Obesity associated with Multiple Micronutrient Deficiency; a Paradox

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What is Obesity?:

Obesity is a complex disorder characterized by excessive fat accumulation and chronic low-grade inflammation. This condition creates a unique nutritional paradox, in which excessive energy intake coexists with deficiencies in essential micronutrients. It therefore represents an important nutritional challenge that arises from the interaction between **undernutrition**, due to a variety of causes of **poor absorption**, and **overnutrition**, secondary to excessive caloric intake[i].

The magnitude of Obesity?:

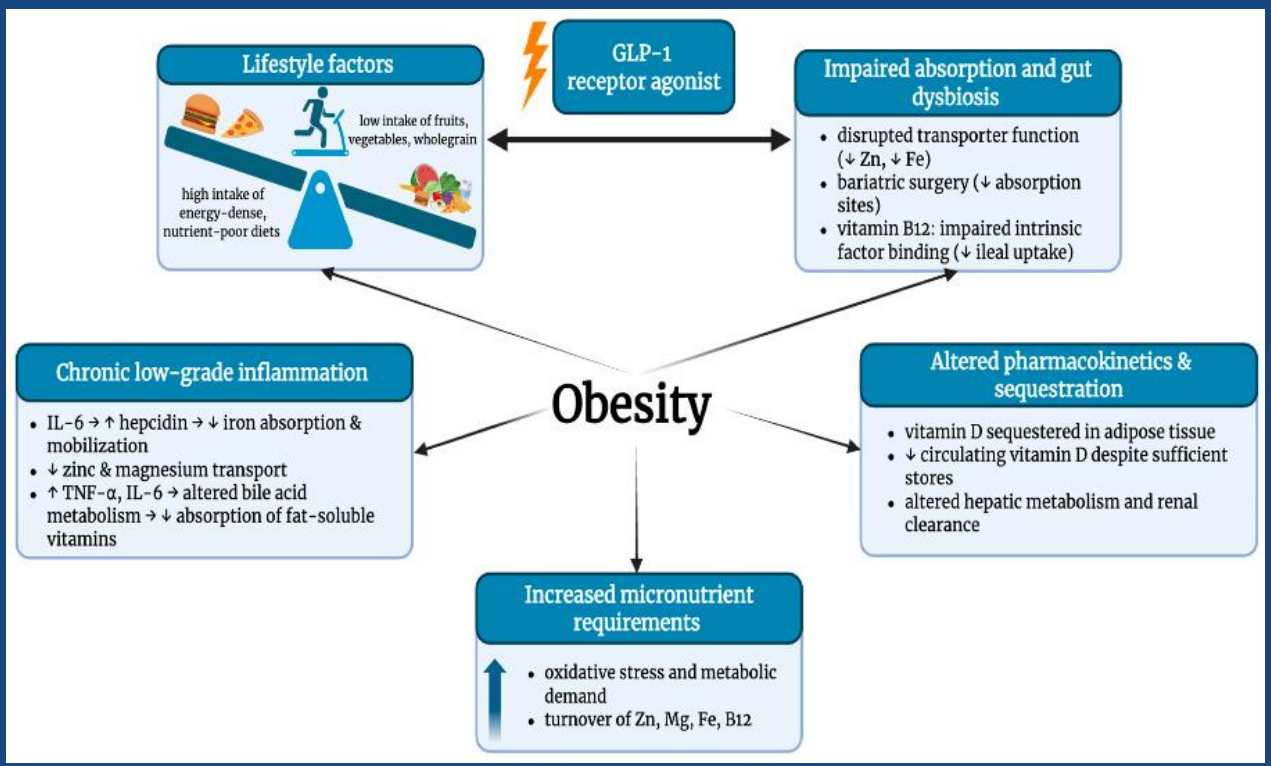
According to the World Health Organization, about 890 million (16%) of them were living with obesity in 2022. In Africa about 120 million (8%) of population are obese; more in women by 20.8% and 9.1% among men. In Tanzania 15% of women are obese and 5% of men. Major factors include a nutrition transition toward cheap fast foods, refined carbohydrates, and soft drinks, combined with reduced physical activity and limited pedestrian or green infrastructure in expanding cities.

Obesity and Micronutrient deficiencies:

Obesity is frequently accompanied by marked deficiencies in several essential micronutrients, including zinc, iron, calcium, and magnesium, as well as fat-soluble (D,A,K and E)and water-soluble vitamins (C and B complex)[ii]. Micronutrient deficiency may include not only incorrect dietary choices and insufficient access to nutrient-rich foods but also changes in the absorption, distribution or excretion of nutrients, and altered micronutrient metabolism resulting from systemic inflammation caused by obesity. Therefore, understanding the bidirectional relationship between micronutrient imbalances and obesity is therefore essential for improving clinical management strategies and optimizing long-term health outcomes.

Mechanism of micronutrient deficiency in obesity:

Micronutrient deficiencies are frequently observed in individuals with obesity, primarily due to **poor dietary habits** characterized by high consumption of energy-dense foods that are low in fiber, protein, essential micronutrients, and phytochemicals. Other factors include increased metabolic demands, altered nutrient distribution and metabolism and pathophysiological alterations characteristic of obesity. These alterations include oxidative stress and chronic systemic inflammation, both of which accelerate nutrient depletion[iii], and impaired gastrointestinal absorption. Figure adopted from **https://BioRender.com/l55b4yp**.



Behavior change in Obesity:

Physical exercise may also influence micronutrient metabolism in individuals with obesity as it may affect micronutrient homeostasis through improved insulin sensitivity, reduces systemic inflammation, and enhances mitochondrial function. Exercise has also been shown to decrease circulating inflammatory markers, which are known to influence micronutrient regulation.

Use of seamossPlus:

SeamossPlus is a locally scientifically designed multiple micronutrient supplement with phytochemicals that provides micronutrient, macronutrients, organic compound and vitamins-all required in obesity management. For example zinc, magnesium, chromium, and manganese found in seamossplus have been reported to play key role in carbohydrate and lipid metabolism[iv]. SeamossPlus contains high content of carrageenan- a complex polysaccharide that behaves exactly like soluble fiber which mixes with water and stomach fluids, thus forming a thick, sticky, gel-like substance. This gel increases the volume of food in your stomach without adding significant calories. The physical bulk stretches the stomach wall, which triggers mechanoreceptors to send direct signal pathways to the brain indicating that you are full thus reducing meal size and frequency.

Another mechanism is that the fiber-rich sea moss triggers chemical signals that actively suppress appetite. Their presence stimulate the release of key satiety hormones, including **Peptide YY (PYY)** and **Glucagon-Like Peptide-1 (GLP-1)**. These hormones circulate back to the central nervous system, effectively flipping the brain's focus from "reward-based craving" to homeostatic fullness, decreasing your desire for highly palatable foods this is called satiety effect. ***Satiety*** is the psycho-biological process that suppresses hunger after an eating occasion and prevents further eating; it is said to control snacking between meals.

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