

Systematic Review

Impact of nutritional quality on mental well-being in obese female: a systematic review

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Received: 03 December 2024

Revised: 16 January 2025

Accepted: 21 January 2025

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ABSTRACT

This systematic literature review explores the bearing of nutrition quality on the overall mental well-being of obese female aged 15-29 years. Thus, the increasing ubiquity of obesity and its related mental health challenges, this study examines the connection between dietary habits and mental health outcomes. This systematic literature review, inclusion criteria include Overweight/obese female youth aged 15-29 years with no prior diagnosed mental health conditions and exclusion criteria includes Participants with chronic physical illnesses, current medication for mental health (MH), or those following specialized diets. The finding suggest that females aged 15-29, particularly in low- to middle-income regions, show poor nutritional habits similar to those in industrialized nations, with a high intake of processed foods, and sugary beverages, and fast food. These dietary choices, coupled with a notable deficiency in essential nutrients (e.g., 78.8% in vitamin D, 34.4% in vitamin B12), contribute to increased obesity rates and related health risks. Obesity in these females is also linked to a greater incidence of MH issues, with obese women being 16% to 50% more likely to experience depression, reinforcing the cycle of poor nutrition, obesity, and MH disorders. So, the study concludes that improving nutritional quality may be a crucial intervention for enhancing mental health among obese females, underscoring the importance of integrated approaches to address both physical along with mental health in this population.

Keywords: Young females, Nutrition, Obesity, Ultra-processed foods, Mental health, Dietary habits, Nutritional knowledge

INTRODUCTION

Nutrition quality, defined by the balance of nutrients and the consumption of whole foods versus processed foods, has been recognized as a key determinant of mental well-being. Poor nutrition significantly drives the development of obesity through various interconnected mechanisms. Essentially, obesity arises from an imbalance across energy intake and expenditure, where excess calories are stored as fat.¹ Diets high in calorie-dense, low-nutrient foods like sugary snacks and processed items contribute to this imbalance by providing excessive calories with minimal nutritional benefit. These foods can induce rapid fluctuations in blood sugar, causing increased hunger and overeating. Additionally, diets rich in unhealthy fats along

with refined carbohydrates can impair metabolic processes, like insulin sensitivity, further promoting fat storage.² Nutrient deficiencies from poor diets can also disrupt appetite regulation, resulting in increased hunger and weight gain. Moreover, poor nutrition can perpetuate unhealthy eating behaviours and emotional eating, reinforcing a cycle of weight gain along with poor health. Addressing these dietary issues is critical for managing and preventing obesity and its related health risks. Poor dietary habits, often characterized by high consumption of sugar, saturated fats, and processed foods, have been associated with negative mental health outcomes, counting increased stress, and anxiety, along with depression levels. For overweight and obese female youth, these associations are particularly concerning, as they are already at a higher risk

of experiencing body dissatisfaction, low self-esteem, and psychological distress. The interplay between nutrition quality and mental health (MH) is complex and also multifaceted, counting biological, and psychological, along with social factors.³

The extant body of data indicates that disturbances in emotion dysregulation and an elevated prevalence of negative emotions are vital in the advancement and extension of obesity.⁴ Furthermore, a reciprocal relationship exists between obesity and many health outcomes, counting not just physical ailments but also psychological illnesses and social challenges, counting diminished self-worth, depressive symptoms, and societal disapproval. This systematic literature review primary objective of this investigation is to gauge the relationship between nutrition quality and mental well-being—specifically focusing on stress, anxiety, and depression—among overweight and obese female youth aged 15-29 years. The study aims to identify dietary patterns or nutritional factors that are associated with mental health outcomes and explore how these associations vary across different subgroups within this age range.

METHODS

Study design

This investigation is conducted as a systematic literature review, aiming to synthesize existing research on the bearing of nutrition quality on mental well-being—specifically stress, anxiety, and depression—of obese female youth aged between 15-29 years.

Inclusion and exclusion criteria

Inclusion criteria

The investigation's inclusion criteria encompassed research focusing on overweight or obese female youth aged 15-29 years, particularly studies examining the impact of nutrition quality, counting dietary patterns, nutritional intake, or specific dietary interventions. Body mass index (BMI) (kg/m²). were calculated for overweight is 25.0 to 29.9 and obese 30.0 or higher. Additionally, studies were included if they measured mental well-being outcomes like stress, anxiety, and depression, and were published in English between 2015 and 2024 to ensure relevance and currency.

Exclusion criteria

Exclusion criteria eliminated studies focusing on populations outside the 15-29 age range and research cantered on unrelated health outcomes or different demographics, like male participants or non-obese/overweight individuals. Grey literature, non-peer-reviewed articles, conference abstracts, and editorials were also excluded from consideration.

Search strategy

The following electronic databases were searched in depth: PubMed, PsycINFO, Scopus, and Web of Science, along with Google scholar. So, the search strategy includes keywords terms related to obesity, mental health (stress, anxiety, depression), nutrition quality, dietary patterns, and the specified female age group (15-29 years).

Data synthesis and extraction

Data extraction concentrated on the relationship across nutrition quality and mental well-being outcomes specifically stress, anxiety, and depression in overweight or obese female youth. It identified common dietary patterns or nutritional factors linked to these mental health outcomes and examined variations across different age subgroups, like 15-19 years and 20-29 years. The quality of included investigations was assessed using tailored tools for each study design, counting cohort, and case-control, along with cross-sectional investigations, along with randomized controlled trials. About 200 studies were identified and 150 were screened from data base out of which 20 papers were selected as per inclusion and exclusion criteria, adhering to PRISMA guidelines for a rigorous and transparent process as shown in Figure 1.

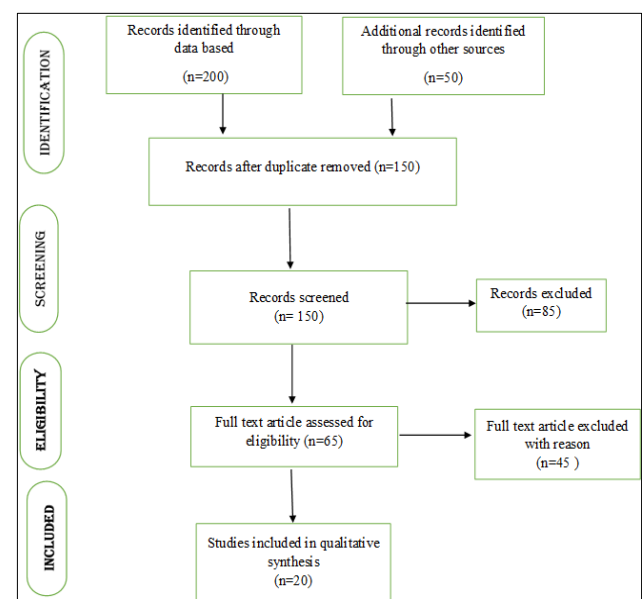


Figure 1: PRISMA diagram for articles' selection.

RESULTS

Dietary patterns and preferences among young females

Poor nutrition and unhealthy food habits are common among young females aged 15-29, particularly in low- to middle-income nations and regions like the Middle East, Asia, and North Africa. These young women are adopting eating patterns similar to those in industrialized nations, leading to rising obesity rates. Factors like increased eating

out, easy access to ultra-processed, low-nutrient foods, and more sedentary lifestyles—marked by less physical activity and reliance on cars—contribute to this trend.⁵

A study on adolescent eating behaviours highlights that girls whose parents focused on healthy eating rather than weight were less likely to engage in dieting, binge eating, or unhealthy weight control methods. This suggests that encouraging healthy eating habits and physical activity, rather than emphasizing weight, may help adolescents maintain a healthier body image and relationship with food.⁶

In terms of diet, many young females reported high intake of processed foods, and sugary beverages, along with fast food, while diets rich in several fruits along with vegetables, and whole grains, and also lean proteins were less common. Females aged 15-22 were more likely than their male counterparts to consume fast food, fried food, meat products, and sugary drinks. However, regular consumption of alcohol and sweetened hot drinks was less prevalent among females.³

Regarding nutritional knowledge, a moderate number of young females displayed sufficient understanding, but a significant portion still had inadequate knowledge. Although many rated their diet positively, their self-assessment often indicated a poor understanding of nutrition. A notable correlation was observed between poor nutritional knowledge and unhealthy dietary habits, suggesting that better education could lead to more balanced eating patterns.⁴

Disordered eating habits, like binge-eating disorder, are prevalent among young females with obesity. Many of these individuals struggle with emotional eating, portion control, and exposure to constant food cues in modern society. Although a formal diagnosis of eating disorders is relatively rare, binge-eating disorder is the most common, involving rapid, uncontrollable food consumption followed by feelings of guilt or disgust. This condition is especially concerning among those seeking weight loss treatment, as it can impede successful weight loss or lead to premature weight regain after bariatric surgery. While not an absolute barrier to such treatments, binge eating is considered a risk factor for less favourable outcomes if not managed with lifestyle changes or medication.⁵

Nutrition quality as a contributor to obesity in young women

Obesity in young females is often linked to poor nutrition quality, particularly the consumption of high-energy, low-nutrient foods. When energy intake, especially from foods rich in fat and sugar, exceeds what the body uses through physical activity, the excess energy is stored as fat, leading to obesity. During adolescence, females experience physical and metabolic changes, counting reduced insulin sensitivity, making healthy eating crucial to prevent excess fat accumulation.⁶ This is particularly important as it can

affect insulin resistance and potentially create a less favourable environment for fetal development if pregnancy occurs later in life. The consumption of ultra-processed foods (UPFs), which are heavy in sugars, and fats, and additives but low in essential nutrients, is a significant contributor to poor dietary habits among young females. Additionally, the metabolic demands associated with obesity can increase the body's need for certain micronutrients, further complicating the nutritional status of these individuals.⁷ The relationship across obesity and micronutrient deficiencies is complex, involving various physiological and metabolic functions that are crucial for overall health.

Nutritional deficiencies are increasingly recognized as a significant concern in young females with obesity, as the condition disrupts the balance of essential micronutrients. Obesity, often stemming from a diet high in calorie-dense but nutrient-poor foods, contributes to deficiencies in vital minerals like iron, and calcium, and magnesium, and zinc, and copper, along with vitamins like folate, vitamin A, D, and B12. Said micronutrients are crucial for various metabolic processes, and their deficiencies can lead to severe health implications, counting impaired immune function, increased risk of chronic diseases, and exacerbated obesity.⁸

Studies indicate that young females who consume processed foods high in calories but low in nutrient density are at an elevated risk obesity.⁹ Research involving bariatric surgery candidates revealed that a significant percentage of obese individuals suffer from deficiencies in vitamin D (up to 78.8%), vitamin B12 (up to 34.4%), iron (up to 32%), and folate (up to 33.5%).⁹ Additionally, the increased adiposity and systemic inflammation associated with obesity can further disrupt the absorption and metabolism of these micronutrients, exacerbating the issue and contributing to the cycle of obesity and poor nutritional status. For instance, vitamin A and carotenoids play vital roles in retinal and epithelial tissue development, and lipid metabolism, and immune system function. However, studies have shown that obese individuals often exhibit significant deficiencies in these nutrients. The deficiency in vitamin A and carotenoids can impair adipocyte differentiation and lipid metabolism, leading to metabolic disturbances that may exacerbate obesity-related health issues.¹⁰

Vitamin D is another crucial nutrient often found deficient in obese individuals, particularly in younger populations. Deficiency in vitamin D among obese youth is concerning, as it can lead to weakened bone structure and increased susceptibility to infections and chronic inflammatory conditions, further complicating the health challenges associated with obesity. Vitamin E, known for its antioxidant properties, is frequently deficient in obese individuals. This deficiency can lead to increased oxidative stress, which is particularly detrimental as it can exacerbate inflammation and metabolic syndrome, conditions already prevalent in obesity. Similarly, deficiencies in B vitamins,

like B2 and B12, are common in obese patients. These vitamins are essential for energy metabolism, DNA synthesis, and nervous system function, and their deficiency can contribute to fatigue, cognitive decline, and other metabolic dysfunctions. Folic acid and vitamin C deficiencies are also prevalent among obese individuals.¹⁰

Iron, zinc, magnesium, and calcium deficiencies are particularly concerning in young females with obesity. Iron deficiency can lead to anaemia and reduced oxygen transport, impacting overall energy levels and cognitive function. Zinc, essential for immune function and enzyme activity, is often deficient in this group, leading to impaired immune response and metabolic disorders. Magnesium and calcium deficiencies are associated with impaired muscle function, bone health, and metabolic processes, further exacerbating the health threats linked with obesity. The global prevalence of these micronutrient deficiencies, particularly among young female obese individuals, highlights the urgent need for interventions to improve nutrient intake.¹¹

Addressing said deficiencies is critical not only to manage obesity but also for preventing the long-run health complications that can arise from chronic nutrient insufficiencies.

A detailed analysis identified dietary patterns that significantly impact nutritional quality and contribute to obesity among young females. Using factor analysis, these patterns were derived from different food groups like processed and fried foods, sugary drinks, and oil-cooked snacks explaining 55.7% of the total variance in dietary habits.¹¹ The first pattern, characterized by a great intake of processed and also fried foods, sugary drinks, and snacks cooked with oil, was closely associated with older age and poorer anthropometric parameters, counting higher BMI and waist circumference. Regression analysis confirmed a positive association between this pattern and increased BMI and waist circumference, indicating its role in promoting obesity.¹²

The most prominent pattern, labelled as the "diversified food pattern," accounted for 31.09% of the variance. This was followed by the "traditional pattern" at 10.51%, the "milk and bread pattern" at 8.21%, and the "egg and fish pattern" at 5.89%.¹⁰

In contrast, the traditional dietary pattern, which involved high consumption of legumes, and starchy foods, and vegetables, and other cereals, and fruits, along with rice, was also found to have a positive relationship with general and also abdominal obesity across female participants. Several studies corroborate these findings, highlighting that frequent consumption of fast food, sugary drinks, and snacks is linked to higher BMI and increased adiposity. Additionally, emotional eating and stress-related food choices further exacerbate the development of obesity in this population.

Female obesity and its impact on mental health

Obesity is consistently linked to negative MH outcomes, particularly in young females, where it is associated with increased stress, anxiety, and depression. Studies have observed that young females who were overweight or even obese were more probable to experience body dissatisfaction and low self-esteem, which in turn contributed to psychological distress. The psychological impact of obesity is closely linked with emotional and behavioural factors, creating a complex interplay where psychological vulnerabilities can both lead to and be exacerbated by obesity.¹²

Young females with obesity struggle with a significantly increased threat of developing imbalanced mental health conditions. Research indicates that individuals having obesity have an 18% to 55% higher likelihood of experiencing depression. However, those with depression are 37% to 58% more likely to be classified as obese. In a study conducted in Austria, 40% of individuals who happen to be overweight or even obese were diagnosed to have psychiatric disorders, counting mood, and anxiety, and psychosis spectrum, and eating disorders. Between 2010 and 2021, the global affliction of both obesities along with mood disorders, like anxiety and depression, has risen markedly, with age-standardized rates for all anxiety and depressive disorders heightening by 16.7% and 16.4%, correspondingly.¹³ The relationship across obesity along with depression is bidirectional and appears more pronounced in women. In the USA, younger individuals, with higher education levels exhibit a stronger correlation between obesity and mood disorders. While some studies suggest depression may act as a threat aspect for obesity, chiefly atypical depression, others indicate that obesity rises the threat of developing depression.¹³

Obesity in young females can be associated with a greater threat of MH issues, counting depression, anxiety, along with lower self-esteem. One study found that obesity within women was linked to a 37% growth in major depression.¹² Previous investigations demonstrate a connection across excess body weight along with depression, with individuals who have extreme obesity being nearly 5 times more probable to have experienced a major depressive episode within the past year compared to those of average weight. So, this link across obesity and depression appears to be greater in women than in men, likely due to societal pressures that associate thinness with female beauty.¹⁴ Among candidates for bariatric surgery, about one-third report clinically noteworthy depression symptoms at the time of surgery, and approximately 50% have a depression-filled lifetime history. A great prevalence of depression in this population may be related to factors like weight-related stigma along with discrimination, and physical pain, or even impairments in life quality, and disordered eating.¹¹

Obesity frequently contributes to anxiety in young females, particularly those seeking bariatric surgery or

treatment for obesity. While the prevalence of anxiety disorders among individuals pursuing nonsurgical weight loss treatments is less documented, social anxiety disorder is notably common among bariatric surgery candidates, affecting about 9% of these patients.¹²

One study uncovered that girls with obesity were 43% more probable to develop anxiety relative to girls in the average populace. Other studies have found associations between obesity and panic disorder, specific phobias, and social anxiety in females. Obese female adolescents may be more likely to experience body dissatisfaction, which can lead to lower self-esteem.¹³

Stress, whether acute or chronic, influences eating behaviours, particularly in adolescents. Research has shown that stress can increase food consumption, especially high-calorie foods. For instance, investigations have found that individuals under high stress are more probable to consume sweet and fatty foods, possibly leading to weight gain. Stress-induced changes in appetite can be attributed to hormonal responses, counting increased cortisol levels that stimulate hunger for high-sugar and high-fat foods. Hormones like cortisol play a critical role in stress-induced eating behaviours.¹⁴ Cortisol can both suppress and stimulate appetite depending on its levels. Increased cortisol can enhance appetite for high-calorie foods and influence emotional and physical development during puberty. The cyclical nature of stress, body image issues, and obesity is evident, with higher cortisol levels leading to greater food intake and potential weight gain. Other studies demonstrated a bidirectional relationship across obesity and MH, where poor MH could lead to unhealthy eating behaviours and weight gain, and obesity exacerbated symptoms of anxiety and depression. The stigma associated with obesity and societal pressure to conform to ideal body standards were also identified as significant stressors impacting mental well-being in this population.¹⁵

Interconnection between nutrition, obesity, and mental health

The findings underscored the complex interplay between nutrition, obesity, and mental health. Poor dietary habits not only contributed to the development of obesity but also negatively impacted mental health through nutrient deficiencies and hormonal imbalances. Conversely, the psychological burden of obesity further reinforced unhealthy eating behaviours, forming a vicious cycle of weight gain and MH deterioration.¹⁴

Research indicates a significant link between obesity and depression. So, people with obesity are 16% to 50% more probable to experience depression relative to those without obesity. Conversely, people with depression face a 37% to 58% increased likelihood of being classified as obese. In India, 11% of those who are overweight or even obese are diagnosed to have psychiatric disorders, counting mood, and anxiety, and psychosis spectrum, and eating disorders.

Individuals with obesity are 2 to 3 times more probable to develop depression relative to those with normal weight. Furthermore, obesity increases the risk of developing anxiety disorders by approximately 30% to 40%. The global affliction of both obesity and mental health disorders has risen substantially. According to age-standardized disability-adjusted life years (DALY) rates for anxiety along with depressive disorders heightened by 16.7% and 16.4%, correspondingly. Similarly, age-standardized years lived with disability (YLD) rates for diabetes—chiefly driven by the upsurge in type 2 diabetes and obesity—rose by 25.9% globally during this period.¹⁵

Dietary patterns significantly impact mental health. Poor dietary habits, like great intake of refined sugars and low intake of fruits along with vegetables, are associated with a 25% to 35% raised threat of developing depressive symptoms. Whereas, nutritional interventions, counting increased omega-3 fatty acid intake, have been proven to reduce depressive symptoms by up to 30% in clinical populations.¹⁶ Weight loss interventions have a notable effect on mental health. Bariatric surgery, for instance, has been found to reduce depressive symptoms by approximately 50% to 70% in many patients. Dietary changes, like increasing fibre intake and reducing saturated fat, have also been associated with a 20% to 40% reduction in the incidence of depression along with anxiety symptoms. These data underscore the intricate relationship across nutrition, obesity, and mental health, highlighting the prominence of addressing these factors comprehensively.¹⁹

DISCUSSION

The analysis of our study reveals a significant impact of nutrition quality on the overall mental well-being of overweight and obese female youth aged 15 to 29 years. The findings indicate that poor dietary habits, like high consumption of processed foods, refined sugars, along with unhealthy fats, are strongly linked with increased levels of stress, anxiety, and depression in this population. These results align with prevailing literature that highlights the role of nutrition in mental health, particularly among individuals with obesity. Our study found that participants with lower nutritional quality scores exhibited more pronounced symptoms of psychological distress. This relationship suggests that the quality of one's diet is not only critical for physical health yet also plays a vital role in mental well-being. Nutrient deficiencies, particularly in essential vitamins and minerals, may contribute to mood disorders, while unhealthy eating patterns can exacerbate psychological symptoms by influencing hormonal balance and brain function.

Moreover, the bidirectional nature of the relationship between nutrition and mental health is evident in our findings. Participants who reported higher stress and depression levels were more likely to engage in poor dietary choices, creating a vicious cycle that perpetuates both obesity and mental health issues. This cycle

underscores the importance of addressing both nutritional and psychological factors in interventions aimed at improving the well-being of overweight and obese female youth. A study by Engin et al indicated that while 58% of young females had a basic understanding of nutrition, 42% demonstrated inadequate knowledge, which correlated with poorer dietary choices.¹⁵ This lack of knowledge often translates to unhealthy eating habits, like excessive intake of high-calorie, low-nutrient foods. Research by Hajek et al found that 25% of obese adolescents reported symptoms consistent with binge-eating disorder, characterized by rapid and uncontrollable food consumption followed by guilt.¹⁶ This condition poses challenges for weight management, particularly in those undergoing weight loss treatments. Another study by Mahendru et al investigated dietary patterns and obesity in adolescents, finding that higher consumption of UPFs was strongly associated with increased BMI and waist circumference.¹⁷ Their research highlighted those diets high in sugary beverages, snacks, and fast food contributed significantly to obesity, reinforcing the link between poor nutrition quality and excess weight in young populations. Research by Esteban et al reviewed the impact of obesity on micronutrient status, identifying significant deficiencies in vitamins like D, A, and E, and minerals like iron and zinc among obese individuals.¹⁸ The study emphasized that the metabolic disruptions caused by obesity can impair nutrient absorption and utilization, exacerbating deficiencies and complicating weight management efforts.¹⁹ Relevant studies by Forster et al consistently shown that individuals with obesity show significant increase ($p < 0.05$) are more likely to experience depression, anxiety, and low self-esteem.²⁰ Another study found that obesity in women was associated with a 37% increase in major depression, and young females with obesity are 43% more likely to develop anxiety compared to their peers.²¹ Additionally, study by Gowy et al have identified a bidirectional relationship between obesity and depression, where each condition exacerbates the other.²² This interconnection is further compounded by societal pressures, body dissatisfaction, and weight-related stigma, which intensify mental health challenges in this population. In summary discussion emphasizes the critical link between nutrition quality and mental well-being in overweight and obese female youth. Addressing nutritional deficits and promoting healthier eating habits should be a priority in interventions aimed at this vulnerable population, as it holds the potential to break the cycle of poor diet and mental health challenges, ultimately leading to improved outcomes for both physical along with mental health.

CONCLUSION

In conclusion, young obese females are most affected by poor nutrition, obesity and mental health in low to middle income regions. A poor diet, especially the consumption of UPFs, is a key contributor to obesity and where obesity is a given, mental health is negatively impacted by it, a cause effect relationship between obesity and depression/anxiety. Solving this interconnection needs an integrated

approach that tackles the problems at the natural checks point where balanced diets and exercise are offered coupled with psychological support to enhance the health welfare of these persons and reduce the cases of chronic diseases.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Ramchandani D. Impact of nutritional quality on mental well-being in obese female: a systematic review. *Int J Community Med Public Health* 2025;12:1455-61.