Vol. 5 No. 2 Year 2024
jurnal.umj.ac.id/index.php/MuJG
mujgfkk@umj.ac.id
e-issn: 2721–6837

MUHAMMADIYAH JOURNAL OF GERIATRIC

Research Article

Comparison of Osteoarthritis Prevalence in Elderly Women with and Without Obesity Using Body Mass Index (BMI) Calculation at MH Thamrin Cileungsi Hospital for the Period of January – December 2022

Ihsanil Husna[1*], Dinda Aulia Setiawan[2], Faisal Syarifuddin[1], Fanny Septiani Farhan[3]

[1]Department of Internal Medicine, Faculty of Medicine, Universitas Muhammadiyah Jakarta, Indonesia
[2]Medicine Study Program, Faculty of Medicine and Health, Universitas Muhammadiyah Jakarta, Indonesia
[3]Department of Biomedicine, Faculty of Medicine, Universitas Muhammadiyah Jakarta, Indonesia

*Corresponding author: ihsanil.husna@umj.ac.id

ABSTRACT

Background: Osteoarthritis (OA) is the most common form of arthritis in society throughout the world and is the main cause of disability in older adults. This disease has a slow development time with common main complaints such as pain, swelling and deformity in the affected area. This can result in limited movement and is a major cause of disability. Women are known to be more susceptible to developing OA, while advanced age is also a risk factor for developing OA. **Purposes**: This research is aiming to know the prevalence of OA in elderly women with and without obesity using the BMI calculation within the period of 2022. **Methods:** This research using a numerical analytic observation from secondary data of medical records with cross-sectional research design. **Result**: The study finds from the total of 196 patients, 133(67.9%) of them were obese whereas 63 (32.1%) weren't in obese condition. **Conclusion**: Therefore, that there was a significant difference between the average number of elderly women with and without obesity.

Keywords: BMI, elderly, obesity, osteoarthritis, women

INTRODUCTION

Osteoarthritis (OA) OA is a chronic disease of the musculoskeletal system that often affects large joints (1). This disease has a slow development time with common main complaints such as pain, swelling and deformity in the affected area. This can result in limited movement and is the main cause of disability which affects 60-70% of the elderly population (2). Symptoms that are commonly complained of by OA patients include pain, swelling, stiffness, and limited joint movement. These complaints result in patients often not moving enough, which makes muscles lose strength so that patients with OA are less able to carry out physical activity. This disease can affect any joint but is most often found in the knee joints, hips, spine and small joints of the palms (3).

Although the cause of OA is still not known with certainty, there are several risk factors that increase the occurrence of OA, including age, female, obesity, genetics, heavy physical activity, and a history of trauma (2). The course of OA disease leading to damage and destruction of joints is still unknown, but the initial changes or symptoms appear when the joint cartilage experiences fibrillation, irregularity and

Submitted: 09/06/2024 Accepted: 08/05/2025 Published: 09/12/2025 DOI: 10.24853/mujg.5.2.68-73

erosion. This erosion then gets deeper and continues to widen until it affects a wider joint area. The high mechanical load in obese conditions can increase the mechanical load not only on the lower extremities but is also known to be responsible for the high incidence of OA in the arms (4)(5). Osteoarthritis in elderly patients with obesity can significantly impair quality of life. (6)(7)(8) This highlights the importance of understanding the burden of OA in female elderly patients, particularly those with obesity.

2018 research shows that the prevalence or joint disease in Indonesia is on 7.3% with the increase of number along with the increase of age. The number of OA cases in women is 2.33% higher than in men. West Java is the sixth region with the highest number of OA patients in Indonesia (9)(10), however these studies only include the prevalence of OA cases as a whole without considering specific factors in patients. Therefore, this study will try to obtain the comparative results of the prevalence of osteoarthritis in elderly women with obesity and without obesity based on body mass index (BMI) calculations at MH Thamrin Cileungsi Hospital for the period January 2022 – December 2022.

METHODS

The research used was numerical analytical observational by comparing two groups, namely osteoarthritis in elderly women with obesity and without obesity with a cross-sectional research design using secondary data from medical records. The targeted population in this study is women with a minimum age of 60-year-old with OA, while the reached population is elderly women (≥60-year-old) with OA who underwent examination at MH Thamrin Hospital Cileungsi for the period of January – December 2022. The minimum sample of 31 was determined using Lameshow calculation with estimated maximum proportion from 2018 research (8.86%) (7). The inclusive characteristics are female OA patients with the minimum age of 60-year-old. The data sample acquired then confirmed the OA diagnosis and characteristics (sex and age), the height and weight were then used to calculate the BMI's. The grouping characteristics of obese patients is using the minimum BMI of 30, while the patients with below 30 BMI are considered not obese. After gathering and grouping, then the data will be processed to find the data distributions using univariate. To analyze further the data will go through bivariate analytic using Mann-Whitney analytic as an alternative if the data does not meet the requirements, bivariate was used to compare the averages of the two groups. This research has passed ethical approval with number: 269/PE/KE/FKK-UMJ/XII/2023 issued by the Health Research Ethics Commission of the UMJ Faculty of Medicine and Health.

RESULTS

The total OA sample obtained in the period January 2022 – December 2022 at MH Thamrin Hospital Cileungsi, Bogor Regency was 196 elderly female patients (Table 1). Based on the research conducted, it was found that the elderly category was divided into two groups, namely the elderly (60 – 69 years) and the older elderly (≥70 years), it was found that the patients in the elderly category were 117 (59.7%), while the older elderly patients are as many as 79 (40.3%). Based on obesity status, the BMI of female patients with OA who were not obese was 63 (32.1%) and 133 (67.9%) of patients with obesity. If we look at the BMI

score further, the results show that there were 21 (10.7%) patients with a normal BMI, 40 (20.4%) with an overweight condition, and 135 (68.9%) with an obese BMI.

Table 1. Age and BMI Status Profile of Female OA Patients at MH Thamrin Hospital, Cileungsi

Variable	Frequency (n = 196)
Age	
60-69	117 (59.7%)
≥ 70	79 (40.3%)
IMT	
Normal	21 (10.7%)
Overweight	40 (20.4 %)
Obese	135 (68.9%)
Obesity status	
Obese	133 (67.9%)
Non-obese	63 (32.1%)

In this way, the results showed that the prevalence of elderly female OA patients with obesity was higher than that of patients without obesity with a ratio of 133 and 63. Using the Mann-Whitney test, a significance value of <0.05 was obtained, indicating that the average number of elderly female OA patients with obesity and without obesity was significantly different, and based on the H0 test criteria which stated that there was no difference between the prevalence of elderly female patients diagnosed of osteoarthritis with obesity and without obesity was rejected.

DISCUSSION

The high number of elderly women with OA proves statements and research in previous studies, through trials conducted at Zhejian University to explore the molecular mechanisms underlying the development of OA through the identification of proteins that are differentially expressed in the cartilage of young and old mice to determine possible involvement in pathogenesis of OA. The results of this experiment stated that increasing age is accompanied by the amount of sulfur oxidation in chondrocytes which increases pseudoproteins and metabolic pressure which increases inflammatory reactions. It was also found that in old age the collagen fiber network decreases (11)(12). Meanwhile, other research states that this occurs due to complex interactions that occur between pro-inflammatory and anti-inflammatory cytokines, chemokines, adipokines and growth factors. Proinflammatory conditions favor catabolism over anabolism in the joint, resulting in cartilage degradation and the resulting imbalance in cartilage turnover (13).

This research also shows that the elderly female OA patients studied were obese, more than twice as many as elderly female OA patients who were not obese. This supports the results of research conducted in Aceh in 2020 where it was stated that the incidence of OA was very often found in patients with obese BMI, this was said to occur due to high body weight along with overloading of joint support and mechanical stress which can accelerate changes in biochemical degradation. articular cartilage. Not only that, the findings in the same study also stated that not all OA patients were at an obese BMI at the time of examination, although the average BMI result for OA patients was obese, but it was also found that the respondents were fatter than at the time of data collection. Therefore, even though patients with obese BMI status have a 4 to 5 times risk factor for developing OA, there are also other factors that can cause OA, especially in the genu, namely age, work, comorbidity, physical activity,

biomechanical factors, dietary exposures, and so on (14)(15)(16). Especially BMI, a modifiable risk factor, impacts women more strongly than men. (17)

However, it was also found that there is evidence that damage to obese patients is not only caused by heavy load bearing, this is because cases of OA are also often found in joints that do not support loads such as hand joints which are also not uncommon in obese patients. In obese patients, cytokines produce and secrete adipose tissue which are also called 'adipokines' which are also important in the incidence of OA. In the process, adipose tissue secretes various adipokines (adiponectin, leptin, resistin, visfatin, omentin, retinol binding protein 4, vaspin, etc.) and also cytokines (IL-1, IL-6, IL-8, tumor nectosis factor (TNF).)- α, and others) which participate in the degradation of controcytes and the melting of the extracellular matrix. Synovial adipokines likely originate from associated infrapatellar fat pad secretions or from the blood circulation system that penetrates the synovial membrane and can enter the joint cavity. The clinical data studied showed that there was a relationship between synovial adipokine levels and OA in elderly female patients with knee OA. Although the detailed pathophysiology of adipokines and OA progression is not yet fully known, there are several pathways that may be the reason, including AMP-Activated Protein Kinase (AMPK), whose activation will increase chondrocyte autophagy and inhibit the production of inflammatory cytokines, such as as IL-6 and TNF-α. , in OA, and also the pathway with Nuclear Factor-κB Signaling (NF-κB) which is related to increased chondrocyte catabolism and apoptosis and decreased chondrocyte anabolism. There are studies showing that adipokines can induce the expression of matrix degrading enzymes and/or proinflammatory mediators in chondrocytes through the NF-κB signaling pathway, where leptin can increase the expression of PGE2, IL-6, IL-8, MMP-1, MMP-3, and MMP-13, ADAMTS-5, and ADAMTS-9 through the NF-κB signaling pathway, increased production of MMP and ADAMTS is a marker of damaged cartilage homeostasis which also initiates and promotes the occurrence of OA (18)(19)(20).

CONCLUSION

Based on the results of research conducted regarding the comparison of the prevalence of elderly female OA patients with obesity and without obesity at MH Thamrin Hospital, Cileungsi for the period January – December 2022 with a total sample of 196 patients, it can be concluded that the prevalence of elderly female OA patients with obesity is almost twice as high as that of patients without obesity with a ratio of 133: 63. Beside that there was also found that in the elderly division, it was found that female OA patients aged 60 – 69 years were higher than patients aged ≥70 years. However, from this study we can conclude that there is a significant difference between the average number of elderly female OA patients with obesity and those without obesity.

ACKNOWLEDGMENTS

Thank you to Muhammadiyah University Jakarta and MH Thamrin Cileungsi Hospital for providing researchers with the opportunity to conduct this research.

CONFLICT OF INTEREST

The researcher has no conflicts of interest, and no affiliations or connections with or

with any entity or organization that could raise questions of bias in the discussion and conclusions of the manuscript.

REFERENCES

1. Snoeker B, Turkiewicz A, Magnusson K, Frobell R, Yu D, Peat G, et al. Risk of knee osteoarthritis after different types of knee injuries in young adults: A population-based cohort study. Br J Sports Med. 2020 Jun 1;54(12):725–30.
2. Akhter M, Khanum H. Etiology and Risk Factors for Developing Knee Osteoarthritis. Copyright@ Hamida Khanum | Biomed J Sci & Tech Res | BJSTR MS. 2021;34(3).
3. WHO. Osteoarthritis. 2023 [cited 2023 Sep 30]. Available from: https://www.who.int/news-room/fact-sheets/detail/osteoarthritis#
4. Sen R, Hurley JA. Osteoarthritis. 2023 Feb 20 [cited 2023 Oct 20]; Available from: https://www.ncbi.nlm.nih.gov/books/NBK482326/
5. Shumnalieva R, Kotov G, Monov S. Obesity-Related Knee Osteoarthritis—Current Concepts. Life 2023, Vol 13, Page 1650. 2023 Jul 28 [cited 2023 Sep 30];13(8):1650. Available from: https://www.mdpi.com/2075-1729/13/8/1650/htm
6. Messier SP, Gill ME, Mihalko SL, Beavers DP, Queen K, Miller GD, Losina E, Katz JN, Loeser RF, DeVita P, Hunter DJ. Clinical, Health-Related Quality of Life, and Gait Differences Among Obesity Classes in Adults With Knee Osteoarthritis. Arthritis Care & Research. 2024 Apr;76(4):503-10.
7. Vitaloni M, Botto-van Bemden A, Sciortino Contreras RM, Scotton D, Bibas M, Quintero M, Monfort J, Carné X, de Abajo F, Oswald E, Cabot MR. Global management of patients with knee osteoarthritis begins with quality of life assessment: a systematic review. BMC musculoskeletal disorders. 2019 Dec;20:1-2.
8. Santos MG, Damiani P, Marcon AC, Haupenthal A, Avelar NP. Influence of knee osteoarthritis on functional performance, quality of life and pain in older women. Fisioterapia em Movimento. 2020 Jan 13;33:e003306.
9. Ghassani FS, Idris FH. Characteristics of Genu Osteoarthritis Patients in the Medical Rehabilitation Polytechnic of Setia Mitra Hospital in 2020. Muhammadiyah Journal of Geriatric. 2023 Jan 30;3(2):54.
10. Bangka Belitung Islands Provincial Health Service. Riskesdas 2018. [cited 2023 Sep 26]. Available from: https://dinkes.babelprov.go.id/sites/default/files/document/bank_data/20181228%20-%20Laporan%20Riskesdas%202018%20Nasional-1.pdf
11. Prima R, Oktarini S. Factors related to the incident of osteoarthritis in the elderly. 2023 [cited 2024 Jan 6]. Available from: http://jurnal.univrab.ac.id/index.php/kewarni/article/view/3602/1485
12. Chen K, Zhang X, Li Z, Yuan X, Fu D, Wu K, et al. Excessive sulfur oxidation in endoplasmic reticulum drives an inflammatory reaction of chondrocytes in aging mice. Front Pharmacol. 2022 Oct 24;13:1058469.

13. Primorac D, Molnar V, Rod E, Jeleč Ž, Cukelj F, Matiši´cmatiši´c V, et al. Knee Osteoarthritis: A Review of Pathogenesis and State-Of-The-Art Non-Operative Therapeutic Considerations. Genes (Basel) [Internet]. 2020 [cited 2024 Jan 6];11:854. Available from: www.mdpi.com/journal/genesGenes 2020,11,854
14. Sofyan Z, Rizal F. The relationship between obesity and the incident of knee joint osteoarthritis at RSU Teungku Peukan, Southwest Aceh. Vol. 7, Journal of Medical and Health Sciences. 2020.
15. Georgiev T, Angelov AK. Modifiable risk factors in knee osteoarthritis: treatment implications. Rheumatology international. 2019 Jul 1;39(7):1145-57.
16. Driban JB, Harkey MS, Barbe MF, Ward RJ, MacKay JW, Davis JE, Lu B, Price LL, Eaton CB, Lo GH, McAlindon TE. Risk factors and the natural history of accelerated knee osteoarthritis: a narrative review. BMC musculoskeletal disorders. 2020 Dec;21:1-1.
17. Szilagyi IA, Waarsing JH, Schiphof D, Van Meurs JB, Bierma-Zeinstra SM. Towards sex-specific osteoarthritis risk models: evaluation of risk factors for knee osteoarthritis in males and females. Rheumatology. 2022 Feb 1;61(2):648-57.
18. Zhang C, Lin Y, Yan CH, Zhang W. Adipokine Signaling Pathways in Osteoarthritis. Front Bioeng Biotechnol. 2022 Apr 19;10:865370.
19. Nedunchezhiyan U, Varughese I, Sun AR, Wu X, Crawford R, Prasadam I. Obesity, inflammation, and immune system in osteoarthritis. Frontiers in immunology. 2022 Jul 4;13:907750.
20. Chen L, Zheng JJ, Li G, Yuan J, Ebert JR, Li H, Papadimitriou J, Wang Q, Wood D, Jones CW, Zheng M. Pathogenesis and clinical management of obesity-related knee osteoarthritis: Impact of mechanical loading. Journal of orthopaedic translation. 2020 Sep 1;24:66-75.