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Comparison of Knowledge about Cellulite and Its Reduction Methods among Women and Men

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Abstract

Introduction and purpose Cellulite (gynoid lipodystrophy, GLD) is a disorder of adipose tissue characterized by fibrotic degeneration of connective tissue and structural changes within the subcutaneous layer. It mainly affects women, regardless of age and body weight, while in men it occurs less frequently and is usually associated with hormonal disturbances. The pathogenesis of cellulite is complex and involves impaired microcirculation, adipocyte hypertrophy, increased vascular permeability, genetic predisposition, and an unhealthy lifestyle. The aim of this study was to assess the knowledge of women and men regarding cellulite and its reduction methods, as well as to analyze the relationship between the degree of severity and factors such as gender, age, BMI, and lifestyle.

Materials and method The study included 104 participants; after verification, 99 respondents (69 women and 30 men) were qualified for the analysis. A diagnostic survey was conducted using an original questionnaire consisting of 22 closed and one open-ended question. The responses regarding the occurrence of cellulite, the level of knowledge, and the applied preventive methods were analyzed.

Results Cellulite occurs more frequently and in more advanced stages in women than in men. The severity of changes correlates with higher Body Mass Index (BMI), poor diet, and low physical activity. Most respondents demonstrate general knowledge about cellulite but do not undertake professional treatments, which may result from limited awareness, high costs, or doubts about the effectiveness of procedures.

Conclusions Gynoid lipodystrophy is a common aesthetic issue whose severity depends on lifestyle and physiological factors. Public knowledge about its prevention and therapy is moderate and should be improved through education and the promotion of healthy habits.

Keywords: cellulite, lipodystrophy, panniculopathy, cellulite reduction, anti-cellulite therapy

1. Introduction

Cellulite (gynoid lipodystrophy, GLD) is a fibrosclerotic degeneration of connective tissue accompanied by alterations within the subcutaneous tissue [1,2]. This condition predominantly affects women-occurring in more than 85% of cases in both young and mature individuals-and is therefore referred to as female-type lipodystrophy [3]. In men, cellulite is observed much less frequently and is typically associated with hormonal disturbances such as abnormal androgen secretion or is a consequence of estrogen therapy used in the treatment of prostate cancer [3,4].

The subcutaneous tissue (hypodermis) is composed of adipocytes surrounded by connective-tissue septa. In women, these septa are thinner and oriented perpendicularly to the skin surface, promoting the accumulation of larger clusters of adipocytes. In men, the septa are thicker and arranged parallel to the skin surface, which limits the formation of large fat deposits [5,6]. The tendency to accumulate adipose tissue also differs by body type: women exhibit predominantly gynoid fat distribution (thighs, hips, buttocks), whereas men typically present android distribution in the abdominal region [5-7].

The development of cellulite is a complex process influenced by numerous factors, including hormonal imbalance, impaired microcirculation, and abnormal adrenergic receptor activity. Excess estrogen together with progesterone deficiency increases vascular permeability, leading to fluid retention and adipocyte hypertrophy. Circulatory disturbances contribute to hypoxia, edema, and fibrosis, whereas changes in the number and activity of adrenergic receptors disrupt the balance between lipogenesis and lipolysis [2,8].

Risk factors for cellulite include female sex, genetic predisposition, inadequate diet, sedentary lifestyle, stress, smoking, excessive alcohol consumption, and certain medications [1,8-13]. Hormonal fluctuations during pregnancy and menopause also play a significant role, as they promote water retention and exacerbate edema [1,8,9,13].

Prevention of cellulite focuses on reducing modifiable risk factors and implementing measures aimed at improving circulation and adipose-tissue metabolism. These include rational nutrition, proper hydration, regular physical activity, avoidance of stimulants, and skin care using products that enhance microcirculation [1,14].

2. Aim of the Study

The aim of this study was to compare the knowledge of women and men regarding cellulite and methods of its reduction. The research sought to assess the level of awareness in both groups concerning the causes, symptoms, available treatment options, and prevention of gynoid lipodystrophy, as well as to determine the relationship between the degree of cellulite severity and factors such as sex, age, BMI, lifestyle, and skin-care practices.

3. Materials and method

The study was conducted using a diagnostic survey method with an original online questionnaire created in Microsoft Forms. Participation was voluntary and anonymous. The questionnaire consisted of 22 single- and multiple-choice questions regarding the causes, symptoms, and methods of cellulite reduction.

The questions were developed based on a literature review. Data collection took place from 1 December 2024 to 1 March 2025. A total of 104 individuals participated, of whom 5 were excluded due to incomplete responses. Ultimately, 99 fully completed questionnaires were included in the analysis. Inclusion criteria were voluntary consent and full completion of the questionnaire.

Data analysis was performed in Microsoft Excel using the chi-square test to examine relationships between variables. The significance level was set at $p < 0.05$. Descriptive statistics were applied, and significant results were presented in tables and figures.

4. Results

4.1 Characteristics of the Study Group

The study included 99 participants: 69 women (69.7%) and 30 men (30.3%). The largest age group comprised individuals aged 18–29 years (69.7%), followed by participants over 50 years (11.1%) and those aged 30–39 years (9.1%). The smallest groups were individuals aged 40–49 and under 18 years (both 5.1%).

Table 1. Distribution of study participants by age and sex

| Age | Women | Men | Total |
|-------|-------|-----|-------|
| <18 | 3 | 2 | 5 |
| 18-29 | 57 | 12 | 69 |
| 30-39 | 3 | 6 | 9 |
| 40-49 | 2 | 3 | 5 |
| >50 | 4 | 7 | 11 |
| Total | 69 | 30 | 99 |

Source: Authors' own study

4.2 Analysis of Survey Results

Hormonal contraception

The question regarding hormonal contraception was directed exclusively to women. The majority (91.3%) did not use hormonal contraceptives, while 8.7% confirmed use. Among users, half (50%) reported the onset or worsening of cellulite.

Body Mass Index (BMI)

BMI analysis showed that 70.7% of participants had normal body weight, 16.2% were overweight, 8.1% were underweight, and 5.1% were obese. The chi-square test ($\chi^2(6) = 35.01$; $p = 0.000004$) revealed a significant relationship between BMI and cellulite severity- individuals with overweight and obesity more frequently reported higher degrees of skin changes.

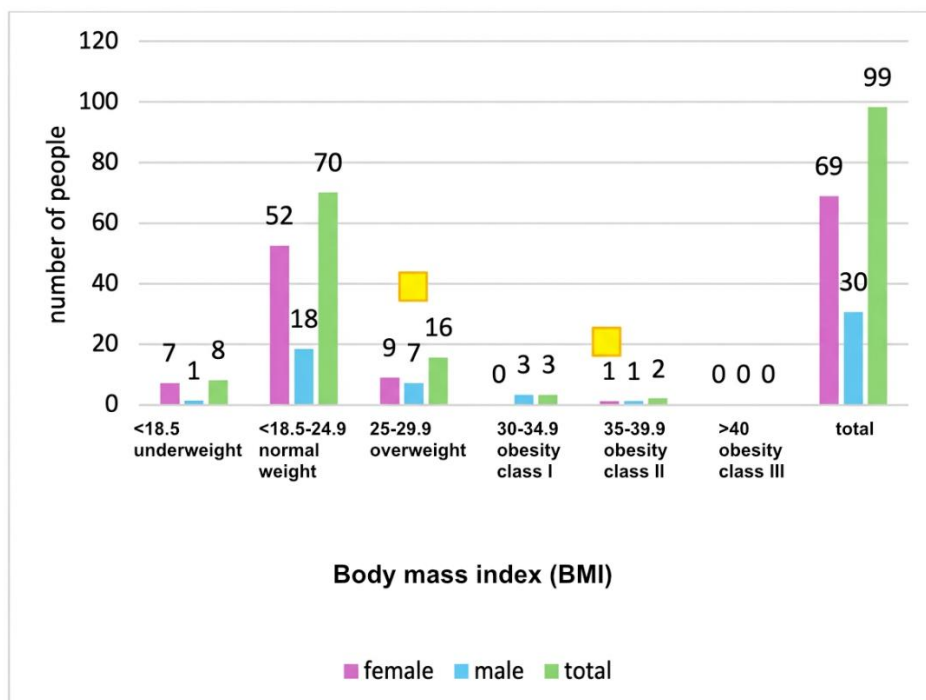


Figure 1. BMI distribution of respondents

Source: Authors' own study

Severity of cellulite

More than half of respondents (52.5%) presented grade I cellulite, 23.2% grade II, and 4% grade III. No cellulite was observed in 18.2% of participants. No statistically significant relationship was found between sex and cellulite severity ($\chi^2 = 5.48$; $p = 0.1399$)

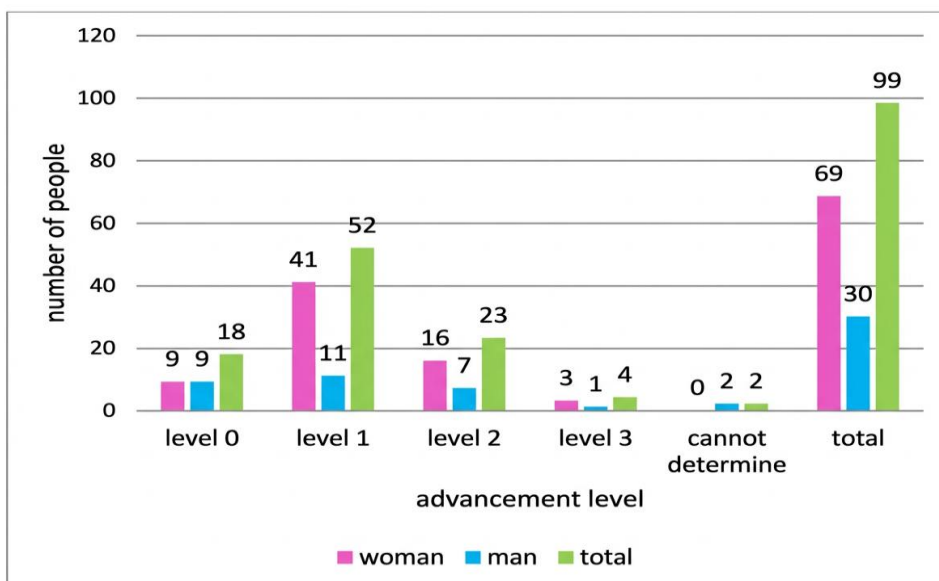


Figure 2. Degree of celulite severity

Source: Authors' own study

Location of cellulite

Among respondents with cellulite (81.8%), the most frequently reported locations were thighs (86.4%) and buttocks (79%), followed by hips (34.6%) and abdomen (27.2%). Women more often reported changes on the thighs and buttocks, while men most commonly indicated the abdomen.

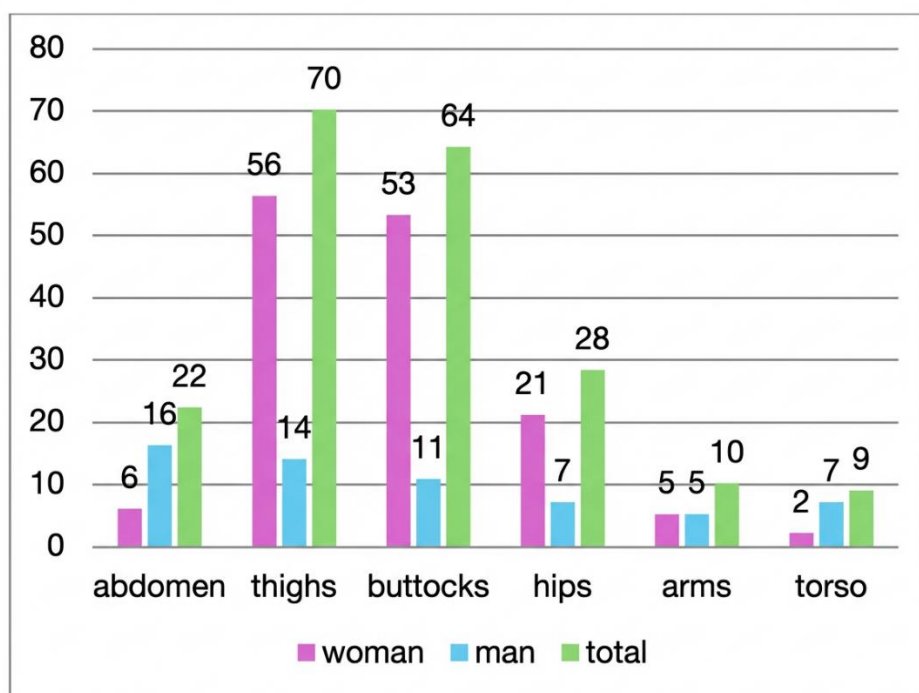


Figure 2. Location of cellulite

Source: Authors' own study

Perceived discomfort

For 37% of respondents, cellulite caused moderate discomfort; 28.4% reported mild discomfort, and 11.1% experienced high discomfort. The chi-square test ($\chi^2 = 18.24$; $p = 0.00039$) showed a significant relationship between sex and perceived discomfort—women more often reported moderate discomfort, whereas men showed extreme values (none or high discomfort). A significant relationship was also identified between cellulite severity and discomfort level ($\chi^2 = 20.20$; $p = 0.0025$).

Physical activity and diet

The most common frequency of physical activity was "once a week" (30.3%) or "several times a week" (29.3%), while 6.1% reported no activity. A significant relationship was found between physical activity frequency and cellulite severity ($\chi^2 = 31.94$; $p = 0.004$). Most participants (96%) did not follow any special diet; the remainder (5.8%) were all women, most commonly following a vegetarian diet. Regarding water intake, 36.4% consumed 1.5-2 liters daily, 34.3% consumed 1–

1.5 liters, and 18.2% drank less than 1 liter. No significant relationship was found between water intake and cellulite severity ($\chi^2 = 20.53$; $p = 0.058$).

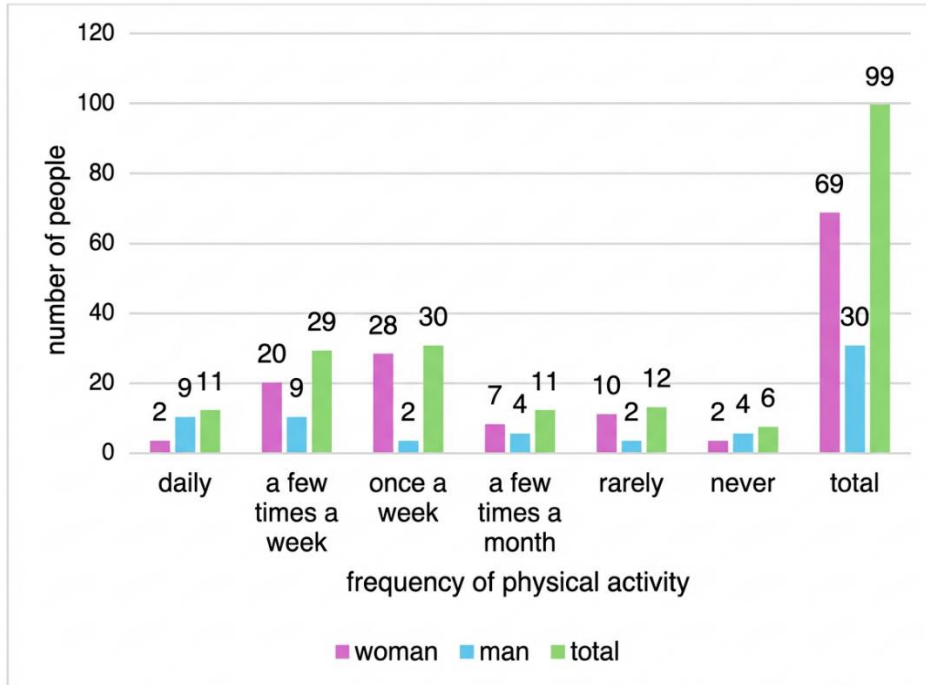


Figure 4. Frequency of physical activity

Source: Authors' own study

Factors contributing to cellulite according to participants

The most frequently indicated factors were: genetics (20.9%), diet (20.6%), physical activity (19.2%), and hormones (17.2%). Less frequently mentioned were sex (14.2%) and comorbidities (7.9%).

Professional treatments and home methods

Anti-cellulite treatments performed in cosmetic clinics were used by 17.2% of respondents, mainly women. The most commonly chosen procedures were anti-cellulite massage (29%), body wrapping and radiofrequency (each 18.4%). Most participants (88.2%) noticed improvement after treatments. No significant relationship was found between treatment frequency and cellulite severity ($\chi^2 = 5.31$; $p = 0.1505$).

Home methods were used by 27.3% of respondents, including 37.7% of women and only 3.3% of men ($\chi^2 = 12.44$; $p = 0.0004$). The most common home methods were anti-cellulite cosmetics (85.2%) and body scrubs or cupping massage (each 48.1%). A total of 88.9% of users reported improved skin appearance.

Table 2. Most frequently chosen professional anti-cellulite treatments

| TYPE OF ANTI-CELLULITE TREATMENT | NUMBER OF RESPONSES | PERCENTAGE OF RESPONSES |
|----------------------------------|---------------------|-------------------------|
| Laser therapy | 2 | 5,3% |
| Electrostimulation | 2 | 5,3% |
| Body wrapping | 7 | 18,4% |
| Cavitation liposuction | 2 | 5,3% |
| Cryolipolysis | 2 | 5,3% |
| Radiofrequency RF | 7 | 18,4% |
| Carboxytherapy | 0 | 0% |
| Needle/ Microneedle mesotherapy | 3 | 7,9% |
| Anti-cellulite massage | 11 | 29% |
| Endermology | 2 | 5,3% |
| Other | 0 | 0% |
| Total | 38 | 100% |

Source: Authors' own study

Table 3. Most frequently chosen home anti-cellulite methods

| TYPE OF HOME METHOD | NUMBER OF RESPONSES | PERCENTAGE OF RESPONSES |
|-----------------------------------|---------------------|-------------------------|
| Anti-cellulite cream/ lotion/ oil | 23 | 35,94% |
| Body scrub | 13 | 20,31% |
| Cupping massage (Chinese cup) | 13 | 20,31% |
| Dry body brushing | 10 | 15,63% |
| Body wrapping | 0 | 0% |
| Classic massage | 0 | 0% |
| Massage with electronic massagers | 5 | 7,81% |
| Total | 64 | 100% |

Source: Authors' own study

5. Discussion

The study analyzed the knowledge of women and men regarding cellulite and its reduction methods. Women constituted the majority of participants, suggesting greater interest in this topic within this group.

Analysis revealed a possible relationship between age and cellulite severity. Absence of symptoms (grade 0) and early stages (grade I) were most common in individuals under 30 years of age, whereas the prevalence of higher degrees increased with age, confirming progressive intensification over time.

The impact of hormonal contraception on cellulite occurrence or severity was not conclusively confirmed. Responses were evenly distributed, suggesting individual variability; hormonal contraception does not appear to be a dominant factor in this sample.

A relationship between GLD severity and BMI was confirmed. Participants with normal body weight (BMI 18.5-24.9) most frequently presented grade I cellulite, whereas higher grades (II and III) were more common in individuals with overweight or obesity, consistent with findings by Hexsel et al. [15]. No high-grade cellulite was found in the underweight group, though this subgroup was small.

Cellulite was more prevalent among women than men. Men more frequently reported no symptoms (grade 0), reflecting anatomical differences in subcutaneous tissue. This is consistent with studies by Rudolph et al. [16], showing that women have thinner connective-tissue septa, promoting cellulite formation. Some men had difficulty determining their grade, indicating lower awareness of the condition.

The most common cellulite locations were thighs and buttocks, and the severity of changes correlated with perceived discomfort. Individuals with grade II and III cellulite more often reported moderate or high discomfort, consistent with findings by Migasiewicz et al. [17].

A significant association was found between physical activity and cellulite severity. Regular exercisers (daily or several times per week) more often reported no or mild cellulite. Low activity impairs circulatory and lymphatic function, promoting metabolite retention and cellulite development. This aligns with observations by Troia et al. [18], who showed that aerobic exercise combined with shockwave therapy reduces cellulite severity.

A relationship between diet and cellulite severity was also confirmed. Participants who rarely consumed sweets and fast foods more often presented lower grades, highlighting the role of balanced, low-calorie nutrition [14]. Water intake below 1.5 L per day was associated with higher cellulite severity.

Only a small percentage (17.2%) used professional cosmetic treatments, although most reported improved skin appearance. The most common treatments—massage, radiofrequency, and body wrapping—have documented efficacy. Studies by Marques et al. highlight the beneficial effects of mechanical tissue stimulation on gene expression in the thigh-buttock region, promoting lipolysis [19]. Similar improvements were observed by Modena et al., showing that electromagnetic wave therapy reduces cellulite severity [20].

Home methods were used more frequently, with over 88% of users reporting satisfactory results.

Study limitations include: small sample size, online self-reporting, and subjective assessment of cellulite grade without objective diagnostic tools. Therefore, results should be interpreted as preliminary and requiring confirmation in larger populations.

In conclusion, cellulite is a common aesthetic issue, especially among women. Its severity is influenced by age, BMI, lifestyle, diet, and hydration. Regular physical activity, balanced diet, adequate hydration, and consistent care—both professional and home-based—may significantly reduce symptoms and improve skin appearance.

6. Conclusions

1. The study showed that the frequency and higher degrees of cellulite occur more commonly in women than in men.
2. A higher body mass index correlates with greater severity of cellulite; individuals with higher BMI are more likely to develop more advanced edematous-fibrosclerotic panniculopathy.
3. Grade I and II GLD predominated among respondents, indicating that cellulite is common but most often does not reach the most advanced stage.
4. Participants demonstrated awareness of causes and prevention; however, further educational efforts remain necessary.
5. Only men experienced difficulty determining their cellulite grade, indicating lower awareness in this group.
6. Increasing cellulite severity is associated with a higher level of perceived discomfort.

7. A significant relationship was observed between physical activity frequency and cellulite severity-those exercising less frequently reported higher grades.
8. Most respondents using professional or home treatments observed improvement in skin appearance.
9. Despite discomfort, some participants refrained from professional cosmetic treatments.

Author's contribution:

Conceptualization, supervision and project administration- DPB

Methodology- KH,WPB

Software, validation-KH, DPB

Formal analysis, investigation, resources-KH

Writing original draft preparation- DPB, KH, AK, DW, TS,WB

Writing review, editing and visualization- AK

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