

Obesity and Osteoarthritis in Libya: Epidemiological Trends and Management Implications

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Abstract

Osteoarthritis (OA) is the most widespread chronic arthritis that affects the quality of a person's life by affecting health parameters. It occurs to old people, but it can happen to adults of any age. Obesity exerts a primary influence on the musculoskeletal system, notably contributing to the development and progression of a debilitating degenerative joint disease characterized by pain, reduced mobility, and diminished quality of life. The pathogenesis of OA involves increased joint stress, changed biomechanical patterns, cytokine dysregulation, and hormonal imbalances. Obesity is suggested to be linked to a higher incidence and development of OA in both weight-bearing and non-weight-bearing joints, along with increased rates of joint replacement surgeries and related complications. In Libya, with 66.8% of adults classified as overweight and 36.2% obese, a significant portion of the population over 40 (29168 people) suffers from OA. Adopting a healthy diet, maintaining an active lifestyle, and achieving weight loss in affected individuals have been demonstrated to improve symptoms and decelerate joint deterioration. This review synthesizes data from 20-year studies, showing that obesity is a major cause of OA. The findings underscore the importance of obesity management in preventing and mitigating OA. Further research, especially in Libya, is necessary to explain the relative contributions of mechanical and metabolic factors in OA pathogenesis.

Keywords: Osteoarthritis, Obesity, Elderly, Nutrition Management.

Introduction

Osteoarthritis (OA) is a clinical disease characterized by discomfort in joint movement, varying degrees of functional impairment mostly due to "wear and tear" on a joint, and consequently, a general reduction in quality of life [1]. It is the most common form of arthritis worldwide and a major cause of pain and disability, particularly among the elderly. Globally, it affects more than 300 million people, with its prevalence increasing due to population aging and obesity trends [2]. The disease primarily affects weight-bearing joints such as the knees and hips, as well as the small joints of the hands, leading to significant psychological burden and physical disabilities [8]. The etiology of OA is multifactorial, involving genetic, biomechanical, metabolic, and environmental factors. As mentioned before, obesity is a major modifiable risk factor, as it increases joint load and systemic inflammation, thereby accelerating cartilage breakdown [6]. Other risk factors include joint injuries, repetitive stress, age, gender [higher in women], and certain occupations [9].

Suggestively, Obesity is one of the main causes of OA in Libya. The prevalence of obesity is alarmingly high, affecting 36.2% of adults, 16.9% of children aged five years and younger, and 6.1% of children aged 10–18 years. The prevalence increases with age, from 4.2% in the 10–12 age group to 46% in the 55–64 age group. The prevalence of overweight among children under five years of age also increased from 17.6% to 25.4%. All these findings reflect the marked adoption of a sedentary lifestyle due to excessive use of electronic devices, coupled with unhealthy dietary habits across all age groups in Libya. Most obesity data in Libya remain significantly higher than the regional average [19, 20, 21]. Obesity was nearly twice as common among Libyan women compared to men (45.5% vs. 26.9%) [3]. Conversely, the global prevalence of overweight tends to be higher among men, also due to Libyan lifestyle and cultural factors, including women's sedentary behavior and imposed social norms, as well as hormonal differences [9].

Table 1. Obesity in Libya compared to other countries

Country	Overweight			Obesity		
	Male [%]	Female [%]	All [%]	Male [%]	Female [%]	All [%]
Libya 2024[16,19, 20]	36.1	29.7	66.8	26.9	45.5	36.2
USA 2024 [16, 18, 20]	40.1	28.6	34.2	39.2	41.3	42.9
KSA 1995–2024 [17, 20]	42.4	31.8	36.9	26.4	44	41.4
Tunisia 1997–2024 [18,20]	23.3	28.2	27.4	6.7	22.7	28.3
Turkey 2001–2024 [18, 20]	46.5	28.6	36.8	16.5	29.4	34.3

According to WHO reports, the yearly gradual continuous increase of obesity in Libya is proposed to contribute significantly to the incidence of OA, as excess weight increases mechanical stress on joints like the knees and hips, accelerating cartilage degeneration [11,19. 20. 21]. To simplify, the adipose tissue secretes pro-inflammatory cytokines and adipokines that promote systemic inflammation, further damaging joint tissues and advancing OA progression [12]. Regional studies indicate that Libyans with high BMI are up to four times more likely to develop joint degeneration, emphasizing the importance of addressing obesity in this population [10]. There is a proven association between obesity and knee OA, and obesity is suggested to be the main modifiable risk factor. Obese patients with a BMI over 30kg/m(2) are possibly require total knee arthroplasty (TKA) [25].

Al Rashdan (2018) conducted a study at a Jordanian field hospital in Benghazi, Libya, which examined 1,267 patients with OA. His findings revealed a high prevalence of OA in Libya, particularly among obese women, with a gender ratio of approximately 1:3 [women to men]. The average age of affected individuals was around 59 years. Notably, 75% of cases involved the right knee, and 65% of patients had concurrent chronic diseases [34]. This short cohort review aims to link the increasing prevalence of obesity in Libya with the rising incidence of arthritis, particularly among older women. It also seeks to raise awareness of the importance of adopting a healthy lifestyle and a healthy diet to aid weight loss and improve bone density. This is crucial for preventing osteoporosis in older adults, which can increase the risk of developing arthritis-associated pain, which sometimes necessitates surgery, especially in cases of knee osteoarthritis.

The Burden of Osteoarthritis in Libya

In 2019, the number of prevalent cases of OA in the Middle East and North Africa (MENA) countries ranged from 72,697 to 4.6 million, with the age-standardized rate (ASR) prevalence ranging from 4,770.5 to 6,601.3 per 100,000 population. The age-standardized prevalence of OA in the MENA shows a gradual annual increase since 1990. The (ASR) of annual incidence of OA per 100,000 was 430.4 (382.2–481.9), but for 2019 the OA incidence elevated remarkably to 5,342.8 per 100,000 (95% UI: 4,815.9–5,907.8), which is 9.3% higher than in 1990 (95% UI: 8.1–10.5).

Among the 21 countries, Saudi Arabia, Kuwait, and Iran had the highest OA burden. Yemen, Afghanistan, and Sudan had the lowest OA burden. Libya, as in Table 2. Shows a noticeable increase since 1990. Although the percentage change in ASRs (7.3) is the lowest in Table 2. However, the ASRs per 100,000 are among the highest in MENA countries, at 433.9/100,000 [13, 39].

Table 2. The OA burden in Libya compared with some MENA countries.

OA Burden	1990		2019		Percentage change in ASRs per 100,000
	No (95% UI)	ASRs per 100,000 (95% UI)	No (95% UI)	ASRs per 100,000 (95% UI)	
MENA	795083	393.5	2292214	430.4	9.4
Saudi Arabia	38187	453.1	168749	504	11.2
Algeria	53832	388.5	169449	427.5	10
Libya	8916	404.3	29168	433.9	7.3
Egypt	141417	400.7	340162	432.8	8
Tunisia	21748	389.8	57298	422.8	8.5
Turkey	156223	379.8	393382	416.6	9.7

Symptoms

Symptoms of OA typically appear in middle age. Most people experience some symptoms of osteoarthritis by age 70. The overall incidence of osteoporosis increased with age, peaking in the 55-59 age group, and then declined with increasing age. This decline was followed by a slower increase in hand osteoporosis cases until the 70-74 age group, after which the incidence gradually increased until the final age group. The knee and hand were the most commonly affected joints across all age groups. The incidence of all types of osteoporosis peaked in the 45-49 age group and then declined significantly [13]. Pain and stiffness in the joints are among the most common symptoms. The pain often worsens when pressure or weight is placed on the joint. With osteoarthritis, which occurs with age due to the loss of bone minerals for various reasons, joints may become stiffer and more difficult to move over time. A grinding, cracking, or grating sound may be heard when moving the joint. Symptoms are usually most severe in the morning. Stiffness caused by osteoarthritis often lasts 30 minutes or less, but if there is joint inflammation, it may last longer. It improves after activity, allowing the joint to warm up. During the day, the pain may worsen with activity. As osteoarthritis progresses, a person with arthritis may experience pain even at rest or be awakened during the night. On the other hand, some people may not show any symptoms even though X-ray results show the physical changes associated with osteoporosis [10].

Pathophysiology and Clinical Features

OA involves the degradation of articular cartilage, subchondral bone remodeling, synovial inflammation, and changes in periarticular tissues. Although traditionally considered a "wear and tear" disease, recent research highlights the role of low-grade inflammation, cytokine production, and immune responses in its progression [7]. Enzymes such as matrix metalloproteinases (MMPs) and aggrecanase are upregulated, contributing to extracellular matrix breakdown [5]. Pain in OA is complex and biopsychosocial, influenced by joint structural changes, psychological factors, sleep quality, and coping strategies [27]. Central sensitization and neurochemical alterations may further amplify pain perception [4].

Management Strategies

Current management focuses on symptom relief, functional improvement, and slowing OA progression. Non-pharmacological approaches such as weight loss, physical therapy, and exercise are foundational. Pharmacological options include analgesics like acetaminophen, NSAIDs, and intra-articular corticosteroids. In advanced cases, surgical interventions such as joint replacement are often necessary [13, 27]. However, the American Academy of Orthopedic Surgeons (AAOS) stated in 2013 that there was clear evidence against recommending intra-articular sodium hyaluronate injections or arthroscopic lavage for patients [40]. Although substantial evidence links weight gain to the onset of knee osteoarthritis, limited research examines how weight loss and the resulting decrease in joint load affect symptom improvement or radiographic characteristics in individuals with existing OA [14].

Recent research emphasizes the role of inflammation in OA, prompting exploration of disease-modifying osteoarthritis drugs and biological therapies targeting inflammatory pathways. Nutritional and lifestyle modifications, including omega-3 fatty acids, antioxidants, and vitamin D, may also help reduce inflammation and improve joint health [26]. A comprehensive, multidisciplinary approach is increasingly advocated to enhance patient outcomes [24]. Keep in mind that obesity is a key factor contributing to elevated inflammation throughout the body [36].

Clinical Signs and Risk Factors

Common signs include pain, stiffness, loss of flexibility, tenderness, bone spurs, grating sensations, and swelling. Risk factors are categorized as joint-level, such as injury, malalignment, and patient-level, such as age, gender, obesity, heredity, and occupation. Knee malalignment is a key indicator of disease progression [15,16].

The Effect of Obesity on OA

Obesity increases stress on weight-bearing joints [16], and overweight/obese individuals face sophisticated risks of knee arthroplasty [18, 25]. The association between elevated BMI and hand OA supports a non-mechanical, metabolic role of obesity in OA progression [18]. The Netherlands Epidemiology of Obesity group demonstrated higher odds ratios for hand OA among individuals with increased fat percentage, especially visceral fat in men [21]. Obesity also correlates with increased risk of joint replacement, particularly relating to central adiposity in knee OA [22]. Obesity induces low-grade systemic inflammation, and weight loss can be achieved by reducing adipose tissue and normalizing cytokine secretion [23]. Adipokines such as leptin, produced by adipose tissue within the infrapatellar fat pad, are associated with inflammation and cartilage breakdown, contributing to OA pathogenesis [24, 27]. A diagram (Figure 1) illustrates these mechanisms.

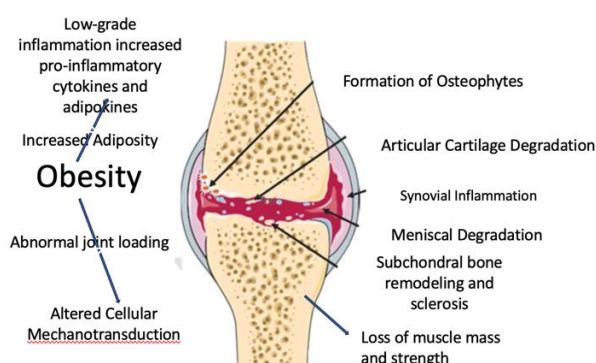


Figure 1. Mechanisms by which obesity leads to or exacerbates OA [27]

Nutritional Aspects and Recent Studies

Obesity is widely recognized as the leading and most significant modifiable risk factor for osteoarthritis. Excess weight causes increased mechanical stress on joints, particularly weight-bearing joints such as the knees and hips, leading to accelerated cartilage breakdown and joint degeneration [28, 30]. In addition to these mechanical effects, obesity contributes to systemic inflammation through the production of pro-inflammatory adipokines, which further promote cartilage breakdown and synovitis, exacerbating the progression of osteoarthritis [30, 31]. Numerous studies have shown that obese individuals have a

significantly higher risk of developing OA, with some reports indicating up to a fourfold increase in risk compared to individuals of normal weight [29, 30]. Therefore, weight control is crucial in both the prevention and management of osteoarthritis. Recent research highlights the importance of nutrition in alleviating osteoarthritis symptoms and addressing factors associated with disease progression. In a 2023 cross-sectional study by Vikas Maheshwari et al. in India, the nutritional status of patients with knee osteoarthritis aged 45 years and older was examined. The study concluded that malnutrition was highly prevalent (69.5%) among these patients, with serum albumin being the most reliable indicator of nutritional deficiency [32]. The findings suggest that malnutrition may worsen disease outcomes and that routine preoperative nutritional assessment may improve surgical outcomes and recovery.

Similarly, studies from Vietnam and the United States have demonstrated the association between nutrition, metabolic health, and the risk of OA [37]. Tran Viet Loc et al. noted that aging syndromes and malnutrition are common among elderly osteoarthritis patients, underscoring the need for nutritional assessments to improve overall health and mobility [31]. Data from the National Health and Nutrition Examination Survey in the United States indicated that elevated triglyceride-glucose index (TyG) levels, which reflect insulin resistance and metabolic dysfunction, are strongly associated with an increased risk of OA, highlighting the metabolic component of OA associated with obesity [33, 38].

Supplements to reduce the risk of OA for older people

Dietary supplements can have a positive effect on OA in older adults by helping to reduce pain and stiffness, but results are mixed, and not all supplements have proven effective. Supplements such as collagen, fish oil, curcumin, and methylsulfonylmethane (MSM) have shown promising results in improving joint function, reducing inflammation, and relieving pain. However, some popular supplements, such as glucosamine and chondroitin, have shown conflicting results and are not recommended by the American College of Surgeons for all forms of osteoporosis. Before taking any supplement, older adults should consult their doctor because of potential side effects and interactions with other medications [36]. In Libya, malnutrition is common among older adults and significantly impacts their mobility and overall health [34]. Many older adults do not consume enough essential nutrients such as calcium and vitamin D, which are necessary for maintaining bone strength and joint health. Inadequate intake of these nutrients, combined with a lack of supplements, increases the risk of osteoporosis and other mobility-related problems. In addition, deficiencies in protein, vitamins (such as B12 and E), minerals (such as magnesium and zinc), and omega-3 fatty acids further impair their physical functions, immune response, and cognitive abilities. Regular nutritional assessments and appropriate supplementation are vital to ensure older adults receive the nutrients necessary to support mobility, prevent osteoporosis, and improve their quality of life [35]. Furthermore, nutritional interventions such as supplements containing specific nutrients have shown promising results. For example, a 2024 study by Ganguly Apurpa and Sudeep KP demonstrated that a Jumpstart Nutrition supplement containing calcium, magnesium, vitamin K2, omega-3 fatty acids, coenzyme Q10, curcumin, and other compounds significantly improved OA symptoms and lower limb coordination [9, 26]. These nutritional strategies may help reduce inflammation and promote joint health.

It is also worth noting that lifestyle factors related to reproductive history may influence the risk of developing OA. Dajeong Ham and Sang Hyuk Bae found an association between prolonged breastfeeding and a higher prevalence of OA among Korean women aged 50 and older, suggesting complex interactions between hormonal, metabolic, and nutritional factors [14, 28]. In summary, while multiple factors contribute to OA, obesity remains the primary cause, causing mechanical and inflammatory effects that accelerate joint degeneration. Treating obesity through targeted nutritional interventions, weight management, and lifestyle modifications is essential for the effective prevention and symptom relief of osteoporosis. Public health initiatives focused on nutrition and weight control are crucial [41, 42].

Conclusion

OA remains a widespread chronic condition with significant physical and psychological impacts. Its multifaceted etiology involves mechanical, inflammatory, and metabolic factors. Effective management should incorporate weight reduction, dietary modifications emphasizing anti-inflammatory foods, physical activity, and psychological support. Addressing obesity is paramount, as it directly influences OA progression and patient quality of life.

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Conflict of interest

None declared.

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