KPC Kinesiology and Physiotherapy Comprehensive

P-ISSN: 2830-6317
E-ISSN: 2962-5491

The relationship between obesity and knee osteoarthritis: a literature review

I Dewa Made Aditya Darma[1,*], M. Widnyana[2], Putu Ayu Sita Saraswati[2]

[1]Bachelor and Professional Program of Physiotherapy, Faculty of Medicine, Universitas Udayana, Bali, Indonesia
[2]Department of Physiotherapy, Faculty of Medicine, Universitas Udayana, Bali, Indonesia

ABSTRACT

Background: Knee osteoarthritis (OA) is an chronic degenerative inflammatory disease of the knee. This study aimed to determine the relationship between obesity and knee OA.
Objective: To explore and analyze more deeply the relationship between obesity and knee osteoarthritis.
Methods: The research used a literature review design using secondary data in the form of a review of research journals related to obesity and the risk of osteoarthritis. The process of identifying relevant journals was conducted by searching the PubMed and Google Scholar databases using specific keywords such as "obesity," "osteoarthritis," and "knee osteoarthritis OR knee OA". Six journals that directly addressed the relationship between obesity and knee osteoarthritis were selected for inclusion. These selected journals contained relevant qualitative data and were published within the last 10 years to ensure that the information was up-to-date and applicable to current discussions on the topic.
Results: The study results showed a possible association between obesity and knee OA in the elderly, although several factors such as age, gender, and lifestyle also influenced this association.
Conclusion: This study concluded that obesity is possibly associated with knee OA, especially in the elderly population. However, further research is needed to validate these findings and address the limitations of existing studies.

Keywords: inflammatory, joint, knee, obesity, osteoarthritis

Received: December 5, 2024. **Accepted**: March 28, 2025.
Type: Review article; **Doi**: 10.62004/kpc.v4i1.55

[*]**Corresponding Author**: I Dewa Made Aditya Darma, Bachelor and Professional Program of Physiotherapy, Faculty of Medicine, Universitas Udayana, Bali, Indonesia; Email: adityadarma@gmail.com

Introduction

Osteoarthritis (OA) is an inflammatory disease that attacks the joints, degenerative chronic is related to joint cartilage damage.[1,2] OA is marked by the presence of degeneration in the joint cartilage, bone hypertrophy occurs, as well as subchondral bone sclerosis, which causes changes in the synovial membrane, which is accompanied by pain and stiffness.[1,2,3] OA can occur in any joint, the joints most at risk of experiencing OA are the joints in the hips, joints in the hands, joints in the spine, joints in the legs, and knee joints. This is because these joints are used to support weight.[2,4] knee OA is an inflammatory disease that attacks the joints, is degenerative characterized by a tear of the cartilage of the joint, precisely in the knee joint, is a disease that develops slowly with the elderly, which causes sufferers to experience pain and disability so that they experience limitations in carrying out activities.[2,3] These symptoms are usually felt after prolonged activity, which is usually felt in the morning or after physical activity.[2,3,5]

Knee OA is an inflammatory disease that attacks the joints that is often found in the world, including in Indonesia. knee OA can cause pain that causes the patient to experience disturbances to limitations in movement, so that daily activities are disturbed.[6,7] Based on Riskesdas 2018 data, the prevalence of OA in Indonesia is directly proportional to the obesity rate is around 21.8%, for in Bali Province the prevalence of OA in the population over 18 years old is around 35%.[8] knee OA generally occurs in adults or the elderly, there are several factors that affect the occurrence of knee OA that is; increasing age or in old age, being overweight or obese, a history of joint injury or trauma, and lifestyle.[5,9]

Obesity or obesity is a condition in which fat accumulation occurs that can interfere with health. Obesity is a condition that occurs when the ratio between a person's weight and height exceeds the standard considered normal, with an abdominal circumference of more than 90 cm for men while for women it is more than 80 cm.[10] Obesity can occur due to being influenced by many factors, one of which is due to the presence of excessive fat tissue that accumulates

P-ISSN: 2830-6317
E-ISSN: 2962-5491

in the body, so it can interfere with health.[9,11] Weight gain cannot be separated from the patterns and behavior or lifestyle of each individual, such as unbalanced food nutrition intake and lack of exercise or activity. As a result, weight increases due to an imbalance between the amount of energy that enters the body and that is expended by the body during activity.[9,12] Obesity can cause various musculoskeletal complaints, one of which is knee osteoarthritis (knee OA) if not handled immediately.[13,14,15]

Clinical symptoms felt by people with knee OA Among others, pain in the joints, stiffness, critters or there is a crackling sound in the joints, swelling, and even changes in the way you walk due to pain.[3] People who are overweight will complain of pain in the joints.[2] By having a non-ideal weight, overweight and obesity will be able to interfere with their daily activities. knee OA three times the risk of exposure in obese people and overweight compared to people who have a normal weight, because one of the factors that has a high risk of knee OA is overweight or obese.[6]

Research on the relationship between obesity and osteoarthritis (OA) risk is urgent given the high prevalence of both in Indonesia, with data showing the prevalence of obesity reaching 21.8% and OA around 35% in Bali Province in the population over 18 years of age.[8] knee OA, which often causes chronic pain, stiffness, and limited movement, can significantly reduce quality of life and productivity. The economic impact is also significant, because OA and obesity require continuous medical care and cause a loss of productivity that affects the quality of life of the community.[16]

Based on the above background, researchers are interested in making a study on the relationship between obesity and the risk of osteoarthritis because there is still little research on OA in Bali. It is important to strengthen the research design, increase the sample size, and consider confounding factors to ensure more accurate results. The limited research on knee OA and the need for further understanding of the relationship between obesity and knee OA, prompted the author to conduct a literature review on this topic to find out the relationship between obesity and the risk of knee OA.

Methods

The research approach used in this study was a literature review that relied on secondary data, specifically through an in-depth analysis of various research journals discussing the relationship between obesity and the risk of developing knee osteoarthritis. The process of identifying relevant journals was conducted by searching the PubMed and Google Scholar databases using specific keywords such as "obesity," "osteoarthritis," and "knee osteoarthritis OR knee OA." These searches resulted in numerous articles related to the topic, which were then carefully reviewed and screened to identify the most relevant studies. Ultimately, six journals that directly addressed the relationship between obesity and knee osteoarthritis were selected for inclusion. These selected journals contained relevant qualitative data and were published within the last 10 years to ensure that the information was up-to-date and applicable to current discussions on the topic. The process of selection prioritized studies with clear methodologies and findings that could contribute meaningfully to the understanding of how obesity influences the risk of knee osteoarthritis.

Results

Through a journal search conducted with 2 databases of high and medium standards, such as PubMed and Google Scholar, 5 Indonesian and English journals with publications published 10 years ago were found as the results of this literature review (Table 1).

Dong et al. (2023) conducted a systematic review and meta-analysis to identify risk factors for knee osteoarthritis (OA) in middle-aged and older adults. The study analyzed 29 articles, comprising 17 case-control studies and 12 cohort studies. The results revealed five significant risk factors ($p \leq 0.05$) associated with knee osteoarthritis: a history of trauma ($p = 0.03$), BMI ≥ 24 kg/m² ($p = 0.004$), female gender ($p = 0.03$), increasing age ($p = 0.007$), and exercise ($p = 0.003$). These statistical findings demonstrated a significant relationship between these factors and the risk of developing knee osteoarthritis, highlighting their importance in understanding the etiology and prevention of knee OA.

Sofyan et al. (2020) conducted a cross-sectional study to examine the relationship between obesity and the incidence of knee osteoarthritis (OA) at Teungku Peukan Hospital in Southwest Aceh. The study involved 70 participants who met the criteria for OA, including individuals with obesity or those with OA but without obesity, all over the age of 16. The study used non-probability sampling with a purposive sampling method. Data were collected through questionnaires, interviews, and measurements of weight and height. The statistical analysis was performed using the chi-square test. The independent variables included age, gender, and weight, while the dependent variable was knee OA. The results showed that 28.6% of participants over 40 years old were affected by OA, with 72.9% of women and 62.9% of obese individuals showing the condition. A significant relationship was found between obesity and the risk of knee osteoarthritis, with a p-value of 0.000 ($P < 0.05$).

Khan et al. (2020) conducted a case-control study to explore the association between obesity and the risk of knee osteoarthritis (OA). The study involved 800 participants aged over 30 years who had a Kellgren-Lawrence (K-L) grade of 2 or higher. Participants with a history of rheumatoid arthritis, trauma, injury, or other bone and joint disorders were excluded. The study utilized statistical tests such as the chi-square test, t-student test, and multivariate logistic regression analysis. Measuring instruments included the Visual Analog Scale (VAS), Western Ontario and McMaster Universities Arthritis Index (WOMAC), and K-L grading system. The independent variables were weight, gender, age, family history, and physical activity, while the dependent variable was knee OA. The results revealed significant

P-ISSN: 2830-6317
E-ISSN: 2962-5491

findings, with a higher incidence of knee osteoarthritis in women, with a ratio of 8:1. Obesity was significantly associated with the risk of knee osteoarthritis ($p < 0.001$), and additional factors such as family history, standing for long periods, lifting heavy weights, climbing stairs, and sitting on the floor were also linked to an increased risk of knee OA.

Aldo et al. (2019) conducted a cross-sectional study to investigate the relationship between obesity and the incidence of osteoarthritis (OA) in the elderly. The study included 89 participants aged over 60 years, selected through accidental sampling. The statistical analysis was performed using the chi-square test, and data were collected through questionnaires. The independent variables were age and obesity, while the dependent variable was knee OA. The results showed a significant association between obesity and OA, with 65.2% of the 89 participants experiencing osteoarthritis, and a p-value of 0.002, indicating a strong correlation between obesity and the incidence of knee OA in this population.

Nugraha et al. (2015) conducted a cross-sectional study to examine the relationship between obesity and the occurrence of knee osteoarthritis (OA) in the elderly in Laweyan District, Surakarta. The study included 50 participants, who were divided into two groups: obese and non-obese. The inclusion criteria were participants aged over 46 years and residing in Laweyan Surakarta, while individuals with a history of knee joint trauma and those under 46 years of age were excluded. Statistical analysis was performed using the chi-square test and IBM SPSS Statistic 21.0 software. The measuring instrument used was the diagnostic criteria for osteoarthritis according to the American College of Rheumatology. The independent variables were age and weight, while the dependent variable was knee OA.

Anggraini et al. (2014) conducted an observational case-control study to investigate the relationship between obesity and risk factors for knee osteoarthritis (OA). The study included 64 participants, who were divided into case and control groups using systematic random sampling. Statistical analysis was performed using the chi-square and statcalc tests on the Epi Info program. X-ray results were used as the measuring instrument to diagnose OA. The independent variables included weight, age, gender, smoking habits, and physical activity, while the dependent variable was knee OA. The results revealed significant associations between obesity and risk factors for knee OA, with obesity ($p = 0.001$, OR = 7.20), age ($p = 0.012$, OR = 3.67), and gender ($p = 0.005$, OR = 4.69) all showing a significant relationship with the incidence of knee OA.

Discussion

Obesity is a condition in which a person is overweight above the normal limit, this is because there is a buildup of fat in the body, especially in the abdomen.[9] Obesity can be measured using the size of the abdominal circumference, a abdominal circumference of more than 90 cm for men can be considered obese, while for women it is more than 80 cm.[10] Obesity can also be measured based on BMI, which is an indicator to find out the ideal weight proportion calculated based on weight and height.[1,5] There are four classifications in BMI, namely: thin with BMI results of less than 18.5 kg/m^2, normal with BMI results between 18.5 to less than 25 kg/m^2, overweight with BMI yield between 25 to less than 30 kg/m^2, and obesity with BMI results of more than 30 kg/m^2.[8]

According to WHO (2018), obesity is a body mass index ranging from 30 to more than 40 kg/m^2.[1,17] The prevalence of obesity varies by region, ranging from 31% in the Southeast Asian region and the African region to 67% in the Americas. Based on Riskesdas data in 2018, the incidence of obesity reached 21.8%, with the prevalence of obesity reaching 35% in the population over the age of 18 years in Bali Province.[8] Obesity, if not treated immediately, can cause various musculoskeletal complaints, namely knee osteoarthritis (knee OA).

Based on the research conducted by Dong et al., a review of 29 articles with cohort and case-control study designs identified five significant risk factors associated with the development of knee osteoarthritis (OA). These risk factors were found to have a statistically significant relationship with the occurrence of knee OA ($p < 0.05$). The factors include a history of knee trauma, a body mass index (BMI) of ≥ 24 kg/m², being female, increasing age, and engaging in high-intensity physical exercise. These findings suggest that individuals who have experienced knee injuries, are overweight or obese, are women, are older in age, or frequently perform intense physical activities are at greater risk of developing knee OA. The statistical significance of these results supports a meaningful association between these risk factors and the likelihood of knee OA development.[18]

Research by Sofyan, et al, showed that patients who experienced knee OA It was found more in patients with obesity as many as 44 people or 62.9%. based on the results obtained from the chi square test the result was obtained *p*-value=0.000, the result was also influenced by the age factor and Gender, of the many respondents who entered about knee OA on average, 28.6% are from the age of 50-60 years, and women are found to be more affected by knee OA as many as 51 people or 72.9%.[6]

In a study conducted by Khan et al., it was found that obesity is significantly associated with an increased risk of developing knee osteoarthritis (OA), with a strong statistical significance ($p < 0.001$). The study also highlighted the influence of age and gender as contributing factors. Specifically, individuals within the age group of 41 to 50 years were shown to be at a higher risk of developing knee OA. Additionally, the findings indicated that women are significantly more likely to develop knee OA compared to men, with a reported female-to-male ratio of 8:1. This suggests that hormonal, anatomical, or lifestyle differences may contribute to the higher prevalence of knee OA in women within this age range.[19]

The research conducted by Aldo, et al, obtained results of 65.2% of 89 samples experiencing knee OA, with the result of p=0.002 and as many as 34.8% did not experience knee OA,

P-ISSN: 2830-6317
E-ISSN: 2962-5491

this is influenced by lifestyle such as doing too heavy work plus being overweight which causes the knee joint work to get heavier to support the weight. Therefore, based on the results of the data, there is a significant relationship between obesity and the incidence of knee OA.[9] In addition, the research of Nugraha, et al, and Anggraini, et al, also obtained significant results in the relationship between obesity and the risk of knee OA in the elderly with the result of p-value=0.001.[2,5] So based on these data, it shows that there are significant results between obesity and knee OA.

Overweight or obese populations are at high risk of developing knee OA compared to the normal-weight population.[13,14] Mechanism of knee OA due to biomechanical and inflammatory factors. A person who is obese will cause the work of the thigh muscles to increase, which will later cause the joints to experience excessive mechanical stress. In addition to biomechanical factors, knee OA are also aggravated by inflammatory factors. Increased adipose tissue due to obesity can increase pro-inflammatory mediators and cause cartilage degradation in cells and tissues. Leptin, along with other inflammatory cytokines, plays an important role in the mechanism of OA occurrence *knee* related to obesity. As a result, chondrocytes respond to repair tissues by forming osteophytes that later contribute to the occurrence of knee OA.[20]

Nonetheless, all results confirm the need for further research to validate these findings, address the limitations of the study, and evaluate different conditions and patient populations. This is due to the limited number of studies and limited comparison groups, in addition to which patient characteristics, such as location, age level, and lifestyle, can affect the results of the study. While the reliance solely on open-access literature, driven by constraints in accessing subscription journals, presents a limitation in the breadth of potentially relevant research considered in this review, it also guarantees the transparency and widespread accessibility of the synthesized evidence.

Conclusions

This literature review shows that overall, obesity is at high risk of causing the occurrence of knee OA. Several studies show that in addition to obesity, OA is influenced by several other risk factors, such as the age level of the sample, the sex of the sample, and also the lifestyle. Nonetheless, the quality of the results still varied among the studies evaluated. Therefore, while these findings confirm the potential for obesity as a risk factor for the occurrence of genomic OA, more research is needed with a more robust design and a wider sample of the population.

Funding

Any grant source did not fund this study.

Conflict of interest

According to the author, there isn't any possible conflict of interest related to this paper's study, writing, or distribution.

Author contributions

IDMAD conceived the study design and data collection and drafted the manuscript; MW and PASS collected the data and revised the manuscript.

Ethical consideration

This review study used published articles that are accessible. Thus, this study did not require any informed consent or ethical consideration.

References

1. Hanif MHH. The relationship between body mass index and high western ontario and mcmaster university osteoarthritis index scores in knee osteoarthritis patients at rspal dr. ramelan surabaya. Surabaya Biomed J. 2023; 2(3):140–9.
2. Yovita L, Enestesia N. Relationship between obesity and factors in individuals with incidence of knee osteoarthritis. J Berk Epidemiol. 2015; 2(1):93–104.
3. Amran, M. Clinical and radiological description according to kellgren and lawrence in patients with *genu* osteoarthritis who underwent outpatient treatment at the orthopedic clinic of rsu anutapura palu in 2018. Herb-Medicine J. 2019; 2(1):10–4.
4. Dulay GS, Cooper C, Dennison EM. Knee pain, knee injury, knee osteoarthritis & work. Best Pract Res Clin Rheumatol. 2015; 29(3):454–61.
5. Nugraha AS, Widyatmoko S, Jatmiko SW. The relationship between obesity and the occurrence of knee osteoarthritis in the elderly in laweyan district, surakarta. Biomedicine. 2015; 7(1):15–8.
6. Sofyan ZR, Rizal F. The Relationship between obesity and the incidence of osteoarthritis of the knee joint at rsu teungku, peukan, southwest aceh. J Mask Science and Health. 2020; 7(4):567–73.
7. Nedunchezhiyan U, Varughese I, Sun ARJ, Wu X, Crawford R, Prasadam I. Obesity, inflammation, and immune system in osteoarthritis. Front Immunol. 2022; 13(July):1–19.
8. Riskesdas 2018 Team. Riskesdas Report 2018 Nasional. IAARD Issuing Institution. 2018. p. 156.
9. Aldo RR, Gustin RK. The relationship between obesity and the incidence of osteoarthritis in the elderly. J Health. 2019; 10(2):106.
10. Harbuwono DS, Pramono LA, Yunir E, Subekti I. Obesity and central obesity in indonesia: Evidence from a national health survey. Med J Indones. 2018; 27(2):53–9.
11. Lv H, Wang Y, Zhang G, Wang X, Hu Z, Chu Q, Zhou Y, Yang Y, Jiang T, Wang J. Association between obesity measurement indexes and symptomatic knee osteoarthritis among the Chinese population: analysis from a nationwide longitudinal study. BMC Musculoskeletal Disorders. 2024 Dec 2;25(1):986.
12. Li TC, Li CI, Liu CS, Lin CH, Yang SY, Lin CC. Obesity marker trajectories and cognitive impairment in older adults: a 10-year follow-up in Taichung community health study for elders. BMC Psychiatry. 2022; 22(1):1–11.
13. Cao Z, Wu Y, Li Q, Li Y, Wu J. A causal relationship between childhood obesity and risk of osteoarthritis: results from a two-sample Mendelian randomization analysis. Ann Med. 2022; 54(1):1636–45.
14. Roux CH, Ferrero S. Epidemiology of osteoarthritis. Rev du Rhum (Edition Fr. 2024; 30(2):184–95.
15. Zheng H, Chen C. Body mass index and risk of knee osteoarthritis: Systematic review and meta-analysis of prospective studies. BMJ Open. 2015; 5(12):56-70.
16. Clynes MA, Jameson KA, Edwards MH, Cooper C, Dennison EM. Impact of osteoarthritis on activities of daily living: does joint site matter?. Aging Clin Exp Res. 2019; 31(8):1049–56.
17. WHO. Obesity. World Health Organization. 2018.
18. Dong Y, Yan Y, Zhou J, Zhou Q, Wei H. Evidence on risk factors for knee osteoarthritis in middle-older aged: a systematic review and meta analysis. J Orthop Surg Res. 2023; 18(1):1–16.
19. Khan B, Khan OY, Zehra S, Azhar A, Fatima S. Association between obesity and risk of knee osteoarthritis. Pak J Pharm Sci. 2020; 33(1):295–

P-ISSN: 2830-6317
E-ISSN: 2962-5491

8.
20. Dharmajayanti IA, Negara AA, Artini IG. The correlation between the body mass index, speed, and agility among athletes: a literature review. Kinesiology and Physiotherapy Comprehensive. 2023 Dec 1;2(3):81-6.
21. Nugraha IGMN, Winaya IMN, Negara AAGAPN, Andayani NLN. The relationship between leg muscle strength and functional mobility in the elderly. Physical Therapy Journal of Indonesia. 2024;5(1):25-28.
22. Warmadewi NKU, Adhitya IPGS, Griadhi IPA, Sutadarma IWG. Hubungan indeks massa tubuh dan lingkar perut terhadap foot hyperpronation pada perempuan dewasa di desa batuan, sukawati, gianyar. Majalah Ilmiah Fisioterapi Indonesia.2018; 3(1):36-40.

KPC Kinesiology and Physiotherapy Comprehensive

P-ISSN: 2830-6317
E-ISSN: 2962-5491

Table 1. Analysis of the relationship between obesity and knee osteoarthritis

Authors	Title	Methods	Results
Dong, et al, (2023)	Evidence on Risk Factors for Knee Osteoarthritis in Middle-Older Aged: A Systematic Review and Meta Analysis	**Study Design**: The systematic review included looking for cohort studies and case-control studies on risk factors for knee osteoarthritis. A total of 29 articles, namely, 17 case-control studies and 12 cohort studies.	There were 5 significant risk factors (p=<0.05), namely, history of trauma (p=0.03), BMI ≥ 24 kg/m2 (p=0.004), women (p=0.03), age (p=0.007), exercise (p=0.003), based on the statistical results showed that there was a significant relationship with the risk of knee OA.
Sofyan, dkk, (2020)	The Relationship Between Obesity and the Incidence of Osteoarthritis of the Knee Joint at Teungku Peukan Hospital, Southwest Aceh	**Study design:** study cross sectional. **Participants:** 70 participants with OA criteria, obesity, no history of OA but with obesity or vice versa over 16 years old, non-probability sampling technique with purposive sampling method. **Statistical analysis:** chi-square test **Measuring tools:** questionnaires, interviews, and measuring weight and height **Variable: Independent variables:** age, gender, weight; **Dependent variable:** knee OA	Research shows that the average person over 40 years old is affected by OA with a percentage of 28.6%. The gender in women was found to be affected by OA with a percentage of 72.9%. In obesity with a percentage of 62.9%. So that there was a significant relationship between obesity and the risk of osteoarthritis (OA) with a result of p-value = 0.000 (P < 0.05).
Khan, et al, (2020)	Association Between Obesity and Risk of Knee Osteoarthritis	**Study design:** case control study **Participants:** 800 participants with inclusion criteria aged >30 years and having a Kellgren-Lawrence (K-L) grading system grade 2 or higher. Exclusion criteria for a history of rheumatoid arthritis, trauma, injury, and bone or joint disorders. **Statistical tests:** chi-square test, t-student test, multivariate logistic regression analysis. **Measuring instruments:** VAS, WOMAC, and KL grade **Variable: Independent variables:** weight, gender, age, family history, physical activity**; Dependent variable:** knee OA.	There were significant results in the sex of the patients, in women there were more KOA incidences with a ratio of 8:1. Obesity is significantly associated with the risk of knee osteoarthritis (p<0.001). Other factors such as family history, standing for long periods of time, lifting heavy weights, climbing stairs, and sitting on the floor are also associated with an increased risk of KOA.
Aldo, et al, (2019)	The Relationship between Obesity and the Incidence of	**Study design:** study cross sectional. **Participants:** 89 people who were taken by accidental sampling, aged >60 years. **Statistical test:** chi-square test	There were significant results between obesity and OA as many as 65.2% of 89 samples experienced osteoarthritis, (p-value 0.002).

P-ISSN: 2830-6317
E-ISSN: 2962-5491

	Osteoarthritis in the Elderly	**Measuring tool:** questionnaire **Variable: Independent variables:** age, obesity**; Dependent variable:** knee OA.	
Nugraha, dkk, (2015)	The Relationship between Obesity and the Occurrence of Knee Osteoarthritis in the Elderly in Laweyan District, Surakarta	**Study design:** study cross sectional. **Participants:** 50 participants who will be divided into 2 groups, namely obese and non-obese. **Inclusion criteria:** >46 years old and residing in Laweyan Surakarta. **Exclusion criteria:** history of knee joint trauma and age <46 years. **Statistical test:** chi-square test and Windows based IBM SPSS Statistic 21.0 software **Measuring instrument:** criteria for diagnosis of osteoarthritis according to the American College of Rheumatology **Variable: Independent variables:** age, weight**; Dependent variable:** knee OA.	There were significant results between obesity and the risk of OA in the elderly in Laweyan Surakarta with p=0.001 (p<0.05).
Anggraini, et al., (2014)	The Relationship Between Obesity and Factors in Individuals with the Incidence of knee osteoarthritis	**Study design:** Observational research of case control studies. **Participants:** 64 samples were divided by systematic random sampling into case groups and control groups. **Statistical test:** chi-square and statcalc test on epi info program **Measuring instrument:** x-ray results **Variable: Independent variables:** weight, age, gender, smoking habits, and physical activity; **Dependent variable:** knee OA.	There were significant results between obesity and risk factors for knee OA, such as age and gender with p-value results obtained in obesity (p=0.001, OR=7.20), age (p=0.012, OR=3.67), gender (p=0.005, OR=4.69),