

## Relationship Between Obesity and Joint Disorders in the Working Area of Ponre Health Center, Bulukumba

### *Hubungan Obesitas dengan Kejadian Gangguan Sendi di Wilayah Kerja Puskesmas Ponre Kabupaten Bulukumba*

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#### ABSTRACT

Background: Obesity is a condition characterized by excessive accumulation of body fat that increases the risk of developing joint disorders. Excess body weight places greater pressure on the joints and triggers inflammatory processes that may accelerate damage to cartilage and joint tissue, potentially causing pain, stiffness, and limited mobility that interfere with daily activities. Purpose: To determine the relationship between obesity and the incidence of joint disorders in the working area of Ponre Community Health Center, Bulukumba Regency, in 2026. Methods: This study employed a quantitative non-experimental design using an analytical observational approach with a cross-sectional design. The sample consisted of 96 respondents selected using purposive sampling according to the study's inclusion and exclusion criteria. Data were collected through observation sheets and Body Mass Index (BMI) measurements, and analyzed using the Chi-Square test with a significance level of  $\alpha = 0.05$ . Results: Most respondents were classified as Obesity Class I (45 respondents, 46.9%), followed by Obesity Class II (32 respondents, 33.3%) and overweight (19 respondents, 19.8%). Most respondents experienced joint disorders (66 respondents, 68.8%), while 30 respondents (31.3%) did not. The Chi-Square test yielded a p-value of 0.001 ( $< 0.05$ ), indicating a significant relationship between obesity and the incidence of joint disorders. Conclusion: There is a significant relationship between obesity and the incidence of joint disorders in the working area of Ponre Community Health Center, Bulukumba Regency, in 2026. The community is advised to maintain an ideal body weight through a healthy diet and regular physical activity, and health workers are encouraged to enhance public education on the prevention of obesity and joint disorders.

**Keywords:** *Obesity, Joint Disorders, Chi-Square Test*

#### ABSTRAK

Obesitas merupakan kondisi penumpukan lemak tubuh yang berlebihan dan dapat meningkatkan risiko terjadinya gangguan sendi, karena kelebihan berat badan meningkatkan tekanan pada sendi serta memicu proses peradangan yang mempercepat kerusakan tulang rawan dan jaringan sendi sehingga dapat menimbulkan nyeri, kekakuan, dan keterbatasan gerak yang mengganggu aktivitas sehari-hari. Penelitian ini bertujuan untuk mengetahui hubungan obesitas dengan kejadian gangguan sendi di Wilayah Kerja Puskesmas Ponre Kabupaten Bulukumba Tahun 2026. Penelitian ini menggunakan desain kuantitatif non-eksperimental dengan pendekatan observasional analitik dan rancangan cross sectional, dengan sampel sebanyak 96 responden yang dipilih menggunakan teknik purposive sampling sesuai kriteria inklusi dan eksklusi penelitian. Pengumpulan data dilakukan melalui lembar observasi dan pengukuran Indeks Massa Tubuh (IMT), kemudian dianalisis menggunakan uji Chi-Square dengan tingkat kemaknaan  $\alpha = 0,05$ . Hasil penelitian menunjukkan bahwa sebagian besar responden berada pada kategori Obesitas I sebanyak 45 responden (46,9%), diikuti Obesitas II sebanyak 32 responden (33,3%), dan overweight sebanyak 19 responden (19,8%). Sebagian besar responden mengalami gangguan sendi yaitu sebanyak 66 responden (68,8%), sedangkan 30 responden (31,3%) tidak mengalami gangguan sendi. Hasil uji statistik diperoleh nilai p-value = 0,001 ( $< 0,05$ ) sehingga dapat disimpulkan bahwa terdapat hubungan yang signifikan antara obesitas dengan kejadian gangguan sendi di Wilayah Kerja Puskesmas Ponre Kabupaten Bulukumba Tahun 2026. Masyarakat disarankan menjaga berat

*badan ideal melalui pola makan sehat dan aktivitas fisik teratur, sementara tenaga kesehatan diharapkan meningkatkan edukasi mengenai pencegahan obesitas dan gangguan sendi guna menurunkan risiko kejadian tersebut di Wilayah Kerja Puskesmas Ponre Kabupaten Bulukumba.*

**Kata Kunci:** *Obesitas, Gangguan Sendi, Uji Chi-Square*

## I. INTRODUCTION

Joint disorders are a common health problem in the community, particularly among adults and older adults, causing pain, stiffness, swelling, and limited joint movement that impair daily activities; if left untreated, they can reduce quality of life and increase the risk of disability.<sup>1</sup> According to the World Health Organization (WHO), musculoskeletal disorders — including joint disorders — are among the leading causes of disability worldwide, with an estimated 1.71 billion people affected in 2022, a figure that continues to rise alongside increasing life expectancy, rising obesity rates, and low levels of physical activity.<sup>1</sup>

In Indonesia, joint disease remains a considerable health burden. Based on the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia), joint disorders are most common among older adults and are influenced by factors such as age, sex, obesity, physical activity, history of injury, and metabolic disease.<sup>2</sup> In South Sulawesi Province, the prevalence of joint disease was recorded at 6.39%, while in Bulukumba Regency it reached 6.12%, affecting approximately 1,702 people — figures that highlight the continued need for prevention, early detection, and appropriate management of joint disorders.<sup>3</sup>

Obesity is a health condition characterized by excessive accumulation of body fat resulting from a prolonged imbalance between energy intake and energy expenditure. Overweight and obesity status are commonly determined through Body Mass Index (BMI), calculated from body weight and height; a person is classified as overweight when BMI exceeds 25 kg/m<sup>2</sup> and as obese when BMI exceeds 27 kg/m<sup>2</sup>.<sup>4</sup> Obesity and overweight have become a widespread global health problem, and WHO has designated obesity as one of the largest chronic health problems in the world.<sup>5</sup>

Based on its cause, obesity can be classified as primary obesity, resulting from an energy intake that exceeds the body's energy requirements and influenced by dietary patterns, or secondary obesity, caused by an underlying disease, congenital abnormality, endocrine disorder, or other medical condition.<sup>6</sup> For clinical and epidemiological purposes, obesity is further categorized according to BMI thresholds, as summarized in Table 1.

Table 1. Classification of Nutritional Status Based on Body Mass Index (BMI)

| Classification   | BMI (kg/m <sup>2</sup> ) |
|------------------|--------------------------|
| Underweight      | < 18.5                   |
| Normal / ideal   | 18.6–22.9                |
| Overweight       | 23.0–24.9                |
| Obesity Class I  | 25.0–29.9                |
| Obesity Class II | ≥ 30.0                   |

*Source: Indonesian Ministry of Health BMI classification, as adopted in the reference study.<sup>4</sup>*

Numerous factors are known to increase the risk of obesity. Genetic inheritance plays an important role: children have approximately a 40% likelihood of obesity when one parent is obese, rising to about 80% when both parents are obese, compared with only about 7% when neither parent is obese.<sup>7</sup> Beyond genetics, modern urban lifestyles that favor convenient, high-calorie, high-fat food, social environments that normalize excess body weight, low levels of physical activity, unhealthy dietary patterns, insufficient sleep duration, certain appetite-stimulating medications, and higher household socioeconomic status that increases access to energy-dense food have all been identified as contributing factors, alongside sex-related differences in body fat composition and hormonal influences such as pregnancy and menopause.<sup>8</sup>

These risk factors operate across several domains. Modern urban living, in which convenient and inexpensive high-calorie, high-fat food is readily available, makes it difficult for many people to maintain a healthy diet, while social environments that regard a larger body size as a marker of prosperity or attractiveness further normalize weight gain.<sup>8</sup> Low levels of physical activity combined with habitual overeating prevent the body from expending the calories consumed, and individual dietary patterns — the foods people habitually choose and how they eat them — further shape long-term energy balance.<sup>8</sup> Hormonal factors also contribute: insufficient sleep duration disrupts the hormonal regulation of appetite, certain medications stimulate the



hunger center and increase food intake, and sex-related differences in body composition and reproductive hormones, including pregnancy and menopause, help explain why obesity is generally more common among women than men.<sup>8</sup> Higher household socioeconomic status, finally, increases access to and consumption of energy-dense food, reflecting the greater purchasing power of higher-income families.<sup>8</sup>

Physiologically, obesity arises from an imbalance between energy intake and energy expenditure, in which incoming energy substantially exceeds the energy used by the body; the surplus energy is then stored as adipose tissue. This imbalance may be exogenous (primary obesity), related to dietary and nutritional patterns and accounting for roughly 90% of cases, or endogenous (secondary obesity), arising from hormonal disturbances, specific syndromes, or genetic abnormalities in about 10% of cases; energy balance itself is regulated by the hypothalamus through the control of hunger and satiety, the rate of energy expenditure, and hormone secretion.<sup>9</sup>

Obesity is associated with a wide range of complications. Increased mechanical load and chronic inflammation in the knee joint raise the risk of osteoarthritis; individuals with obesity also face a substantially higher risk of type 2 diabetes mellitus, dyslipidemia, vitamin D deficiency, cardiovascular disease including heart failure, atrial fibrillation, and coronary heart disease, ischemic stroke, and hypertension, which obesity is estimated to cause in 65–78% of cases globally.<sup>10</sup>

These complications are wide-ranging and, in several cases, well quantified. Beyond the musculoskeletal burden already noted, individuals with obesity face a 3.5- to 4.5-fold higher risk of type 2 diabetes mellitus, and dyslipidemia — marked by elevated triglycerides, reduced HDL cholesterol, and elevated LDL cholesterol — occurs in approximately 60–70% of people with obesity and 50–60% of those who are overweight. Serum vitamin D deficiency is reported in roughly 35% of individuals with obesity and 24% of those who are overweight, compared with people of normal BMI, while among women with Polycystic Ovary Syndrome (PCOS), obesity prevalence reaches 33–47%, and PCOS itself is up to five times more common in women with obesity than in those of normal weight.<sup>10</sup>

Cardiovascular complications are similarly substantial: obesity-related neurohormonal change, adipokine activity, oxidative stress, inflammation, and epicardial fat accumulation can progress to cardiomyopathy, and obesity is estimated to underlie roughly one in five cases of atrial fibrillation, with each 5 kg/m<sup>2</sup> increase in BMI raising atrial fibrillation risk by up to 29%. Coronary heart disease risk rises by approximately 5–7% for every 1 kg/m<sup>2</sup> increase in BMI above normal, while ischemic stroke risk increases by 22% in overweight and 64% in obese individuals, with each 5 kg/m<sup>2</sup> increase in BMI associated with a 29–41% rise in ischemic-stroke mortality. Obesity is estimated to cause 65–78% of primary hypertension cases globally, with each 5% increase in body weight raising hypertension risk by 20–30%; it is also reciprocally linked to chronic kidney disease and affects the respiratory system through mechanical, inflammatory, and neurophysiological pathways.<sup>10</sup>

Management of obesity is not limited to weight reduction but also emphasizes long-term weight maintenance through lifestyle modification, increased physical activity, structured weight-loss programs, psychological therapy when emotional or social factors contribute to the condition, and, when other approaches prove insufficient, surgical intervention.<sup>6</sup> Lifestyle modification — combining self-monitoring, goal setting, stimulus control, stress management, and social support — together with light-to-moderate aerobic exercise such as walking, swimming, or cycling, remains the first-line approach and can reduce body weight by approximately 10% within 4 to 26 weeks.<sup>6</sup>

In 2020, WHO estimated that around 2 billion adults worldwide (39%) were overweight (BMI > 25) and more than 600 million were classified as obese (BMI > 30);<sup>11</sup> this prevalence has continued to increase, with an estimated two-fold rise reported the following year.<sup>12</sup> In Indonesia, around 43% of adults aged ≥ 18 years were overweight and 16% were living with obesity in the Southeast Asia region.<sup>1,13</sup>

Data from the Bulukumba District Health Office show a marked year-on-year increase in obesity cases, from 17 people in 2023 to 1,603 in 2024 and 2,234 in 2025. In the working area of Ponre Community Health Center specifically, obesity cases rose from 1,339 in 2023 to 2,294 in 2024 and 2,326 in 2025 — the highest number among all community health centers in Bulukumba Regency, indicating a relatively high local prevalence of obesity.

A joint disorder is a condition in which the structure or function of a joint is disrupted, giving rise to pain, stiffness, swelling, and limited movement; causes include the degenerative process of aging, inflammation, infection, injury, and metabolic disturbances affecting the joint and

surrounding tissue.<sup>14</sup> Joint disorders comprise several distinct conditions with different causes, symptoms, and severity. Osteoarthritis, the most common form, results from the gradual degeneration of articular cartilage and most often affects the knee, hip, hand, and spine, with a higher risk among individuals who are obese or of advanced age.<sup>14</sup> Rheumatoid arthritis is a chronic autoimmune disease in which the immune system attacks joint tissue, typically affecting both sides of the body symmetrically.<sup>15</sup> Gout arthritis results from elevated serum uric acid that crystallizes within the joint, most classically the great toe, while septic arthritis is joint inflammation caused by infection, most often bacterial, and requires prompt treatment to prevent permanent joint damage.<sup>16</sup> Spondyloarthritis is a group of chronic inflammatory diseases primarily affecting the spine and sacroiliac joints, of which ankylosing spondylitis is the best-known form.<sup>17</sup> Psoriatic arthritis is associated with psoriasis and affects both skin and joints,<sup>18</sup> while lupus arthritis is joint inflammation occurring in Systemic Lupus Erythematosus, most often involving the fingers and wrists.<sup>19</sup>

Joint disorders give rise to a recognizable cluster of signs and symptoms that vary in severity depending on the type of disease, its duration, and the extent of joint damage. The most common complaint is joint pain, which typically worsens with use and eases with rest, although in advanced disease it may persist even at rest; the pain arises from inflammation, cartilage damage, or structural change within the joint.<sup>14</sup> Stiffness is often most pronounced after waking or after prolonged inactivity, tends to be brief in osteoarthritis but more prolonged in inflammatory joint disease, and is frequently accompanied by swelling from fluid accumulation or inflammation, a grating or crepitant sensation during movement as the cartilage surface roughens, and, in inflamed joints, localized warmth and redness.<sup>14</sup> Over time, the muscles surrounding an affected joint may weaken from disuse, and in long-standing, poorly managed cases the joint itself may become permanently deformed; the cumulative effect of these symptoms is a progressive reduction in the ability to perform daily activities such as walking, bathing, dressing, and working, with a corresponding decline in overall quality of life.<sup>1</sup>

The etiology of joint disorders is rarely attributable to a single cause and typically reflects a combination of biological, genetic, mechanical, and environmental factors. The aging process reduces the capacity of cartilage to regenerate and decreases the elasticity of joint tissue; obesity increases mechanical load on weight-bearing joints while promoting the release of pro-inflammatory substances from adipose tissue; injury or trauma damages cartilage, ligaments, and supporting structures; family history influences cartilage structure, bone density, and the inflammatory response; occupations and activities involving repetitive heavy loading, prolonged standing, squatting, or kneeling accelerate joint wear; and metabolic diseases such as diabetes mellitus, hyperuricemia, and dyslipidemia disturb joint tissue metabolism and promote inflammation.<sup>14</sup>

Left inadequately managed, joint disorders can give rise to a range of complications that affect physical, psychological, and social well-being. These include progressive limitation of mobility that interferes with walking, climbing stairs, and prolonged standing; permanent physical disability with growing dependence on others; chronic pain that disturbs sleep, concentration, and productivity; joint deformity in advanced, poorly managed cases; an overall decline in quality of life; and a higher risk of psychological difficulties such as stress, anxiety, and depression arising from persistent pain and reduced independence.<sup>14</sup> The severity of these complications tends to increase with the duration and severity of the underlying joint damage, underscoring the importance of early detection and intervention.<sup>14</sup>

Obesity is increasingly recognized as one of the most important modifiable risk factors for joint disorders, particularly for weight-bearing joints such as the knee, hip, and ankle: the higher a person's body weight, the greater the mechanical load these joints must bear. Beyond mechanical loading, excess adipose tissue secretes a range of inflammatory mediators that can accelerate cartilage and joint tissue damage.<sup>20</sup> Epidemiological evidence indicates that individuals with obesity face a substantially higher likelihood of developing osteoarthritis than individuals with normal body weight,<sup>21</sup> and that obesity contributes to systemic inflammation that accelerates the progression of joint disease.<sup>22</sup> Importantly, this relationship also runs in the opposite direction: weight reduction has been shown to reduce pain and improve functional capacity among people with joint disorders, underscoring weight control as a central strategy in both the prevention and management of joint disease.<sup>23</sup>

Previous research conducted in the working area of Puskesmas Lampaseh found that a higher body mass index was associated with a greater likelihood of joint disorders, with excess body weight contributing to more severe joint damage.<sup>24</sup> Similarly, a study conducted in Sei Putih Village, working area of Puskesmas Kampar, found a significant association between obesity and

joint disorders among older adults ( $p = 0.000$ ).<sup>25</sup> Based on this background and these prior findings, the present study was conducted to determine whether a relationship exists between obesity and the incidence of joint disorders in the working area of Ponre Community Health Center, Bulukumba Regency, in 2026.

## II. METHODOLOGY

This study employed a quantitative, non-experimental design using an analytical observational approach with a cross-sectional design, in which the independent variable (risk factor) and the dependent variable (outcome) were measured simultaneously; each respondent was examined once, at a single point in time.<sup>26</sup> The study was conducted in the working area of Ponre Community Health Center, Bulukumba Regency, from March to May 2026.

The population comprised 2,326 people with obesity recorded by the Bulukumba District Health Office in the working area of Ponre Community Health Center in 2025.<sup>27</sup> The sample size was calculated using the Slovin formula with a 10% margin of error, yielding  $n = 95.88$ , rounded up to 96 respondents, who were selected using purposive sampling.<sup>27</sup> Inclusion criteria were: BMI  $\geq 23.0$  kg/m<sup>2</sup>, age  $\geq 30$  years, residing in the working area of Ponre Community Health Center, and willingness to participate as a respondent; exclusion criteria were a history of bone fracture and residence outside the study area.

The sample size was determined using the Slovin formula,  $n = N / (1 + Ne^2)$ , where  $N$  is the population size and  $e$  is the margin of error. With  $N = 2,326$  and  $e = 0.1$ , this yields  $n = 2,326 / (1 + 2,326 \times 0.1^2) = 2,326 / (1 + 23.26) = 2,326 / 24.26 = 95.88$ , rounded up to 96 respondents.<sup>27</sup> Sampling was carried out using a non-probability, purposive approach, in which respondents were deliberately selected according to the inclusion and exclusion criteria rather than at random.<sup>27</sup>

The independent variable in this study was obesity and the dependent variable was joint disorder occurrence. Both variables were operationally defined, including their measurement criteria and scale, as summarized in Table 2.<sup>26</sup>

Table 2. Operational Definitions of Study Variables

| Variable                      | Operational Definition                                                                                       | Criteria                                                                                                                                             | Scale   |
|-------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Obesity<br>(independent)      | Excessive accumulation of body fat, determined through BMI measurement                                       | Overweight: BMI 23.0–24.9 kg/m <sup>2</sup> ; Obesity Class I: BMI 25.0–29.9 kg/m <sup>2</sup> ; Obesity Class II: BMI $\geq 30.0$ kg/m <sup>2</sup> | Ratio   |
| Joint disorder<br>(dependent) | Presence of joint complaints such as pain, stiffness, swelling, limited movement, or impaired joint function | With joint disorder / without joint disorder                                                                                                         | Nominal |

*Measurement tools: BMI measurement (weight and height) for obesity; observation sheet and secondary community health center data for joint disorder status.*<sup>26</sup>

Data on obesity were obtained directly using an observation sheet and BMI measurement, while data on joint disorders were obtained from secondary data recorded at the community health center.<sup>28</sup> Data processing followed editing, coding, data entry, and tabulation procedures.

Univariate analysis was used to describe the distribution of obesity and joint disorders, while bivariate analysis using the Chi-Square test ( $\alpha = 0.05$ ) was used to examine the relationship between the two variables. This study was conducted in accordance with the ethical principles of respect for persons — obtaining informed consent and allowing respondents to withdraw at any time — beneficence, non-maleficence (all measurements were non-invasive), justice (equal opportunity to participate for all respondents meeting the inclusion criteria), and confidentiality (respondent identities were coded and kept confidential), and received ethical approval from the Health Research Ethics Committee of STIKES Panrita Husada Bulukumba (No. 002211/KEP-STIKES Panrita Husada Bulukumba/2026).

## III. RESULTS AND DISCUSSION

Of the 96 respondents, the majority were female (67 respondents, 69.8%) while 29 (30.2%) were male. By age group, most respondents were 46–59 years old (43 respondents, 44.8%), followed by 36–45 years old (29 respondents, 30.2%), while those aged  $\geq 60$  years formed the smallest group (24 respondents, 25.0%). By occupation, most respondents worked as

housewives (68, 70.8%), followed by farmers (24, 25.0%), fishers (2, 2.1%), and laborers or waitstaff (1 each, 1.0%), as summarized in Table 3.

Table 3. Characteristics of Respondents (n = 96)

| Characteristic    |           | n  | %     |
|-------------------|-----------|----|-------|
| Sex               | Male      | 29 | 30.2  |
|                   | Female    | 67 | 69.8  |
| Age Group (years) | 36–45     | 29 | 30.2  |
|                   | 46–59     | 43 | 44.8  |
|                   | ≥ 60      | 24 | 25.0  |
| Occupation        | Housewife | 68 | 70.8  |
|                   | Farmer    | 24 | 25.0  |
|                   | Fisher    | 2  | 2.1   |
|                   | Laborer   | 1  | 1.0   |
|                   | Waitstaff | 1  | 1.0   |
| Total             |           | 96 | 100.0 |

Source: Primary data, 2026.

Most respondents were classified as Obesity Class I (45, 46.9%), followed by Obesity Class II (32, 33.3%) and overweight (19, 19.8%). Regarding joint disorder status, 66 respondents (68.8%) experienced joint disorders while 30 (31.3%) did not, as summarized in Table 4.

Table 4. Distribution of Obesity Category and Joint Disorder Status (n = 96)

| Category              |                  | n  | %    |
|-----------------------|------------------|----|------|
| Obesity Category      | Overweight       | 19 | 19.8 |
|                       | Obesity Class I  | 45 | 46.9 |
|                       | Obesity Class II | 32 | 33.3 |
| Joint Disorder Status | Yes              | 66 | 68.8 |
|                       | No               | 30 | 31.3 |

Source: Primary data, 2026.

The bivariate analysis (Table 5) shows that among overweight respondents, 18 (94.7%) experienced joint disorders and 1 (5.3%) did not. Among respondents with Obesity Class I, 23 (51.1%) experienced joint disorders and 22 (48.9%) did not, while among respondents with Obesity Class II, 25 (78.1%) experienced joint disorders and 7 (21.9%) did not. The Chi-Square test yielded a p-value of 0.001 ( $< 0.05$ ), indicating a statistically significant relationship between obesity and the incidence of joint disorders in the working area of Ponre Community Health Center, Bulukumba Regency, in 2026; the alternative hypothesis ( $H_a$ ) was accepted and the null hypothesis ( $H_0$ ) was rejected.

Table 5. Relationship Between Obesity and the Incidence of Joint Disorders in the Working Area of Ponre Community Health Center

| Obesity Category | Yes (n) | Yes (%) | No (n) | No (%) | Total (n) | Total (%) |
|------------------|---------|---------|--------|--------|-----------|-----------|
| Overweight       | 18      | 94.7    | 1      | 5.3    | 19        | 100.0     |
| Obesity Class I  | 23      | 51.1    | 22     | 48.9   | 45        | 100.0     |
| Obesity Class II | 25      | 78.1    | 7      | 21.9   | 32        | 100.0     |
| Total            | 66      | 68.8    | 30     | 31.3   | 96        | 100.0     |

Source: Primary data and Chi-Square test, 2026.  $p = 0.001$  ( $p < 0.05$ ).

Although the proportion of respondents with joint disorders was highest among those classified as overweight (94.7%) rather than increasing steadily across obesity categories, respondents with Obesity Class II still showed a markedly higher proportion of joint disorders (78.1%) than those with Obesity Class I (51.1%), suggesting that the relationship between the degree of obesity and joint disorder occurrence in this sample was not strictly linear and may be

influenced by the uneven distribution of respondents across categories, as well as by other factors examined in the following discussion.

These findings indicate that respondents with a higher degree of obesity tended to experience joint disorders more frequently, suggesting that increased body weight affects the musculoskeletal system, particularly weight-bearing joints such as the knee, hip, and ankle. According to WHO, obesity is one of the major risk factors for musculoskeletal disease, including osteoarthritis.<sup>29</sup> People with obesity have a higher risk of joint damage due to continuous mechanical pressure on the joint surface; in addition, adipose tissue produces proinflammatory cytokines that accelerate inflammation and cartilage degeneration. Physiologically, excess body weight increases the load borne by the joints — with each increase in body weight, the pressure on the knee joint during walking and daily activity rises several-fold, leading to cartilage damage, reduced joint elasticity, and the pain and limited mobility characteristic of osteoarthritis.

Excess weight also increases pressure on weight-bearing joints, accelerating cartilage breakdown; matrix fragments released into the joint cavity trigger a response from synoviocytes and macrophages, whose activation generates further proinflammatory and catabolic mediators — a process known as mechanical inflammation that contributes to the development of osteoarthritis. Beyond mechanical loading, obesity also stimulates adipokine production that raises proinflammatory cytokine levels, contributing to synovial inflammation, increased matrix metalloproteinase (MMP) activity, cartilage degradation, and bone remodeling in osteoarthritis; insulin resistance in the synovial tissue of individuals with obesity further reduces insulin's ability to suppress inflammatory and catabolic mediators, promoting the onset of osteoarthritis.<sup>30</sup>

They are also consistent with a study conducted in the working area of Puskesmas Lampaseh, which found that a higher body mass index increased the likelihood of joint disorders and worsened the severity of joint damage,<sup>24</sup> and with a study among older adults in Sei Putih Village, working area of Puskesmas Kampar, which reported a statistically significant association between obesity and joint disorders ( $p = 0.000$ ).<sup>25</sup>

These findings are consistent with previous research showing that a higher body mass index is associated with greater severity of knee osteoarthritis among older adults,<sup>31</sup> as well as findings from Laweyan Subdistrict, Surakarta, reporting a significant relationship between obesity and the incidence of knee osteoarthritis among older adults.<sup>32</sup> A similar association between age, obesity, and sex with the risk of knee osteoarthritis has also been reported elsewhere.<sup>33</sup>

Nevertheless, some respondents with obesity did not experience joint disorders, while others with a lower degree of obesity did, indicating that joint disorders are not determined by obesity alone but are also influenced by other factors such as age, sex, physical activity, occupation, prior joint injury, and genetic predisposition. Osteoarthritis is indeed a multifactorial disease influenced by advanced age, obesity, female sex, history of joint trauma, genetic factors, and prolonged heavy physical activity;<sup>23</sup> obesity is therefore not the sole cause of joint disorders but plays an important role in increasing the disease risk. Based on these findings, the researchers assume that the higher a person's degree of obesity, the greater the risk of joint disorders due to increased biomechanical stress on the joints and chronic inflammatory processes.

The demographic profile of respondents in this study is also consistent with recognized risk patterns for obesity and joint disorders. The predominance of female respondents (69.8%) is in line with evidence that women generally have a higher body fat percentage and are more susceptible to weight gain around pregnancy and menopause,<sup>8</sup> while the concentration of respondents in the 46–59 year age group reflects the cumulative effect of aging on cartilage regeneration and joint elasticity described earlier. Similarly, the large proportion of respondents working as housewives may reflect a comparatively sedentary daily routine, which — combined with a positive energy balance — can further compound the risk of both obesity and subsequent joint disorders.

Occupational patterns among respondents may also help explain the obesity distribution observed in this study. The majority of respondents were housewives (70.8%), an occupation typically associated with lower levels of structured physical activity and greater exposure to a sedentary daily routine compared with more physically demanding occupations such as farming or fishing, which together accounted for a much smaller share of respondents (25.0% and 2.1%, respectively).<sup>8</sup> Low physical activity is a recognized contributor to a sustained positive energy balance and, over time, to the accumulation of excess body fat, which is consistent with the high proportion of obesity observed across all age and occupational groups in this study.<sup>8</sup>

These findings carry practical implications for the prevention and management of joint disorders in the community. Non-pharmacological measures — including health education, weight control, regular physical activity such as walking, cycling, swimming, and low-impact exercise, and

the use of assistive devices when needed — form the foundation of joint disorder management and are complemented, when necessary, by pharmacological treatment (analgesics, non-steroidal anti-inflammatory drugs, and corticosteroids) or, in advanced cases, surgical intervention.<sup>34</sup> Community health centers are therefore well positioned to integrate obesity screening with joint-disorder prevention programs, rather than addressing the two conditions separately.

In more granular terms, non-pharmacological management encompasses patient education about the disease process and aggravating factors, weight control — particularly important for patients with obesity, since reducing body weight lowers the load borne by the knee and hip and can slow the progression of joint damage — physiotherapy to strengthen periarticular muscles and preserve joint function, and assistive devices such as canes, walkers, or knee braces to offload affected joints during daily activity.<sup>14</sup> Pharmacological options range from simple analgesics such as paracetamol for mild-to-moderate pain to non-steroidal anti-inflammatory drugs and, in more severe inflammatory flares, corticosteroids administered orally or by intra-articular injection; surgical procedures such as arthroscopy, osteotomy, or joint replacement are reserved for cases in which conservative therapy no longer provides adequate relief.<sup>34</sup>

Beyond their statistical significance, these findings carry meaning for several audiences. For nursing education, they reinforce the importance of understanding obesity as a modifiable risk factor for joint disorders within the nursing curriculum and provide a foundation for future research on related risk factors. For health workers, they support the integration of weight control, early detection, and lifestyle education into routine efforts to prevent and manage joint disorders. For community health centers, they provide a basis for designing health-promotion, obesity-prevention, and degenerative-disease control programs tailored to the local population. For the community itself, they underscore the importance of maintaining an ideal body weight in order to reduce the risk of joint disorders and preserve long-term quality of life.

This study has several strengths, including a sample size calculated using a recognized statistical formula, a validated observation-sheet instrument, direct anthropometric measurement of BMI, and formal ethical approval and oversight throughout data collection. Nevertheless, several limitations should also be acknowledged: this study did not assess the severity of joint disorders and was limited to identifying their presence or absence among respondents, so the relationship between the degree of obesity and the severity of joint disorders could not be described in further detail. Its cross-sectional design also means that obesity and joint disorder status were measured at a single point in time, which limits the ability to draw causal conclusions, and the single-center sample restricts the generalizability of these findings to other populations. Further research using a larger, multi-center, and more representative sample, incorporating additional variables such as physical activity level and history of joint injury, and employing a longitudinal design, is recommended to build on these findings.

#### **IV. CONCLUSION**

Based on the findings of this study on the relationship between obesity and the incidence of joint disorders in the working area of Ponre Community Health Center, Bulukumba Regency, in 2026, it can be concluded that most respondents in the working area of Ponre Community Health Center were obese, and most respondents experienced joint disorders. Statistical analysis confirmed a significant relationship between obesity and the incidence of joint disorders in the working area of Ponre Community Health Center, Bulukumba Regency ( $p = 0.001$ ).

Community health centers are encouraged to strengthen promotive and preventive efforts against joint disorders through health education on maintaining an ideal body weight, healthy eating patterns, and regular physical activity, along with periodic obesity screening to detect risk factors for joint disorders at an early stage.

Nurses and other health professionals are encouraged to provide education, counseling, and motivation to the community regarding the dangers of obesity and its relationship with joint disorders, while the community is encouraged to adopt a balanced diet, engage in regular physical activity, and avoid a sedentary lifestyle to reduce the risk of joint disorders and maintain long-term joint health.

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