

## PREDICTING FACTORS OF JOINT PAIN

Friska Sinaga<sup>1</sup>, Lidwina Triatuti<sup>1</sup>, Maria Yunita<sup>1</sup>

<sup>1</sup>*Department of Medical Nursing, Santo Borromeus School Health Science,*

*Corresponding authors : frizca25@gmail.com*

**Abstract:** Joint pain could have impact on the wellbeing of elders with knee osteoarthritis (OA). Several factors could influence joint pain. Therefore, it is beneficial to explore contributing factors regarding with joint pain among Indonesian elders with knee osteoarthritis. The aim of this study was to explore predicting factors affecting joint pain of people with knee osteoarthritis. A descriptive cross-sectional design was used and involved 100 participants. All participants were asked to answer the demographic questionnaire, Lifestyle Modification Behaviors Questionnaire (LMBQ), and Intermittent and Constant Osteoarthritis Pain (ICOAP). These instruments were validated by three experts. The internal consistency reliability of the LMBQ and ICOAP yielded a Cronbach Alpha coefficient of .84 and .95, respectively. The results indicated significant correlation between joint pain and age, body mass index, education, duration being diagnosed with OA, level of severity, and lifestyles modification behaviors. However, there was no significant difference between occupation, genders and joint pain. A multiple regression was conducted. Age, BMI, diseases duration, level severity of knee OA, and lifestyles behaviors were examined as predictors. These variables statistically significant predict joint pain  $F(5.94) = 5.467, p < 0.001$ ,  $R^2 = 0.225$ . Age, gender, BMI, diseases duration, severity of knee OA, and lifestyle behaviors were related to joint pain. Therefore, nursing and other health professional should concern and consider these factors in allocating care to reduce joint pain in this group.

**Keywords:** Elders; joint pain; knee osteoarthritis; lifestyle behaviors.

Sinaga, F., Triastuti, L., & Yunita, M. (2021). PREDICTING FACTORS OF JOINT PAIN . *Indonesian Journal of Applied Research (IJAR)*, 2(1), 59-65. <https://doi.org/10.30997/ijar.v2i1.72>

### 1. INTRODUCTION

A high percentage of elderly population in Indonesia will lead to an increasing number of people who are susceptible to osteoarthritis (OA) as one of the degenerative joint disease. In Indonesia, prevalence of OA was found to be common among people 55 – 60 years of age. Knee OA was found to be the most frequent type, accounting for 89.1 % of cases (Arissa, 2013). The main cause of knee is multifactorial, consisting of non-modifiable and modifiable factors. Non-modifiable factors include age, gender, genetics and race or ethnicity (Driban et al., 2015). Modifiable factors include: obesity (Driban et al., 2015; Lee et al., 2013), nutrition (Lee et al., 2013), occupation and joint injury. All of these multifactorial causes will impact on the wellbeing of elders with knee OA. In addition, joint pain is one of the main impacts of knee OA (Neogi, 2013).

Joint pain could have the following impact on the wellbeing of elders with knee OA including limitation in movement, disability or loss of mobility (Conaghan et al., 2015),

anxiety, depression (Milano et al., 2016; Stubbs, Aluko, Myint & Smith, 2016). limiting social interaction, social activities (Keefe, Porter, Somers, Shelby, & Wren, 2013), loss of income, and treatment cost (Conaghan et al., 2015).

Several studies have been conducted to explore contributing factors related to joint pain. Previous study found that personal factors including age (Jhun, Sung, & Kim, 2013) and gender (Tonelli, Rakel, Cooper, Angstrom, & Sluka, 2011) had significantly correlation on joint pain. Moreover, obesity (Macfarlane, de Silva, & Jones, 2011) increased the level of joint pain due to the mechanical stress in weight bearing of joints (Adamson, Ebrahim, Dieppe, & Hunt, K, 2006). Furthermore, an evidenced showed that depression or anxiety as one of factors related with increasing level of joint pain. Patients with high level of anxiety or depression, they will report more pain (Kim et al., 2011).

In addition, most of previous studies related to joint pain contributing factors were conducted in western countries (Jhun, Sung, & Kim, 2013, Macfarlane, de Silva, & Jones, 2011; Kim et al., 2011). Therefore, the findings from previous studies cannot be fully generalized in a country like Indonesia due to the cultural context differences. Thus, this study explores contributing predicting factors regarding with joint pain among people with knee osteoarthritis.

## **2. METHODS**

### **2.1. Design and Setting**

This study was conducted in Bandung, Indonesia between December 2018 to June 2019 by using descriptive cross-sectional study. The participants were taken from the primary health care that provides elderly health care units in Bandung Barat.

### **2.2. Participants**

The sample of this study was taken from the primary health care units which provide elderly health care unit in Bandung Barat by using purposive sampling technique. The sample size was calculated based on the sample size calculation technique of multiple regressions. Finally, 100 participants were recruited as the sample for this study. The inclusion criteria were people who are 60 years and above, absence of cognitive impairment by a score over 24 in MMSE (Mini Mental State Examination), absence of depression by a score < 3 by using the patient health questionnaire-2 (PHQ-2), not undergoing joint surgery treatment, be able to communicate in Indonesian language, both verbally and written, having a family member who stays with the elders with knee OA.

### **2.3. Measurements**

Data collection was conducted after getting approval from the Head of Public Health Care in Bandung. The eligible participants were identified from medical record. The researchers developed the Demographic data Questionnaire to obtain the data of the participants which consisted of age, gender, level of education, occupation, duration of disease, and BMI. Lequesne Index of Severity for Osteoarthritis of the Knee which was developed by Lequesne (1991) was used to measure the level severity of knee OA. It consists of three indexes: (1) pain or discomfort, (2) maximum distance walked, and (3) activities of daily living (Appendix E). The index score for each each level of severity is: (1)

none (0), (2) mild (1-4), (3) moderate (5-7), (4) Severe (8-10), (5) very severe (11 – 13), (6) extremely severe ( $\geq 14$ ) (Lequesne, 1991). The Cronbach alpha for this instrument in this present study was 0.91.

Furthermore, the researchers also developed a Lifestyle Modification Behaviors to measure lifestyles behaviors. A lifestyle modification behaviors questionnaire and was validated by three experts and the internal consistency of the LMBQ were .84. It consists of 17 items: exercise (8 items), and posture practice to prevent joint injury (9 items). Higher scores indicate the frequency in performing lifestyle modification behaviors. The Cronbach alpha for this instrument in this present study was 0.84 Each item was measured by using a four –point (1-4) Likert scale.

Joint pain outcomes in this study were measured by Intermittent and Constant Osteoarthritis Pain (ICOAP). This tool is a multidimensional measurement to measure pain experience in people with hip or knee osteoarthritis including the intensity, frequency and the impact of pain on mood, sleep, physical function and also quality of life (Hawker et al., 2008).). It consists of 11 items question to evaluate two domains of pain. The total pain is the sum of the scores from the two subscale scores. Higher scores indicate a worse pain experience. The Cronbach alpha for this instrument in this present study was 0.95. The instruments were originally developed in English. Since the study conducted in Indonesia and all samples were Indonesian elders with knee OA, the instruments were translated to Indonesian language. The instruments were translated by a back translation process to ensure equivalence of the original content and the translated versions (Brislin, 1970).

## 2.4. Data Analysis

Descriptive statistics were used to analyse and describe the demographic data and health information of the participants. Before determining statistical analysis, the assumption of correlation and multiple regressions were checked. Correlation between independent variables and joint pain were measured by a point-biserial correlation or Pearson's correlation depending on the level of measurements each variable. A hierarchical regression was used to measure contribution of each variable on joint pain.

## 3. RESULT AND DISCUSSION

### 3.1. Result

The results in Table 1 showed that the average age was 72.54 years ( $SD = 5.61$ ). More than 54 % of the participants were female and 39 % had an education level of primary school. Moreover, that the average body mass index of the participants was 25.95  $kg/m^2$  ( $SD = 4.63$ ). More than 40 % of participants had very severe level of severity knee OA and the duration being diagnosed with knee OA were average 25.9 month.

Table 1 Demographic characteristic of the participants

Variables	Number	Percent
Age		
M=72.54, SD=5.61, Min-Max=65-84		
BMI		
M=25.95, SD=4.63, Min-Max=17.5-39		

Duration being diagnosed OA  
M=24.54, SD=8.59, Min-Max=8-36

Education	Primary	39	39
	Junior High School	33	33
	Senior High School	19	19
	Diploma or Higher	9	9
Gender	Female	54	54
	Male	46	46
Occupation	Farmer	16	16
	Housewife	45	45
	Private employee	5	5
	Retired	24	24
	Entrepreneur	10	10
Severity	Mild	6	6
	Moderate	6	6
	Severe	17	17
	Very severe	42	42
	Extreme severe	29	29

Table 2 Lifestyle modification behaviors, and joint pain of participants

Measures	Mean	SD	Possible score	Actual score
Lifestyle modification behaviors	39.63	10.81	1 - 68	24 - 63
Joint pain	39.95	18.20	0 - 44	6 - 43

Table 2 presents the mean score of lifestyle modification behaviors were ( $M = 39.63$ ,  $SD = 10.81$ ). In addition, the mean score of joint pain were ( $M = 39.95$ ,  $SD = 18.20$ ). Pearson correlation matrix of demographic data, lifestyle modification behaviors, and joint pain are shown in Table 3. Positive correlation was showed between age and joint pain ( $r = 0.21$ ,  $p < 0.05$ ). Moreover, there was positive significant correlation between BMI and joint pain ( $r = 0.32$ ,  $p < 0.001$ ) which indicates that the participants with higher BMI had higher joint pain. In addition, duration being diagnosed with OA had significant correlation with joint pain ( $r = 0.22$ ,  $p < 0.05$ ). Likewise, a significant correlation between the level severity and lifestyle modification behaviors with joint pain ( $r = 0.20$ ,  $p < 0.05$ ). On the other hand, there was negative significant correlation between lifestyle modification behaviors

Table 3 Correlation matrix between demographic, level severity, lifestyle modification behaviors, and joint pain

Variables	1	2	3	4	5	6	7	8	9
1. Joint pain	1								
2. Age	0.21*	1							
3. BMI	0.32**	0.06	1						
4. Duration	0.22*	0.23*	0.08	1					
5. Education	0.20	0.08	0.08	0.11	1				
6. Gender	-0.41	0.12	0.14	0.02	-0.12	1			
7. Occupation	-0.08	-0.07	-0.25	0.02	0.32**	-0.31**	1		
8. Severity	0.20*	0.06	0.33**	0.03	-0.18	-0.005	-0.09	1	

9.	LMBQ	-	0.18	-	-0.06	0.18	0.08	0.03	-	1
		0.34**		0.30**					0.21*	

\*  $p < 0.05$ , \*\*  $p < 0.01$

Table 4 Hierarchical regression analyses determining joint pain

Independent variables	$\beta$	$p$	95 % CI	$R^2$
Age	-0.36	0.031	(-0.94, 0.33)	0.225
BMI	0.99	< 0.001	(0.22, 1.75)	
Duration	0.41	0.041	(-0.36, 0.86)	
Severity	-1.98	0.015	(-5.59, 1.63)	
LMBQ	0.43	< 0.001	(-0.75, -0.11)	

Model:  $R^2 = 0.225$ ; Adjusted  $R^2 = 0.17$ ;  $F(5.94) = 5.467$ ,  $p < 0.001$

Since age, BMI, Duration, severity, and lifestyle modification behaviors had significant correlation, then multiple hierarchical regression was performed. The full regression model showed that 22 % of the variance in joint pain (adjusted  $R^2 = 0.225$ ,  $F(5.94) = 5.467$ ,  $p < 0.001$ ). Overall, age, BMI, duration being diagnosed with OA, level severity of knee OA, and lifestyle modification behaviors were statistically significant factors of joint pain. Among those, Table 4 showed that BMI and lifestyle modification behaviors was the strongest factors of joint pain ( $\beta = 0.99$ ,  $p < 0.001$ ;  $\beta = 0.43$ ,  $p < 0.001$ )

### 3.2. Discussion

This study examined the related factors including demographic factors, the level severity, duration being diagnosed with OA, and lifestyle modification behaviors. determining joint pain among elders with knee OA. Among those factors, age, BMI, duration being diagnosed with OA, level severity of knee OA, and lifestyle modification behaviors were statistically significant factors of joint pain.

Age is one factor influence to joint pain. Organs functional decline are common problems in elders due to aging process which lead to an inadequate response to the joint injury and increase the level of joint pain (Litwic, Edwards, Dennison, & Cooper, 2013). Moreover, aged will decrease the function of chondrocytes and differently response to cytokine and growth factor. It also impacts to joint protective neural and mechanical factors (Moskowitz, 2007). A study about joint pain and the severity among different age group elderly found that the high prevalence reported severe joint pain in Age above 70 and in every age group, woman was found with the higher prevalence of joint pain than men. The prevalence of mild, moderate, and severe joint pain in women were 5.4 %, 12.0 %, and 14.4 % respectively and in men were 2.8 %, 5.4 %, and 3.5 % respectively (Jhun, Sung, & Kim, 2013).

In addition, Obesity is one factor which contributes in joint pain. Obesity can increase the load and force the articular cartilage of the knee. Higher load will damage the structure and composition of hyaline cartilage (Lee & Kean, 2012). Moreover, obesity increasing the mechanical stress in weight bearing of joints (Adamson, Ebrahim, Dieppe, & Hunt, K, 2006). A study about the correlation between body mass index (BMI)and joint pain found that BMI of > 30 kg/m<sup>2</sup> experienced more in joint pain after 45 years old age (Macfarlane, de Silva, & Jones, 2011).

Moreover, a study examined the effect of activity modification in patients with knee OA found that activity modification on activity daily living reduce pain symptoms and increase range of motion (Shakoor, Taslim, & Hossain, 2007). Moreover, aerobic moderate-intensity and progressive strength training are more beneficial for elders with knee OA.

#### 4. CONCLUSION

This study examined the related factors including demographic factors, the level severity, duration being diagnosed with OA, and lifestyle modification behaviors. determining joint pain among elders with knee OA. Based on the result showed that age, gender, BMI, diseases duration, severity of knee OA, and lifestyle behaviors were related to joint pain. Therefore, nursing and other health professional should concern and consider these factors in allocating care to reduce joint pain in this group.

#### 5. ACKNOWLEDGEMENT

The authors would like to thanks to the administrator and research staff of Faculty of Nursing Prince of Songkla University, Padalarang Primary Health Care, all the participants, and also to Saint Borromeo School of Health Sciences for scholarship award to support this study.) for validating the instruments and the program of this study

#### REFERENCES

- Adamson, J., Ebrahim, S., Dieppe, P., & Hunt, K. (2006). Prevalence and risk factors for joint pain among men and women in the West of Scotland Twenty-07 study. *Annals of the Rheumatic Diseases*, 65, 520-524. doi: 10.1136/ard.2005.037317.
- Arisa, M. I. (2013). Pola distribusi kasus osteoarthritis di RSUD dokter soedarso pontianak periode 1 Januari 2008-31 Desember 2009 (*Prevalence of osteoarthritis cases in RSUD Dokter Soedarso Pontianak from 1 Januari 2008 – 31 Desember 2009*). *Jurnal Mahasiswa PSPD FK Universitas Tanjungpura*, 1(1). Retrieved from <http://jurnal.untan.ac.id/index.php/jfk/article/view/1772/1716>.
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 185-216. doi: 10.1177/135910457000100301.
- Conaghan, P. G., Porcheret, M., Kingsbury, S. R., Gammon, A., Soni, A., Hurley, M., ... & Llewelyn, K. (2015). Impact and therapy of osteoarthritis: The Arthritis Care OA Nation 2012 survey. *Clinical Rheumatology*, 34, 1581-1588. doi:10.1007/s10067-014-2692-1.
- Driban, J. B., Lo, G. H., Eaton, C. B., Price, L. L., Lu, B., & McAlindon, T. E. (2015). Knee pain and a prior injury are associated with increased risk of a new knee injury: Data from the osteoarthritis initiative. *The Journal of Rheumatology*, 42, 1463-1469. Retrieved from <http://www.jrheum.org/content/42/8/1463.short>.
- Hawker, G. A., Stewart, L., French, M. R., Cibere, J., Jordan, J. M., March, L., ... & Gooberman-Hill, R. (2008). Understanding the pain experience in hip and knee osteoarthritis: An OARSI/OMERACT initiative. *Osteoarthritis and Cartilage*, 16, 415-422.

- Jhun, H. J., Sung, N. J., & Kim, S. Y. (2013). Knee pain and its severity in elderly Koreans: prevalence, risk factors and impact on quality of life. *Journal of Korean Medical Science*, 28, 1807-1813. doi:10.3346/jkms.2013.28.12.1807.
- Keefe, F. J., Porter, L., Somers, T., Shelby, R., & Wren, A. V. (2013). Psychosocial interventions for managing pain in older adults: Outcomes and clinical implications. *British Journal of Anaesthesia*, 111(1), 89-94. doi:10.1093/bja/aet129.
- Kim, K. W., Han, J. W., Cho, H. J., Chang, C. B., Park, J. H., Lee, J. J., ... & Kim, T. K. (2011). Association between comorbid depression and osteoarthritis symptom severity in patients with knee osteoarthritis. *Journal of Bone & Joint Surgery*, 93, 556-563. doi:10.2106/JBJS.I.01344.
- Lee, R., & Kean, W. F. (2012). Obesity and knee osteoarthritis. *Inflammopharmacology*, 20(2), 53-58. doi:10.1007/s10787-011-0118-0.
- Lequesne, M. (1991). Indices of severity and disease activity for osteoarthritis. *Seminars in Arthritis and Rheumatism*, 20(6), 48-54. doi:10.1016/0049-0172(91)90027-W.
- Litwic, A., Edwards, M. H., Dennison, E. M., & Cooper, C. (2013). Epidemiology and burden of osteoarthritis. *British Medical Bulletin*, 105(1), 185-199. doi:https://doi.org/10.1093/bmb/lds038.
- Macfarlane, G. J., de Silva, V., & Jones, G. T. (2011). The relationship between body mass index across the life course and knee pain in adulthood: Results from the 1958 birth cohort study. *Rheumatology*, 50, 2251-2256. doi:10.1093/rheumatology/ker276.
- Milano, J. V., Barbero, M. H., Basallote, S. G., Martín, J. V., Lladó, E. V., Serrano, H. M., ... & Díaz, J. J. (2016). Anxiety and depression in knee osteoarthritic patients: Results from emartro study. *Osteoarthritis and Cartilage*, 24, 218-219. doi:10.1016/j.joca.2016.01.422.
- Moskowitz, R. W. (Ed.). (2007). *Osteoarthritis: Diagnosis and medical/surgical management*. Retrieved from [https://books.google.co.th/books?hl=id&lr=&id=YffJ8Gbq5H0C&oi=fnd&pg=PR7&dq=Osteoarthritis:+Diagnosis+and+Medical/Surgical+Management&ots=6ym\\_alHvvl&sig=WtkOVIMO\\_BwIWBE0VkByZ3kenvo&redir\\_esc=y#v=onepage&q=Osteoarthritis%3A%20Diagnosis%20and%20Medical%2FSurgical%20Management&f=false](https://books.google.co.th/books?hl=id&lr=&id=YffJ8Gbq5H0C&oi=fnd&pg=PR7&dq=Osteoarthritis:+Diagnosis+and+Medical/Surgical+Management&ots=6ym_alHvvl&sig=WtkOVIMO_BwIWBE0VkByZ3kenvo&redir_esc=y#v=onepage&q=Osteoarthritis%3A%20Diagnosis%20and%20Medical%2FSurgical%20Management&f=false).
- Neogi, T. (2013). The epidemiology and impact of pain in osteoarthritis. *Osteoarthritis and Cartilage*, 21, 1145-1153. doi:10.1016/j.joca.2013.03.018.
- Shakoor, M. A., Taslim, M. A., & Hossain, M. S. (2007). Effects of activity modification on the patients with osteoarthritis of the knee. *Bangladesh Medical Research Council Bulletin*, 33(2), 55-59. doi:10.3329/bmrcb.v33i2.1205.
- Stubbs, B., Aluko, Y., Myint, P. K., & Smith, T. O. (2016). Prevalence of depressive symptoms and anxiety in osteoarthritis: a systematic review and meta-analysis. *Age and Ageing*, 45(2), 228-235. doi:10.1093/ageing/afw001.
- Tonelli, S. M., Rakel, B. A., Cooper, N. A., Angstrom, W. L., & Sluka, K. A. (2011). Women with knee osteoarthritis have more pain and poorer function than men, but similar physical activity prior to total knee replacement. *Biology of Sex Differences*, 2(1), 1-12. <https://doi.org/10.1186/2042-6410-2-12>.