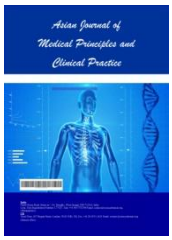

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Prevalence of Depression in Patients with Osteoarthritis and Its Relationship with Associated Pain and Physical Disability– A Descriptive Cross-Sectional Questionnaire Based Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims and Objectives: This study was aimed at establishing a correlation between disease activity (Total WOMAC Score), pain (VAS-during interview, WOMAC Pain-while doing activities), stiffness (WOMAC Stiffness Score), disability (WOMAC Disability Score), duration of disease (caused due to osteoarthritis) to prevalence of comorbid depression (BDI).
Methodology: This is a descriptive cross-sectional questionnaire-based study on 151 participants with osteoarthritis. The study was conducted in the Government Wenlock Hospital, Mangalore, Karnataka, India from 17th May to 29th September 2018. The WOMAC (Western Ontario and Macmaster Universities Arthritis Index) was used to assess symptoms for the past 48hrs and the VAS (Visual Analogue Scale) was used to measure pain intensity. Becks Depression Inventory (BDI) scale is used to measure depression.

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Results: In this study it was found that depression was highly prevalent among osteoarthritis patients. 73.83% of participants were found to have moderate depression. Pain experienced during interview due to osteoarthritis (as measured by VAS) had very high statistical correlation with depression. Pain experienced due to osteoarthritis while performing certain daily activities (as measured by pain section of WOMAC) had significant statistical correlation with depression (p=0.028).
Conclusion: The study concluded that pain caused due to osteoarthritis has significant correlation with comorbid depression. Duration of disease and duration of treatment though was not significantly correlated with depression. Physical disability caused by osteoarthritis is also not significantly correlated to depression.

Keywords: Depression; osteoarthritis; WOMAC; VAS; BDI.

1. INTRODUCTION

Osteoarthritis is a rheumatological disorder characterized by hyaline articular cartilage loss present in a focal and initially in a nonuniform manner. There is also thickening and sclerosis of the subchondral bony plate (due to outgrowth of osteophytes at the joint margin), stretching of the joint capsule and weakness of muscles responsible for joint movement. Osteoarthritis usually involves the weight bearing joints (knee, hip, back) and the interphalangeal joints but may affect other joints also. Pain is chronic relapsing type and is aggravated by joint use or after long period of inactivity. It is the most common type of arthritis globally and an important cause for disability among elderly. With modern trends of increased obesity and sedentary lifestyle it is on the rise [1].

With the advent of modern medicine, increase in food production and other scientific advances there has been a significant increase in the average life expectancy hence geriatric diseases has become more important [2]. Better management of diseases such as osteoarthritis will lead to increased productivity of individuals and help increase the quality of life of affected individuals.

Depression in India is still a vastly underdiagnosed disorder and continues to be a major mental health problem. A cross sectional study in rural areas among elderly indicate that 42.7% were depressed and 6.8% had severe depression [3].

It is generally accepted that that depression is a significant clinical feature in rheumatoid arthritis associated with increasing physical deformity [4] there is no consensus about depression occurring due to osteoarthritis. Moreover, osteoarthritis affects the elderly who are at higher risk of depression and have less psychological adaptability [5].

A holistic approach to treatment might be required to be adopted if depression is adding to the burden of the disease. This will in turn lead to better physical and emotional remedy [6].

1.1 Objectives

This study is aimed at establishing a direct correlation between pain and disability in osteoarthritis and its emotional ramifications.

- Prevalence of depression in patients with osteoarthritis
- Correlation between pain and depression
- Correlation between duration of the disease, duration of treatment and depression
- Correlation between physical disability and depression

2. METHODOLOGY

The study was approved by the Institutional Human Ethics Committee of Kasturba Medical College Mangalore. A quantitative descriptive cross-sectional study of the clinical investigations variety was conducted. The study was conducted in the Government Wenlock Hospital from 17th May to 29th September 2018.

2.1 Study Population

Consenting patients clinically diagnosed with osteoarthritis visiting outpatient departments of Orthopaedics, Medicine, Physiotherapy and patients admitted in Medicine, Surgery and Orthopaedics wards of Government Wenlock Hospital, Mangalore).

2.2 Exclusion Criteria

Non-consenting patients, patients with past or family history of psychiatric disorders, patients with physical disability post stroke paralysis who could not move or actively use their limbs, non-cooperative patients and patients unable to communicate verbally due to language barriers (tulu or konkanni speaking patients).

Verbal informed consent was taken before investigating patients and they were required to sign an informed consent form.

2.3 Sample Size

Using proper statistical methods, the sample size comes to be 150 [7]. By adding 10% as nonresponse error, the final sample size comes to be 165. Finally, questionnaire from 151 patients were collected and compiled.

2.4 Sample Collection

Patients were investigated with the help of a pre-validated questionnaire. The questionnaire was translated to Kannada language. The questionnaire was explained in detail. The rest of the questionnaire was either self-reported or the questions were asked and explained by the investigator and the responses were noted.

The questionnaire consisted of the following- Patient details, WOMAC (Western Ontario and Macmaster Universities Arthritis Index) scale to asses associated pain and disability clinically [8] and VAS (Visual Analogue Scale) to measure pain intensity [9] and the BDI-Becks Depression Inventory scale to measure chronic depression [10].

2.5 Statistical Analysis

Quantitative variables are described using means, standard deviation, medians and analyzed using Analysis of variance (ANOVA f) Test and Kruskal Wallis test. Qualitative variables are to be described using number proportion and percentage. They are analyzed by Chi square test. Pearson's correlation is used to find the strength of association between two continuous variables. The Statistical package for social sciences (SPSS 27) was used to analyze the data.

3. RESULTS

A total of 151 patients with clinical diagnosis of osteoarthritis were interviewed. Here are the descriptive statistics as acquired from the questionnaires of 151 patients as reported by them.

3.1 Age in Years

The range of age of patients lie between 45 and 82 years of age with a mean age of 65.7 years and SD of 8.903. 60 patients were found between 65 and 75 years of age. It is inferred that osteoarthritis is a disease of old age.

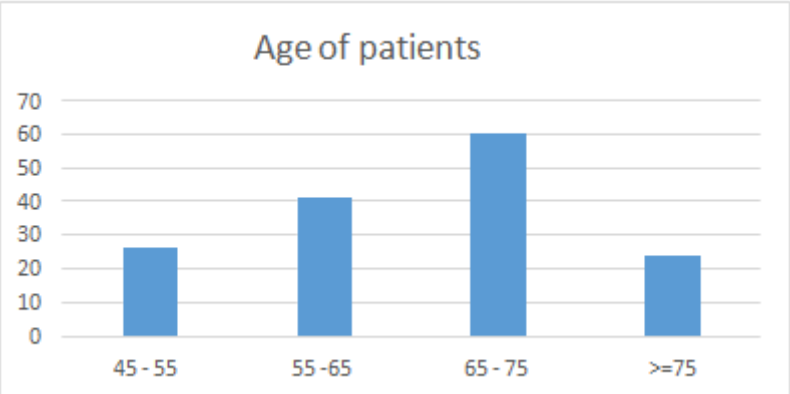

Fig. 1. Age distribution
x axis –class intervals of age in years; y axis-number of patients

3.2 Gender of Patient

55.6 % of participants were females.

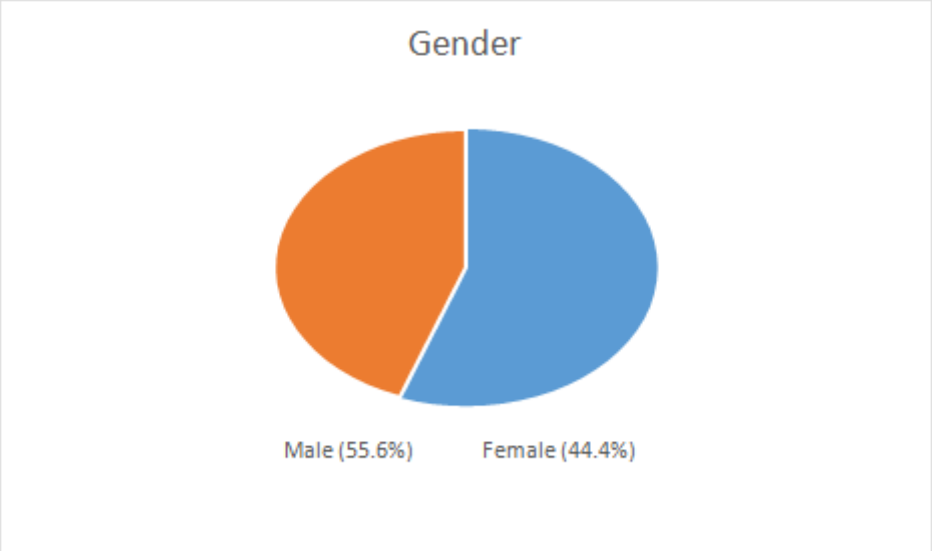

Fig. 2. Sex distribution

3.3 Marital Status

Majority of the patients were married.

Table 1. Marital status

	Frequency	Percent
Married	115	76.2
Widow/er	34	22.5
Unmarried	2	1.3
Total	151	100.0

3.4 Occupational Distribution

Majority of patients were retired and unskilled laborers. Most of the females were housewives.

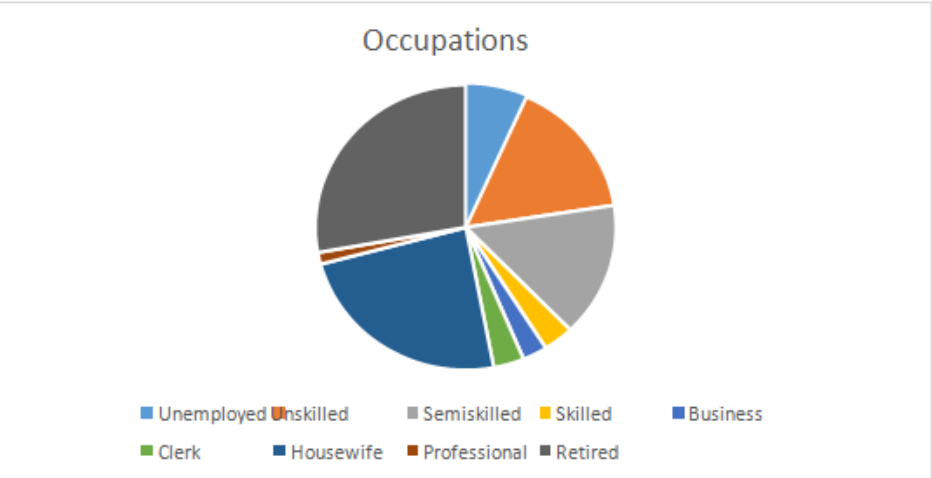

Fig. 3. Occupation

3.5 Education

Majority of the patients had received a primary level of education or were just literate.

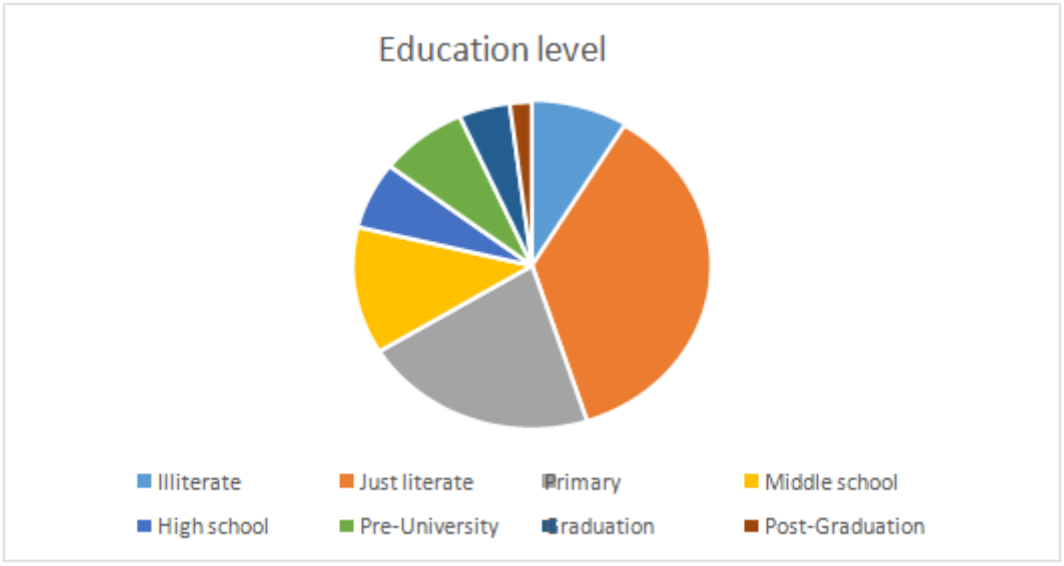

Fig. 4. Educational status

3.6 Socioeconomic Status-Calculated as per Modified BG Prasad Scale (updated in 2016) [11]

Most of the study population belonged to the lower middle- and middle-class SES.

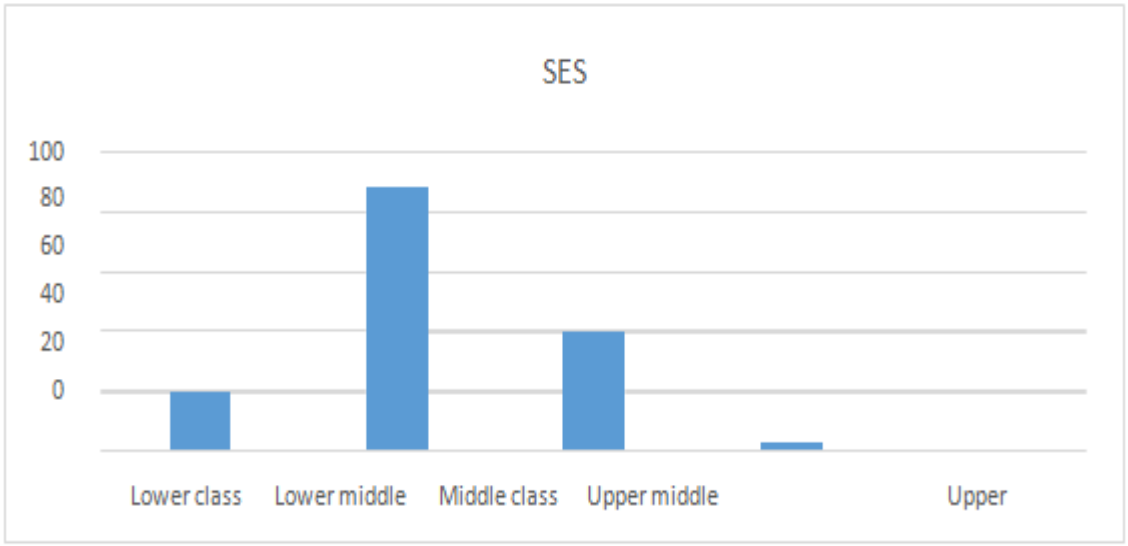

Fig. 5. Socioeconomic status

3.7 History of Other Medical Disorders or Comorbid Conditions

Most patients had Hypertension and Diabetes as comorbidities. No patients had either past or family history of psychological disorders as per exclusion criteria.

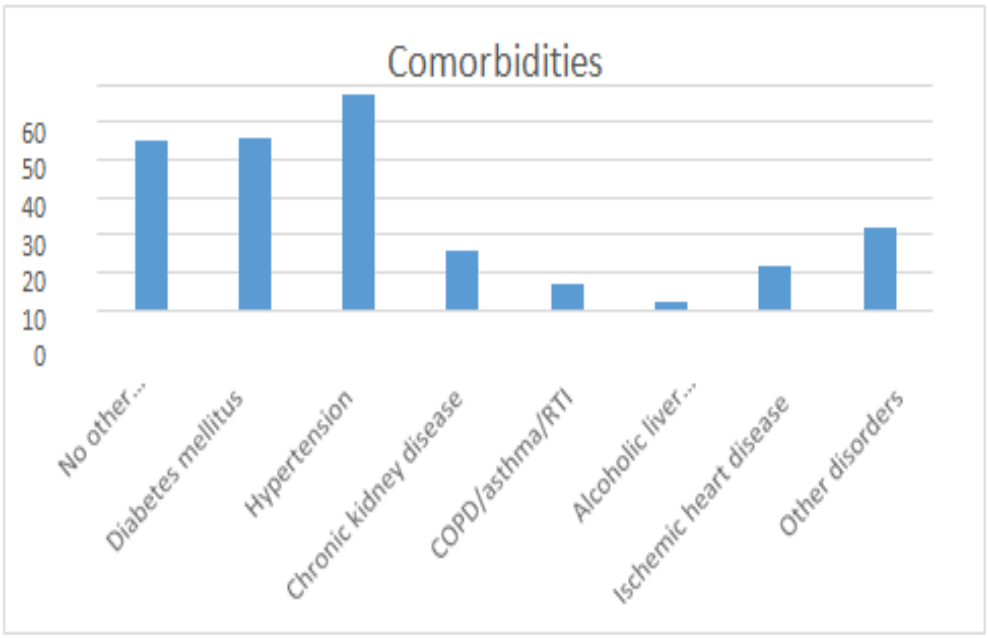

Fig. 6. Comorbid conditions

3.8 Duration of Disease and Duration of Treatment

Mean duration of disease is 8 yrs. and Duration of treatment is 7.26 yrs.

Table 2. Duration of disease and treatment

	N	Minimum	Maximum	Mean	Std. Deviation
Duration of disease	151	2	20	8.01	3.328
Duration of treatment	151	1	15	7.26	3.052

3.9 Treatment Compliance

Table 3. Level of treatment compliance

	Frequency	Percent
Poor	35	23.2
Average	74	49.0
Good	42	27.8
Total	151	100.0

3.10 Relationship between Depression and Pain, Disability and Duration of OA through WOMAC, VAS and BDI

Table 4. WOMAC, VAS and BDI

Score	N	Minimum	Maximum	Mean	Std. Deviation
WOMAC	151	46	82	65.02	9.290
VAS	151	4	10	7.69	1.103
BDI	151	10	37	25.44	4.570

The mean WOMAC score came to be 65.02 (SD of 9.29). Mean VAS Score of 7.69 (SD 1.103) was reported. The mean BDI score was 25.44 (SD 4.57) which indicated moderate depression

Table 5. Pain, stiffness and disability (WOMAC)

N		Minimum	Maximum	Mean	Std. Deviation
pain	151	8	17	11.59	2.395
stiffness	151	1	7	3.96	1.437
disability	151	34	65	49.34	7.329
Valid N (listwise)	151				

Patients complained of Pain with a mean score of 11.59 (SD 2.395). The Mean Stiffness score experienced due to osteoarthritis is 3.96 (SD=1.437) and the Mean Disability score is 49.34 (SD=7.33).

Table 6. Descriptive statistics of depression in study population

Level of depression	Number of participants
Normal	1
Mild Mood Disturbance	3
Borderline clinical	14
Moderate depression	113
Severe depression	20
Extreme depression	0

Results showed that most of the study population suffered from moderate depression.

Table 7. Correlations b/w WOMAC, VAS AND BDI

		VAS	BDI
WOMAC	r	.543	.112
	p	.000	.172
	N	151	151
VAS	r		.303
	p		.000
	N		151

The correlation between disease activity (measured by the WOMAC scale) and depression (measured by the BDI scale) is not significant as r value (Pearson coefficient) =0.112 (p >0.05). Amount of pain during the interview was measured using VAS scale. There seems to be significant correlation between pain (VAS) and depression (BDI) (p<.05).

Table 8. Correlation between duration of disease and treatment with depression

		Duration of treatment	Duration of disease
BDI	r	.053	.072
	p	.521	.382
	N	151	151

The duration of disease and duration of treatment does not have significant correlation with depression as r disease=.072 and treatment=.053(r<0.5) and p> 0.05.

Table 9. Correlation between pain, stiffness, disability and BDI

		Pain	stiffness	disability
BDI	r	.179	.096	.060
	p	.028	.239	.464
	N	151	151	151

Pain while doing various activities as recorded from pain section of WOMAC scale seems to have significant correlation with depression (BDI) as p(pain)=.028 (p<.05). There is no correlation between Stiffness and BDI as r (stiffness)=.096 (<.5) and p(stiffness)=.239(>.05). Also, there is no correlation between Disability and BDI as r (disability)=.060(<.5) and p(disability)=.464 (>.05).

3.11 Correlation between Gender, Age and Depression

Table 10. Correlation between Depression and Gender

	Sex	N	Mean	Std. Deviation	t
BDI	Male	84	25.18	5.260	.797
	Female	67	25.78	3.533	p=0.427(ns)

There is no significant correlation between gender and depression; p (gender)=0.427 (>.05)

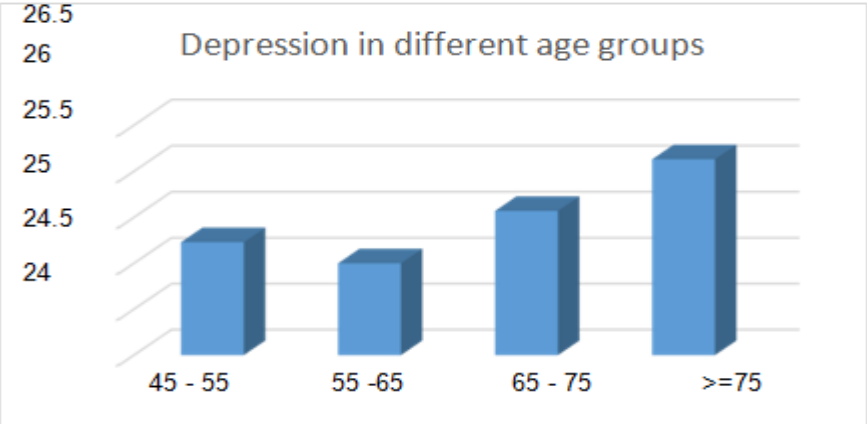

Fig. 7. Depression in different age groups

There is no significant correlation between different age groups and depression P(age)=0.8 (>.05).

3.12 BDI vs. Socioeconomic Status

No significant correlation between socioeconomic status and depression p(SES)=.248 (p>.05).

Table 11. Correlation between socioeconomic status and depression

	N	Mean	Std. Deviation	Minimum	Maximum
Lower class	20	25.05	5.176	15	37
Lower middle	88	25.44	4.441	13	35
Middle	40	25.25	4.562	10	37
Upper Middle	3	30.67	2.309	28	32

4. DISCUSSION

WOMAC score is used for disease activity as such there are no available grades for classification of disease activity. The degrees of difficulty experienced during a task is described as none, mild, moderate, severe and extreme. WOMAC scale (especially disability) was not very amenable to the population in question.

VAS score used for pain assessment which are subjective and depends on patients previous most painful experience. People also perceive pain differently and have different pain threshold [12].

BDI scale is almost universally used to measure depression. Most of the population in question belong to the lower middle socioeconomic strata and hence might be more prone to depression [13]. Holzer CE et al. found significant correlation between lower socioeconomic status and depression (among other psychiatric disorders) [14]. Also, with increased age people are more susceptible to depression [5].

The present study was aimed at establishing a correlation between disease activity (WOMAC Score), pain (VAS - during interview, WOMAC Pain - while doing activities), stiffness (WOMAC Stiffness Score), Disability (WOMAC Disability

Score), duration of disease (caused due to osteoarthritis) to comorbid depression (BDI).

The study found that the highest number of patients belonged to the age group of 65-75 years. The Framingham Osteoarthritis Study [12] reported a mean age of 73 years and concluded that the prevalence of osteoarthritis increases with age after 65 years. 55.6% of the patients interviewed were male. 76% of the patients interviewed were married. This might affect the socioeconomic status for female patients, as often males are breadwinners in this demographic region. Highest proportion of patients were retired (27.8%), this might be due to their advanced age or for patients engaging in physical labour it may be a consequence of the debilitating effects of osteoarthritis.

As far as education is concerned, most of the patient were just literate (36.4%) or had received only primary schooling (21.2%). 58.3% patients belonged to the lower middle class. This might have reflected their socioeconomic status. The BG Prasad scale recognizes the value of education and how it reflects on the socioeconomic status of a person (education is a part of the scale).

Family members residing with the patient influences the patient's socioeconomic status. Patients living with more family members might be less depressed. Most of the study population comes from a lower socioeconomic status and might have a background of poor health awareness and have co-morbid diseases such as hypertension, diabetes that demonstrate the iceberg phenomenon [15]. Nüesch E et al. reported similar findings stating cardiovascular disorders associated with hypertension and diabetes were the most common causes of morbidity and mortality in osteoarthritis patients along with depression [16].

The duration of disease and duration of treatment does not have significant correlation with depression. There is no statistically significant correlation between age and depression in this study. Blazer D et al. found old age to be a risk factor for depression but could not establish a linear correlation thereof [17]. In this study patients more than 75 years of age (oldest age group) showed highest values of BDI score mean and hence displayed highest amount of depression. This might be due to the increased duration of osteoarthritis.

Correlation between gender of the patient and depression (BDI) was not statistically significant. Cole MG et al. found female gender to be at a higher risk for depression among healthy elderly subjects [18]. No statistically significant correlation between Socioeconomic status and depression (BDI) was found. Correlation between duration of disease (osteoarthritis), duration of treatment and depression (BDI) is not statistically significant. Moussavi S et al. found that depression increases with duration of disease in chronic diseases like arthritis [19], also the Framingham Osteoarthritis Study revealed increase in prevalence of osteoarthritis with age [12].

Correlation between pain (WOMAC) caused by osteoarthritis and depression (BDI) is found to be statistically significant. Study conducted Rosemann T et al. showed that perceived pain due to osteoarthritis was the strongest predictor of depression [20]. Framingham Osteoarthritis Study also found such similar correlations [12]. Surah A et al. [21], Fishbain DA et al. [22], Romano JM et al. [23] and several other studies have described statistically significant correlation between chronic pain and depression.

No statistically significant correlation was found between stiffness caused due to osteoarthritis and depression. There can be great deal of variability in stiffness before and after joint use in Osteoarthritis and on different days.

No statistically significant correlation was found between disability caused due to osteoarthritis (WOMAC disability score) and depression (BDI Score). Study by Rosemann T et al. concurred that physical limitation of lower body and the upper body respectively were the 2nd and 3rd most important predictors of depression in osteoarthritis patients. [20] Many other studies done by Turner RJ et al [24], Von Korff M et al. [25] etc. enumerate statistically significant correlation between physical disability and depression.

Correlation between disease activity (Total WOMAC Score) and depression was not statistically significant. As explained above the correlation between disability and depression (not statistically significant) as found in this study is incongruent with results of other studies where total WOMAC score has not been found to be significant.

Duration of disease as reported by patients is open to recall bias and may be differently

described by different patients. All these factors might have been some of the possible causes for the failure to prove all the required hypotheses.

5. CONCLUSION AND IMPLICATIONS

This study was aimed at establishing a direct correlation between pain and disability in osteoarthritis and its emotional ramifications. Even though this study failed to establish a direct correlation between disability and depression, it proves a definite link between the same. Modern advancements in science has proved that the best approach of treatment is the holistic approach that aims at improving both the physical and mental health. Depression can alter the perception of pain and adversely affect the quality of life of patients. The elderly are often an emotionally vulnerable group and their mental health is often ignored as they may suffer from social maladjustment. In such a scenario a more aggressive approach should be undertaken to diagnose depression in such patients and measures should be undertaken to improve their quality of life. Future research work is encouraged in this arena to establish link between pain disability and depression.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The study was approved by the Institutional Human Ethics Committee of Kasturba Medical College Mangalore.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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