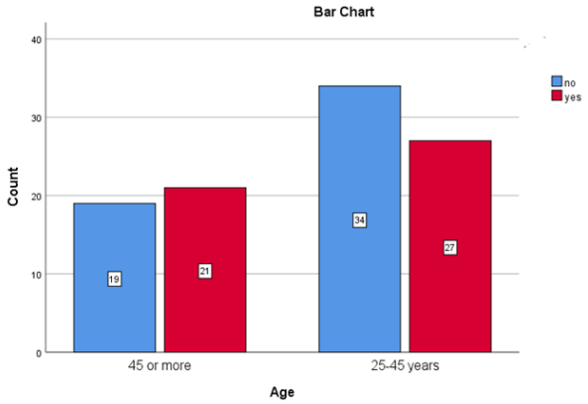

Figure 15: Showing association between age and diagnosis of osteoarthritis

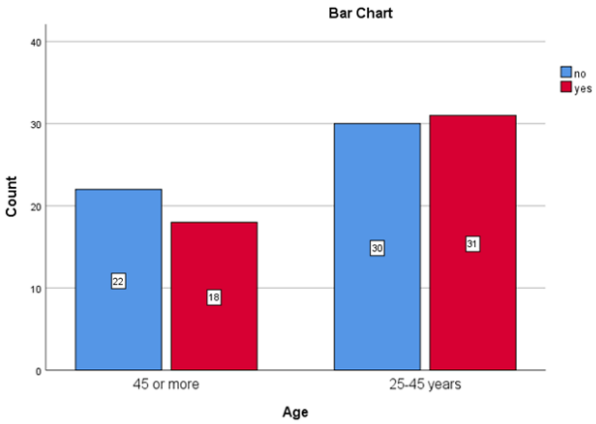

Figure 16: Showing association between age and obesity

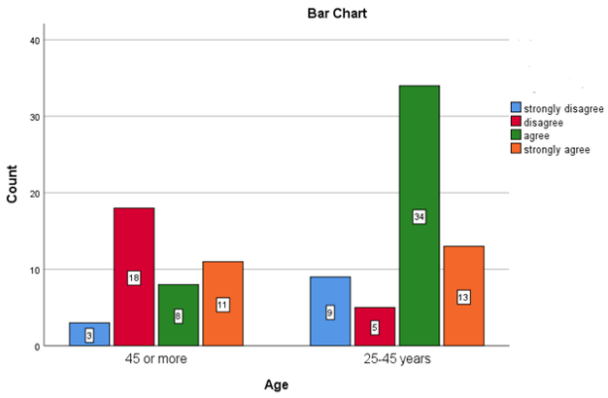

Figure 17: Showing association between age and obesity as a factor for osteoarthritis

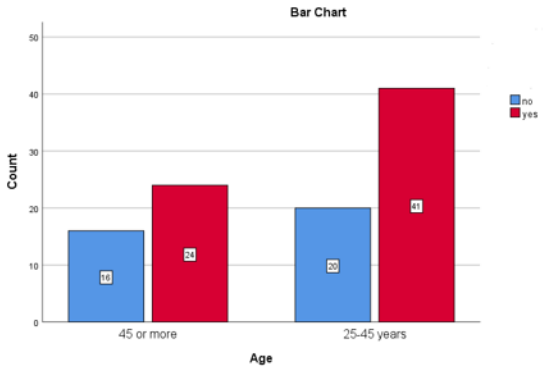

Figure 18: Showing association between age and family member with osteoarthritis

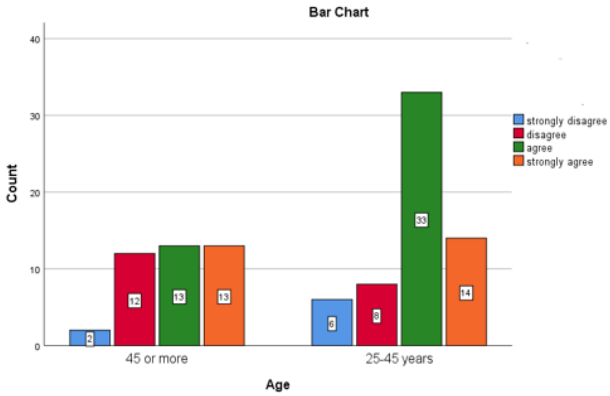

Figure 19: Showing association between age and heredity as a factor

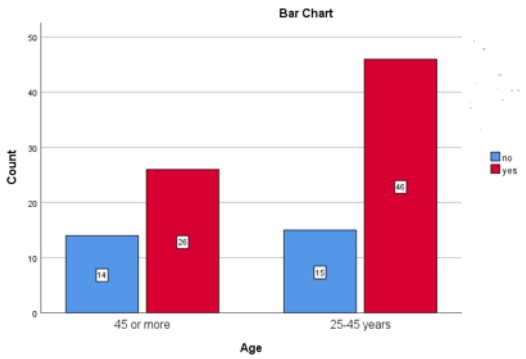

Figure 20: Showing association between age and reduced weight to decreased probability of osteoarthritis

ure 3). This depicts that people are relatively more aware of OA. 11.8% people didn't have knee joint pain, 23.76% had mild pain, 30.69% of people had moderate and 23.76% people had severe knee joint pain (Figure 4). Similar data were observed in earlier study (Krishna and Babu, 2016).

It was found that 52.48% of the people have not been diagnosed with knee OA and 47.52% of the people were diagnosed with knee OA (Figure 5). Similar study has been found in the study given

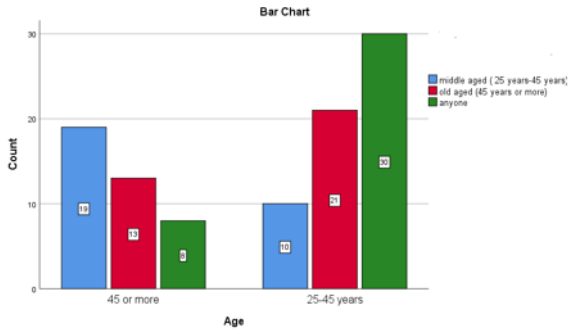

Figure 21: Showing association between age and probability of age group prone to osteoarthritis

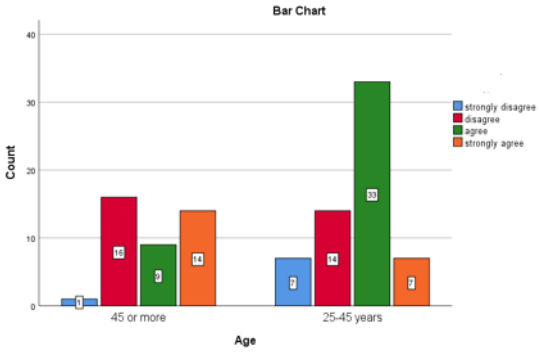

Figure 22: Showing association between age and previous injury as a factor of osteoarthritis

by F. Guilleman et al with 70% people being diagnosed (Guillemin, 2011). 48.51% obese and 49% were not obese (Figure 6). A similar result was found by (Jiang, 2012), where 5 unit increase in BMI resulted in 35% increased risk factor. This observation was similar to the data reported by previous similar study (Jiang, 2012).

From the data it was found that 11.8% strongly disagree, 22.77% disagree, 41.58% agree and 23.76% of people strongly agree that obesity causes OA (Figure 7). A similar result was seen in Abdulla I. Ismail and his team with 90.53% obesity causing OA (Ismail *et al.*, 2006). 64.36% of people's family members diagnosed with OA and 35.64% were not diagnosed (Figure 8). Similar result was found by (Wang, 2007), where women are more susceptible (26.5%) to men (11.4%) (Wang, 2007).

It was seen that 7.92% strongly disagree, 19.80% disagree, 45.54% agree and 26.73% strongly agree that heredity is a factor of OA (Figure 9). A similar study was found by Cicutini and Spector that 65% supported the twin study (Cicuttini and Spector, 1996). It was seen that 71.29% of people agreed and 28.71% of people didn't agree that reduced weight reduces the probability of OA (Figure 10) (Hafeez and Thenmozhi, 2016).

From the survey study it was found that 83.66% of people responded that old aged (45 years or more) and 28.71% of people responded that middle aged (25-45 years) are more prone to osteoarthritis of knee and 37.62% of people have responded that any individual can be affected suggesting irrespective of age OA can be affected (Figure 11). A similar result was found by Louser, R. F, 2013, where age increases the risk of getting OA (Loeser, 2013).

7.92% strongly disagree, 29.70% disagree, 41.58% of people agree and 20.79% of people strongly agree that previous injury causes OA of the knee in future (Figure 12). A similar result was seen in a study conducted by Donald D. Anderson with 40% people with previous injury developed OA. This could be a possible similar comparison between these studies of different origin (Anderson *et al.*, 2011).

46% of participants belonging to the age group 25-45 years were aware of knee osteoarthritis and the chi square analysis between age and knee osteoarthritis was statistically not significant as p=0.591 which was greater than 0.05 (Figure 13) (Sekar and Lakshmanan, 2019). Chi square test showing p=0.591, (p>0.05) indicatingstatistically not significant. 21% of participants belonging to the age group 25-45 years showed mild knee joint pain and the chi square analysis between age and presence of knee joint pain was statistically significant as p=0.000 which was less than 0.05 (Figure 14). Chi-square test showing p=0.000, (p<0.05) indicating statistically significant. 34% of participants belonging to the age group 25-45 years were not diagnosed with osteoarthritis and the Chi square analysis between age and diagnosis of osteoarthritis was statistically not significant as p=0.417 which was greater than 0.05 (Figure 15). Chi-square test showing p=0.417, (p>0.05) indicating statistically not significant. 22% of participants belonging to the age group 45 and above were not obese and the chi square analysis between age and obesity was statistically not significant as p=0.517 which was greater than 0.05 (Figure 16) (Sriram and Yuvaraj, 2015). Chi-square test showing p= 0.517, (p>0.05) indicating statistically not significant.

From the analyzed survey data it was found that 34% of participants belonging to the age group 25-45 years agreed that obesity was a factor for osteoarthritis and the chi square analysis between age and relation of obesity and osteoarthritis was statistically significant as p=0.000 which was less than 0.05 (Figure 17) (Thejeswar and Thenmozhi, 2015). Chi-square test showing p= 0.000 (p<0.05) indicating statistically significant. 41% of the participants belonging to the age group 25-45 years didn't

have family members suffering from osteoarthritis and the chi square analysis between age and family members with osteoarthritis was statistically not significant as p=0.459 which was greater than 0.05 (Figure 18). Chi-square test showing p=0.459 (p>0.05) indicating statistically not significant. 33% of the participants belonging to the age group 25-45 years agrees that heredity was a factor for osteoarthritis and chi square analysis between age and relation between heredity and osteoarthritis was statistically not significant as p=0.058 which was greater than 0.05 (Figure 19) (Choudhari and Thenmozhi, 2016). Chi-square test showing p=0.058 (p>0.05) indicating statistically notsignificant.

46% of participants belonging to the age group 25-45 years agreed that reduction in weight decreases the probability of osteoarthritis and the chi square analysis between age and relation between weight and osteoarthritis was statistically not significant as p=0.258 which was greater than 0.05 (Figure 20) (Samuel and Thenmozhi, 2015). p=0.258 (p>0.05) indicating statistically not significant. 19% of participants belonging to the age group 45 and above agreed that middle aged people were more susceptible to osteoarthritis and the chi square analysis between age and relation between osteoarthritis and age was statistically significant as p=0.001 which was less than 0.05 (Figure 21) (Pratha and Thenmozhi, 2016). Chi-square test showing p=0.001 (p<0.05) indicating statistically significant. 14% of participants belonging to the age group 45 and above strongly agreed that injury was a factor for osteoarthritis and the chi square analysis between age and relation between injury and osteoarthritis was statistically not significant as p=0.059 which was greater than 0.05 (Figure 22). Chi-square test showing p=0.059 (p>0.05) indicating statistically not significant.

Though the middle-aged and old aged people are aware of osteoarthritis of knee joint, the knowledge about the risk factors, its effects and future problems remains sparse among the population (Keerthana and Thenmozhi, 2016). Hence, the probable risk factors of knee osteoarthritis such as age, sedentary lifestyle and obesity, unhealthy diet and heredity seems to play a key role in knee OA and has to be considered seriously for the prevention and management of this disease (Menon and Thenmozhi, 2016). Proper awareness and interventional strategies at primary health care centers has to be carried out to reach people of all sectors and of all ages.

Thus, the survey study serves as evidence and adds to the consensus that there is an association between gender, age, and osteoarthritis and can be utilized for further studies at larger populations and clinical studies.

This study has limitations that it only included limited sample size and homogeneous population. Future scope of the study is that people were less aware about the osteoarthritis and lifestyle changes increased the probability and the change in food habit, occupation, obesity and exercise and good lifestyle reduces the probability of osteoarthritis.

CONCLUSION

The risk factors of osteoarthritis are age, heredity, lifestyle changes and obesity. Choice of lifestyle and good living atmosphere reduces the susceptibility of osteoarthritis. In addition to the spread of awareness in relation to osteoarthritis and its deleterious effects, a proper knowledge about self-care by reducing body weight, maintaining a healthy diet and by doing regular physical exercises among the middle aged population can decrease the risks of osteoarthritis. Thus, within the limitations of this study we conclude that there is an association between age, obesity, and heredity with osteoarthritis of knee joint among middle aged and old aged populations.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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The authors declare that they have no funding support for this study.

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