Kwashiorkor and sarcopenic obesity: Two Sides Of The Same Coin?

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Abstract

Kwashiorkor is a form of protein energy malnutrition, while obesity usually occurs due to overnutrition. These syndromes, therefore, are considered to be poles apart. However, there are many similarities between the two conditions. Both are forms of malnutrition, and have common features in causation, clinical presentation, comorbidities and complications, as well as strategies for management. In this review, we discuss whether kwashiorkor and obesity, especially sarcopenic obesity, are two sides of the same coin or not.

Keywords: Kwashiorkor, Sarcopenia, Sarcopenic obesity, Protein energy malnutrition.

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Introduction

Kwashiorkor is a form of severe acute malnutrition, found in young children in severely deprived settings, many decades ago. Obesity is a 'modern' disease, more often seen in adults, which afflicts the affluent and the prosperous, what can they have in common? How can they be considered two sides of the same coin? Does this exploratory thought process have any clinical or public health significance? This communication tries to address some of these questions.

Historical Context

Kwashiorkor was first named by Cecily Williams, who encountered the condition while working in Ghana, West Africa, in 1933.[1] Later on, it was identified in various other nutritionally deprived, low income parts of the world. A review of PubMed citations on Kwashiorkor shows that the maximum number of articles were published from 1965 to 1975.[2] This suggests a peak in prevalence around the same time.

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Obesity has been known to humankind since antiquity, but the first acceptance of it as a disease occurred in 2013, when the American Medical Association accepted obesity as disease.[3] While obesity is present across the world, low-income and middle- income countries are experiencing the most rapid rise in its incidence.[4]

Definitions

Kwashiorkor, a form of severe malnutrition, is named after a word from the Ga language of coastal Ghana, which mean "you come, I go". This allude to the increased prevalence of this condition in children who are weaned off early, due to the next pregnancy of their mother.[1] Due to protein deficiency, in the face of adequate caloric intake, it is characterized by oedema, hepatomegaly and loss of subcutaneous fat.

Obesity is a metabolic disorder which has just recently been acknowledged as a disease by various professional bodies. Obesity has been defined as a chronic, relapsing multifaceted, multisystemic endocrine disease, which needs timely, and sustained, attention at a clinical as well as public health level.[5] There is a subset of obesity known as sarcopenic obesity,[6] in which obesity and low muscle mass coexist.

Superficially, kwashiorkor and obesity may be considered to be poles apart. There are many similarities, however, between the two conditions (Table). Both are forms of malnutrition, and have common features in causation, clinical presentation, comorbidities and complications, as well as strategies for caring.

Epidemiology

Kwashiorkor is a disease of young children and not of adults.[1] The concept of subclinical kwashiorkor has been described by modern researchers, however. This describes subclinical protein deficiency, and may be used, to drive home the point that if unchecked, protein deficiency may lead to kwashiorkor-like symptoms and signs in adults.[2]

Obesity is more common in adults, and sarcopenic obesity in elderly adults. This differentiates them from kwashiorkor. At the same time, it must be noted that obesity is rising rapidly in children and adolescents.[4] This situation, if not corrected, will make obesity endemic to our society.

Table: Kwashiorkor And Obesity: Comparison And Contrast.

Domain	Similarities	Differences
Epidemiology	Both are found in low and middle income countries; obesity is increasingly becoming more common in children and adolescents	Kwashiorkor is a disease of the past century; obesity of the current.
Etiology: macronutrition	Energy intake is normal/high but protein intake less, in both kwashiorkor and sarcopenic obesity	While both are states of protein deficiency, energy intake may be excessive in obesity
Etiology: micronutrition	Micronutrient deficiency and aflatoxins/obesogens are associated with both	Food toxins are usually not associated with obesity
Clinical features	Protuberant abdomen, hepatomegaly occur in both kwashiorkor and obesity; skinny limbs are seen in kwashiorkor and sarcopenic obesity	Edema is a sine qua non of kwashiorkor, but not obesity
Complications	Both are multisystemic syndromes with neurological (delayed intellect/early dementia), cardiac (arrhythmias, heart failure), respiratory (infections) and hepatic (fatty liver, cirrhosis) complications	Kwashiorkor is characterized by small sized heart and usually by low lipid levels, as opposed to obesity
Investigations	Sarcopenia is found in both kwashiorkor and sarcopenia	Body composition analysis reveals high adiposity in obesity and high fluid content in kwashiorkor
Management strategy	Medical nutrition therapy (MNT) introduced in a graded manner is the basis of management. Errors in MNT may have negative consequences in both diseases	Obesity usually requires drug therapy, and sometimes surgical treatment, along with MNT
Public health importance	Both syndromes are biopsychosocial conditions, which must be managed through a multisectoral, multidisciplinary approach. Food and protein security are required for both	Kwashiorkor management entails healthy re-feeding while obesity management usually requires calorie restriction. Social awareness is more important for obesity management

Causation

The causation of kwashiorkor and obesity is uncannily similar. Sufficient energy intake, with insufficient protein content, is said to be the etiology of kwashiorkor.[1] Obesity is associated with excessive caloric intake.[7] Most persons with obesity report a relatively higher percentage of carbohydrate and fat in their diet. The low protein intake promotes obesity, especially sarcopenic obesity. This is explained by the protein satiety hypothesis.[8] Micronutrient deficiency and aflatoxins are some of the contributory factors hypothesized to operate in kwashiorkor.[1]

Clinical Features

Kwashiorkor is characterized by a protuberant abdomen, due to ascites, swelling of the feet(oedema), and skinny limbs. This phenotype is similar to that seen in obesity, especially sarcopenic obesity. The increased waist circumference, high waist hip ratio, and relative reduction in mid-calf and mid-arm circumference are seen in both diseases.[1,6] Body composition analysis however, will reveal increased water percentage in kwashiorkor, but high adiposity in obesity.

Complications

The complications of Kwashiorkor are multisystemic. This is another similarity with obesity, which, with its multi-M list of comorbidities, is well recognized as a multisystemic disorder.[1,7] Heart failure is one complication which is common to both. In kwashiorkor, however, small-sized heart size is reported, due to loss of muscle mass. Obesity, on the other hand, will usually lead to cardiomyopathy. Arrhythmias, usually precipitated by dyselectrolytaemia, are a cardiovascular complication that occur in both kwashiorkor and obesity. Neurological complications are found in both diseases: intellectual impairment in kwashiorkor, and early dementia in obesity.

Poor immunity is another common feature of kwashiorkor and obesity. Both syndromes are prone to an increased risk of infections, and experience worse outcomes. The recent COVID-19 epidemic was associated with higher risk and poorer prognosis in persons living with obesity.[9]

Another commonality is hepatomegaly. Both diseases are characterized by fatty liver, with a propensity toward cirrhosis and hepatocellular carcinoma. While the concept

of metabolic-associated steatotic liver disease is well understood, the occurrence of fatty liver in kwashiorkor may seem paradoxical. This is explained by the decreased synthesis of β-lipoproteins, which help in transport of triglycerides. Because of the deficiency of these proteins, serum lipid levels remain low in kwashiorkor, while triglycerides remain deposited in the liver. Selective deficiency of hepatic triglyceride lipase may lead to hypertriglyceridaemia in kwashiorkor, however.10 The two-hit hypothesis, which is often used to explain the pathogenesis and progression of MASLD, has been proposed for kwashiorkor as well.

Care And Cure

Both kwashiorkor and obesity need nutritional, medical and psychological support. A focus on gradual medical nutrition therapy, with supportive care, is necessary. Most people with obesity will need medical treatment as well, and some may require surgical intervention. While obesity needs lifelong therapy, children with kwashiorkor will also require long term nutritional and metabolic surveillance.[1,7]

Culture

Both the diseases need a healthy psychosocial and physical environment in order to ensure proper recovery and prevention of relapse. This can be ensured by a multisectoral approach, which includes the agricultural and nutritional industries as well. Protein security is as essential as overall food sufficiency.[11]

Conquer Or Collapse

Just as we have been able to eradicate kwashiorkor from most of its pockets, we should be able to do so for obesity as well. Availability of modern tools for monitoring and management should be matched by accessibility and affordability. This will automatically lead to greater acceptance and adherence. It must be noted that the 'human touch', i.e., the art of metabolic medicine, is as important as the science. Behavioural and motivational techniques are tools of strength in the fight against both kwashiorkor and obesity.[1,7]

It would be insightful, and interesting, for modern obesity researchers and barocrinologists to study and share science related to kwashiorkor evaluation, intervention and eradication. This will assist us in achieving the same for obesity.

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