Predictors of functional disability in Nigerians with osteoarthritis

Uhunmwangho UC[1], Taiwo OF[2], Amusa AG[3], Odoh G[4], Ani C[5]

[1]Department of Medicine, University of Jos /Jos University Teaching Hospital, Jos, Nigeria
[2]Department of Orthopaedic Surgery, Jos University Teaching Hospital, Jos, Nigeria
[3]Department of Medicine, University of Jos / Jos University Teaching Hospital, Jos, Nigeria
[4]Department of Medicine, Jos University Teaching Hospital, Jos, Nigeria
[5]Department of Radiology, University of Jos / Jos University Teaching Hospital Jos, Nigeria

Corresponding author:
*Dr. Uhunmwanghou Courage, Rheumatology Unit, Department of Medicine, Jos University Teaching Hospital, Permanent Site, Lamingo, PMB 2076, Jos, Plateau State, Nigeria.
Email: uhunmwanghoc@unijos.edu.ng*

Abstract

Background: Osteoarthritis (OA) is one of the leading causes of disability globally, resulting in limitation of walking and activities of daily living. Patients with OA frequently have to depend on devices and humans for assistance in carrying out activities of daily living. Disability associated with OA is attributed to pain. Other factors that may directly or indirectly contribute to this disability are poorly studied.

Objective: To determine factors other than pain that can predict functional disability in patients with OA.

Methods: The study was a cross-sectional total population survey for musculoskeletal disorders carried out in Katon Rikkos, Jos, Nigeria. The survey was a phase 1 Community-Oriented Program for the Control of Rheumatic Diseases (COPCORD) study that included 2,454 adults aged 15 years or older. The diagnosis of osteoarthritis was based on the American College of Rheumatology (ACR) criteria for the classification of osteoarthritis, functional disability was estimated and graded using the HAQ-DI and data was analyzed using Statistical Package for the Social Sciences (SPSS) version 24.

Results: One hundred and fifty subjects were diagnosed with OA, 89 (59.3%) females and 61 (40.7%) males with a mean (SD) age of 51.8 (14.4) years. Mild to moderate disability was present in 125 (83.3%) of subjects, 24 (16.0%) had moderate to severe disability and only one subject had very severe disability. A disability score of ≥1, considered significant disability was recorded in 31 (20.7%) of subjects. Age, sleep disturbance, anxiety, hypertension, active straight leg raise and OA site were significantly associated with functional disability. Age correlated negatively with functional disability while sleep disturbance, anxiety, depression and hypertension were positive correlates. All except sleep disturbance added statistically significantly to the prediction on multiple regression, P < 0.05.

Conclusion: Anxiety, depression and hypertension are important predictors of disability in patients with osteoarthritis, therefore, these co-morbid conditions should be adequately sought for and managed in these patients to improve their outcome.

Key words: Osteoarthritis, Functional disability, Nigerians, Predictors, Co-morbidities

Introduction

Osteoarthritis (OA) is the most common form of arthritis globally with an estimated prevalence of 20-30% in population surveyed[1-3]. It is generally more common in females and blacks than other populations[2,3]. Risk factors for the development of osteoarthritis include age, sex, obesity, sedentary life style and genetic predisposition[1,3]. OA was thought to be more prevalent in developed than developing countries but recent Community Oriented Program for the Control of Rheumatic Diseases (COPCORD) and Global Burden of Diseases (GBD) report indicates that prevalence in developing countries is similar to or higher than what is obtained in developed countries[3-5].

OA is one of the leading causes of disability globally, resulting in limitation of walking and activities of daily living[2,3]. Disability associated with OA is attributed to pain. Other factors that may directly or indirectly contribute to this disability are poorly studied. This study seeks to highlight factors other than pain that are associated with the degree of functional disability seen in patients with OA.

Materials and methods

One hundred and fifty subjects diagnosed with osteoarthritis in a cross-sectional total population survey for musculoskeletal disorders in Katon Rikkos, Jos, Nigeria were analyzed, to determine factors associated with functional disability in osteoarthritis. The survey was a phase 1 COPCORD study that included 2,454 adults aged 15 years or older, residing in Katon Rikkos community of Jos, North Central Nigeria.

Katon Rikkos is a semi-urban community in Lamingo ward of Jos North Local Government Area in Plateau state, about 3.8 Km from Jos University Teaching Hospital (JUTH). It has an adult population of about 3000 people based on the 2006 national population survey. Lamingo ward is one of the 6 administrative wards of Jos North LGA with an estimated population of 17,503 people, the LGA has a total population of 429,300 people which makes up about 12.3% of the 3.5million people in Plateau state[6].

The study was approved by the ethical committee of JUTH and the community head of Katon Rikkos. Informed consent was obtained from every participant by signing or thumb printing on the consent form attached to the questionnaire. Trained health workers went from house to house to administer the COPCORD questionnaire. Subjects reporting positive musculoskeletal symptoms were examined and investigated by the rheumatologist, at the rheumatology unit of JUTH, for specific rheumatic diagnosis[5].

In this study, 150 of the 179 subjects diagnosed with osteoarthritis, who had complete records on the anatomical site of OA, knee compartment, Kellgren-Lawrence and Health Assessment Questionnaire Disability Index (HAQ-DI) scores, were analyzed to determine factors associated with the degree of disabilities experienced by subjects with OA. The diagnosis of osteoarthritis was based on the American College of Rheumatology (ACR) criteria for the classification and reporting of osteoarthritis[7-9].

Radiographic severity of OA was graded using the Kellgren and Lawrence (KL) grade, which scores OA severity on a scale of 0 to 4[1]. Functional disability was estimated and graded using the HAQ-DI, which grades disability as mild to moderate (score 0-1), moderate to severe (score 1-2) and severe to very severe (score 2-3)[10]. Data was analyzed using Statistical Package for the Social Sciences (SPSS) version 24.

Results

One hundred and fifty subjects with osteoarthritis were analyzed, 89 (59.3%) females and 61 (40.7%) males with a mean (SD) age of 51.8 (14.4) years. Other socio-demographics are shown in Table 1.

Osteoarthritis of the knee was present in 52 (34.7%) subjects, while OA of the spine was present in 65 (43.3%) subjects. Other affected sites are as shown in Table 2. One hundred and forty-two (94.7%) subjects had radiographic OA, while 8 (5.3%) met clinical criteria for OA without radiographic features. Radiographic findings was classified using the Lawrence & Kellgren criteria as shown in Table 3. Mild to moderate disability was present in 125 (83.3%) subjects, 24 (16.0%) had moderate to severe disability and only one subject had very severe disability. A disability score of ≥1, considered significant disability was recorded in 31 (20.7%) of the subjects.

Table 1: Social demographics of study patients

Variable	Frequency (%) n=150
Age (years)	
15-24	29 (19.3)
25-34	31 (20.7)
35-44	45 (30.0)
45-54	31 (20.7)
55-64	8 (5.3)
≥65	6 (4.0)
Sex	
Females	89 (59.3)
Males	61 (40.7)
Marital status	
Single	12 (8.0)
Married	115 (76.7)
Divorced	18 (12.0)
Widowed	5 (3.3)
Literacy	
None	33 (22.0)
Read only	16 (10.7)
Read & write	101 (67.3)
Occupation	
Unemployed	3 (2.0)
Unskilled	79 (52.7)
Student	6 (4.0)
Semi-skilled	26 (17.3)
Skilled	12 (8.0)
Professional	12 (8.0)
Retired	12 (8.0)
Habits	
Alcohol	17 (11.3)
Smoking	11 (7.3)
Co-morbidities	
Obesity	46 (30.7)
Diabetes mellitus	9 (6.0)
Hypertension	33 (22.0)
Depression	41 (27.3)
Anxiety	83 (55.3)
Sleep disturbance	63 (42.0)

Table 2: Site of osteoarthritis

OA site	Frequency (%)
Spine	65 (43.3)
Knee	52 (34.7)
Knee & spine	22 (14.7)
Ankle	4 (2.7)
Hip	4 (2.7)
Hand	2 (1.3)
Shoulder	1 (0.6)
Total	150 (100.0)

Table 3: Kellgrade and Lawrence grading of radiographic OA

Kellgrade & Lawrence grade	Frequency	(%)
0.0	8.0	5.3
1.0	9.0	6.0
2.0	76.0	50.7
3.0	39.0	26.0
4.0	18.0	12.0
Total	150.0	100.0

Significant disability was associated with age, 38% of subjects in the ≥65 years age group had significant disability compared to none in the 15-24 years age group (χ^2 10.82, P = 0.05). Sex, body mass index and educational attainment had no significant association with functional disability in osteoarthritis. Self-reported sleep disturbance (χ^2 4.14, P= 0.04, OR 2.27, 95% CI 1.01 – 5.05), anxiety (χ^2 7.71, P = 0.005, OR 3.48, 95% CI 1.39 – 8.70) and depression (χ^2 4.19, P = 0.04, OR 2.34, 95% CI 1.02 – 5.38) were significantly associated with functional disability in osteoarthritis. A history of hypertension (χ^2 4.14, P = 0.04, OR 2.42, 95% CI 1.01 – 5.78) but not diabetes mellitus (χ^2 3.30, P = 0.06, OR 3.37, 95% CI 0.85 – 13.42) was also associated with disability in osteoarthritis. The presence of crepitus (χ^2 0.21, P = 0.64, OR 0.81, 95% CI 0.34 – 1.93) or femoral nerve stretch (χ^2 2.27, P = 0.13, OR 2.01, 95% CI 0.80 – 5.05) on physical examination was not associated with functional disability, while active straight leg raise (χ^2 7.42, P = 0.006, OR 3.50, 95% CI 1.37 – 8.94) was significantly associated with disability. Radiographic features of OA were not associated with functional disability in this population. However, the location of osteoarthritis was significantly associated with disability (χ^2 13.431, P = 0.037, 95% CI = 0.033 – 0.041) (Table 4).

Table 4: Association between patients' characteristics and significant functional disability

Variable	Significant FDI No. Freq (%)	Yes, Freq (%)	χ^2	Pvalue	Odds Ratio	95% CI
Age group (years)			10.83	0.05		0.048 – 0.057
15-24	6 (100.0)	0 (0.0)				
25-34	6 (75.0)	2 (25.0)				
35-44	29 (93.5)	2 (6.5)				
45-54	36 (80.0)	9 (20.0)				
55-64	24 (77.4)	7 (22.6)				
>65	18 (62.1)	11(37.9)				
Sex			0.435	0.51	0.759	0.334 – 1.725
Male	50 (82.0)	11 (18.0)				
Female	69 (77.5)	20 (22.5)				
Marital status			2.840	0.417		0.406 – 0.425
Single	11 (91.7)	1 (8.3)				
Married	92 (80.0)	23 (20.0)				
Widowed	13 (72.2)	5 (27.8)				
Divorced	3 (60.0)	2 (40.0)				
Education			4.469	0.348		0.346 – 0.365
Informal	23 (71.9)	9 (28.1)				
Primary	27 (73.0)	10 (27.0)				
Secondary	33 (89.2)	4 (10.8)				
Tertiary	29 (82.9)	6 (17.1)				
Postgraduate	7 (77.8)	2 (22.2)				
Smoking			0.316	0.574	1.487	0.370 – 5.969
Yes	8 (72.7)	3 (27.3)				
No	111 (79.9)	28 (20.1)				
Alcohol			2.502	0.114	2.356	0.796 – 6.978
Yes	11 (64.7)	6 (35.3)				
No	108 (81.2)	25 (18.8)				
Trauma			0.065	0.799	0.753	0.085 – 6.694
Yes	5 (83.3)	1 (16.7)				
No	113 (79.0)	30 (21.0)				
Hypertension			4.140	0.042	2.425	1.017 – 5.784
Yes	22 (66.7)	11 (33.3)				
No	97 (81.5)	20 (17.1)				
Diabetes			3.302	0.069	3.378	0.850–13.427
Yes	5 (55.6)	4 (44.4)				
No	114 (80.9)	27 (19.1)				
Depression			4.195	0.041	2.347	1.024 – 5.381
Yes	28 (68.3)	13 (31.7)				
No	91 (83.5)	18 (16.5)				
Anxiety			7.712	0.005	3.487	1.396 – 8.709
Yes	59 (71.1)	24 (28.9)				
No	60 (89.6)	7 (10.4)				
Sleep disturbance			4.140	0.042	2.277	1.019 – 5.087
Yes	45 (71.4)	18 (28.6)				
No	74 (85.1)	13 (14.9)				
Obesity			0.047	0.829	1.098	0.470 – 2.565
Yes	36 (78.3)	10 (21.7)				
No	83 (79.8)	21 (20.2)				
Straight leg raise			7.427	0.006	3.503	1.372 – 8.946
Positive	14 (58.3)	10 (41.7)				
Negative	103 (83.1)	21 (16.9)				
FABER test			4.594	0.032	2.383	1.064 – 5.337
Positive	43 (70.5)	18 (29.5)				
Negative	74 (85.1)	13 (14.9)				
Radiographic OA			0.344	0.558	1.875	0.222–15.836
Yes	112 (78.9)	30 (21.1)				
No	7 (87.5)	1 (12.5)				
OA site			13.431	0.037		0.033 – 0.041
Spine	47 (72.3)	18 (27.7)				
Hip	2 (50.0)	2 (50.0)				
Shoulder	0 (0.0)	1 (100.0)				
Hand	1 (50.0)	1 (50.0)				
Knee	45 (86.5 %)	7 (13.5)				
Ankle	4 (100.0)	0 (0.0)				
Knee & spine	20 (90.9)	2 (9.1)				

A Pearson's point biserial correlation was done to determine the strength and direction of association between FDI and variables that had P values of ≤0.05 on chi square test: Age was negatively correlated with disability, which was statistically significant (rpb = -.309, n=150, P < 0.0001), while sleep disturbance (rpb = .243, n = 150, P = 0.003), anxiety (rpb = .332, n = 150, P = 0.0001), depression (rpb = .251, n = 150, P = 0.002) and hypertension (rpb = .251, n = 150, P = 0.008) were positively correlated with disability in this population. However, active straight leg raise did not correlate with functional disability in this OA population.

A multiple regression was run to predict functional disability from variables that were significantly correlated with FDI including age, hypertension, sleep disorder, anxiety and depression. These variables statistically significantly predicted FDI (5, 144) = 8.013, P < 0005, R^2 = .218. All the variables except sleep disturbance added statistically significantly to the prediction, P < 0.05.

Discussion

The global burden of disease study reported that osteoarthritis (OA) is the second most common cause of disability globally[5]. This study was carried out to identify the factors that can predict the disability experienced by osteoarthritis patients.

Most subjects with OA in this study were found to have some form of disability, while a fifth had significant disability. This further corroborates the fact that OA is a major cause of disability in the population.

Several factors have been associated with functional disability in patients with OA. In this study, age was found to be significantly associated and negatively correlated with functional disability. After the age of 45 years, there was a steady decline in the functional ability of the subjects. Though age is a significant risk factor for the development of OA, it has been inconsistently associated with functional disability [11-13]. This may be because, age is more of a confounder rather than a cause in the disability associated with OA. Physical fitness, self-efficacy, worsening disease, presence of co-morbidities and even psychological factors affects how people express their ability as they age[11,14,15], hence, Covinsky[16] suggested the need to better understand how arthritis interact with other conditions to cause disability in the elderly.

This study agreed with earlier studies including systematic reviews that sex was not significantly associated with disability in OA. Even though the female sex has been associated with higher pain levels in OA , it does not predict disability[11].

Unlike studies from other populations, where obesity was found to be associated with disability in OA[13,17-19], this study found no significant association between body mass index and disability in OA. It is not clear whether this can be attributed to racial differences as other authors had previously reported that there was no statistical difference in the disability rate due to OA in blacks or Caucasians[17,20]. Further large population study among Nigerians is needed to clarify whether this is particularly true of Nigerians , since Adegoke et al[21] reported similar findings in Ibadan.

Educational attainment was not associated with functional disability in this study, in contrast to findings from other populations, where education protected against disability in OA[20,22,23]. This may be attributed to the content of education received rather than the level of education. Therefore, there is need to evaluate the impact of educational content on disability rather than just the levels of education that this study assessed.

The relationship between sleep and functional disability in patients with osteoarthritis has not been well studied. This study showed that sleep disturbance was significantly associated and positively correlated with functional disability. However, on regression analysis, sleep disturbance could not significantly predict functional disability. This is in contrast with the findings of Parmelee et al[24] who found no significant association between sleep and disability at baseline, however, when the parameters were measured again at one year, sleep disturbance at baseline was found to be a significant predictor of functional disability in subjects with osteoarthritis. These differences may have resulted from the population studied and the study design. While this was a community based cross-sectional study in a homogenous black population, Parmelee et al[24] studied a larger (about 2 times the sample size) hospital based, multicenter, heterogenous (about 27% non-white) population in a longitudinal study. While the relationship between sleep disturbance and pain intensity as well as disability in general have been reported in several studies, this study and that of Parmelee et al[24] were the study we could find relating sleep disturbance to functional disability in osteoarthritis patients. There is a need for larger prospective studies on this relationship and the effect of sleep intervention to improve function in subjects with OA.

Anxiety and depression are common in patients with OA. Several studies including this one shows that anxiety and depression are significantly associated with functional disability in OA[25,26]. This study also showed that anxiety and depression were positively correlated with and predicted the occurrence of functional disability in OA. This is an indication that health care providers should look out for anxiety and depression and other psychosocial factors in patients with OA from the first contact, as it is very likely that treating these psychosocial factors at the outset can reduce the incidence and burden of disability in patients with OA[27,28].

Components of the metabolic syndrome have long been associated with osteoarthritis, with emphasis on obesity, which is a recognized risk factor for OA. Bijlsma et al [29] have even proposed a phenotypic reclassification of OA to delineate the risk factors including a group they referred to as metabolic/obese-dominated phenotype. Recent efforts have been towards establishing other members of the metabolic syndrome group as independent factors in the development and severity of osteoarthritis[30,31]. Three components of the metabolic syndrome viz. obesity, hypertension and diabetes were evaluated as per association with functional disability in OA in this study.

Hypertension was found to be significantly associated and positively correlated with functional disability in OA and also was a significant predictor of disability in these subjects. This is important because hypertension is a common comorbidity in patients with OA, however, it may be more than just a comorbidity[32]. While recent studies have shown that hypertension may be related to the development and progression of OA, its association with disability may not have been attended to in research.

Several studies have shown significant association between diabetes and the incidence, prevalence, progression and severity of OA[33,34], only a few studies have related comorbid diabetes in OA patients to disability. This study found no significant association between diabetes and disability in OA. This is in contrast to findings by Magnusson et al[35] who found significant association between long-term type 1 diabetes and disability in patients with OA. This difference may have arisen from the fact that Magnusson et al[35] specifically addressed hand OA in type 1 diabetics retrospectively over a variable time period, while our study is a cross-sectional population study which did not specify the type of diabetes the subjects had. This study also found

significant association between the site of OA and disability; however, it was not specific for hand OA. This study agreed with Magnusson et al[35] that the relationship between diabetes and functional disability in OA patients need to be studied further.

Active straight leg raise was the only physical examination finding that was associated with functional disability even though it provided no direction nor predictability for disability in these subjects.

Limitations to this study include the cross-sectional nature of the study which makes it difficult to draw causal inferences from these predictors. Also the data on comorbidities were mainly self-reported which increases the chance of recall bias.

Conclusion

Osteoarthritis is common among Nigerians. Mental health disturbances and hypertension are significant predictors of disability in patients with osteoarthritis. These factors should be sought and adequately managed to reduce disability among these patients. Larger prospective studies are required to determine the impact of interventions in line with these predictors can have on the prevention and rehabilitation of disability in osteoarthritis.

References

1. Neogi T, Zhang Y. Epidemiology of osteoarthritis. *Rheum Dis Clin North Am*. 2013; **39**:1–19.
2. Vina ER, Kwoh CK. Epidemiology of osteoarthritis: Literature update. *Curr Opin Rheumatol*. 2018; **30**:160–167.
3. Palazzo C, Nguyen C, Lefevre-Colau MM, Rannou F, Poiraudeau S. Risk factors and burden of osteoarthritis. *Ann Phys Rehabil Med*. 2016; **59**:134–138.
4. Tehrani-Banihashemi A, Davatchi F, Jamshidi AR, Faezi T, Paragomi P, Barghamdi M. Prevalence of osteoarthritis in rural areas of Iran: A WHO-ILAR COPCORD study. *Int J Rheum Dis*. 2014; **17**:384-388.
5. Courage UU, Stephen DP, Lucius IC, Ani C, Oche AO, Emmanuel AI, *et al.* Prevalence of musculoskeletal diseases in a semi-urban Nigerian community: results of a cross-sectional survey using COPCORD methodology. *Clin Rheumatol*. 2017; **36**:2509–16.

6. Courage UU, Tolulope AO. Prevalence and pattern of soft-tissue rheumatism in a semi-urban Nigerian population. *J Autoimmune Disord*. 2017; **3**:1–6.

7. Altman R, Alarcón G, Appelrouth D, Bloch D, Borenstein D, Brandt K, *et al*. The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hip. *Arthritis Rheum.* 1991; **34**:505-514.

8. Altman R, Alarcon G, Appelrouth D, Bloch D, Borenstein D, Brandt K, *et al.* The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hand. *Arthritis Rheum.* 1990; **33**:1601-10.

9. Altman R, Asch E, Bloch D, Bole D, Borenstein K, Brandt K, *et al*. The classification of osteoarthritis of the knee. *Arthritis Rheumatism*. 1986; **29**: 1039-49.

10. Bruce B, Fries JF. The Health Assessment Questionnaire (HAQ). *Clin Exp Rheumatol.* 2005; **23**:S14-18.

11. Roorda LD, Sanchez-ramirez DC, Vet HCW De. Prognosis of pain and physical functioning in patients with knee osteoarthritis : A systematic review and meta-analysis. *Arthritis Care Res*. 2016; **68**:481-492.

12. Suri P, Morgenroth DC, Hunter DJ. Epidemiology of osteoarthritis and associated comorbidities. *PM and R*. 2012; **4**:S10-19.

13. Dekker J, Van Dijk GM, Veenhof C. Risk factors for functional decline in osteoarthritis of the hip or knee. *Curr Opin Rheumatol*. 2009; **21**:520–524.

14. White DK, Zhang Y, Niu J, Keysor JJ, Nevitt MC, Lewis CE, *et al*. Do worsening knee radiographs mean greater chances of severe functional limitation? *Arthritis Care Res (Hoboken).* 2010; **62**:1433–39.

15. Dijk GM Van, Veenhof C, Spreeuwenberg P. Prognosis of limitations in activities in osteoarthritis of the hip or knee : A 3-year cohort study. *YAPMR*. 2010; **91**:58–66.

16. Covinsky K. Aging, arthritis, and disability. *Arthritis Rheum*. 2006; **55**:175–176.

17. Jordan JM, Luta G, Renner JB, Linder GF, Dragomir A, Hochberg MC, *et al*. Self-reported functional status in osteoarthritis of the knee in a rural southern community: The role of sociodemographic factors, obesity, and knee pain. *Arthritis Rheum*. 1996; **9**:273–278.

18. Marks R, Külcü DG, Yanik B, Atalar H, Gülşen G. Diz osteoartriti olan hastalarda ağri{dotless} ve özürlülükle İlişkili faktörler. *Turkish J Rheumatol*. 2010; **25**:77–81.

19. Marijke Hopman-Rock, Else Odding, Albert Hofman, Floris W. Kraaimaat JWJB. Physical and psychosocial disability in elderly subjects in relation to pain in the hip and/or knee. *J Rheumatol*. 1996; **23**:1037–44.

20. Creamer P, Lethbridge-Cejku M, Hochberg MC. Factors associated with functional impairment in symptomatic knee osteoarthritis. *Rheumatology* (Oxford). 2000; **39**:490-496.

21. Adegoke BOA, Babatunde FO, Oyeyemi AL. Pain, balance, self-reported function and physical function in individuals with knee osteoarthritis. *Physiother Theory Pract*. 2012; **28**:32–40.

22. Rosemann T, Laux G, Kuehlein T. Osteoarthritis and functional disability: Results of a cross sectional study among primary care patients in Germany. *BMC Musculoskelet Disord*. 2007; **8**:1–8.

23. Kawano MM, Araújo ILA, Castro MC, Matos MA. Assessment of quality of life in patients with knee osteoarthritis. *Acta Ortopédica Bras*. 2015; **23**:307–310.

24. Parmelee PA, Tighe CA, Dautovich ND. Sleep disturbance in osteoarthritis: Linkages with pain, disability, and depressive symptoms. *Arthritis Care Res*. 2015; **67**:358-365.

25. Marks R. Depression and osteoarthritis: Impact on disability. *J Aging Sci* [Internet]. 2014; **02**:doi:10.4172/2329-8847.1000126

26. Marks R. Prevalence of anxiety symptoms and it impact in people with osteoarthritis: An update. *J Osteoarth*. 2016; **1**:42–49.

27. Bischoff-Ferrari HA, Lingard EA, Losina E, Baron JA, Roos EM, Phillips CB, *et al*. Psychosocial and geriatric correlates of functional status after total hip replacement. *Arthritis Care Res*. 2004; **51**:829–835.

28. Marks R. Anxiety in disabling osteoarthritis: Implications for research and practice. *J Aging Sci.* 2013; **1**:3. doi:doi:10.4172/2329-8847.1000e105.

29. Bijlsma JWJ, Berenbaum F, Lafeber FPJG. Osteoarthritis: An update with relevance for clinical practice. *Lancet.* 2011; **377**:2115–26.

30. Louati K, Vidal C, Berenbaum F, Sellam J. Association between diabetes mellitus and osteoarthritis: systematic literature review and meta-analysis. *RMD Open.* 2015;**1:**e000077. doi: 10.1136/rmdopen-2015-000077

31. Xie D, Wei J, Zeng C, Yang T, Li H, Wang Y, *et al.* Association between metabolic syndrome and knee osteoarthritis: a cross-sectional study. *BMC Musculoskelet Disord.* 2017; **18**:533.

32. Breedveld FC. Osteoarthritis--the impact of a serious disease. *Rheumatology.* 2004; **43**:4–8.

33. Marks R. Diabetes and osteoarthritis disability: An important underrepresented topic in the related literature. *Austin J Endocrinol Diabetes.* 2016; **3**: 1039.

34. Piva SR, Susko AM, Khoja SS, Josben DA, Fitzgerald GK, Toledo FGS. Links between osteoarthritis and diabetes: Implications for management from a physical activity perspective. *Clin Geriatr Med.* 2015; **23**:841–850.

35. Magnusson K, Bech Holte K, Juel NG, Brox JI, Hagen KB, Haugen IK, *et al.* Long term type 1 diabetes is associated with hand pain, disability and stiffness but not with structural hand osteoarthritis features - The Dialong hand study. *PLoS One.* 2017; **12**:1–13.