Level Of Body Composition Identification And Postural Assessment At Vertebre In Celebrity Fitness Solo Paragon

Tingkat Identifikasi Body Composition Dan Postural Assessment Pada Vertebre Di Celebrity Fitness Solo Paragon

Original Article

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Abstract.

Background The increasing popularity of fitness centers as a means of promoting physical health has highlighted the importance of comprehensive physical assessments prior to exercise prescription. Body composition and postural assessment, particularly of the vertebral column, play a crucial role in identifying health risks, optimizing training programs, and preventing musculoskeletal injuries. However, empirical studies integrating both assessments in commercial fitness center settings remain limited, especially in Indonesia.

Objectives This study aimed to identify the body composition profile and vertebral postural characteristics of members at Celebrity Fitness Solo Paragon.

Methods A descriptive quantitative research design was employed. The participants consisted of 40 active fitness center members (20 males and 20 females) selected using purposive sampling. Body composition was measured using Bioelectrical Impedance Analysis (BIA) with the Tanita SC-330 device, while vertebral postural assessment was conducted using the go-Xpro application. Data were analyzed using descriptive statistics and presented as means, frequencies, and percentages.

Results The results indicated that the majority of members exhibited suboptimal body composition, particularly in body fat percentage, muscle mass, hydration status, and bone mass. Male members tended to have higher body weight, muscle mass, basal metabolic rate, and degree of obesity compared to female members. Although most participants demonstrated normal vertebral alignment, a considerable proportion presented with postural deviations, including lordosis, kyphosis, and scoliosis.

Conclusion The findings demonstrate that body composition and postural abnormalities are prevalent among fitness center members. Integrating comprehensive body composition and vertebral postural assessments as routine screening procedures is essential to support individualized exercise programming, injury prevention, and health promotion in fitness center settings.

Keywords: body composition, postural assessmen,; vertebral alignment, fitness center, bioelectrical impedance analysis

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INTRODUCTION

In today's global era, public awareness of the importance of healthy lifestyles and physical activity has increased significantly across all age groups, from children to the elderly. This phenomenon is in line with the growing interest in fitness center-based activities, which not only serve as a means of physical exercise, but also as a medium for health education and quality of life improvement [1]. A fitness center is defined as a place that provides physical training facilities with various fitness equipment to improve an individual's physical condition and health [2]. As public participation in fitness activities increases, the need for accurate and measurable physical condition monitoring becomes increasingly important. Such monitoring is necessary to ensure that exercises are tailored to individual physical conditions and goals. Thus, initial physical condition measurements have become a crucial part of modern fitness practices [3].

In Indonesia, people's goals for participating in fitness activities vary greatly, ranging from weight loss and muscle gain to improving fitness and body aesthetics [4]. In addition to physiological benefits, fitness centers also serve as social spaces that support interaction and motivation for sustained exercise [5]. However, fitness practices that are not preceded by comprehensive physical assessments have the potential to increase the risk of injury and the ineffectiveness of exercise programs. Therefore,

a scientific approach is needed to identify an individual's physical condition before designing an exercise program. One widely used approach is body composition measurement [6]. This approach is considered to provide a more objective picture of physical condition than weight measurement alone [7].

Body composition is the ratio of fat mass to fat-free mass, which reflects a person's health and fitness status [8]. Body composition measurement is an important indicator in sports and health because it is closely related to disease risk, physical performance, and the effectiveness of exercise programs [9]. One method commonly used in fitness centers is Bioelectrical Impedance Analysis (BIA), which can measure various indicators such as body weight, body fat percentage, muscle mass, body water content, and basal metabolic rate in a practical and relatively accurate manner [10]. Several studies in Indonesia show that BIA measurements often indicate suboptimal body composition in physically active individuals, characterized by low body composition scores and high fat percentages [11]. These findings emphasize the importance of body composition assessment as a basis for exercise intervention. However, these measurements have not always been systematically integrated with postural assessment.

In addition to body composition, postural aspects also play an important role in supporting the safety and effectiveness of exercise. Postural assessment is a process of evaluating the alignment of the body's anatomy to identify deviations or abnormalities in posture, particularly in the spine (vertebrae). [12]. Postural analysis is necessary to detect potential risks of musculoskeletal injury and as a basis for improving movement patterns and corrective exercises [13]. Abnormalities in the vertebral structure, if not identified early on, can affect exercise performance and increase the risk of long-term injury [14]. Therefore, integrating body composition measurements and postural assessment is a more comprehensive approach in fitness practice. Unfortunately, scientific studies combining these two aspects in the context of commercial fitness centers are still limited, especially in Indonesia.

Celebrity Fitness Solo Paragon is one of the most popular fitness centers in Solo and has implemented body composition measurements and postural assessments as initial steps for its members. These measurements are used to determine exercise program recommendations tailored to each individual's physical condition and posture. Although this practice is considered important, to date there has been little research specifically examining the level of identification of body composition and vertebral postural conditions among members of commercial fitness centers. This lack of empirical data indicates a research gap regarding body composition profiles and postural assessment among fitness center members. Therefore, this study aims to identify body composition and postural assessment of the vertebrae of members at Celebrity Fitness Solo Paragon as a basis for developing safer, more effective, and evidence-based exercise programs.

METHOD

Study Design

This study employed a descriptive quantitative research design aimed at identifying body composition and vertebral postural characteristics of fitness center members. A descriptive approach was selected to present an objective overview of participants' physical profiles without experimental manipulation.

Study Setting and Period

The research was conducted at Celebrity Fitness Solo Paragon, located in Surakarta, Central Java, Indonesia. Data collection was carried out from March to June 2023.

Participants

The study population consisted of active members of Celebrity Fitness Solo Paragon during the research period. A purposive sampling technique was applied to select participants who met the inclusion criteria. A total of 40 members participated in the study, comprising 20 males and 20 females. The inclusion criteria were as follows: (1) Registered as an active member of Celebrity Fitness Solo Paragon. (2) Willing to participate and provide informed consent.

Instruments and Measurements

Body composition was assessed using Bioelectrical Impedance Analysis (BIA) with the Tanita SC-330 device. The instrument measured multiple body composition indicators, including body weight,

body fat percentage, free fat mass, muscle mass, total body water, bone mass, basal metabolic rate (BMR), visceral fat rating, body mass index (BMI), degree of obesity, and physique rating.

Postural assessment of the vertebral column was conducted using the go-Xpro application, which is routinely utilized by Celebrity Fitness for postural evaluation. Photographic documentation was used to identify vertebral alignment and classify postural conditions into normal posture, kyphosis, lordosis, or scoliosis.

Data Collection Procedure

Participants underwent body composition measurement using the Tanita SC-330 following standard operational procedures. Postural assessment photographs were subsequently taken and analyzed using the go-Xpro application. All data were recorded and stored securely for further analysis.

Data Analysis

Data were analyzed using **descriptive quantitative analysis**. Results were presented in the form of **means, frequencies, and percentages** to describe the distribution of body composition and postural characteristics among participants. Percentage values were calculated using the standard formula:

$$\text{Percentage} = \frac{f}{N} \times 100$$

Where f represents the frequency of observations and N denotes the total number of participants.

RESULTS AND DISCUSSION

Results

Participant Characteristics

A total of 40 active members of Celebrity Fitness Solo Paragon participated in this study, consisting of 20 male and 20 female members. Participants were aged between 15 and 60 years. The demographic distribution showed variability in age and sex, providing a representative overview of fitness center members included in the assessment.

Table 1. Number of Female Members at Celebrity Fitness

Age	Number of Respondents
19 – 24 years old	13
25 – 29 years old	4
30 – 34 years old	1
35 – 39 years old	0
40 – 44 years old	2

Table 2. Number of Male Members at Celebrity Fitness

Age	Number of Respondents
19 – 24 years old	1
25 – 29 years old	7
30 – 34 years old	7
35 – 39 years old	1
40 – 44 years old	2
55 – 60 years old	1

Body Composition Profile

Body Weight

The mean body weight of male members was **80.95 kg**, whereas female members had a lower mean body weight of **59.70 kg**.

Table 3. Average Body Weight of Research Subjects

Jenis Kelamin	Mean	N (Jumlah)
Laki – laki	80.955	20
Perempuan	59.705	20
		40

Body Fat Percentage

The majority of male members were classified in the **very poor** body fat category (**60%, n = 12**), followed by fair (**20%, n = 4**), poor (**10%, n = 2**), and good (**10%, n = 2**) categories. Among female members, **80% (n = 16)** were classified as **very poor**, **15% (n = 3)** as fair, and **5% (n = 1)** as good. No female participants were categorized as poor.

Table 4. Body Fat% Levels of Research Subjects (male)

No	Category	Sum	Percentage
1	Good	2	10%
2	Fair	4	20%
3	Poor	2	10%
4	Very Poor	12	60%
	Sum	20	100%

Figure 1. Body fat percentage circle diagram (men)

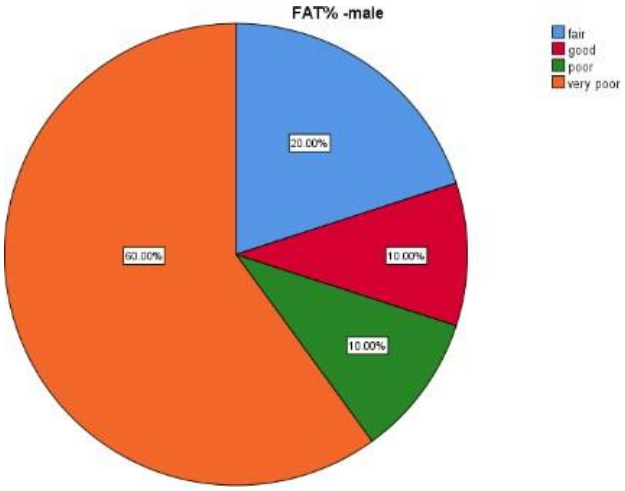
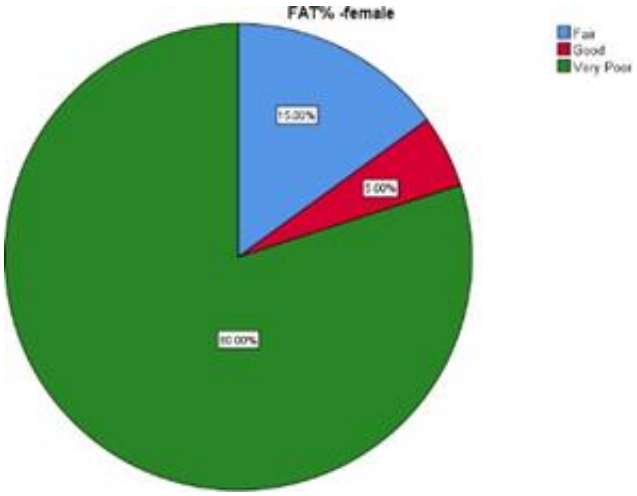


Table 5. Body Fat% Levels of Research Subjects (female)

No	Category	Sum	Percentage
1	Good	1	5%
2	Fair	3	15%
3	Poor	0	0%
4	Very Poor	16	80%
	Sum	20	100%

Figure 2. Body fat percentage diagram (female)



Free Fat Mass

The average free fat mass among male members was 56.3 kg, while female members demonstrated a lower average free fat mass of 36.8 kg.

Table 6. Average Free Fat Mass of research subjects

Gender	Mean	N (Sum)
Male	56.3050	20
Female	36.8300	20
		40

Muscle Mass

Male members predominantly fell into the average muscle mass category (83%, n = 17), with the remaining 15% (n = 3) classified as low. All female members (100%, n = 20) were classified as having low muscle mass.

Table 7. Average muscle mass of research subjects

Gender	Mean	N (Sum)
Male	55.225	20
Female	34.765	20
		40

Table 8. Muscle Mass Levels of Research Subjects (male)

No	Category	Sum	Percentage
1	Average	17	83%
2	Low	3	15%
	Sum	20	100%

Figure 3. Muscle Mass Circle Diagram (Male)

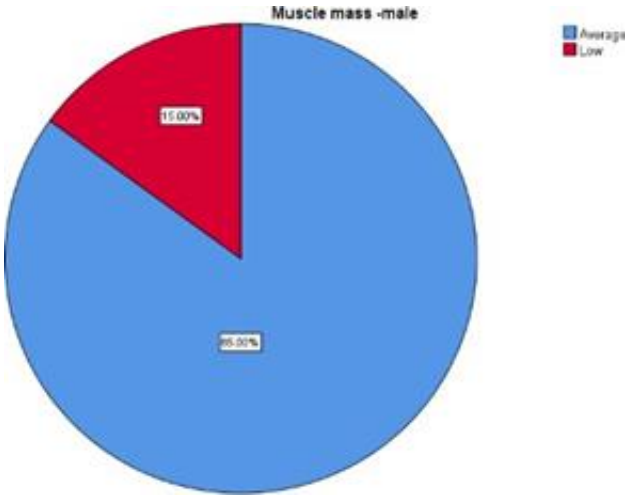
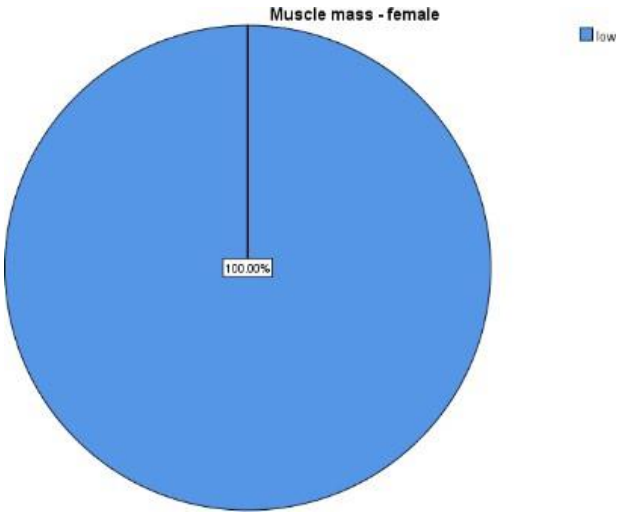


Table 9. Muscle Mass Levels of Research Subjects (female)

No	Category	Sum	Percentage
1	Low	20	100%
	Sum	20	100%

Figure 4. Muscle Mass Circle Diagram (feale)



Total Body Water

Among male members, 50% (n = 10) were categorized as hydrated, while the remaining 50% (n = 10) were underhydrated. In female members, 70% (n = 14) were categorized as underhydrated, and 30% (n = 6) were classified as hydrated.

Table 10. Total Body Water% of research subjects (male)

No	Category	Sum	Percentage
1	Hydrate	10	50%
2	Underhydrate	10	50%
	Sum	20	100%

Figure 5. Total body water percentage diagram (male)

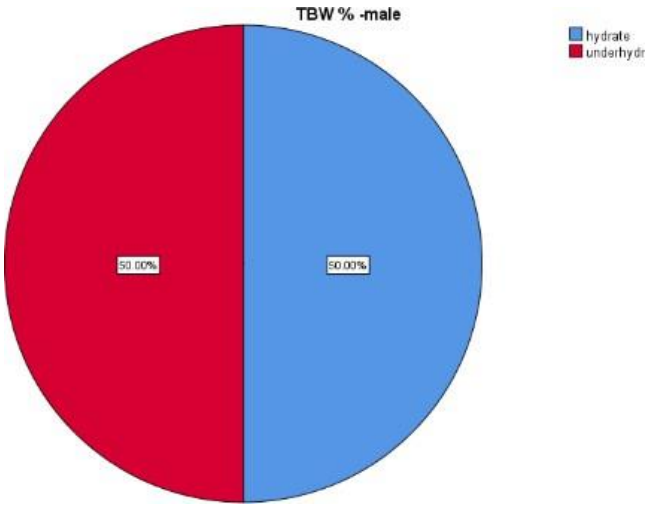
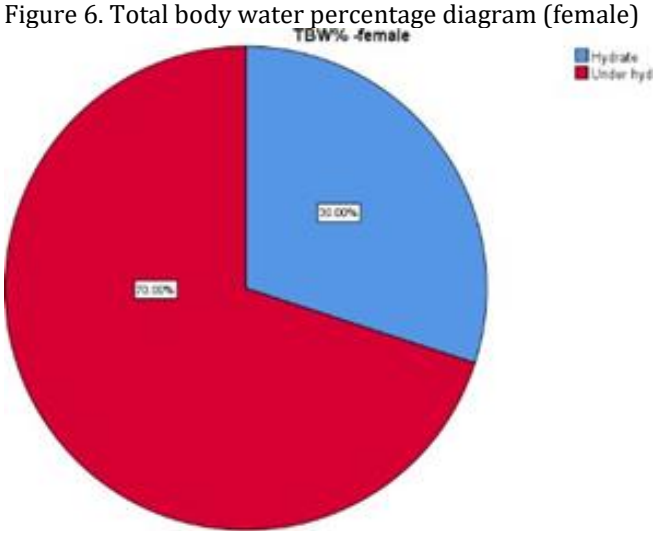


Table 11. Total Body Water% of research subjects (female)

No	Category	Sum	Percentage
1	Hydrate	6	30%
2	Underhydrate	14	70%
	Sum	20	100%

Figure 6. Total body water percentage diagram (female)



Bone Mass

Male members showed the highest proportion in the low bone mass category (60%, n = 12), followed by adequate (20%, n = 4) and good (15%, n = 3) categories. One participant (5%) was not detected due to being underage. Among female members, 95% (n = 19) were categorized as having low bone mass, while only 5% (n = 1) were classified as good.

Table 12. Bone Mass Levels of Research Subjects (male)

No	Category	Sum	Percentage
1	Poor	12	60%
2	Fair	4	20%
3	Good	3	15%
4	Not Detected	1	5%
	Sum	20	100%

Figure 7. Bone Mass Level Cycle Diagram (Male)

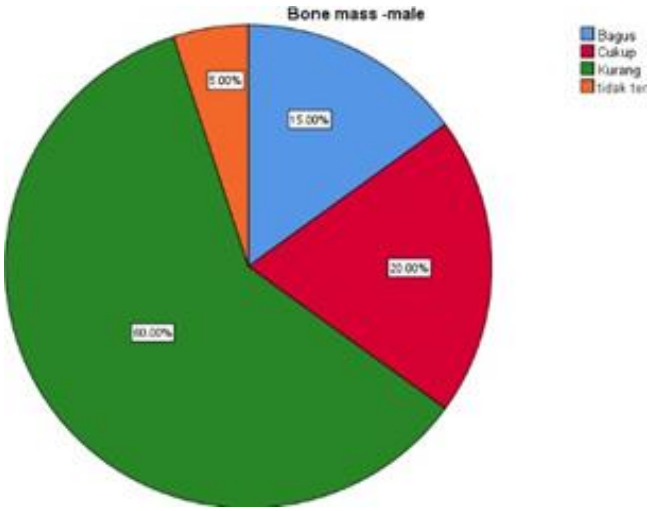
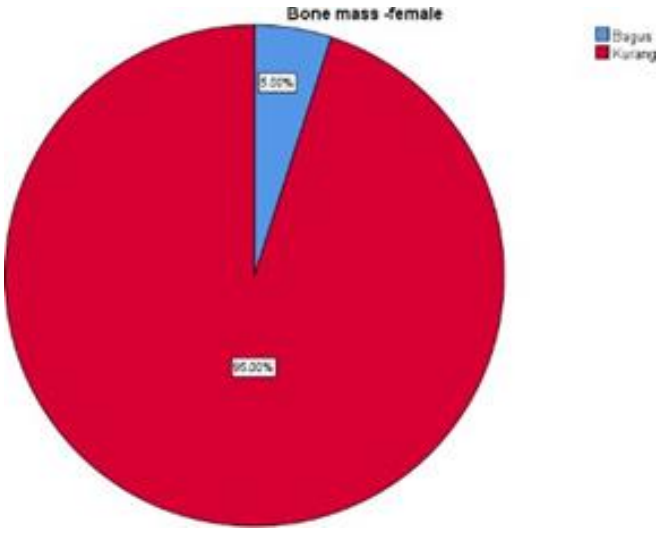


Table 13. Bone Mass Levels of Research Subjects (female)

No	Category	Sum	Percentage
1	Poor	19	95%
2	Fair	0	0%
3	Good	1	5%
Sum		20	100%

Figure 8. Bone Mass Level Cycle Diagram (Female)



Basal Metabolic Rate

The mean basal metabolic rate (BMR) of male members was 1633 kcal, whereas female members demonstrated a lower mean BMR of 1181 kcal.

Table 14. Average BMR

Gender	Mean	N (Sum)
Male	1633.10	20
Female	1181.75	20
		40

Visceral Fat Rating

In male members, the most frequent categories were acceptable and good, each accounting for 35% (n = 7). The remaining participants were classified as very good (20%, n = 4), poor (5%, n = 1), or not detected (5%, n = 1). Female members demonstrated higher visceral fat ratings, with 50% (n = 10) categorized as excellent, 30% (n = 6) as good, and 20% (n = 4) as very good.

Table 15. Visceral Fat Levels of Research Subjects (male)

No	Category	Sum	Percentage
1	Acceptable	7	35%
2	Good	7	35%
3	Poor	1	5%
4	Very Good	4	20%
5	Not Detected	1	5%
	Sum	20	100%

Figure 9. Visceral fat diagram for males

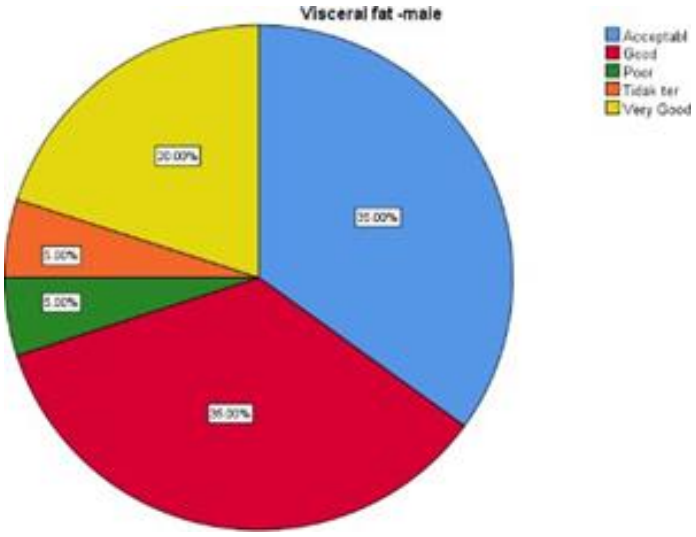
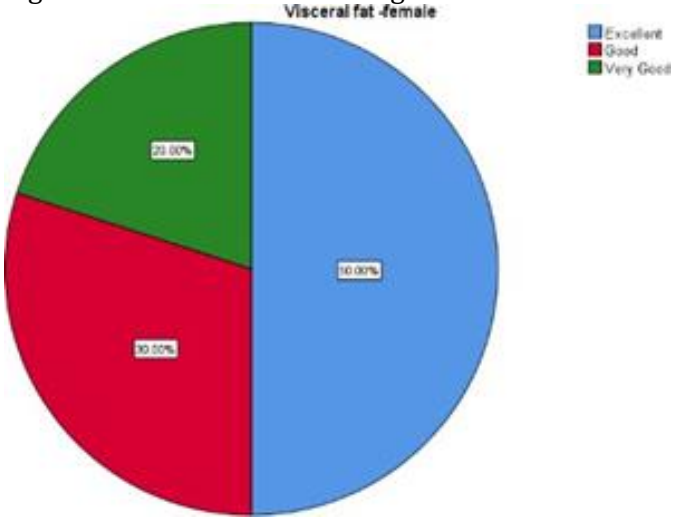


Table 16. Visceral Fat Levels of Research Subjects (female)

No	Category	Sum	Percentage
1	Excellent	10	50%
2	Good	6	30%
3	Very Good	4	20%
	Sum	20	100%

Figure 10 Visceral fat circle diagram for females



Body Mass Index

The majority of male members were classified as overweight (60%, n = 12), followed by normal (20%, n = 4) and obese (20%, n = 4).

Female members were predominantly classified as normal (55%, n = 11), while 15% (n = 3) were underweight, overweight, and obese, respectively.

Table 17. BMI levels of research subjects (male)

No	Category	Sum	Percentage
1	Underweight	0	0%
2	Normal	4	20%
3	Overweight	12	60%
4	Obese	4	20%
	Sum	20	100%

Figure 11. Male BMI Circle Diagram

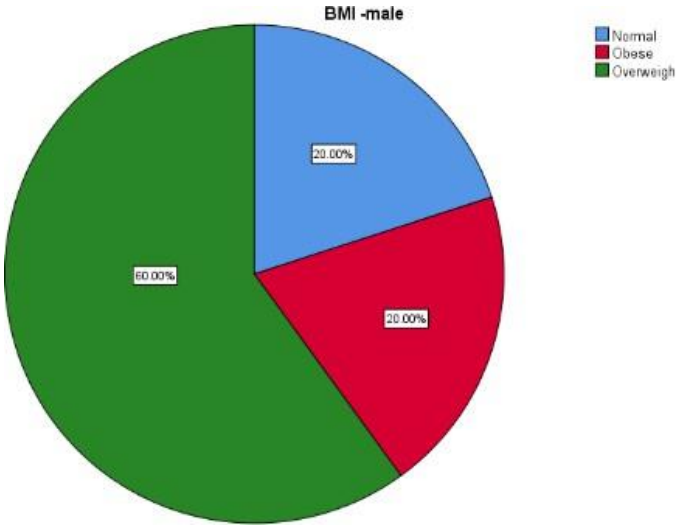
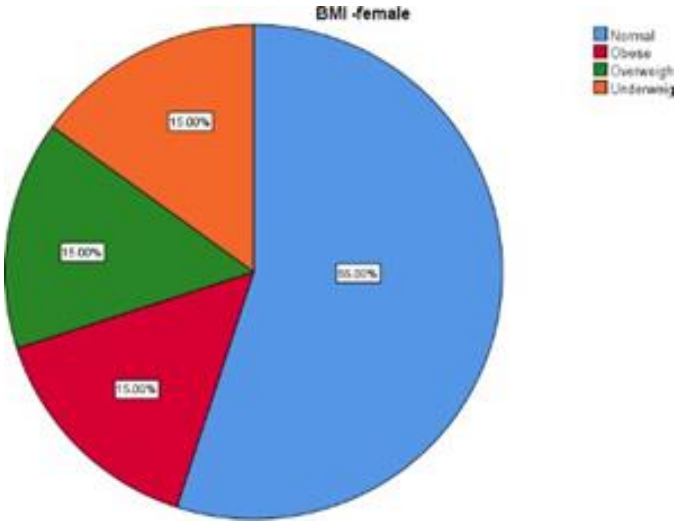


Table 18. BMI levels of research subjects (female)

No	Category	Sum	Percentage
1	Underweight	3	15%
2	Normal	11	55%
3	Overweight	3	15%
4	Obese	3	15%
	Sum	20	100%

Figure 12. BMI Circle Diagram for females



Degree of Obesity

The mean degree of obesity among male members was **20.21%**, while female members demonstrated a lower mean value of **6.96%**.

Table 19. Average Degree of Obesity of Research Subjects

Gender	Mean	N (Sum)
Male	20.210	20
Female	6.963	20
		40

Physique Rating

Male members were predominantly categorized as **obese** (**40%, n = 8**) and **solidly built** (**35%, n = 7**). Female members were mainly classified as **hidden obese** and **under-exercised**, each accounting for **25% (n = 5)**.

Table 19. Physique Rating Levels of Research Subjects (male)

No	Category	Sum	Percentage
1	Hidden Obese	0	0%
2	Obese	8	40%
3	Solidly-built	7	35%
4	Standard	3	15%
5	Under Exercised	1	5%
6	Not detected	1	5%
	Sum	20	100%

Figure 13. Physique rating circle diagram (male)

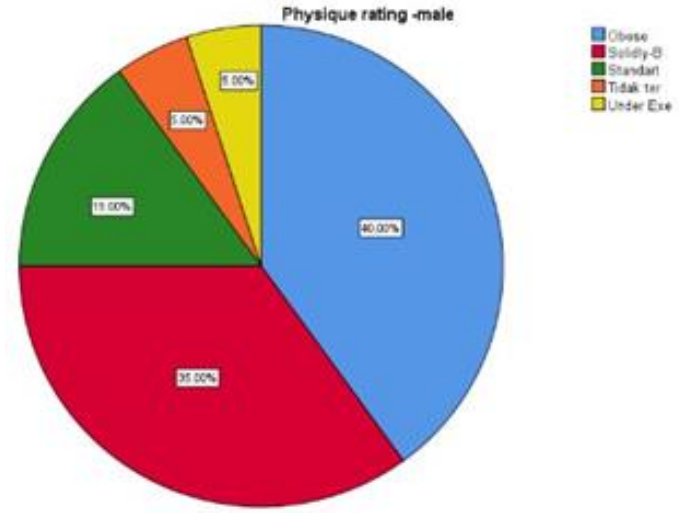
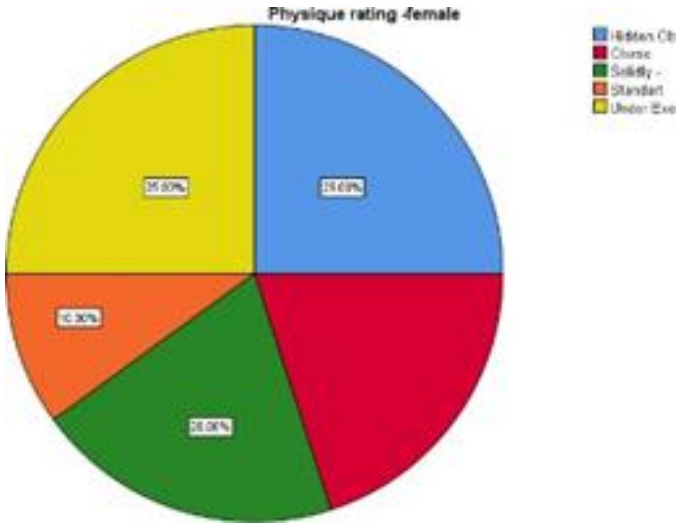


Table 20. Physique Rating Levels of Research Subjects (female)

No	Category	Sum	Percentage
1	Hidden Obese	5	25%
2	Obese	4	20%
3	Solidly-built	4	20%
4	Standard	2	10%
5	Under Exercised	5	25%
	Sum	20	100%

Figure 14. Physique rating circle diagram (male)



Postural Assessment of Vertebrae

Postural assessment revealed that 50% (n = 10) of male members demonstrated normal vertebral alignment, while the remaining participants exhibited lordosis (25%, n = 5), scoliosis (20%, n = 4), or kyphosis (5%, n = 1).

Among female members, 65% (n = 13) presented with normal vertebral posture, followed by lordosis (20%, n = 4), kyphosis (10%, n = 2), and scoliosis (5%, n = 1).

Table 21. Vertebrate categories of research subjects (male)

No	Category	Sum	Percentage
1	Normal	10	50%
2	Kyphosis	1	5%
3	Lordosis	5	25%
4	Scoliosis	4	20%
Sum		20	100%

Figure 15. Vertebrate Category Circle Diagram (male)

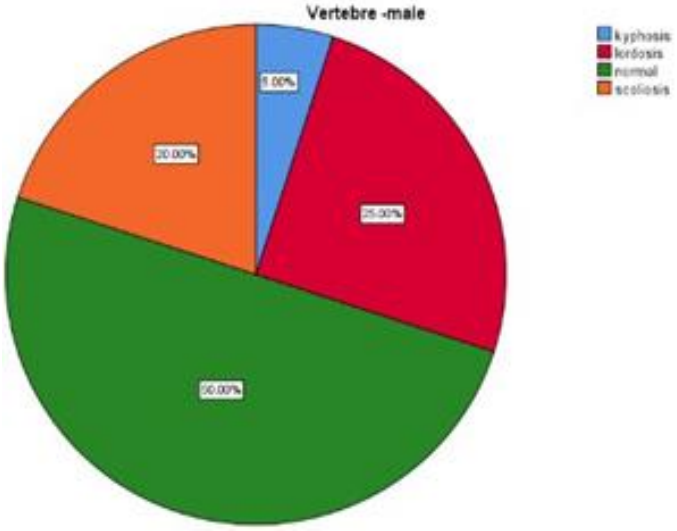
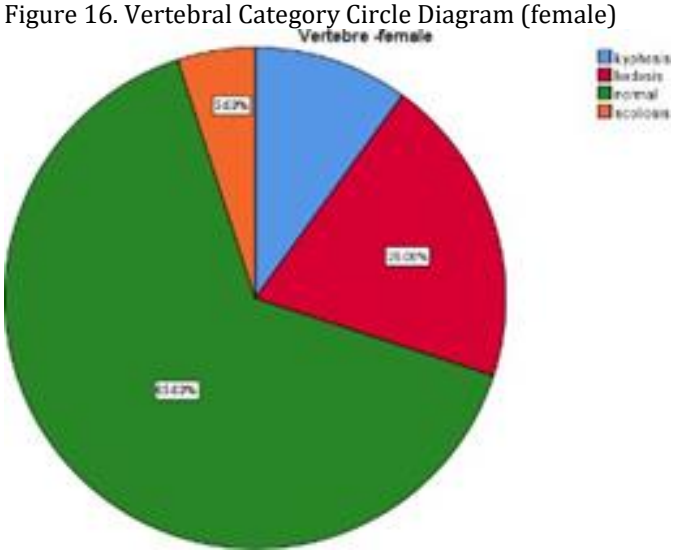


Table 22. Vertebrate categories of research subjects (male)

No	Category	Sum	Percentage
1	Normal	5	25%
2	Kyphosis	4	20%
3	Lordosis	4	20%
4	Scoliosis	2	10%
Sum		20	100%

Figure 16. Vertebral Category Circle Diagram (female)



Discussion

The present study aimed to identify body composition profiles and vertebral postural characteristics among members of a commercial fitness center, Celebrity Fitness Solo Paragon. The findings demonstrate considerable variation in body composition indicators and postural alignment between male and female members, highlighting the importance of comprehensive physical assessment prior to exercise prescription in fitness settings.

The predominance of unfavorable body fat percentages observed in both male and female members indicates that participation in fitness activities does not necessarily reflect optimal body composition. This finding is consistent with previous studies reporting that individuals attending fitness centers may still present with excessive body fat levels due to inadequate training intensity, nutritional imbalance, or inconsistent exercise habits [15]. High body fat levels are known to negatively affect physical performance and increase the risk of metabolic disorders, underscoring the importance of routine body composition monitoring as part of fitness center services [16].

Muscle mass distribution differed markedly between sexes, with male members predominantly categorized as average and all female members classified as having low muscle mass. This disparity is physiologically plausible and aligns with prior literature indicating that hormonal differences, particularly testosterone levels, contribute significantly to greater muscle mass in males [17]. However, the uniformly low muscle mass observed among female members suggests the need for resistance-based training interventions tailored to improve musculoskeletal health and functional capacity in this population.

Hydration status, as reflected by total body water measurements, revealed that a substantial proportion of participants were underhydrated, particularly among female members. Adequate hydration is essential for thermoregulation, metabolic processes, and exercise performance. Insufficient hydration may impair physical function and increase fatigue during training sessions, highlighting the need for education on fluid intake within fitness programs[18] [19].

The findings related to bone mass showed a high prevalence of low bone mass, especially among female members. This observation is consistent with national data indicating a higher risk of reduced bone density among women due to hormonal fluctuations and lifestyle factors [20]. Low bone mass may predispose individuals to musculoskeletal injuries, particularly when engaging in high-impact or resistance exercises. Therefore, incorporating weight-bearing and bone-strengthening exercises, alongside nutritional strategies, is essential in fitness programming.

Basal metabolic rate values were higher in male members than in female members, reflecting differences in body size, muscle mass, and energy requirements. Similar trends have been reported in previous nutritional and metabolic studies, which emphasize the role of lean mass as a primary determinant of resting energy expenditure. These findings reinforce the relevance of individualized caloric and training recommendations based on metabolic profiles.

Visceral fat distribution varied among participants, with male members showing more diverse categories compared to female members, who generally exhibited lower visceral fat levels. Although visceral fat is less visible than subcutaneous fat, it is metabolically active and strongly associated with cardiovascular and metabolic diseases. The presence of moderate to high visceral fat levels among some members highlights the importance of early detection and targeted interventions to mitigate long-term health risks.

Body mass index and degree of obesity assessments further revealed a higher prevalence of overweight and obesity among male members. While BMI remains a widely used screening tool, it does not differentiate between fat and lean mass. Thus, combining BMI with body composition analysis provides a more accurate representation of an individual's health status, particularly in physically active populations.

Postural assessment of the vertebral column indicated that although the majority of members exhibited normal alignment, a considerable proportion demonstrated postural deviations such as lordosis, kyphosis, and scoliosis. These postural abnormalities may result from prolonged poor posture, muscular imbalances, or insufficient corrective exercises. Identifying such deviations is crucial, as improper spinal alignment can increase injury risk and reduce exercise efficiency. The integration of postural assessment into fitness evaluations allows for more precise and preventive exercise programming.

Overall, this study contributes empirical evidence regarding the combined assessment of body composition and vertebral posture within a commercial fitness center context, which remains underexplored in previous research. The findings emphasize the necessity of integrating objective physical assessments into fitness services to enhance training effectiveness and injury prevention. Future studies should expand sample size, include longitudinal designs, and examine the effectiveness of tailored intervention programs based on comprehensive assessment outcomes.

CONCLUSION

This study provides a comprehensive overview of body composition and vertebral postural characteristics among members of a commercial fitness center. The findings indicate that a substantial proportion of members, both male and female, exhibit suboptimal body composition profiles, particularly in terms of body fat percentage, muscle mass, hydration status, and bone mass. In addition, although most members demonstrated normal vertebral alignment, a notable number presented with postural deviations, including lordosis, kyphosis, and scoliosis. These results highlight the importance

of integrating body composition assessment and postural evaluation as standard initial screening procedures in fitness centers. Such assessments enable more individualized, safe, and effective exercise programming, while also contributing to injury prevention and long-term health promotion. Overall, this study contributes empirical evidence to the limited body of research on combined body composition and postural assessment in commercial fitness settings. Future research is recommended to employ longitudinal designs, larger sample sizes, and intervention-based approaches to further examine the impact of assessment-driven training programs on health and fitness outcomes.

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AUTHOR CONTRIBUTION STATEMENT

The writing of this article involved roles in devising the research concept and design, reviewing and analyzing relevant literature, and drafting the overall manuscript.

CONFLICT OF INTEREST AND FUNDING

There is no conflict of interest

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