Association between shoulder osteoarthritis with age, exercise and work related damage among middle aged and old aged population - A survey based analysis

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ABSTRACT

Shoulder osteoarthritis can be defined as the disease in which the joint of the shoulders get worn down and makes movement very hard. It can be defined as the disease associated with age and genetic factors. This study was done to assess the association between age, exercise and work-related damage with shoulder osteoarthritis among middle-aged and old aged men and women. The study population consisted of 100 men and women of middle age group and old age group. A questionnaire was circulated online through the Google forms link, and the responses were recorded. The data was collected and was statistically analyzed in SPSS software. The results were represented in the form of pie charts and graphs. The association between age, exercise and work related damage with shoulder osteoarthritis among middle-aged and old-aged male and female population was analyzed. It was seen that only less than 60 percent of the population were aware of the term osteoarthritis. This survey can be used to diagnose and treat shoulder osteoarthritis at the earlier stages in an effective way.

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INTRODUCTION

Shoulder osteoarthritis is a disease in which the cartilage in the ball and socket joint of the shoulder gets worn down. It causes pain in the shoulder, stiffness of joint and reduced motion (Johnson *et al.*, 2020). The pain aggravates during work, the joint becomes tender and warm, and the pain aggravates, especially during the morning. This disease is common among people who are overweight and who do heavy labour. People who do vigorous exercise and take heavy stress in the joint are also prone to shoulder osteoarthritis. The etiology of arthritis varies with different types. Osteoarthritis, the major contributory factors are advancing age, female sex, joint trauma and obesity (Senthelal, 2020).

Osteoarthritis affects most of the joints in the human body, but it is more prevalent in the joints of the hand, knee, hip and vertebral column (Krishna and Babu, 2016). The point to be inferred from this is that it affects mostly the weight-bearing and severely working joints (Sekar *et al.*, 2019).

As far the heavily working joints are concerned, it is the shoulder joint to be accounted for (Nandhini *et al.*, 2018). The shoulder plays a crucial role in most of the human's day today activities. Apart from

the normal movements, it works further even heavily for people who has jobs giving work to shoulder joints as in carrying heavy weights, mechanical hand-driven simple machines, or any jobs in industries (Subashri and Thenmozhi, 2016).

For many people involved in such jobs, work related damage degenerate the shoulder joint cartilages more quickly than a normal human being (Thejeswar and Thenmozhi, 2015). Such work related damages persists for longer duration impairing the shoulder joint severely leading to reduced quality of life in their later years of life (Pratha and Thenmozhi, 2016).

Knee osteoarthritis occurs in 10% men and 13% women aged sixty years or older. The number may increase due to ageing and obesity, it can also be considered as interplay between systemic and local factors (Zhang and Jordan, 2008). Clinically osteoarthritis is a wear and tear degenerative disease of articular joints. Ageing changes in the musculoskeletal system, abnormal biomechanics, joint injury, genetics and obesity are the susceptible factors that could cause osteoarthritis (Loeser, 2013).

To assess the impact of heavy workload leading to physical stress and susceptibility to knee osteoarthritis a survey was conducted (Koskinen et al., 2002). Osteoarthritis is considered to be the most prevalent type of arthritis and is considered to be caused due to heavy physical stress and also heavy workloads (Sacks et al., 2001).

The major challenge this research had to face was osteoarthritis caused due to obesity couldn't be perfectly assessed because of improper and imbalance diet among the daily wage workers, which led to errors in their Body Mass Index, and each individual has different bone strength (Sriram et al., 2015). This survey can also be conducted to create awareness among people advising them to follow a proper diet, take proper treatment and also to avoid heavy labour (Seppan et al., 2018). Hence shoulder osteoarthritis could be prevented.

The present study was a detailed structured study, especially focusing on shoulder osteoarthritis based on age, sex, work and exercise. The aim of this study was to associate between age, work and exercise related damage with shoulder osteoarthritis among middle aged to old aged male and female population by a survey.

MATERIALS AND METHODS

The study involves men and women of middle aged group (25-45 years) and old age group (above 45 years). A self-structured questionnaire containing 15 questions was prepared covering the socio-demographic information, attitude, knowledge and perception. The survey was circulated among the participants using the google forms link. The sample size of the survey contained 100 men and women in total. The questionnaire was validated both internally and externally. The external validation was to find an association between age, sex, work and exercise related shoulder osteoarthritis. The results obtained were collected and statistically analyzed using the SPSS software. The advantages of this study was that it was economical, easy to create and can have a wide reach. The disadvantages are that it has survey fatigue and response bias.

RESULTS AND DISCUSSION

Young aged groups ranging from 18 to 26 years old, middle age groups ranging from 26 to 44 years old and old age groups 45 and above have taken up the survey (Figure 1). 40.59% old aged (green colour), 34.65% middle aged (red colour) and 24.75% young age (blue colour). According to Yuoquing Zhang, et al prevalence of osteoarthritis among middle aged was 25% and among old age was 40% (Zhang and Jordan, 2008). 53.47% of the survey population was males, and 46.53% of the population was females (Figure 2). 53.47% male (red colour), 46.53% female (blue colour) Among the total population, 39.6% were daily wage workers, 28.71% were professionals, and 25.74% of the population was students, and 5.94% were in other occupations (Figure 3). 39.6% daily wage labour (orange colour) were the participants of greater percentage. The study included students as they possessed a chance of developing osteoarthritis due to vigorous exercise. According to Felix, et al., long standing hours can cause knee osteoarthritis but has no relation to shoulder osteoarthritis. 74.26% of the population had the habit of regular physical exercise, and 25.7% of them did not have any regular habit in relation to physical exercise (Figure 4). According to Felix, et al., abnormal and weak joints due to physical exercise may cause osteoarthritis (Hunter and Eckstein, 2009). 74.26% yes (red colour), 25.7% no (blue colour).

53.47% of the population worked 8 to 12 hours a day, and 4.95% of the population worked for more than 12 hours a day, and 41.58% worked 6 to 8 hours a day (Figure 5). 53.47% 8 to 12 hours of work (green colour) were the highest working hour. According to Prijo, et al heavy physical workload may lead to osteoarthritis (Koskinen et al., 2002). 29.7% of women from the population have undergone two pregnancies, 11.88% of the women have
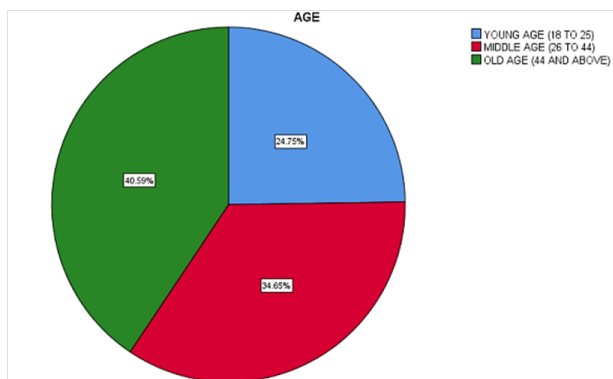
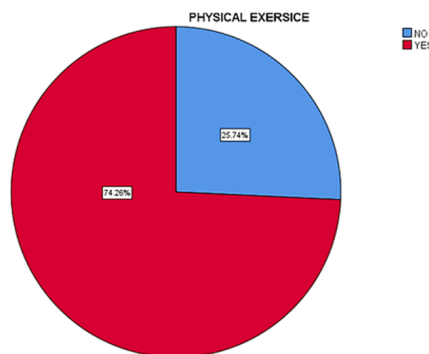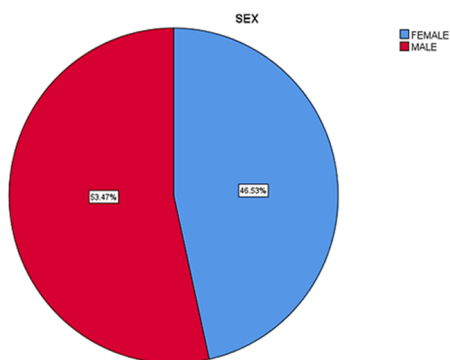**Figure 1: Pie chart showing descriptive analysis of the age of the survey population**

Figure 2: Pie chart showing descriptive analysis of a number of males and females in the survey population

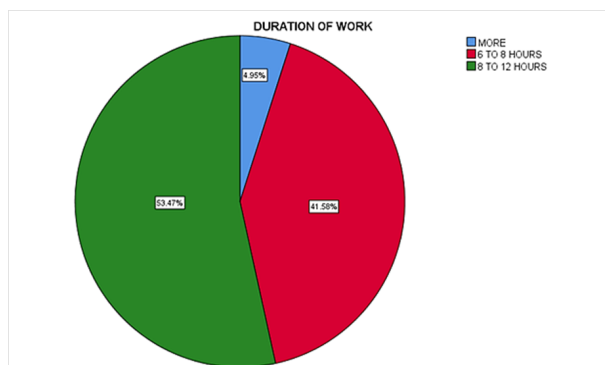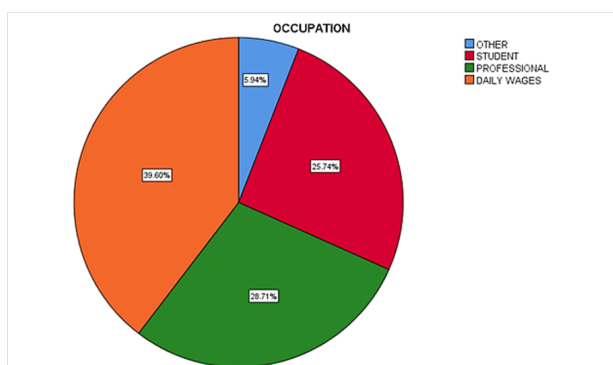**Figure 3: Pie chart showing descriptive analysis of occupation of participants**

Figure 4: Pie chart representing the descriptive analysis of regular physical exercise among participants

Figure 5: Pie chart representing a descriptive analysis of the duration of working hours of the participants
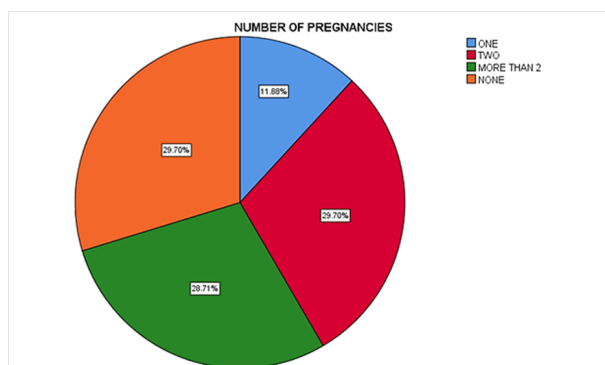
Figure 6: Pie chart showing descriptive analysis of number of pregnancies undergone by female participants

undergone one pregnancy, 29.70% of women have had no pregnancies and 28.71% women have undergone more than two pregnancies (Figure 6). 29.7% none (orange), 29.7% 2 pregnancies (red) were more. According to JMW Hazes, et al pregnancies did not substantially change the risk of rheumatoid arthritis, and shoulder osteoarthritis was the most unlikely to occur (Hazes, 1991).

Only 56.44% of the population was aware of the term osteoarthritis, and the remaining 43.56% remain unaware of this disease (Fig-

ure 7) (Keerthana and Thenmozhi, 2016). 56.44% yes (red colour), 43.56% no (blue colour). 53.47% of the total population had a body weight ranging from 60 to 80 kilograms, and 23.76% of the population had a body weight ranging from 50 to 60 kilogram while 21.78% of the population were above 80 kilograms (Figure 8). 53.47% 60 to 80kg (orange colour), were the people with larger percentage. According to Yuquing Zhang, et al Obesity and overweight cause knee osteoarthritis
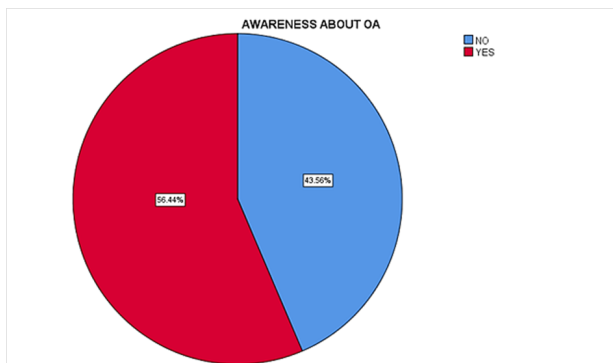
Figure 7: Pie chart representing descriptive analysis of awareness about osteoarthritis among participants
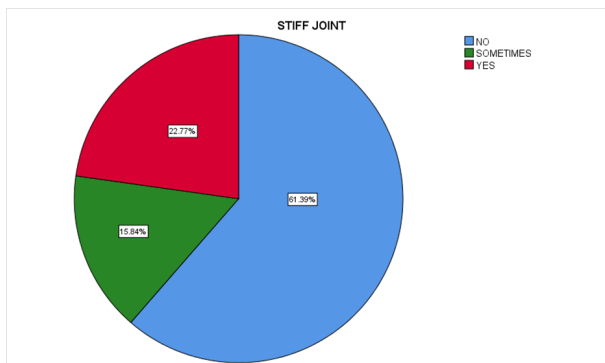

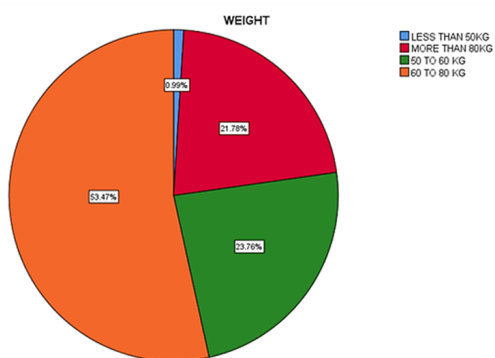**Figure 8: Pie chart representing descriptive analysis of body weight of participants**

Figure 9: Pie chart showing descriptive analysis of the presence or absence of pain during movement of shoulders

Figure 10: Pie chart representing a descriptive analysis of the presence of stiffness in shoulder joints
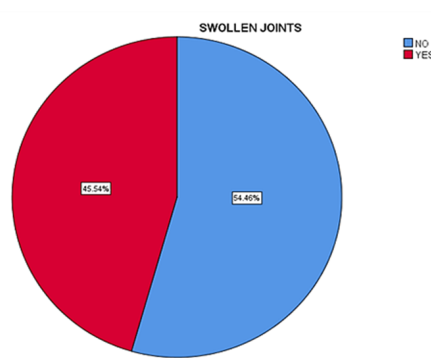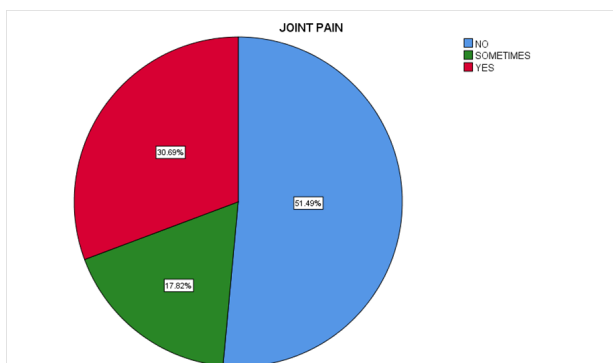

Figure 11: Pie chart representing descriptive analysis of swelling of shoulder joints among participants
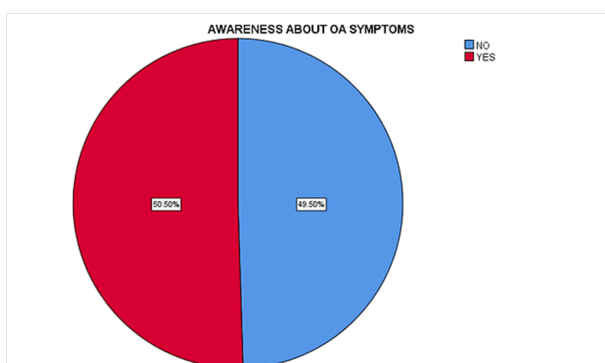

Figure 12: Pie chart showing descriptive analysis of awareness of symptoms of osteoarthritis

while shoulder osteoarthritis was more unlikely to occur (Zhang and Jordan, 2008).

30.69% of the population experience pain in their joints and 51.49% of the population do not experience pain. However, 17.82% of the population experience occasional pain (Figure 9). 51.49% No (blue colour), were the maximum responses. 61.39 % of the population has no stiffness in their joints, and 22.77% of the population experience stiffness in their shoulders (Figure 10). 61.39% no (blue colour), 22.77% yes(red colour), 15.84% sometimes (green colour). However, 15.84% of the population experience this stiffness occasionally (Menon and Thenmozhi, 2016). 45.54% population report to have swollen joints and 54.46% don't have such manifestations (Figure 11) (Samuel and Thenmozhi, 2015). 54.46% no (blue colour), 45.54% yes (red-colour). 50.50% of the populations are aware of the symptoms of osteoarthritis, and the rest, 49.50% are unaware (Figure 12). 50.50%- Yes (red colour), 49.50%- No (blue colour).
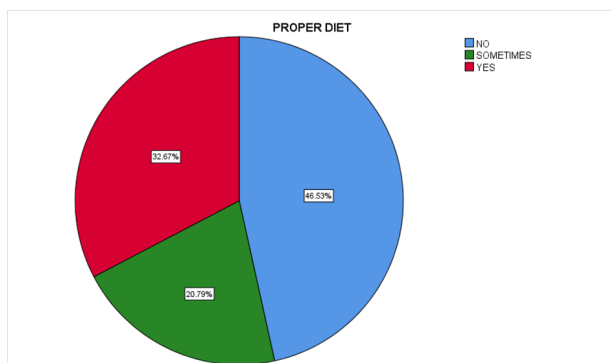
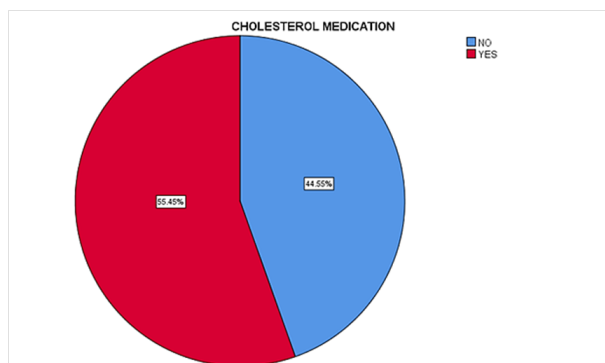**Figure 13: Pie chart showing descriptive analysis of ensuring proper diet among the survey population**

Figure 14: Pie chart showing descriptive analysis of number of asthma patients

Figure 15: Pie chart showing descriptive analysis of number of people suffering from osteoporosis among the survey population

It was found that 32.67% of the population consumes a balanced diet, and 46.53% don't have one. 20.79% don't have a constant diet at all (Figure 13). 45.53% said No (blue), 32.67% said Yes (red), 21.79% said sometimes(green). According to Yuquing Zhang et al., insufficient vitamin-D can cause osteoarthritis (Zhang and Jordan, 2008). 51.49% of the populations are asthma patients, and the rest, 48.51% are not (Figure 14) (Choudhari and Thenmozhi, 2016). 51.49%- Yes (red colour), 48.51%- No (blue colour).

Figure 16: Pie chart showing descriptive analysis of a number of people under medication for cholesterol among the survey population
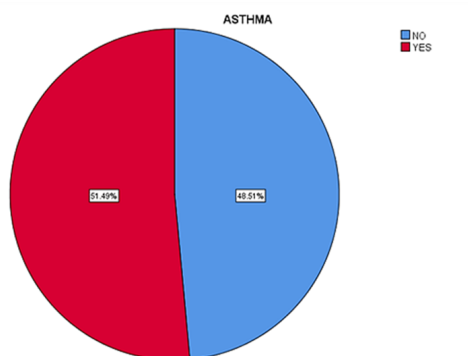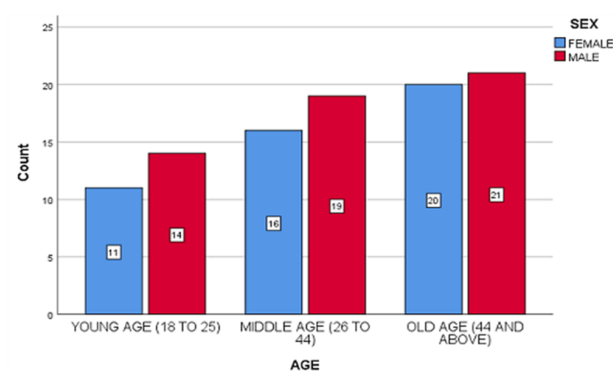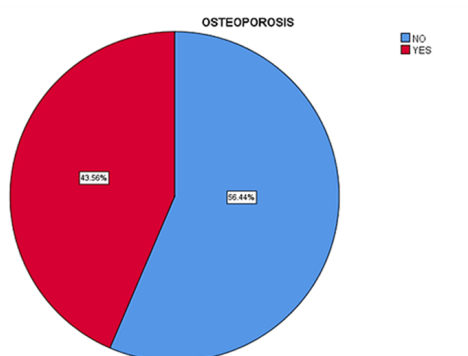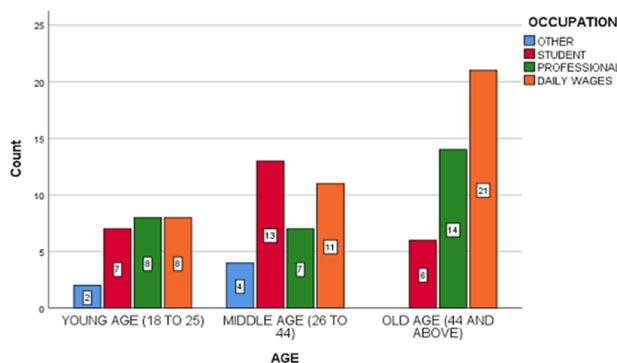

Figure 17: Bar graph showing the association between age and gender

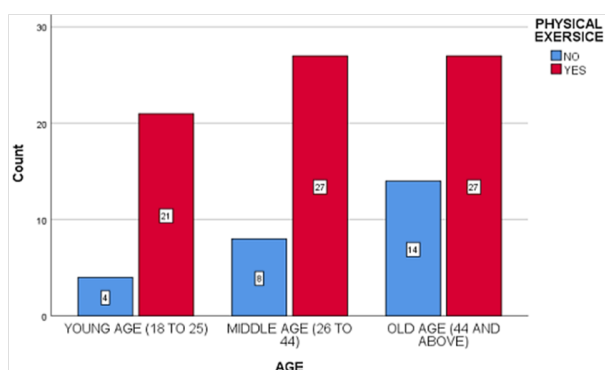**Figure 18: Bar graph showing association between age and occupation**

Figure 19: Bar graph showing association between age and physical exercise

Figure 20: Bar graph showing association between age and duration of work

Figure 21: Bar graph showing association between age and awareness about OA

Figure 22: Bar graph showing association between age and weight of the individual
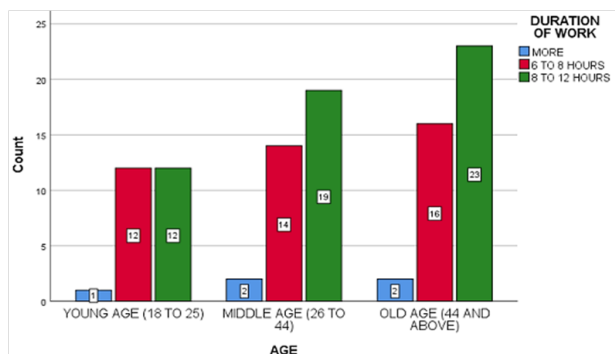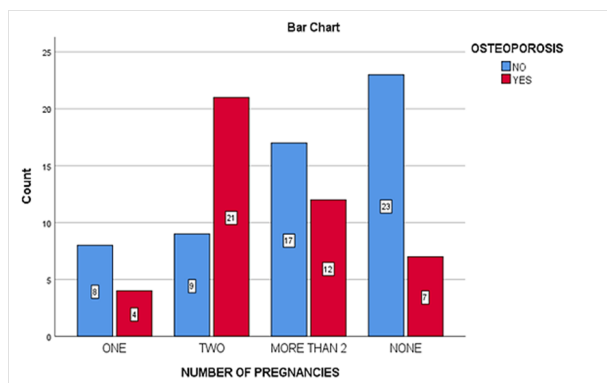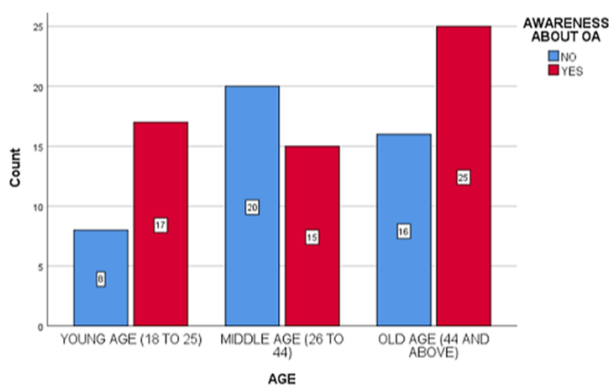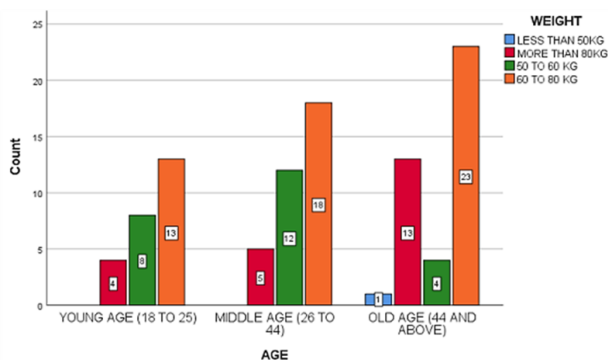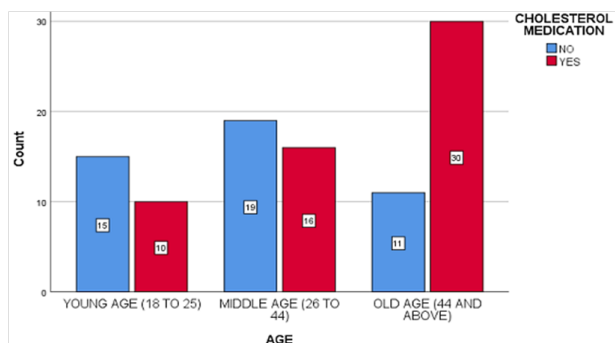

Figure 23: Bar graph showing association between age and cholesterol medication

Figure 24: Bar graph showing association between number of pregnancies and osteoporosis

43.56% of the women populations are reported to have osteoporosis, and the rest, 56.44% are not affected (Figure 15). 56.44% said No (blue) and 43.56% said Yes (red).

According to Dequeker Jan et al., osteoporosis and osteoarthritis are two different diseases; hence a woman with osteoporosis may or may not have osteoarthritis (Dequeker *et al.*, 2003). 55.45% of the populations are under medication for cholesterol, blood pressure, sugar and the rest 44.55% are not (Figure 16) (Kannan and Thenmozhi, 2016). 55.45%- Yes (red), 44.55%- No (blue).

21% of participants belonging to the age group 44 and above were males, and the chi square analysis between age and gender shows statistically not significant as p=0.924 (p>0.05) (Figure 17) (Hafeez and Thenmozhi, 2016). Comparison between age and sex showed no significant association as Chi square test p=0.924 (p>0.05). 21% of participants belonging to the age group 44 and above were daily wage workers, and the chi square analysis age and occupation shows statistically not significant as p=0.063 (p>0.05) (Figure 18). Comparison between age and occupation showed no significant association as Chi square test p=0.063 (p>0.05). 27% of participants belonging to the age group 26 to 44 and above had regular physical exercise and the chi square analysis between age and physical exercise shows statistically not significant as p=0.234 (p>0.05) (Figure 19). Age and regular exercise showed no significant association as Chi square test p=0.234 (p>0.05). 23% of participants belonging to the age group 44 and above had an average of 8 to 12 hours work per day and the chi square analysis between age and duration of work shows statistically not significant as p=0.961 (p>0.05) (Figure 20). Comparison between age and duration of work showed no significant association as Chi square test p=0.961(p>0.05). 25% of participants

belonging to the age group 44 and above were aware about shoulder osteoarthritis, and the chi square analysis between age and awareness about shoulder osteoarthritis shows statistically not significant as p=0.115 (p>0.05) (Figure 21). There was no significant association as Chi square test showed p=0.115 (p>0.05). 18% of participants belonging to the age group 26 to 44 years had an average body weight of 60 to 80 kg, and the chi square analysis between age and weight shows statistically not significant as p=0.108 (p>0.05) (Figure 22). This showed no significant association as the Chi square test p=0.108 (p>0.05). 19% of participants belonging to the age group 26 to 44 years were not influenced by cholesterol medication, and the chi square analysis between age and cholesterol medication shows statistically significant as p=0.011 (p<0.05) (Figure 23). It was statistically significant as Chi square test showed p=0.011 (p<0.05).

21% of participants who had two pregnancies suffered from osteoporosis, and the chi square analysis between the number of pregnancies and osteoporosis shows statistically significant as p=0.003 (p<0.05) (Figure 24).

The major setbacks of this survey were that it was conducted online. Also, the various methods of physical exercises haven't been tabulated. A daily wage worker can have variable working hours each day. It is also difficult to assess the type of daily wage work any individual was doing. Sometimes women who haven't undergone pregnancies can also develop osteoporosis. The future scope of this study can be that the medical, physical and physiological implications can be rectified for the future treatment of shoulder osteoarthritis. With advancements in technology it can also be possible to reduce the workload of daily wage workers and can minimize the cause of shoulder osteoarthritis in them.

CONCLUSION

The association between age, exercise and work related damage with shoulder osteoarthritis among middle aged and old aged men and women population had been studied by conducting a survey. Nutritional supplements can also be used to treat shoulder osteoarthritis, they include glucosamine and chondroitin. Shoulder arthroplasty a surgical procedure produces excellent and functional improvements. But more studies are required to confirm the long term effect of this procedure.

Conflict of interest

The authors declare that there was no conflict of interest for this study.

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