BALNEO RESEARCH Balneo and PRM Research Journal
English Edition
e ISSN 2734 - 8458 p ISSN 2734 - 844X ROMANIAN ASSOCIATION OF BALNEOLOGY

Research article

Body composition analysis and metabolic risk in women with reduced physical activity

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Citation: Vizitiu Lakhdari E., Slusar A., Leuciuc F.V. – Body composition analysis and metabolic risk in women with reduced physical activity
Balneo and PRM Research Journal **2025**, *16(4): 936*

Academic Editor(s):
Constantin Munteanu

Reviewer Officer:
Viorela Bembea

Production Officer:
Camil Filimon

Received: 07.11.2025
Published: 3012.2025

Reviewers:
Ruxandra Postoiu
Mihai Hoteteu

Abstract: Maintaining a sedentary lifestyle is a major risk factor for adverse body composition and metabolic outcomes in adult women. This study evaluated the impact of physical inactivity on anthropometric and metabolic parameters in women grouped by age (29–40, 41–50, and >50 years). Assessments included bioelectrical impedance analysis and anthropometric measurements, and data were analyzed using descriptive statistics and ANOVA. Results showed progressive increases in BMI, body fat, visceral fat, and metabolic age with advancing age. Statistically significant differences were found for BMI ($F = 7.88$, $p = 0.00086$), visceral fat ($F = 3.47$, $p = 0.0369$), and metabolic age ($F = 9.95$, $p = 0.00017$). Women >50 years exhibited markedly elevated visceral fat (mean 9.59) and WHtR above risk thresholds (0.53), indicating high cardio-metabolic risk. Muscle mass and lean mass remained adequate across all groups, while hydration was slightly lower in older participants. Physical fitness showed high inter-individual variability, especially in older women, and metabolic age exceeded chronological age in the 41–50 and >50 groups. The study highlights the association between sedentary behavior and increased cardiometabolic risk and emphasizes the need for targeted physical activity interventions in middle-aged and older women.

Keywords: body composition, visceral fat, metabolic age, women, sedentary lifestyle, cardio-metabolic risk

1. Introduction

A sedentary lifestyle and physical inactivity are associated with adverse changes in body composition and increased health risks in adults. In women, sedentarism contributes to reduced fertility, while body fat accumulation affects fertility in both sexes. Lean mass is particularly important in women [1]. Sedentary behavior is linked to increased body fat, impaired lipid and carbohydrate metabolism, and reduced insulin sensitivity, which may negatively affect cardiovascular and musculoskeletal health [2-5]. Although the direct association between sedentary behavior and obesity is limited, prolonged screen time and reduced physical activity can influence body weight [6]. Socioeconomic transitions have increased periods of sedentarism, impacting public health in both developed and developing countries [7]. Overweight and obesity have increased significantly in recent decades, affecting up to 61% of adults in the United States [8]. Physical activity, including resistance and strength training, prevents weight gain, improves body composition, lipid profiles, metabolic rate, and cardiovascular health, and is important throughout life [9-11,12-14]. Moderate to vigorous physical activity reduces body fat, preserves muscle mass, and is more effective than low-calorie diets alone [15]. Combined diet and exercise interventions are essential in obesity therapy [16], and wearable monitoring technologies help track progress and optimize rehabilitation [17]. Despite these benefits, sedentary behaviors remain prevalent, even among adults with normal BMI, contributing to cardiometabolic disorders, mortality, and impaired musculoskeletal function [18,19]. In women, physical activity prevents sarcopenia, maintains bone density, and supports overall well-being [20,21]. Studies confirm that swimming, jogging, and fitness exercises complement each other by engaging large muscle groups, stimulating lipid metabolism, improving cardiorespiratory endurance, and maintaining muscle mass, while reducing the risk of injury [22-24].

2. Results

Interpretation of anthropometric characteristics-Group of women aged 29 to 40 years (n = 40). The mean height of the participants is 1.67 ± 0.06 m, with homogeneous values Cv% = 3.55% and an interquartile range of 1.63-1.70 m, indicating a well-standardized group from a physical point of view. Body weight showed a variability of Cv% = 21.13%, with a mean of 71.0 ± 15.0 kg, with half of the participants having values between 58.5 and 77 kg. This higher dispersion reflects individual differences in body composition. The mean BMI is 25.35 ± 4.74 kg/m², which places the group at the lower limit of the overweight category according to WHO classification (18.5–24.9 = normal; 25–29.9 = overweight). The mean waist circumference is 82.08 ± 7.77 cm (IQR 77.21–85.20 cm), slightly above the recommended limit of 80 cm for women, suggesting a mild tendency towards abdominal fat accumulation (Figure 1).

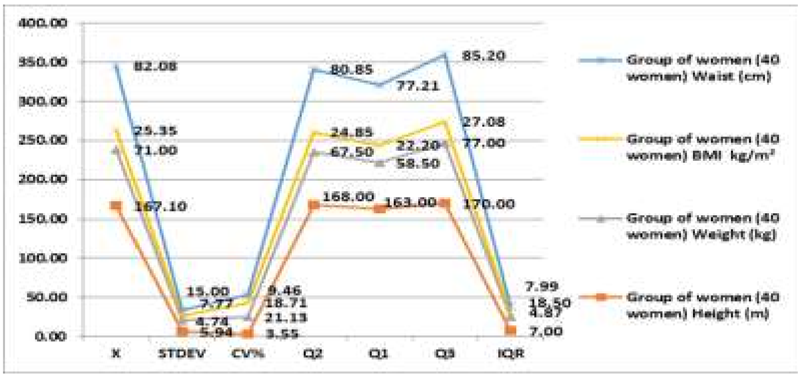

Figure 1 Anthropometric and body composition parameters in women aged 29–40 years

Interpretation of anthropometric characteristics-Group of women aged 41 to 50 years (n = 16). Women in this age group had a mean height of 1.64 ± 0.06 m, with very low variability Cv% = 3.69%, indicating a homogeneous group in terms of stature. Body weight showed moderate variability Cv% = 14.72%), with a mean of 77.0 ± 11.3 kg, and half of the values ranged between 66.75 and 86 kg, suggesting a relatively wide distribution of body mass within the group. The mean BMI is 28.45 ± 4.31 kg/m², in the overweight range, with some participants exceeding 30 kg/m², classifying them as obese (IQR 24.58–32.77 kg/m²). Waist circumference averaged 84.06 ± 5.68 cm (IQR 79.09–87.98 cm), above the recommended 80 cm, indicating a high likelihood of abdominal fat accumulation (Figure 2).

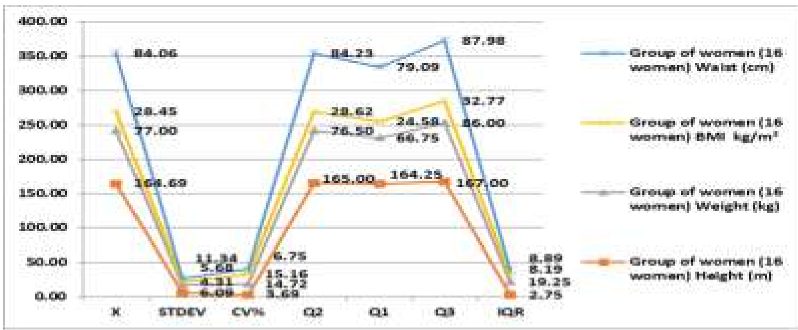

Figure 2 Anthropometric and body composition parameters in women aged 41–50 years

Interpretation of anthropometric characteristics-Group of women >50 years old (n = 12). Women in this age group had a mean height of 1.575 ± 0.08 m, with low variability Cv% = 5.15%, indicating a relatively homogeneous distribution of stature, although slightly shorter compared to younger groups. Mean body weight is 80.33 ± 23.45 kg, with a large dispersion Cv% = 29.19% and half of the values ranging between 65 and 85 kg (IQR). This reflects a considerable variability in body mass, probably associated with metabolic changes and body composition at this age. The mean body mass index is 32.11 ± 7.98 kg/m², placing the majority of participants in the obesity categories of class I and II (≥30 kg/m²). The interquartile range (26.71–35.38 kg/m²) indicates that some participants remain overweight, while others cross the obesity threshold. The mean waist circumference is 83.40 ± 12.02 cm, with an interquartile range of 76.05-84.75 cm, exceeding the recommended limit of 80 cm. This suggests an increased risk of abdominal fat accumulation and cardio-metabolic diseases in this age group (Figure 3).

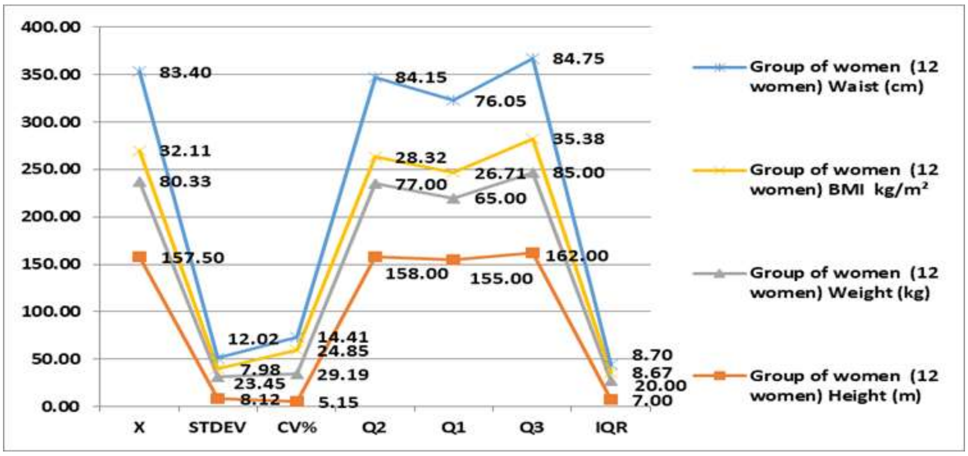

Figure 3 Anthropometric and body composition parameters in women >50 years old

Body composition analysis-Group of women 29–40 years old (n = 40). The mean waist-to-height ratio for the group is 0.49 ± 0.04, with an IQR of 0.46–0.51 and a low variability Cv% = 7.65%. The mean values are below the risk threshold of 0.5, indicating a moderate risk of abdominal fat accumulation. The mean body fat percentage is 31.48 ± 7.27%, with an IQR of 25.20–34.98% and a moderate dispersion Cv% = 23.10%. Most participants had a body fat percentage that was normal or slightly elevated according to the reference values for adult women (~21–33%), with a few values that exceeded the upper threshold. The mean value of mineral mass is 2.41 ± 0.32 kg, with an IQR of 2.20-2.50 kg and a Cv% of 13.18%, indicating relatively good homogeneity of bone mass within the group. The values are typical for young adult women, with no signs of significant bone loss. The group is relatively homogeneous in terms of weight-to-tissue ratio (WHtR) and MMO, with moderate variability in body fat percentage. Most women had normal body composition, moderate abdominal risk, and age-appropriate bone mass (Figure 4).

Figure 4 Body Composition-WHtR, Body Fat and Bone Mineral Mass-women 29-40 years old

Body composition analysis-Group of women 41-50 years old (n = 16). The mean waist-to-height ratio is 0.51 ± 0.03, with an IQR of 0.50-0.54 and a low variability Cv% = 5.98%. The mean exceeds the risk threshold of 0.5, indicating an increased risk of abdominal fat accumulation in this group. The mean body fat percentage is 35.54 ± 7.28%, with an IQR of 34.00-42.83% and a moderate dispersion Cv% = 20.48%. Most participants were above the normal range for adult women (~21-33%), indicating a high percentage of body fat. The mean value of bone mineral mass is 2.48 ± 0.26 kg, with an IQR of 2.35-2.63 kg and a Cv% of 10.63%, indicating good homogeneity. The values are appropriate for middle-aged adult women without signs of major bone loss. This group is at increased risk of abdominal fat accumulation and a body fat percentage above normal, while bone mass remains appropriate for age (Figure 5)

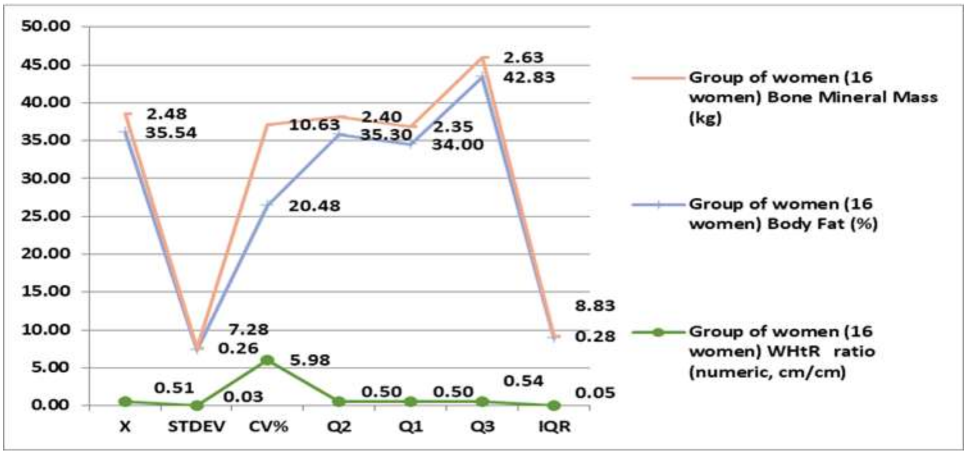

Figure 5 Body Composition-WHtR, Body Fat and Bone Mineral Mass-women 41-50 years old

Body composition analysis-Group of women >50 years old (n = 12) The mean waist-to-height ratio is 0.53 ± 0.06. For the group of women over 50 years of age (n = 12), the mean waist circumference (WHtR) is 0.53, calculated from the mean waist circumference 83.4 cm and height 1.575 m as follows: WHtR = 83.4 / 157.5= 0.529≈0.53. This value exceeds the risk threshold of 0.5, indicating an increased risk of abdominal fat accumulation and cardio-metabolic problems. The interquartile range is 0.49–0.55, showing that half of the participants had values below the risk threshold. The relative variability was moderate Cv% = 11.66%, reflecting individual differences within the group.Values exceed the threshold of 0.5, indicating a high risk of abdominal fat accumulation and potential cardio-metabolic risk. The mean body fat percentage is 36.75 ± 9.33%, with an IQR of 34.30–40.10% and a high dispersion Cv% = 25.38%. Most participants were above the normal range for adult women (~21-33%), indicating a high percentage of body fat. Bone mineral mass remained relatively constant across age groups (mean 2.41–2.48 kg), although variability was moderate, particularly in the >50-year age group (SD = 0.32 kg, Cv% = 13.2%), likely reflecting individual differences due to the small sample size. The values are still appropriate for adult women over 50 years of age without signs of severe osteoporosis. This group is at increased risk of general and abdominal fat accumulation, while bone mass remains relatively age-appropriate (Figure 6).

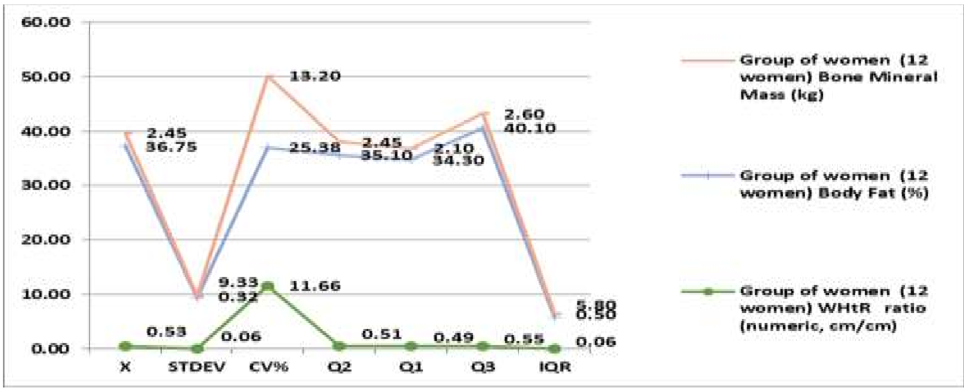

Figure 6 Body composition-WHtR, Body Fat and Bone Mineral Mass-women >50 years old

Analysis of muscle mass, lean mass and body water-Group of women 29-40 years old (n = 40). The mean value of muscle mass is 45.19 ± 6.50 kg, with an IQR of 41.13–47.40 kg and a moderate variability Cv% = 14.38%. The values indicate an adequate level of muscle mass for young adult women, with normal individual variations. The mean value of lean mass is 47.60 ± 6.82 kg, with an IQR of 43.33-49.90 kg and a Cv% of 14.32%, indicating a similar distribution of lean mass, corresponding to muscle mass and fat-free tissue. The mean body water value is 48.11 ± 4.48%, with an IQR of 45.60–52.30% and a low variability Cv% = 9.31%. The values are within the normal range for adult women (~45-60%), indicating adequate body hydration. The 29-40 year age group shows age-appropriate lean and muscular mass with a normal body water percentage, suggesting good body composition and adequate hydration (Figure 7).

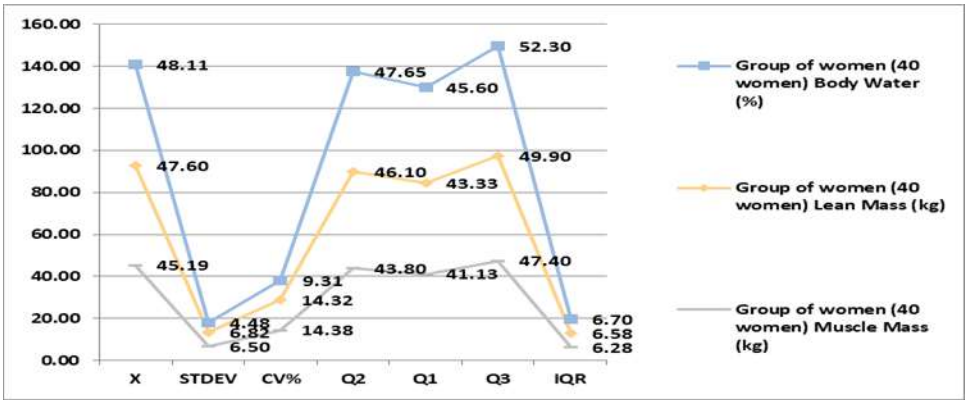

Figure 7 Body composition-muscle mass, lean mass and body water-women 29-40 years old

Analysis of muscle mass, lean mass and body water-Group of women 41-50 years old (n = 16). The mean value of muscle mass is 46.42 ± 5.33 kg, with an IQR of 43.48-49.05 kg and a moderate variability Cv% = 11.48%. The values indicate an adequate level of muscle mass, slightly higher compared to the younger group, possibly due to the higher body weight. The mean value of lean mass is 48.90 ± 5.59 kg, with an IQR of 45.83-51.68 kg and a Cv% of 11.43%, indicating a uniform distribution of lean mass, proportional to muscle mass and fat-free body tissue. The mean body water value is 45.31 ± 4.52%, with an IQR of 41.00-46.00% and a low variability Cv% = 9.97%. The values fall within the normal range (~45-60%), but towards the lower limit, indicating adequate hydration, although slightly lower compared to the younger group. The 40-50 year old age group has age-appropriate muscle mass and lean mass, but a slightly lower body water percentage compared to younger women, suggesting a minor trend towards reduced hydration with age (Figure 8).

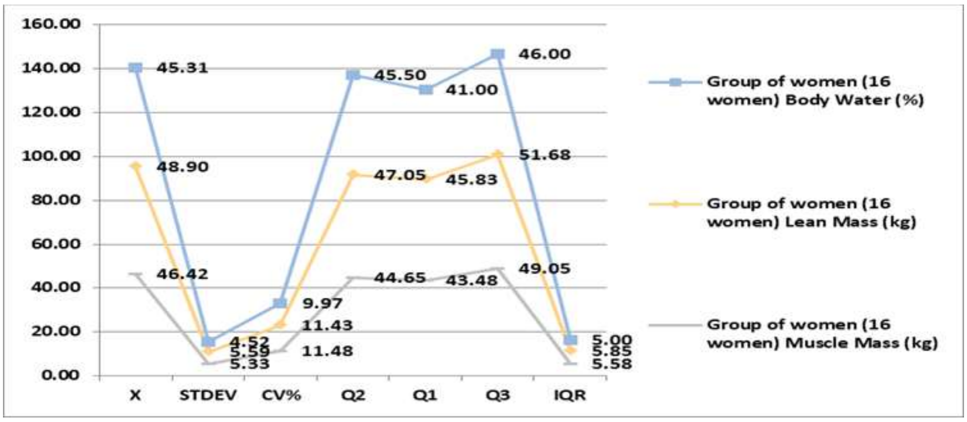

Figure 8 Body composition-muscle mass, lean mass and body water-women 41-50 years old

Analysis of muscle mass, lean mass and body water-Group of women >50 years old (n = 12). The mean value of muscle mass is 45.35 ± 5.98 kg, with an IQR of 39.90–47.90 kg and a moderate variability Cv% = 13.19%. The values indicate an adequate level of muscle mass, similar to the younger groups, although with a greater individual dispersion. The mean value of lean mass is 47.80 ± 6.30 kg, with an IQR of 42.00-50.50 kg and a Cv% of 13.18%, indicating a moderate distribution of lean mass, proportional to muscle mass and fat-free tissue. The mean value of body water is 44.22 ± 5.57%, with an IQR of 42.40-45.90% and a moderate variability Cv% = 12.59%. Values are slightly lower compared to younger groups, indicating relatively normal hydration but reduced with age. The >50 age group has adequate muscle and lean mass but a slightly lower body water percentage compared to younger women, suggesting a minor trend towards reduced hydration with age (Figure 9).

Figura 9 Body composition-muscle mass, lean mass and body water-women >50 years old

Analysis of physical performance, visceral fat and metabolic age-Group of women 29-40 years old (n = 40). The mean value of physical fitness is 3.88 ± 1.71, with an IQR of 2-5 and a high variability Cv% = 44.19%. The distribution shows significant individual differences in the level of physical fitness, with most women having an average to good score. The mean value of visceral fat is 5.13 ± 2.90, with an IQR of 2.50-7 and a Cv% of 56.49%, indicating a high dispersion. The values are generally within the normal range of visceral fat for young adult women, although a few participants have higher values. The mean value of metabolic age is 38.60 ± 12.75 years, with an interquartile range of 25.50-48 and a Cv% of 33.04%. The mean values are close to the chronological age of the group (37–38 years), indicating a metabolic status appropriate to the age, although there are considerable individual variations. The age group 29–40 years presents an average physical condition, visceral fat within normal limits and a metabolic age close to the chronological age, with high individual variability (Figure 10).

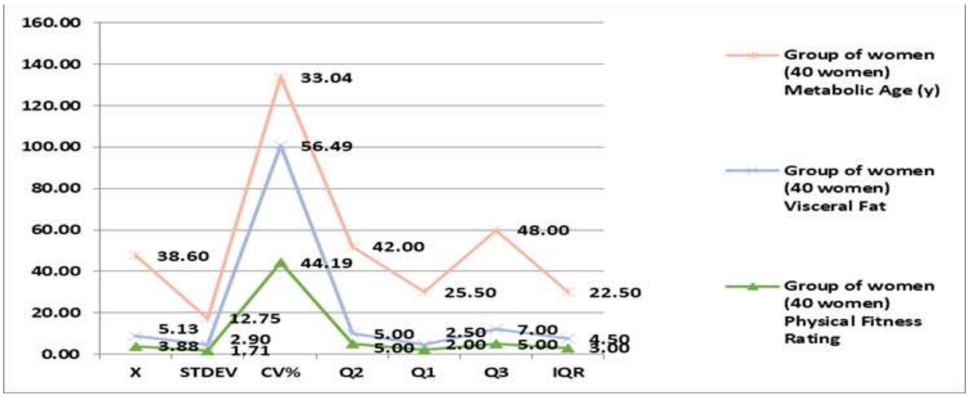

Figure 10 Physical and metabolic status of the 29-40 year old age group

Analysis of physical performance, visceral fat and metabolic age-Group of women 41-50 years old (n = 16). The mean value of physical fitness is 3.25 ± 1.29, with an interquartile range of 2-5 and a high variability Cv% = 39.72%. The mean level of physical fitness is slightly lower compared to the age group 29-40 years, indicating a moderate physical fitness. The mean value of visceral fat is 7.53 ± 2.07, with an IQR of 6.63-10 and a Cv% of 27.48%, exceeding the normal values for young adult women, indicating a tendency towards increased visceral fat accumulation and moderate cardio-metabolic risk. The mean metabolic age is 49.19 ± 9.18 years, with an interquartile range of 44.50–59 and a Cv% of 18.67%. The mean values exceed the chronological age of the group (~45 years), suggesting a relatively old metabolic status, associated with increased visceral fat and decreased physical fitness. The 41-50 year age group presents moderate physical fitness, increased visceral fat and a metabolic age higher than chronological age, indicating a slight metabolic deterioration with age (Figure 11).

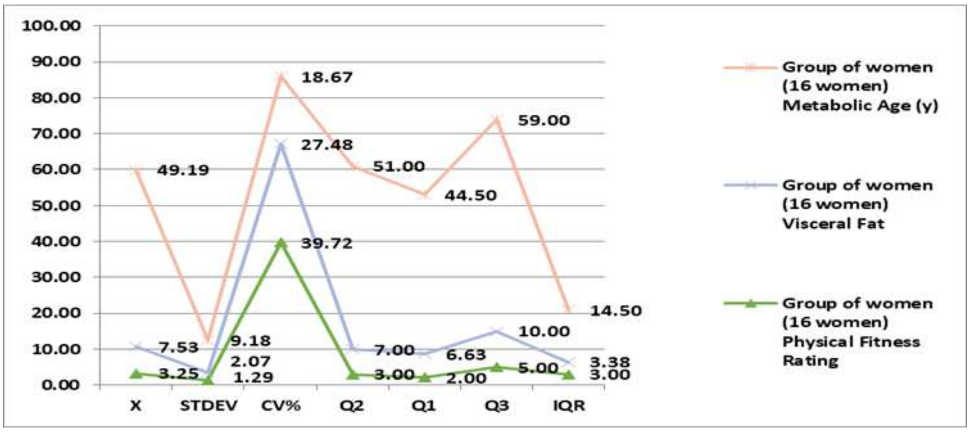

Figure 11 Physical and metabolic status of the 41-50 year old age group

The mean value of physical fitness is 4.00 ± 2.56, with an IQR of 2.00–5.00 and a high variability Cv% = 63.96%, indicating substantial individual differences in physical fitness. The mean visceral fat is 9.59 ± 4.84, with an IQR of 7.03–11.00 and a high dispersion Cv% = 50.44%. These values exceed the normal range for adult women, indicating a high risk of abdominal fat accumulation and increased cardio-metabolic risk. The mean metabolic age is 54.17 ± 12.26 years, with an interquartile range of 49.00–68.00 and a relative variability Cv% = 22.64%. Metabolic age exceeds chronological age in this group, suggesting age-related metabolic deterioration and heterogeneous fitness among participants. Women over 50 years of age present moderate fitness with high interindividual variability, increased visceral fat, and a metabolic age above chronological age, highlighting increased cardiometabolic risk and age-related metabolic changes (Figure 12).

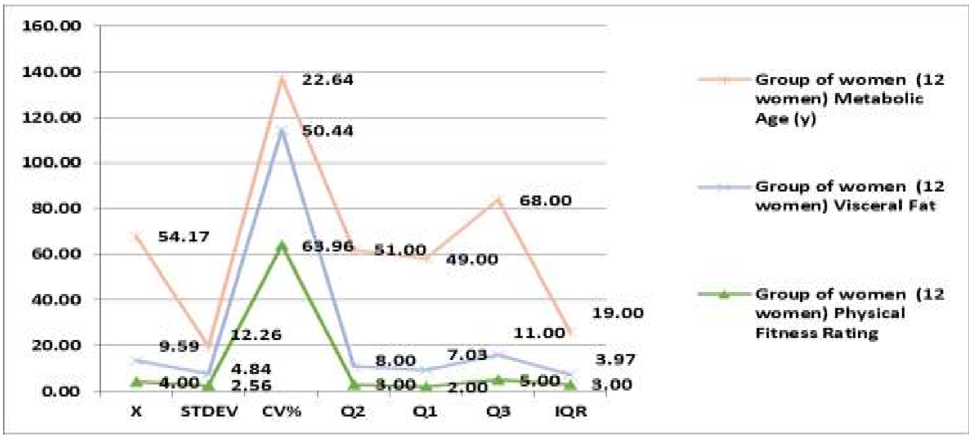

Figure 12 Physical and metabolic status of the >50 age group

ANOVA analysis for body mass index (BMI) by age group: The statistical results indicate F = 7.88; P value = 0.00086 < 0.05; and F critical = 3.138. These values show that there are statistically significant differences in BMI between the three age groups, confirmed by F > F critical. The mean BMI values for the age categories are as follows: 25.35 kg/m^2 for 29-40 years, 28.45 kg/m^2 for 41-50 years, and 32.11 kg/m^2 for >50 years. Descriptive interpretation: A progressive increase in BMI with age can be observed. The age group 41-50 years has a significantly higher BMI compared to the age group 29-40 years. The >50 years group has the highest BMI, falling within the mild obesity range (≥30 kg/m^2), which is significantly different from the other two groups. ANOVA analysis for body fat percentage (%) by age groups: The statistical results show F = 3.03; P value = 0.055 > 0.05, insignificant difference ; and F critical = 3.138. These values indicate that the differences in body fat percentage between age groups are not statistically significant at p < 0.05, since P value > 0.05 and F < F critical. The mean values for body fat percentage (%) are 31.48% for the 29-40 age group, 35.54% for the 41-50 age group, and 36.75% for the >50 age group. Descriptive interpretation: The differences are not statistically significant. The >50 age group has the highest values, while the 29-40 age group has the lowest values. ANOVA analysis for visceral fat by age group: The statistical results indicate F = 3.47; P value = 0.0369 < 0.05; and F critical = 3.138. These values indicate statistically significant differences in visceral fat between age groups. The mean values of visceral fat are 5.13 for the 29-40 year group, 7.53 for the 41-50 year group and 9.59 for the >50 year group. Descriptive interpretation: A clear increase in visceral fat with age can be observed. The >50 year group has much higher values compared to younger groups, suggesting an increased cardio-metabolic risk. ANOVA analysis for metabolic age by age group: The statistical results show F = 9.95; P value = 0.00017 < 0.05; and F critical = 3.138. These values indicate statistically significant differences in metabolic age between age groups. The mean values of metabolic age (y) are 38.6 for the 29-40 year group, 49.19 for the 41-50 year group, and 54.17 for the >50 year group. Descriptive interpretation: A progressive increase in metabolic age with chronological age can be observed. The >50 year group has the highest metabolic age, indicating a relatively "older" metabolic status compared to the younger groups.

3. Discussion

The authors' study [25] shows that sedentary lifestyle and aging influence body composition, as measured by BFMI and FFMI. Active women have better values of fat-free mass, while older women have higher weight and BFMI [26]. Resistance exercise programs, cardio and step-aerobics improve body composition and blood parameters in sedentary women. Physical activity reduces BMI and normalizes weight distribution [27], while light aerobic exercise increases HDL and reduces body fat, triglycerides and LDL [28]. Physical activity in postmenopausal women improves oxidative stress and iron overload [29], and water aerobics decreases body fat percentage and improves blood parameters [30]. Regular moderate activity protects physical function and energy balance in older adults [31,32]. In general, physical exercise reduces the risk of overweight and obesity, improves body composition and cardiovascular parameters, and attenuates the negative effects of aging [33,34]. Our study revealed that data analysis revealed a balanced anthropometric and metabolic profile, with age-related variations. The groups were homogeneous in terms of age and height, facilitating comparability. Anthropometric parameters showed a moderate increase in body weight (mean: 71.0 kg for the 29-40 year group, 77.0 kg for the 41-50 year group, and 80.3 kg for the >50 year group) and BMI (25.35; 28.45; 32.11 kg/m^2, respectively) with age, with most values being within normal limits and with a slight trend towards overweight in the 41-50 year and >50 year groups. Body composition was balanced in terms of lean mass (45.19; 46.42; 45.35 kg) and body fat (31.48%; 35.54%; 36.75%), with stable bone mass (~2.41–2.48 kg) and adequate hydration (48.11%; 45.31%; 44.22%). Abdominal and visceral fat remained below risk thresholds (waist/htr: 0.49; 0.51; 0.53; visceral fat: 5.13; 7.53; 9.59). Abdominal and visceral fat increased with age, exceeding risk thresholds in the age group >50 years (waist-to-height ratio: 0.53; visceral fat: 9.59), indicating a high risk of abdominal fat accumulation and potential cardio-metabolic complications. Functional and metabolic values showed variable levels of fitness (physical fitness index: 3.88; 3.25; 4.00), and metabolic age was close to chronological age (38.6; 49.19; 54.17 years), indicating good health and adequate metabolism.

Study limitations: The study has several limitations, including the lack of strict control over participants' lifestyle; the assessment conducted at a single point in time, which prevents establishing causal relationships; and the small number of participants, which limits the generalizability of the results.

Recommendations for future studies: Future research should consider expanding the sample of participants; implementing longitudinal analyses to track changes over time; correlating body composition with nutritional, hormonal, and physical activity factors; and including additional functional assessments to analyze the impact of lifestyle on physical performance and metabolism.

4. Materials and Methods

Hypothesis: It is assumed that maintaining a sedentary behavior over the long term is associated with an increase in risk factors that negatively affect body composition in adult women. Objective: The study aims to analyze the impact of a sedentary lifestyle on body composition in adult women by evaluating associated risk factors and the relationship between sedentarism and changes in body composition. The study also seeks to promote adapted physical activity programs and raise awareness of the negative effects of sedentary behavior on health. Data Analysis: Data were analyzed using descriptive statistical methods (means, medians, quartiles, interquartile range, standard deviation, and coefficient of variation), ANOVA tests for group comparisons, and by referencing the obtained values against established normal ranges for adult women. Study objectives: To assess the degree of overweight and obesity among adult women, as indicated by BMI and body fat percentage. To identify the distribution of abdominal fat and associated cardiovascular risk, using waist circumference and body weight ratio (WHtR). To determine the level of muscle mass and lean mass, relevant to metabolic and functional health. To assess metabolic risks through indicators such as visceral fat and metabolic age. To compare results with healthy reference values, highlighting the effects of a sedentary lifestyle on body composition. Study participants: Participants were selected based on the following criteria: adult women aged ≥18 years, divided into age groups (29–40 years, 41–50 years and >51 years) to assess differences in body composition according to maturity and metabolic age. Inclusion criteria: Participants who spend most of their daily time in a sedentary position, with low physical activity (<150 minutes of moderate activity per week), as recommended by the World Health Organization. Women without severe acute or chronic conditions that could influence body composition or the ability to perform measurements (e.g., severe muscle or metabolic diseases, renal failure, severe cardiovascular diseases). Participants who voluntarily agreed to participate, gave informed consent, and were willing to undergo anthropometric measurements, bioimpedance analysis, and functional/metabolic assessments. Women who had not participated in intensive physical activity programs or special diets in the last 3-6 months, to ensure that the results reflect a pre-existing sedentary lifestyle. Signing of the informed consent form. Research methods: The study used the scientific documentation method, the observation method, the testing method and the graphic method. Data processing and analysis were carried out using mathematical and statistical methods with Microsoft Excel. Basic statistical indicators were calculated to describe the variables: arithmetic mean (X), standard deviation (SD), coefficient of variation (Cv%), median (Q2), quartiles (Q1 and Q3) and interquartile range (IQR), allowing the assessment of central tendencies and data dispersion. Differences between age groups were compared using one-way ANOVA, applied to the variables BMI, Body fat, Visceral fat and Metabolic age. Study Design: This is a cross-sectional and descriptive study, conducted during a single testing session, as part of the "Researchers' Night" event at "Ștefan cel Mare" University of Suceava. Measurements were performed under standardized conditions on the evening of the event. Participants wore loose clothing and were asked about the time of their last meal and drink, which was generally about 3 hours before, to assess hydration status and control for the influence of recent food intake on the results. Since the measurements were performed on a single day and participants only attended this event, all available individuals (n = 68) were included, even though the age groups had unequal sizes. All measurements were performed using the Tanita BC-730 body composition analyzer, including: Height (m), Weight (kg), Body Fat (%), Bone Mineral Mass (kg), Muscle Mass (kg), Lean Mass (kg), Body Water (%), Physical Fitness Rating, Visceral Fat, and Metabolic Age (y). Participants were positioned correctly on the device, with bare feet and without any metal contact that could affect the results. Obtained values were compared with reference values from the scientific literature. The table presents a physical activity program proposed by the authors as a theoretical example of interventions that could counteract the effects of sedentary behavior in adult women. The program was not implemented with the study participants; the study only assessed the association between sedentary behavior and body composition parameters at the time of testing.

Table 1. Physical activity program for a period of 4 months (suggestion)

Type of Physical Activity	Program Duration	Weekly Frequency	Session Duration	Intensity	Specific Objectives	Anticipated Benefits
Swimming	4 months	3 sessions/week	45–60 minutes	Moderate	Improve cardiorespiratory capacity and muscle tone; reduce body fat	Increase general endurance, reduce stress, improve muscular balance
Jogging	4 months	3–4 sessions/week	30–45 minutes	Moderate to high	Stimulate metabolism, reduce fat mass, increase lean mass	Improve body composition, cardiovascular endurance, and psychological well-being
Fitness (strength and toning exercises)	4 months	3 sessions/week	60 minutes	Moderate	Develop muscle mass, increase strength and joint stability	Increase fat-free mass (FFM), improve posture and metabolism

5. Conclusions

Data analysis revealed a balanced anthropometric and metabolic profile among adult women, with age-related variations. The groups were homogeneous in terms of age and height, facilitating comparability. Body weight and BMI increased progressively with age: 71.0 kg and 25.35 kg/m² in the 29-40 year group; 77.0 kg and 28.45 kg/m² in the 41-50 year group; and 80.3 kg and 32.11 kg/m² in the >50 year group. The increase in BMI in the 41-50 and >50 year groups indicates a slight trend towards overweight and mild obesity in the oldest group. Differences between groups were statistically significant for BMI (ANOVA, $P < 0.05$). Muscle mass and lean mass were adequate in all groups, body fat percentage increased with age, and bone mass remained relatively constant. Hydration was adequate, while abdominal and visceral fat increased in the older groups, indicating increased cardio-metabolic risk. Fitness levels varied among participants, and metabolic age was close to chronological age in younger groups, but higher in the 41–50 and >50 year groups, suggesting age-related metabolic changes. The results indicate that sedentary behavior is associated with increased cardiometabolic risk factors and changes in body composition. Based on these observations, tailored physical activity programs can be proposed to prevent increased body fat and maintain metabolic health, although these programs were not actually implemented in the study.

6. Patents

This section is not mandatory but may be added if there are patents resulting from the work reported in this manuscript.

Supplementary Materials: No supplementary materials were used in this study.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, Viztiu Lakhdari Elena and Leuciuc Florin Valentin; methodology, Vizitiu Lakhdari Elena.; software, Leuciuc Florin Valentin.; validation, Vizitiu Lakhdari Elena, Leuciuc Florin and Slusar Adriana.; formal analysis, Vizitiu Lakhdari Elena; investigation, Slusar Adriana; resources, Slusar Adriana.; data curation, Slusar Adriana.; writing—original draft preparation, Vizitiu Lakhdari Elena.; writing—review and editing, Leuciuc Florin Valentin; visualization, Vizitiu Lakhdari Elena.; supervision, Leuciuc Florin Valentin.; project administration, Vizitiu Lakhdari Elena; funding acquisition, Leuciuc Florin Valentin. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported

Funding: "This research received no external funding"

Institutional Review Board Statement:"Not applicable

Informed Consent Statement: "Written informed consent has been obtained from the patient(s) to publish this paper" if applica-ble.

Data Availability Statement: "Not applicable" here.

Acknowledgments: In this section, you can acknowledge any support given which is not covered by the author contribution or funding sections. This may include administrative and technical support, or donations in kind (e.g., materials used for experiments).

Conflicts of Interest: "The authors declare no conflict of interest."

Appendix A

No appendices or supplementary details were included in this study

Appendix B

No appendices or supplementary details were included in this study

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