

Assessment of Gluteal Femoral Fat Deposition in Relation to Life style, Screen Exposure, Sleep patterns and Dietary Habits Among Obese Young Adults: A Comprehensive review

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Abstract

Gluteofemoral fat deposition, referring to the accumulation of subcutaneous adipose tissue in the gluteal and femoral regions, is recognized as a metabolically beneficial fat depot when compared to visceral adiposity. This review explores the association between gluteal femoral fat distribution and modifiable lifestyle factors, including screen time, sleep behaviour, and dietary intake, in young adults with obesity. While intrinsic factors such as genetics and hormonal regulation contribute to adipose tissue distribution, lifestyle-related behaviours significantly influence regional fat accumulation. Increased screen time, reflecting sedentary habits, is associated with reduced physical activity and a tendency toward central fat deposition, potentially diminishing the protective role of gluteal femoral fat. Inadequate sleep duration and poor sleep quality disrupt metabolic and hormonal balance, affecting appetite regulation and insulin sensitivity, which may contribute to unfavourable fat distribution. Additionally, diets high in energy-dense, processed foods promote adipocyte dysfunction and inflammation, whereas balanced diets rich in fibre and unsaturated fats support healthier fat storage patterns. Overall, lifestyle factors play a crucial role in shaping adipose tissue distribution, emphasizing the need for targeted interventions to improve metabolic health outcomes in obese populations.

Key words : Gluteofemoral adiposity; Regional fat distribution; Subcutaneous fat; Young adult obesity; Sedentary behaviour; Screen time; Sleep duration.

The escalating prevalence of obesity among young adults represents a critical public health issue due to its strong association with metabolic and cardiovascular morbidity. Current evidence emphasizes that the distribution of adipose tissue, rather than total adiposity alone, is a key determinant of metabolic risk⁹. Gluteofemoral adiposity, defined as subcutaneous fat accumulation in the hip and thigh regions, has gained attention as a metabolically advantageous fat depot, in contrast to visceral adipose tissue, which is closely linked to insulin resistance, dyslipidaemia, systemic inflammation, and increased cardiometabolic risk^{1,2,4}.

Adipose tissue operates as a dynamic endocrine organ involved in energy homeostasis, lipid metabolism, and hormonal regulation^{3,8}. Gluteofemoral fat is characterized by a greater capacity for long-term lipid storage, reduced lipolytic activity, and a favourable adipokine secretion profile, collectively contributing to enhanced insulin sensitivity and metabolic protection. The regulation of fat distribution is influenced by a multifactorial interplay of genetic, hormonal, and environmental factors; however, modifiable lifestyle behaviours play a pivotal role.

Prolonged sedentary behaviour, particularly excessive screen exposure, is associated with decreased physical activity and a shift toward central adiposity. Inadequate sleep duration and poor sleep quality disrupt endocrine pathways governing appetite and metabolism, while energy-dense, nutrient-poor dietary patterns promote adipocyte dysfunction and metabolic imbalance. The interaction of these lifestyle factors significantly influences adipose tissue distribution. Therefore,

understanding their relationship with gluteal femoral fat deposition is essential for developing targeted strategies to reduce obesity-related metabolic risk.

Objectives :

Primary objective :

- To systematically elucidate the association between gluteal femoral adipose tissue deposition and key lifestyle determinants, including screen-based sedentary behaviour, sleep architecture, and dietary intake patterns, among young adults with obesity.

Secondary objectives :

- 1) To determine the extent to which lifestyle-related factors, including sedentary behaviour, sleep characteristics, and dietary habits, contribute to inter-individual differences in gluteal femoral fat deposition.
- 2) To assess the association between gluteal femoral adiposity and metabolic health parameters, particularly insulin responsiveness and cardiometabolic risk profiles.
- 3) To examine the differential functional and hormonal roles of gluteal femoral adipose tissue in comparison with other adipose compartments.
- 4) To critically identify existing research limitations and outline future investigative priorities concerning lifestyle influences on regional fat distribution.

Techniques (Scientific and Professional) :

This review was undertaken using a

narrative synthesis framework to critically examine the association between gluteal femoral adipose tissue distribution and modifiable lifestyle determinants, including sedentary behaviour, sleep characteristics, and dietary intake, in young adults with obesity¹⁰. A comprehensive and systematic search of electronic databases was performed using predefined search terms and Boolean operators to ensure extensive identification of relevant literature⁵.

Eligibility criteria were established a priori. Studies were included if they involved individuals aged 18–35 years, evaluated regional adiposity with specific reference to gluteal femoral fat depots, and assessed at least one lifestyle-related variable. Both observational and interventional study designs published in English were considered. The study selection process followed a structured protocol involving initial screening of titles and abstracts, removal of duplicate records, and subsequent full-text assessment in accordance with predefined inclusion and exclusion criteria.

Data extraction was conducted using a standardized and replicable framework to ensure methodological consistency⁶. Extracted variables included study design, participant demographics, techniques for assessing adiposity, and measures of lifestyle exposures. The methodological rigor and risk of bias of included studies were critically appraised using appropriate quality assessment tools.

Given the anticipated heterogeneity in study designs, measurement approaches, and reported outcomes, a quantitative synthesis was

not feasible. Therefore, findings were integrated through qualitative thematic analysis, with results organized according to key domains of interest. As the review was based exclusively on secondary data from published sources, ethical approval was not required.

Findings :

1. **Sedentary Behaviour and Adiposity:**
Prolonged engagement in screen-based sedentary activities is consistently associated with increased total and central adiposity. Its relationship with gluteal femoral fat deposition appears indirect and heterogeneous, potentially mediated through reductions in energy expenditure, impaired lipid metabolism, and altered metabolic regulation¹¹.
2. **Sleep Parameters and Fat Distribution⁷:**
Short sleep duration and poor sleep quality are associated with increased adiposity via endocrine dysregulation, including alterations in appetite-regulating hormones, elevated cortisol levels, and circadian misalignment. However, evidence linking sleep disturbances specifically to gluteal femoral adiposity remains inconclusive.
3. **Dietary Intake and Regional Adiposity⁸:**
Dietary patterns characterized by high energy density and excessive intake of saturated and processed fats are positively associated with adiposity, whereas nutrient-dense diets rich in fibre and unsaturated fats support favourable body composition. The influence of dietary factors on gluteal femoral fat deposition appears depot-specific but is not yet clearly established.

4. Metabolic Characteristics of Gluteofemoral Adipose Tissue⁹:

Gluteofemoral fat demonstrates distinct metabolic properties, including enhanced lipid storage capacity and improved insulin sensitivity, and is associated with a more favourable cardiometabolic profile. These features suggest a potential protective role against ectopic fat accumulation.

5. Integrated Role of Lifestyle Determinants: Sedentary behaviour, sleep characteristics, and dietary intake interact in a complex manner to regulate energy balance, hormonal homeostasis, and metabolic function, thereby influencing regional adipose tissue distribution.

6. Overall Interpretation :

Although lifestyle factors are strongly implicated in overall and central adiposity, their specific effects on gluteal femoral fat deposition remain variable and incompletely understood, underscoring the need for further methodologically rigorous investigation.

The synthesized evidence indicates that modifiable lifestyle determinants, including sedentary behaviour, sleep characteristics, and dietary intake, are critical contributors to overall adiposity in young adults with obesity; however, their specific influence on gluteal femoral fat distribution remains heterogeneous and insufficiently characterized. Sedentary behaviour and sleep-related disturbances appear to preferentially promote central adiposity through alterations in energy balance, endocrine function, and circadian regulation, whereas dietary patterns demonstrate a more consistent association with adiposity outcomes.

Gluteofemoral adipose tissue exhibits distinct metabolic and functional properties, including enhanced lipid storage capacity and improved insulin sensitivity, and is generally associated with a more favourable cardiometabolic profile. Nonetheless, these effects are context-dependent and modulated by total adiposity, hormonal milieu, and inter-individual variability.

Collectively, these findings underscore the complex and multifactorial regulation of regional adipose tissue distribution. The observed variability across studies highlights the need for rigorously designed longitudinal and mechanistic investigations employing standardized assessment methodologies to elucidate causal relationships and inform targeted strategies for optimizing fat distribution and mitigating metabolic risk.

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