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Article

Evaluation of The Effect of Body Weight Change on Joint Health and Quality of Life: A Longitudinal Cohort Study

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Abstract: A cross-sectional study was conducted on 110 Iraqi patients. The aim of this study was to identify the close relationship between obesity and knee joint problems, where the study duration was one year. Data and demographic information related to the patients were collected from several different hospitals. In addition, the results were analyzed according to the Microsoft SPSS statistical analysis program In addition, Microsoft Excel 2013 was used as well as the results were found Mean (sd) of age 50.9 (7.9), Male 58 (52.7%), Female 52 (47.3%), KL grade were the most common in this study were 3 for 52 (47.2), with Duration of illness 6.5 (1.98) also found The results of this study also found a close relationship between weight loss and increased physical performance, as it was noted that the physical performance measure witnessed a significant improvement with (12.3+) so we conclude from this study Obesity greatly increases inflammation throughout the body and is a major factor behind the development of arthritis and Losing weight can stop these infections.

Keywords: Evaluation, Weight, Health, Quality of Life, Obesity, Joint, KL Grade, BMI.

1. Introduction

The World Health Organization (WHO) has defined obesity as a chronic disease, although many sufferers, a large portion of the healthcare community, and policymakers do not recognize where obesity is gradually increasing in prevalence and is considered one of the major epidemics of the 21st century. The WHO estimates that 13% of the world's population lives with this condition, which has tripled in Spain since the 1970s. According to the European Health Survey in Spain, in 2020, 16.5% of men over the age of 18 and 15.5% of women were obese, and 44.9% of men and 30.6% of women were overweight. It is projected that by 2030, obesity prevalence will reach 37%. This situation represents a public health challenge that is often not recognized as a serious social and health problem [1], [2], [3], [4].

Knee pain is one of the most common clinical complaints in adults and represents a serious public health problem that requires urgent treatment. Osteoarthritis is the leading cause of joint pain [5], [6]. One in six people with knee pain seek medical care annually, and one-third of these people become disabled. Obesity is a risk factor for joint pain, with elevated C-reactive protein (CRP) levels being associated with a higher body mass index (BMI) (1). Obesity is a multifactorial chronic disease defined by the excessive accumulation of adipose tissue, which threatens an individual's health [7], [8]. It can affect bone health and, consequently, quality of life in areas such as mobility. In 2022, 2.5 billion adults were overweight, of whom more than 890 million were obese, representing 43% of the global population. In most cases, obesity is attributed to an obesogenic environment,

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psychosocial factors, and genetic variants. The main causative factors are medications, illnesses, lack of movement, medical procedures, or monogenic diseases [9], [10], [11].

According to previous studies, overweight people are 20 times more likely than healthy people to require knee replacement due to joint disease. If a fracture does occur, its severity is also higher than that of the general population. Obesity itself surgical increases complications and poor outcomes, including higher rates of infection, venous thrombosis, loosening of internal fixators, and reduced lifespan of artificial joints due to wear [12], [13]. Moreover, obese people often have comorbidities such as diabetes, heart disease, and liver disease. These medical conditions increase the risk of anaesthesia and post-operative complications, and may also prolong hospital stays [14], where this paper aims to assessment outcomes of the effect of body Weight Change on Joint Health and Quality of Life

2. Materials and Methods

Demographic data and information were collected for 110 patients in Iraq to investigate the relationship between obesity and its impact on joints. The average age of Iraqi patients in this study was between 30 and 65 years. The study design was a cohort study for patients who had a high body mass index (BMI) greater than 26 kg/m2. In this study, examinations were conducted from several different hospitals in Iraq. The study period was one full year, from April 1, 2024, to April 6, 2025. Initial examinations were collected, which included height, weight, and age. BMI was determined according to a special equation linking height and weight. Participants were classified into three groups based on the change in body composition at the fourth follow-up, according to weight gain (>5%), weight stability (±3%), or weight loss (>5%), as shown in the table below. Several treatment methods were used in this study, see Table 1.

Table 1. Explanation of the treatment methods used in this study.

Treatment	Description
Behavioral weight-loss programs	Combine nutritional counseling and physical activity.
Nutritional interventions	Focus on calorie restriction and a balanced diet.
Improving physical activity	Aerobic or joint-appropriate resistance training
Pharmacotherapy	Includes prescribed weight-loss medications
Psychological flexibility therapies	Support behavioral adherence through acceptance and flexibility strategies.
Multidisciplinary weight management	Integrates medical, nutritional, psychological, and physical therapy components

Adipose tissue actively participates in the production of pro-inflammatory substances, such as interleukins, tumor necrosis factor alpha, and other cytokines. With weight gain, levels of these substances continually rise, causing a chronic, mildly inflammatory state in the body. Joints are constantly exposed to these substances, leading to:

1. Accelerated destruction of articular cartilage.
2. Reduced regenerative capacity.
3. Development of synovitis—inflammation of the synovial membrane of a joint, accompanied by pain and swelling.

Anthropometric measurements were performed monthly, including height, weight, body mass index (BMI), waist circumference (WC), hip circumference (HC), and waist-to-hip ratio. WOMAC questionnaires were completed, and quality of life was assessed using the Quality-of-Life Scale.

Patients' BMI was determined according to World Health Organization recommendations, based on the classification of body weight by BMI (WHO, 1997, Table 2). BMI was calculated by dividing a person's body weight in kilograms by a person's height in meters squared (kg/m^2).

Statistical analysis was performed using IBM SPSS 22 software. Data were processed using descriptive statistics, and the Student's t-test was used to compare groups. Differences were considered statistically significant at a p-value < 0.05.

3. Results

As shown in the tables below, the mean ± SD to the patients' ages were 50.9 (7.9). The patients were distributed according to sex, as shown in Table 1, for 58 male patients and 52 female patients. It is worth noting the high levels of body mass index (BMI) (29.4 (3.82)). It is also worth noting that the smoking rate was low in this study, as shown in Table 1 where The number of smokers was 10 patients where The patients in this study were classified according to the KL GRADE and the patient prevalence board according to the third classification for 52 patients in addition to The results below show a significant increase in weight by 36.4% more ever This increase was estimated at 5% according to logistic regression. A statistically significant relationship was observed between obesity and the possibility of joint space stenosis. The results of this study also found a close relationship between weight loss and increased physical performance, as it was noted that the physical performance measure witnessed a significant improvement with (12.3+). As for the stable weight group, the amount of change was very slight with (-1.22) as well as According to the programs used for weight loss and management, the highest degree of improvement in patients' quality of life was observed, with a strong positive relationship and As for the treatment method based on nutritional interventions, it also witnessed significant improvements as shown in table 2 below.

Table 2. Describe initial outcomes of patients according to demographic characteristics.

Variable	Value
Age	
Mean (sd)	50.9 (7.9)
Sex, n (%)	
Male	58 (52.7%)
Female	52 (47.3%)
BMI	
Mean (sd)	29.455 (3.82)
Comorbidities n (%)	
High blood pressure	30
Diabetes	33

joint space narrowing	20
None	27
Status according to smoking	
Yes	10 (9.09)
No	100 (90.9)
Education	
Primary and secondary	20 (18.18)
College	60 (54.5)
High education	30 (27.2)
Knee-based characteristics	
KL grade	
2	28 (25.4)
3	52 (47.2)
4	30 (27.2)
Duration of illness	
Mean (sd)	6.5 (1.98)

As illustrated in Figure 1, the distribution of Iraqi patients according to weight gain shows a significant increase in body weight among the participants, with a notable percentage of patients experiencing more than a 5% increase in weight

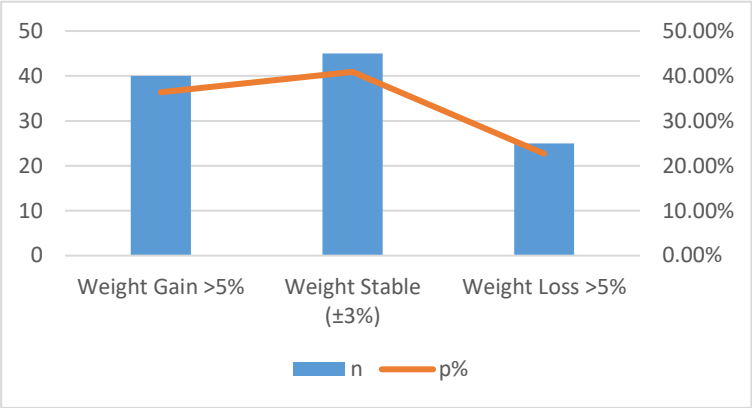

Figure 1. Distribution of Iraqi patients according to weight gain

The table 3 shows significant correlations, particularly between weight gain and new knee pain in participants.

Table 3. Assessmnet outcomes according to Odds Ratios of Knee Joint Outcomes by Weight

Variable	OR	CS	P VALUE
JSN in Weight Gain >5% Group	1.33	0.89-1.88	0.023
New Knee Pain in Weight Gain >5% Group	1.41	1.123-1.837	0.00144
KL Grade Worsening in Weight Loss >5% Group	0.883	0.23-1.23	0.0012
Knee Pain Resolution in Weight Loss >5% Group	1.50	0.892-1.92	0.023

Figure 2 provides a visual representation of changes in the quality-of-life scale, highlighting the improvements observed in physical performance measures, particularly in the weight loss group

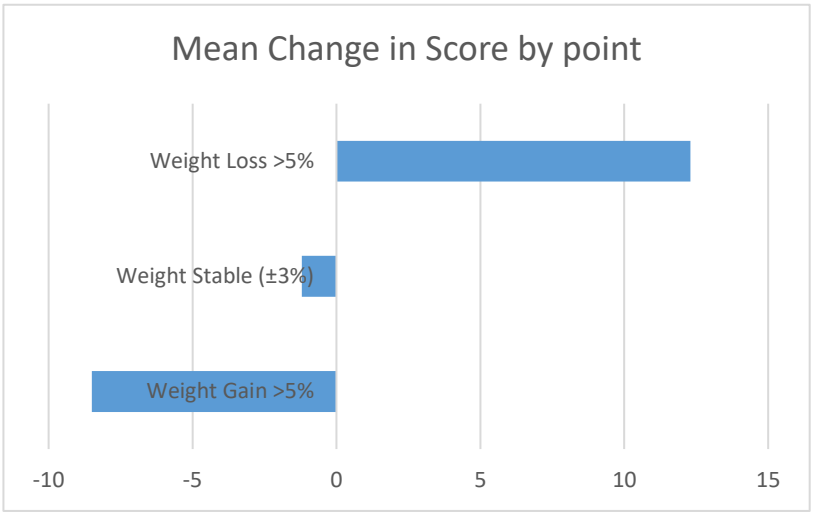

Figure 2. Description of changes in the quality-of-life scale according to physical measurement

As depicted in Figure 3, the outcomes for the 110 patients in the weight loss group show a notable improvement in joint health, as reflected by the marked changes in physical function and pain reduction.

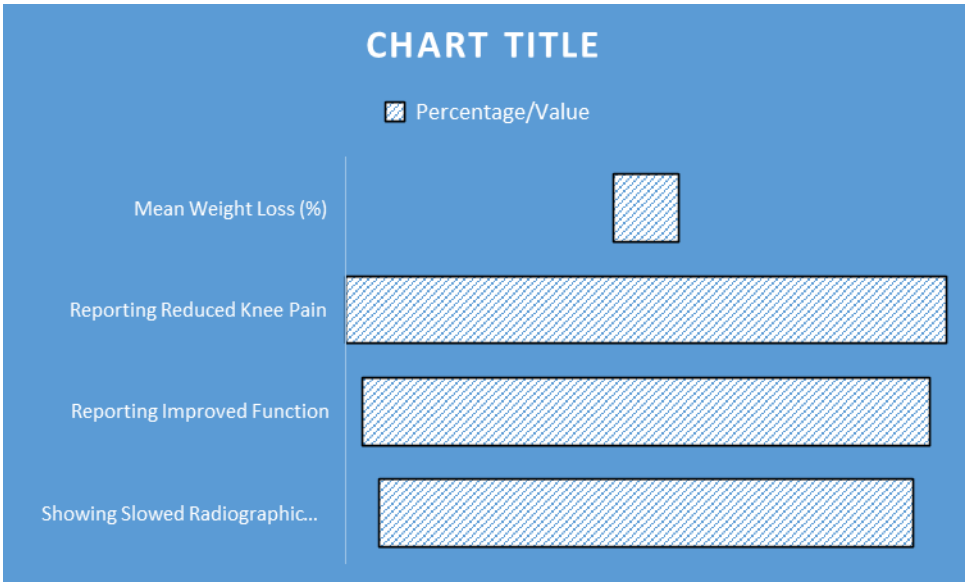

Figure 3. Outcomes of 110 patients according to Treatment in the Weight Loss Group

Figure 4 shows the distribution of patients according to the incidence of knee joint comorbidities over a four-year period, illustrating how these conditions evolved in relation to weight changes

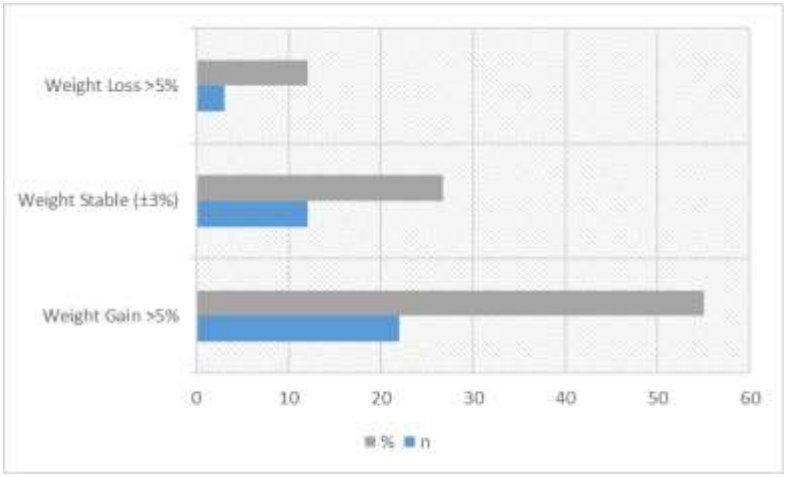

Figure 4. Distribution of patients according to the Incidence of Knee Joint Comorbidities Over 4 Years

The relationship between the type of treatment and quality of life improvements is presented in Table 4. The table reveals that multidisciplinary weight management yielded the highest improvements in quality of life among the patients.

Table 4. Describe the relationship between the type of treatment used and quality of life.

Treatment type	F	Mean Change in Quality of Life	Correlation with QOL
Behavioral Weight Loss Programs	40	+11.2	0.68
Nutritional Intervention	20	+9.8	0.61
Physical Activity Enhancement	22	+10.5	0.65
Pharmacotherapy (Weight Loss Drugs)	10	+8.7	0.54
Psychological Flexibility Training	8	+7.5	0.49
Multidisciplinary Weight Management	10	+12.4	0.72

4. Discussion

This prospective, observational study was conducted in Iraq between 2024 and 2025 on 110 patients aged 30 to 65 years and older with joint problems. Participants were recruited based on screening of patients referred to the treatment department at several private hospitals in Iraq. Patients were contacted, and those willing to participate were invited to a briefing session to explain the study details. Patients who agreed to participate underwent the following assessments: anthropometric measurements, body composition,

pain, joint stiffness and function, and pressure pain threshold. Anthropometric assessment included weight and height measurements. Body weight (kg) was assessed with the participant barefoot and wearing light clothing, using a digital scale. Body mass index (BMI) was calculated from weight and height, and participants were classified according to adiposity index [15], [16]. According to previous studies, excess adiposity may also be associated with greater pain sensitivity [17]. However, despite the observed decreased absolute tolerance in overweight and obese individuals, no significant differences were observed between the two groups. This is likely due to the fact that increased body weight is associated with increased pain. Regarding the other forms of pain assessment used in the current study, no significant differences were found between the two groups, although the visual reflectance scale (VAS) and pain scores were worse in the overweight/obese and obese groups compared to the normal weight/obese and non-obese groups [18].

According to the findings, pain is a typical symptom of osteoarthritis and was strongly linked to poor gait performance in this population. According to the literature, people with more advanced stages of osteoarthritis may feel pain while they are at rest, but it usually gets worse with movement and at the end of the day. In people with osteoarthritis, chronic inflammation may be a major factor in the development of pain and the course of the condition, impairing function and mobility [19]. In comparison to those without osteoarthritis, the osteoarthritis volunteers assessed in this study showed decreased functional mobility and worse performance on walking-related functional tasks. These results support those of other studies that assessed the biomechanical aspects of GAIT in people with osteoarthritis and found that these people have altered GAIT kinematics and kinetic patterns. Gait performance may suffer as a result of these modifications. This could account for the osteoarthritis study participants' subpar gait performance [20]. Aging brings about biopsychosocial changes that interfere with functional abilities and quality of life, contributing to a sedentary lifestyle that leads to weight gain, further exacerbating conditions in people with joint health problems. Previous studies have found similarities with our current study, which found that behavioral weight loss programs reduce body weight and circulatory pressure, strengthen muscles, and improve joint stability and functional capacity, thus mitigating the damage caused by aging. In this study, a significant improvement was observed in the reassessment, with the index decreasing from 10.20 (±3.42) to 6.40 (±1.29), taking into account that a lower value indicates a decrease in functional impairment as well as Regarding the range of motion (ROM) assessed in the current study using goniometers, previous studies before and after the protocol demonstrate significant improvements in flexion of both knees, confirming the study, which used stretching, mobilization, and passive traction, in addition to hip and knee flexion and extension movements.

5. Conclusion

In this study, we conclude that behavioral weight loss programs were effective in improving pain and function in Iraqi patients suffering from overweight/obesity and joint problems ,where the behavioural weight loss programs significantly increased knee flexion range of motion and improved quality of life. It should also be noted that despite the small sample size and program sessions, significant results were obtained, with a positive statistical correlation.

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