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Association of Body Composition with GERD Risk in Medical Students: A Bioelectrical Impedance Analysis Study in Fallujah, Iraq

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ABSTRACT

Background: The prevalence of gastroesophageal reflux disease (GERD) is on the rise, driven by factors such as obesity, diet, and lifestyle. This study focuses on assessing the grade of GERD among medical students in Fallujah, evaluating their body composition through bioelectrical impedance analysis (BIA), and examining the relationship between GERD and body composition, particularly visceral fat.

Methods: A cross-sectional study involved 146 medical students from Fallujah University, assessed between March and May 2024. A convenience sampling method was employed, with participants screened based on eligibility criteria to ensure a representative sample. GERD likelihood was measured using the validated GerdQ questionnaire, while body composition was analyzed using the InBody 270 BIA device. Data analysis was conducted using SPSS, focusing on descriptive statistics and chi-square tests to explore the associations between GERD and body composition.

Results: The study analyzed demographic, anthropometric, and body composition data from 146 participants to evaluate GERD likelihood. The cohort, with a mean age of 21.7 years, was balanced in gender. The average weight was 70.1 kg, and the mean BMI was 25.1 kg/m², with many participants classified as overweight or obese. Body composition analysis indicated high levels of body fat mass, percent body fat, and visceral fat among most participants. Gastrointestinal symptoms, particularly heartburn and regurgitation, were reported by nearly half of the participants. GERD likelihood was highest among those with obesity and specific body composition parameters, such as low skeletal muscle mass and high visceral fat. Significant associations were found between GERD likelihood and BMI, skeletal muscle mass and visceral fat.

Conclusions: This study underscores the link between obesity-related factors, such as higher BMI and visceral fat, and increased GERD risk among Iraqi university students, highlighting the need for targeted public health strategies to improve body composition and reduce GERD.

Keywords: GERD, Body Composition, Bioelectrical Impedance Analysis, Iraq students.

Introduction

Gastroesophageal reflux disease (GERD) is a chronic digestive disorder characterized by the frequent backward flow of stomach acid into the esophagus, a phenomenon known as acid reflux. This reflux can lead to a variety of symptoms, with heartburn being the most common. Over time, GERD can cause more severe complications such as esophagitis, which is inflammation of the esophagus; strictures, or narrowing of the esophagus; and Barrett's esophagus, a precancerous condition where the lining of the esophagus changes due to repeated acid exposure [1]. The prevalence of GERD has been increasing globally, affecting a substantial number of individuals, including younger populations [2]. This rise is attributed to various risk factors such as obesity, dietary habits, and lifestyle choices. As GERD progresses, its impact on quality of life and its association with more serious health issues underscore the need for effective management and treatment strategies.

Several factors contribute to the development of GERD, with obesity being a major one. Excess body weight increases abdominal pressure, which can force stomach acid into the esophagus [3]. Hiatal hernia, a condition where part of the stomach protrudes into the chest, is another significant risk factor [4]. Hormonal changes and increased abdominal pressure during pregnancy also elevate the risk [5]. Smoking weakens the lower esophageal sphincter, facilitating acid reflux [6]. Certain medications, including NSAIDs, calcium channel blockers, and muscle relaxants, may exacerbate GERD [7]. Dietary habits, especially the intake of fatty or fried foods, chocolate, caffeine, alcohol, and spicy foods, are known triggers [8]. Alcohol consumption not only increases acid production but also relaxes the esophageal sphincter, further aggravating symptoms [9]. Aging is another factor, as the esophageal sphincter weakens with age, increasing susceptibility to GERD [10]. Additionally, certain sleeping positions, particularly lying down or on the back, can exacerbate reflux symptoms by making it easier for acid to flow back into the esophagus [11].

Body composition, which includes the distribution of fat, muscle, bone, and water, is influenced by genetics, diet, physical activity, and hormonal balance [12]. The distribution and amount of body fat, especially visceral fat, play a crucial role in the development and progression of GERD. Obesity, marked by excessive body fat accumulation, is strongly associated with an increased risk of GERD and its symptoms [13].

Visceral adiposity, or fat stored within the abdominal cavity, is particularly important in GERD pathogenesis. This type of fat is linked to metabolic disorders, chronic inflammation, and hormonal imbalances, which can worsen GERD symptoms [14]. Research indicates a direct correlation between higher visceral fat levels and more severe GERD, suggesting that reducing abdominal fat could be an effective treatment strategy [15]. In addition to obesity, being underweight or having low muscle mass can also contribute to GERD. Individuals with eating disorders, such as anorexia nervosa or bulimia nervosa, who typically exhibit low body weight and reduced muscle mass, are at an increased risk of developing GERD [16]. Malnutrition and muscle wasting, which weaken the esophageal sphincter, can further exacerbate GERD symptoms [17].

Assessment of body composition is vital for understanding its impact on GERD. Methods such as anthropometry and BIA are commonly used. BIA is a non-invasive technique that estimates body fat, water, and muscle mass by measuring the body's resistance to an electrical current, making it a popular choice for research and clinical settings due to its affordability and ease of use [18]. While the link between GERD and body composition has been studied, data on specific populations like medical students in Fallujah, Iraq, is limited. Medical students may have an elevated GERD risk due to stress, irregular eating habits, and sedentary lifestyles [19]. The prevalence of GERD in conflict-affected regions like Iraq remains under-researched [20].

The study aims:

1. To determine the grade of GERD among medical college students in Fallujah city.
2. To assess the body composition of these students using BIA, focusing on parameters like BMI, body fat percentage, skeletal muscle mass, visceral fat, and waist-to-hip ratio.
3. To investigate the relationship between GERD grade and body composition parameters.

Material and Methods

Study Design: A cross-sectional analytical study was conducted to examine the association between likelihood of GERD and body composition among medical students at the College of Medicine, Fallujah University. A cross-sectional design was chosen to assess the prevalence of GERD likelihood and body composition parameters at a single point in time.

Setting and Study Time: The study was conducted at the College of Medicine, Fallujah University, Iraq, with data collection occurring from March 1 to May 31, 2024.

Sampling Technique: A convenience sampling technique was employed to recruit medical students participating in the study. All eligible medical students attending the College of Medicine during the study period were invited to participate.

Study Population: A total of 146 medical students aged 18 to 25 from the College of Medicine at Fallujah University participated in the study. Eligibility for inclusion required participants to be enrolled in the College of Medicine, within the specified age range, and capable of providing informed consent. Exclusion criteria included a history of gastrointestinal surgery, pregnancy, lactation, dysphagia, chronic gastrointestinal conditions, smoking, alcohol consumption, or an inability to complete the questionnaire or undergo BIA measurements. These criteria were established to ensure that the sample was appropriately representative and that the data collected would be both relevant and reliable.

Data Collection Instruments: The GERD Quality of Life Questionnaire (GerdQ) [21] is a validated, self-administered tool developed by the American Association of Family Medicine (AAFP) to assess the likelihood of GERD based on symptom frequency and severity. It evaluates the presence, severity, and daily impact of GERD symptoms, and its reliability and validity have been established through prior research [22].

Instructions: For each symptom, indicate its weekly frequency and assign the corresponding point value:

Symptom	0 days	1 day	2-3 days	4-7 days
Heartburn	0	1	2	3
Regurgitation	0	1	2	3
Upper stomach pain	0	1	2	3
Nausea	0	1	2	3
Sleep trouble due to symptoms	0	1	2	3
Use of over-the-counter medicine	0	1	2	3

Scoring: Sum the points for each symptom.

Interpretation:

- **0 to 2 points**: 0% likelihood of GERD
- **3 to 7 points**: 50% likelihood of GERD
- **8 to 10 points**: 79% likelihood of GERD
- **11 to 18 points**: 89% likelihood of GERD

Additionally, Body composition was evaluated using the InBody 270 BIA device, known for its precise measurements of body mass index (BMI), body fat percentage, skeletal muscle mass, visceral fat level, and waist-to-hip ratio. To obtain accurate and reliable results from the InBody test, adherence to specific pre-test conditions is crucial. Participants were instructed to fast for 2–4 hours prior to the test, conduct the assessment in the morning or at consistent times, and maintain normal hydration while avoiding excessive water intake. Additionally, they were advised to refrain from intense exercise for at least 12 hours and to avoid alcohol or caffeine consumption for 24 hours before the test. Prior to the assessment, participants were required to empty their bladders, wear light clothing, and remove any heavy accessories. During the test, participants stood still with proper posture, and consistent testing conditions were maintained to accurately track progress over time. The InBody 270 device was meticulously calibrated before each assessment to ensure the accuracy of the measurements.

Data Collection Procedure: Before the data collection, all participating students provided written informed consent. Subsequently, the GerdQ questionnaire was administered to assess the likelihood of GERD based on symptom frequency and severity. Body composition measurements were then conducted using the InBody 270 machine, adhering strictly to the manufacturer's guidelines. All collected data was entered electronically and stored securely for subsequent analysis.

Data Analysis: Data analysis was conducted using SPSS software (version 26), where a comprehensive approach to descriptive statistics was employed to characterize the study population. This included the presentation of key variables such as age, gender, anthropometric measurements, and body composition parameters in tables and figures, providing a detailed overview of the sample demographics and physical attributes. The likelihood of GERD was assessed based on the GerdQ scoring system, which is a validated tool for evaluating GERD symptoms. To explore the potential associations between GERD and various factors, including age, gender, anthropometric measurements, and body composition parameters, the chi-square test was utilized. This statistical test was chosen to assess the strength and significance of relationships between categorical variables. The level of statistical significance was set at $p < 0.05$.

Ethical Considerations and Approval: The study adhered to ethical principles outlined in the Declaration of Helsinki. Ethical approval was secured from the Iraqi Ministry of Health, Supervising Committee of the Arab Board of Health Specializations, and the College of Medicine, Fallujah University. This comprehensive review process ensured alignment with ethical research standards and safeguarded participant well-being. Participants were provided with detailed information about the study's objectives, procedures, potential risks, and benefits prior to obtaining their informed consent. Stringent confidentiality measures were implemented to protect participant data throughout the study. To uphold ethical standards and safeguard privacy, the individual participant data remained inaccessible for public sharing.

Results

Table 1 presents the demographic and anthropometric characteristics of the study population, which consisted of 146 participants. The gender distribution was nearly balanced, with 50.7% male (n = 74) and 49.3% female (n = 72) participants. The mean age of the cohort was 21.7 years, with a standard deviation of ±1.5 years. The age groups were categorized into three ranges: 19-20 years (24.7%), 21-22 years (45.2%), and 23 years and older (30.1%). The mean weight was 70.1 kg (SD± 15.4), with participants' weights distributed as follows: 43-60 kg (27.4%), 61-80 kg (53.4%), 81-100 kg (13.7%), and 101-126 kg (5.5%). The average Body Mass Index (BMI) was 25.1 kg/m² with a standard deviation of ± 4.4. The BMI categories were: underweight (12.3%), normal weight (41.1%), overweight (32.9%), Obesity I (9.6%), and Obesity II (4.1%). The mean waist-to-hip ratio was 0.89 (SD± 0.065), with 61.6% of participants classified as having a normal waist-to-hip ratio, while 38.4% were categorized as having obesity based on this measure.

Table 1: Demographic and anthropometric characteristics of the study population (N= 146)

Variables	**N. (%)**
Gender	
Male	74 (50.7)
Female	72 (49.3)
Age group (years) **Mean 21.7 SD ±1.5**	
19- 20	36 (24.7)
21- 22	66 (45.2)
23 +	44 (30.1)

Weight (kg) **Mean 70.1 SD ± 15.4**	
43-60	40 (27.4)
61-80	78 (53.4)
81-100	20 (13.7)
101-126	8 (5.5)
Body Mass Index (kg/m²) **Mean 25.1 SD ±4.4**	
Underweight	18 (12.3)
Normal weight	60 (41.1)
Over weight	48 (32.9)
Obesity I	14 (9.6)
Obesity II	6 (4.1)
Waist Hip Ratio **Mean 0.89 SD ± 0.065**	
Normal	90 (61.6)
Obesity	86 (38.4)

Table 2 presents the descriptive statistics for body composition variables in the study sample, consisting of 146 participants, reveal several key findings. The mean skeletal muscle mass was 26.5 kg (SD ± 6.6 kg), with 12.3% of participants categorized as "Over," 54.8% as "Normal," and 32.9% as "Under." For body fat mass, the mean was 22.1 kg (SD ± 9.6 kg), with a majority (71.2%) classified as "Over," followed by 20.5% as "Normal," and 8.2% as "Under." The percent body fat showed a mean of 31.3% (SD ± 10.5), with 80.8% of participants categorized as "Over," 17.8% as "Normal," and 1.4% as "Under." The mean visceral fat level was 9.7 (SD ± 4.9), with 49.4% classified as "High," 6.8% as "Normal," and 43.8% as "Low." The InBody score, with a mean of 67.2 (SD ± 7.3), indicated that the majority of participants (47.9%) had average muscle mass and body fat, while 38.4% had good muscle mass and healthy body fat. A small proportion fell into the categories of extremely low muscle mass or excessive body fat (2.7%), low muscle mass or high body fat (9.6%), and high muscle mass with very low body fat (1.2%).

Table 2: Descriptive statistics of body composition variables for the study sample (N= 146)

Variables	**N. (%)**
Skeletal Muscle Mass (kg) **Mean 26.5 kg SD ± 6.6 kg**	
Over	18 (12.3)
Normal	80 (54.8)
Under	48 (32.9)
Body Fat Mass (kg) **Mean 22.1 kg SD ± 9.6 kg**	
Over	104 (71.2)
Normal	30 (20.5)
Under	12 (8.2)
Percent Body Fat (%) **Mean 31.3 SD ± 10.5**	
Over	118 (80.8)
Normal	26 (17.8)
Under	2 (1.4)
Visceral Fat Level **Mean 9.7 SD ± 4.9**	
Low	64 (43.8)
Normal	10 (6.8)

High	72 (49.4)
InBody Score/ 100 points **Mean 67.2 SD ± 7.3**	
Low score (< 70 points)	86 (58.9)
Moderate score (70- 89 points)	54 (37.0)
High score (90- 100 points)	6 (4.1)

The gastrointestinal symptom profile in the study population, as summarized in **Table 3**, indicates varying frequencies of reported symptoms on a weekly basis. A heartburn sensation was not reported by 42.5% of participants, while 28.7% experienced it once weekly, and 28.8% reported experiencing it 2-3 days per week. Regarding regurgitation, 47.9% of the population did not report experiencing this symptom, with 24.7% experiencing it once a week and 27.4% reporting it 2-3 days per week. Stomach pain was not reported by 41.1% of participants, while 35.6% experienced it one day a week, and 23.3% reported it 2-3 days weekly. Nausea was absent in 53.4% of the sample, with 26.0% experiencing it once a week and 20.6% reporting it 2-3 days weekly. The majority of participants (69.8%) did not report sleep trouble due to symptoms, while 19.2% experienced it once a week and 11.0% reported it 2-3 days per week. Lastly, use of over-the-counter medicine related to gastrointestinal symptoms was not reported by 67.1% of the participants, with 23.3% using medicine once a week and 9.6% using it 2-3 days per week.

Table 3: Weekly frequency of gastrointestinal symptom profile in the study population (N= 146)

Variables	**N. (%)**
Heartburn	
none	62 (42.4)
1 day	42 (28.8)
2- 3 days	42 (28.8)
Regurgitation	
none	70 (47.9)
1 day	36 (24.7)
2- 3 days	40 (27.4)
Upper stomach pain	
none	60 (41.1)
1 day	52 (35.6))
2- 3 days	34 (23.3)
Nausea	
none	78 (53.4)
1 day	38 (26.0)
2- 3 days	30 (20.6)
Sleep trouble due to symptoms	
none	102 (69.8)
1 day	28 (19.2)
2- 3 days	16 (11.0)
Use of over-the-counter medicine	
none	98 (67.1)
1 day	34 (23.3)
2- 3 days	14 (9.6)

Figure 1 illustrates the distribution of GERD likelihood within the study population is illustrated as follows: Out of 146 individuals assessed, 90 (61.6%) were found to have a 0% likelihood of GERD. In contrast, 38 individuals (26.0%) had a 50% likelihood, and 18 individuals (12.4%) had a 79% likelihood of GERD, suggesting a significant proportion with potential symptoms. Despite this, the majority of the participants, 90 individuals (61.6%), showed no significant likelihood of GERD, reflecting the varied impact of the condition across the study group.

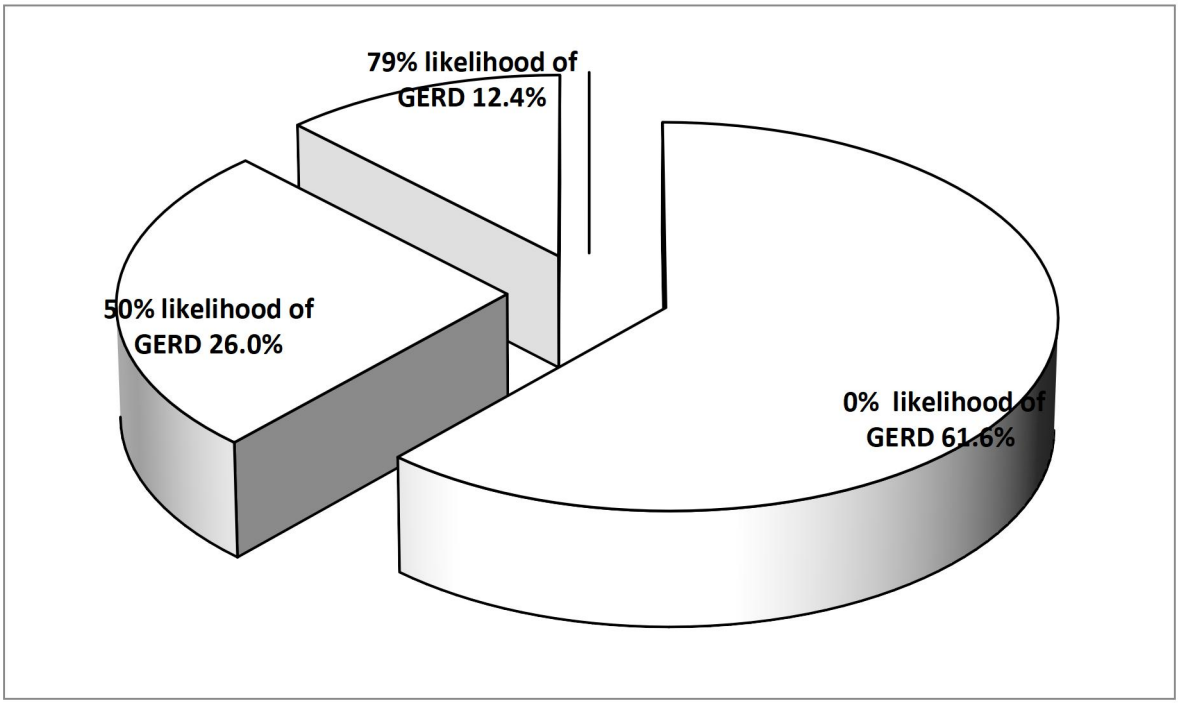

Figure 1: Distribution of GERD likelihood among the study population.

Table 4 examined the association between the likelihood of GERD based on symptom severity and frequency with various demographic and anthropometric factors within the study population. The results revealed that the distribution of GERD likelihood did not significantly differ by gender (p=0.48). However, age showed a significant association (p=0.009), with the 19-20 age group having a higher prevalence of a 50% likelihood of GERD compared to the 21-22 and 23+ age groups. Regarding waist-to-hip ratio, no significant difference was observed (p=0.49), although individuals with obesity had a slightly higher likelihood of GERD. BMI demonstrated a significant association (p=0.001), with underweight and normal weight individuals generally having a lower likelihood of GERD compared to those who were overweight or obese. Specifically, those with obesity had the highest proportion of a 79% likelihood of GERD.

Table 4: Association between likelihood of GERD and various demographic and anthropometric factors within the study population (N= 146)

Variable	likelihood of GERD				P value
	0% likelihood 90 (61.6)	50% likelihood 38 (26.0)	79% likelihood 18 (12.4)	Total 146 (100.0)	
Gender					
Male	42 (56.8)	22 (29.7)	10 (13.5)	74 (50.7)	0.48
Female	48 (66.7)	16 (22.2)	8 (11.1)	72 (49.3)	
Age					
19- 20	22 (61.1)	14 (38.9)	0 (0.0)	36 (24.7)	**0.009**
21- 22	38 (57.6)	14 (21.2)	14 (21.2)	66 (45.2)	
23 +	30 (68.2)	10 (22.7)	4 (9.1)	44 (30.1)	
Waist hip ratio					

Normal	52 (57.8)	26 (28.9)	12 (13.3)	90 (61.6)	0.49
Obesity	38 (67.9)	12 (21.4)	6 (10.7)	86 (38.4)	
Body mass index					
Underweight	10 (55.6)	6 (33.3)	2 (11.1)	18 (12.3)	**0.001**
Normal weight	44 (73.3)	16 (26.7)	0 (0.0)	60 (41.1)	
Over weight	28 (58.3)	14 (29.2)	6 (12.5)	48 (32.9)	
Obesity	8 (40.0)	2 (10.0)	10 (50.0)	20 (13.7)	

Table 5 examined the association between the likelihood of GERD based on symptom severity and various body composition parameters. It revealed significant differences in body composition across the likelihood categories. For skeletal muscle mass, individuals with a 0% likelihood of GERD had a higher proportion with normal or above-normal muscle mass compared to those with 50% or 79% likelihoods ($p = 0.001$). Regarding body fat mass, those with 0% likelihood had a higher percentage of individuals with above-normal fat mass ($p = 0.014$). Percent body fat did not show a significant association with GERD likelihood ($p = 0.48$). Visceral fat levels were notably different, with individuals having a 0% likelihood of GERD more frequently exhibiting low visceral fat levels compared to those with higher likelihoods ($p = 0.006$). Lastly, InBody scores indicated that individuals with a 0% likelihood of GERD had higher scores on average compared to those with 50% or 79% likelihoods ($p = 0.016$). Overall, the data highlighted significant associations between body composition and the likelihood of GERD, emphasizing differences in muscle mass, body fat mass, visceral fat levels, and InBody scores across the severity of GERD symptoms.

Table 5: Association between likelihood of GERD symptoms and body composition parameters

Variable	**Severity of GERD symptoms**				**P value**
	0% likelihood 90 (61.6)	**50% likelihood 38 (26.0)**	**79% likelihood 18 (12.4)**	**Total 146 (100.0)**	
Skeletal Muscle Mass (kg)					
Over	12 (66.7)	0 (0.0)	6 (33.3)	18 (12.3)	**0.001**
Normal	43 (52.5)	28 (35.0)	10 (12.5)	80 (54.8)	
Under	36 (75.0)	10 (20.8)	2 (4.2)	48 (32.9)	
Body Fat Mass (kg)					
Over	66 (63.5)	22 (21.2)	16 (15.4)	104 (71.2)	**0.014**
Normal	16 (53.3)	14 (46.7)	0 (0.0)	30 (20.5)	
Under	8 (66.7)	2 (16.7)	2 (16.7)	12 (8.2)	
Percent Body Fat (%)					
Over	74 (62.7)	28 (23.7)	16 (13.6)	118 (80.8)	0.48
Normal	14 (53.8)	10 (38.5)	2 (7.7)	26 (17.8)	
Under	2 (100.0)	0 (0.0)	0 (0.0)	2 (1.4)	
Visceral Fat Level					
Low	48 (66.7)	20 (27.8)	4 (5.6)	72 (49.4)	**0.006**
Normal	4 (40.0)	6 (60.0)	0 (0.0)	10 (6.8)	
High	38 (59.4)	12 (18.8)	14 (21.9)	64 (43.8)	
InBody score/ 100 points					
Low score (< 70 points)	45 (52.3)	25 (29.1)	16 (18.6)	86 (58.9)	**0.016**
Moderate score (70- 89 points)	39 (72.2)	13 (24.1)	2 (3.7)	54 (37.0)	
High score (90- 100 points)	6 (100.0)	0 (0.0)	0 (0.0)	6 (4.1)	

Discussion:

This study provides a detailed analysis of demographic, anthropometric, and body composition characteristics, as well as the prevalence of GERD symptoms in a sample of 146 participants from a university population in Iraq. The findings offer significant insights into the relationships between body composition parameters and the likelihood of GERD, contributing to the existing literature both regionally and globally.

The demographic data reveal a near-equal gender distribution within the study population, which is consistent with the gender balance typically observed in university settings. The mean age of the participants was 21.7 years, with most participants falling within the 21-22 year age group. These age and gender distributions are similar to those reported in previous studies conducted in Iraq, such as the work by Al-Jubouri et al. (2022), which also examined young adults in a university setting [23]. However, the focus on a university population might limit the generalizability of the findings to other age groups or populations with different sociodemographic characteristics.

In terms of anthropometric measurements, the mean BMI of the participants was 25.1 kg/m², with a significant portion of the population falling into the overweight and obese categories. This is reflective of the increasing prevalence of overweight and obesity in Iraq, particularly among young adults, as highlighted by a study conducted by Younis et al. (2021) [24]. The distribution of BMI categories in this study aligns with regional trends observed in the Middle East, where lifestyle changes have contributed to rising obesity rates among younger populations (Musaiger, 2011) [25]. Globally, the World Health Organization (WHO) has also reported similar trends, with a growing number of young adults classified as overweight or obese, underscoring the importance of addressing these health concerns early.

The analysis of body composition parameters provides further insights into the health status of the study population. The mean skeletal muscle mass and body fat mass indicate a considerable variation in muscle and fat distribution among participants. The majority of participants had normal skeletal muscle mass, but a significant portion was classified as having low muscle mass, which could have implications for their overall health and physical performance. Similarly, the high percentage of participants with elevated body fat mass and percent body fat is concerning, as these factors are known to contribute to the development of metabolic disorders and cardiovascular diseases (Grundy, 2004) [26].

When examining the likelihood of GERD, the study found significant associations with several body composition parameters. Participants with higher BMI, especially those classified as overweight or obese, were more likely to have a higher likelihood of GERD. This finding is consistent with previous research, such as the study by Almadi et al. (2014) conducted in Saudi Arabia, which reported a strong association between obesity and GERD symptoms in the Middle Eastern population [27]. The relationship between obesity and GERD has been well-documented globally, with studies from Europe and North America also reporting similar associations (El-Serag, 2014) [28]. The increased intra-abdominal pressure in obese individuals is thought to contribute to the development of GERD by promoting the reflux of stomach contents into the esophagus.

Moreover, the study found that participants with lower skeletal muscle mass were more likely to have a higher likelihood of GERD, suggesting that muscle mass may play a protective role against the development of GERD. This is an emerging area of research, with studies indicating that sarcopenia, or the loss of skeletal muscle mass, may be associated with an increased risk of various gastrointestinal disorders, including GERD (Kubo et al., 2017) [29]. This finding highlights the importance of maintaining muscle mass through regular physical activity and adequate nutrition, particularly in young adults.

Visceral fat, another key body composition parameter, was also significantly associated with GERD likelihood. Participants with higher visceral fat levels were more likely to have a higher likelihood of GERD, which is consistent with findings from previous studies. Visceral fat is known to be metabolically active and contributes to the release of pro-inflammatory cytokines, which can exacerbate GERD symptoms (Karagiannis et al., 2009) [30]. The association between visceral fat and GERD has been observed in various populations globally, including studies from Asia and the United States, further reinforcing the global relevance of these findings.

When comparing these findings with similar studies conducted in Iraq, it is evident that the prevalence of obesity and its associated health risks, including GERD, is on the rise. For instance, a study by Al-Kubaisy et al. (2019) found a high prevalence of obesity and GERD symptoms among Iraqi adults, which is in line with the findings of this study [31]. This trend mirrors the regional increase in obesity and related health conditions, as reported in studies from neighboring countries such as Jordan and Kuwait (Zubaidi et al., 2012) [32].

Regionally, the Middle East has experienced a rapid epidemiological transition, with a shift from infectious diseases to non-communicable diseases, including obesity and GERD. The cultural and dietary changes, coupled with sedentary lifestyles, have contributed to the rising burden of obesity-related health issues in the region (Musaiger, 2011) [25]. Studies from Saudi Arabia, for example, have reported similar associations between obesity and GERD, highlighting the need for public health interventions to address these growing concerns (Almadi et al., 2014) [27].

Globally, the findings of this study are consistent with those reported in Western countries, where obesity and GERD are also prevalent. The association between body composition and GERD has been well-documented in studies from Europe and North America, where obesity rates are high, and GERD is a common gastrointestinal disorder (El-Serag, 2014) [28]. However, the global context also reveals some differences in the prevalence and presentation of GERD, with studies from Asia reporting lower rates of obesity but a high prevalence of GERD symptoms, suggesting that factors other than obesity, such as dietary habits and genetic predisposition, may also play a role in the development of GERD (Kubo et al., 2017) [29].

Conclusions

This study provides significant insights into the demographic, anthropometric, and body composition characteristics of a university population in Iraq and their association with GERD likelihood. The near-equal gender distribution and the predominance of overweight and obese individuals among the participants highlight the growing concern of obesity-related health issues. The findings indicate that higher BMI and increased body fat, particularly visceral fat, are associated with a higher likelihood of GERD. Additionally, lower skeletal muscle mass was linked to a greater likelihood of GERD, suggesting a potential protective role of muscle mass. These results align with regional and global trends, reinforcing the need for targeted public health interventions. It is recommended to promote regular physical activity and balanced nutrition to manage body composition and reduce GERD risk. Public health strategies should focus on increasing awareness about the impact of obesity on GERD and encourage lifestyle modifications to address these issues effectively.

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