Nutritional Deficiency & Impact on Health

Chapter 4

Nutritional Aspects in Adults: The Impact of Good Nutrition on Health

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Abstract

Biologically, an adult is a human being who has reached sexual maturity and in this context, the term adult additionally has meanings associated with social and legal concepts. A legal adult is a person of adulthood and is therefore considered independent, self-reliant and responsible.

The adult age range is considered to be between 19 and 59 years old, and adulthood is divided into two forms: biological adulthood and social adulthood. Thus, there are two primary forms of adults: biological adults (people who have reached reproductive capacity, are fertile, or who show secondary sexual characteristics) and social adults (people who are recognized by their culture or law as adults). Adult development encompasses the changes that occur in the biological and psychological domains of human life from late adolescence to late life. These changes may be gradual or rapid, and may reflect positive, negative, or no change from previous levels of functioning.

About concerns of the good adult development, good nutrition plays a role fundamental, crucial and decision-making. Proper nutrition is essential for good health and the prevention, treatment and management of diseases. As risk factors for chronic diseases in adults, such as high blood pressure (HBP), type 2 diabetes mellitus (DM2), cardiovascular disease, among others, are increasingly seen at younger ages, often the result of poor dietary habits healthy and increased of body weight.

The relationship between diet, nutrition and health, however, is complex, dynamic and multifaceted and highly affected by biological, environmental, socioeconomic, cultural and behavioral factors.

Therefore, in this context, good nutrition plays a prominent role in adulthood and has been seen as a precious tool that should be used in the maintenance of well-being, disease prevention, health promotion and better quality of life. High quality, effective nutrition and multidisciplinary research is critical to improving overall health.

Keywords: Nutrients; Health; Adult; Nutritional deficiencies; Well-being.

1. Introduction

Biologically, an adult is a human being who has reached sexual maturity and in this context, the term adult, additionally, has meanings associated with social and legal concepts. A legal adult is a person of adulthood and is therefore considered independent, self-reliant and responsible.

It is considered the age of the adult the between 19 to 59 years complete. After the social construction of adolescence was created, adulthood was divided into two forms: biological adulthood and social adulthood. Thus, there are two primary forms of adults: biological adults (people who have reached reproductive capacity, are fertile, or who show secondary sexual characteristics) and social adults (people who are recognized by their culture or law as adults). Depending on the context, the adult may indicate any of the settings. However, definitions of adulthood are often inconsistent and contradictory. A person may be biologically adult and have adult behavior but still be treated as a child if they are below the legal age of majority. On the other hand, one can legally be an adult but have no maturity and responsibility that can define an adult character.

Adult development encompasses the changes that occur in the biological and psychological domains of human life from late adolescence to late life. These changes may be gradual or quick, and may reflect positive, negative, or no change from previous levels of functioning and with regard to good adult development, good nutrition plays a crucial and

decisive role.

Proper nutrition is critical to good health and disease prevention, treatment and management. Since the risk factors for chronic diseases in adults, such as high blood pressure (HBP), diabetes mellitus type 2 (DM2), cardiovascular diseases, among others, are increasingly present in younger ages, often a result of unhealthy eating habits and increased weight gain. Eating habits established in childhood often endure into adulthood, so that teaching children to feed on healthy way at a young age will help keep them healthy throughout their lives.

Access to a healthy and sustainable diet is a fundamental requirement throughout life and around the world. The relationship between diet, nutrition and health, however, is complex, dynamic and multifaceted and highly affected by biological, environmental, socioeconomic, cultural and behavioral factors.

Global population growth, climate change and pressure on natural resources, poor access to healthy food, unhealthy lifestyles and growing consumer demand pose increasing challenges. Paradoxically, while in the developing world about 800 million people suffer from chronic malnutrition, both developed economies as emerging face increased levels of obesity and diseases associated with diet, such as disease cardiovascular diseases, DM2 , various types of cancer, HBP and bone diseases. This is largely due to changes in consumption patterns and the type of food consumed, as well as, more sedentary lifestyles.

Therefore in this context, good nutrition plays an important role in adulthood and is being seen as a valuable tool to be used in maintaining the well-being, the prevention of disease, promotion of health and better quality of life. High quality multidisciplinary nutrition researches are critical to improving overall health.

2. Nutritional Transition

Nutritional Transition is the gradual change in dietary behavior in society that has been occurring in recent decades. This process is related to the demographic and epidemiological transitions experienced by some countries. The “traditional” dietary pattern, based on grain and cereal consumption, is increasingly replaced by foods, meals and nutritional habits that are less suited to a healthy lifestyle.

Lifestyle changes, with increased physical inactivity and the adoption of a diet rich in processed foods and reduced consumption of natural nutrient sources (fruits, vegetables and cereals) corroborated with a decline in the prevalence of malnutrition with consequent increase of obesity [1].

Thus, from the epidemiological and nutritional transition processes, noncommunicable chronic diseases (NCDs), which are part of a group of diseases characterized by long latency,

prolonged evolution, irreversible lesions and complications leading to varying degrees, have gained importance of disability or early death. .

Low consumption of fruits and vegetables has been linked to the genesis of several NCDs, recognized as the leading cause of death and disability worldwide, accounting for approximately 44.1% of deaths among men and 44.7% among women. , representing almost 46% of the global disease burden (WHO, 2011).

In this context, cardiovascular diseases that are considered an important global public health problem stand out, being recognized as the leading cause of death in the world [2]. Due to this scene, the World Health Organization launched in 2008 a global strategy for prevention and control for these diseases, where we highlight the cardiovascular diseases [3].

Data have revealed that the claim that NCDs only affect elderly individuals in rich countries and rich individuals in poor countries is totally false. The number of deaths from NCDs among men and women is basically equivalent [4]. NCDs death rates are already higher in low- and middle-income countries than in rich countries. Almost two thirds of premature adult deaths and three quarters of all adult deaths are attributable to such conditions. It can be said that in all countries of the world, NCDs are the main public health problem, whether for men or women.

Most NCDs can be prevented or treated. Many of them are reversible and many can be alleviated by secondary prevention and curable. However, these effects are intrinsically related to the identification and proper control of key risk factors, defined as the likelihood of an adverse outcome, or factor that increases that likelihood.

3. The Role of Good Nutrition in Disease Prevention

Regarding risk factors, epidemiological studies have shown a strong association between many NCDs and low fruit and vegetable intake, excess body weight, hypertension, hypercholesterolemia, excessive alcohol consumption, physical inactivity and smoking. in the adult population. As can be seen, five of these seven major risk factors are closely related to the population feeding. Consumption of foods with high levels of saturated and trans fat, salt and sugar is the cause of at least 14 million deaths or 40% of all annual NCD deaths. This is why the relationship between diet and incidence of NCDs is so close [4].

Low consumption of these foods is associated with about 31% of ischemic heart disease and 11% of stroke cases worldwide. It is estimated that more than 2.7 million lives could potentially be saved each year if consumption of fruits, vegetables and legumes was increased [5].

Although the signs and symptoms of NCDs most often affect adults aged 35 to 59 years,

it is now known that their development begins early and that the fight against risk factors such as obesity, Physical inactivity, smoking, hypertension, and low consumption of antioxidant dietary factors may contribute to its reduction in adulthood [6].

The prevalence of obesity is increasing among adults in both developed and developing countries. The World Health Organization (WHO) estimates that at least 1 billion people are overweight, of which 300 million are with obesity.

4. Nutritional Deficiencies and Non-communicable Chronic Diseases

It is noted that the nutritional deficiencies found in the general population are not due to insufficient amount of food consumed, since the main indicator of energy deficiency, the Body Mass Index (BMI), shows that only 2.7% of adult were classified with weight deficit [7]. Thus, recent findings reinforce the concept that energy intake does not necessarily characterize adequate micronutrient consumption [8].

The low permanent consumption of fruits and vegetables associated with increased obesity and chronic diseases [5] , is disturbing since these foods are important sources of nutrients with antioxidant function and the low consumption of these are related the installation and aggravation of various NCDs. In fact, insufficient micronutrient consumption is among the top ten risk factors for the total global burden of disease worldwide, and is considered the third preventable risk factor for NCDs diseases.

The micronutrients have an important role in disease prevention with high impact, the antioxidant activity of some nutrients in the reduction of the occurrence of various NCDs, excessive sodium intake is associated with HBP and thus an increased risk of cardiovascular disease and renal function and vitamin D and calcium that are fundamental in maintaining bone health and reducing the risk of osteoporosis [7]. In addition, accumulated evidence suggests an important role of micronutrient deficiency in increasing the risk of DM2, some cancers, and other tooth diseases.

[7] developed a study that aimed to estimate energy and nutrient intake and the prevalence of inadequate micronutrient intake among adults that included a module for the assessment of individual food intake in a representative sample of the population.

In evaluating the intake of micronutrients based on representative data, the authors observed high prevalence of inadequate intake of calcium, sodium, magnesium, vitamin E, D, A and C in all regions in both urban and rural areas in adult population .

The magnitude of the inadequacies was higher among adults, especially for vitamins A. D, E, and C, being approximately 78%, 99.6%, 100%, and 51%, respectively. Other study evaluated the intake of dietary micronutrients, the establishment of their nutritional adequacy,

as well as to discuss the consequences of low consumption of these nutrients for population health., in a representative sample of the population [9] . Data from the study showed that the inadequacy was similar for the same micronutrients and for those with antioxidant function, in general, was higher in overweight and individuals with obesity when compared to eutrophic individuals.

In addition to cardiovascular disease and DM2, liver disease, gastrointestinal tract disease, and some cancers, which have increased their participation in the composition of mortality through slow but steady growth in recent decades, also deserve special attention in relation to the nutritional status of micronutrients, as they are pointed as secondary causes for the development of deficiencies of these nutrients, since they interfere in the absorption, storage, transformation of micronutrients in their metabolically active form and/or in the transport of various nutrients. Thus, in addition to the mentioned diseases being identified as secondary causes for the development of micronutrient deficiency, this, in turn, has been considered as a triggering and/or aggravating factor of such diseases.

Many studies report low dietary intake of vitamin A as a causal factor of vitamin A deficiency in overweight individuals. Some studies have attributed the poor quality of the diet, which is deficient in antioxidant nutrients, to find a negative and significant association between obesity and serum carotenoid concentrations and serum concentrations of interleukin-6 (IL-6) and C-protein reactive (CPR), these are important inflammatory markers and therefore strong determinants of future atherosclerotic events.

A recent study [10] found that low circulating retinol concentrations in Non alcoholic Fatty Liver Disease (NAFLD) may therefore not reflect the real "vitamin A deficiency," but the metabolism of vitamin A changed NAFLD and its putative role in the progression of liver disease, as well as the therapeutic potential of vitamin A metabolites.

Considering the significant increase in the participation of NCDs in the composition of mortality, it is noteworthy that neoplasms have increased their participation in the composition of mortality, through a slow but continuous growth in recent decades. In adults, the effects anti-inflammatory of acid retinoic that favor immune homeostasis are a detached treatment strategy or in combination with other drugs for inflammatory bowel disorders, neurodegeneration, skin aging and cancer [11].

Vitamin A deficiency has been associated, among other factors, with the high incidence of cancer and increased susceptibility to carcinogenic substances. Vitamin A can increase the immune response to cancer cells by several mechanisms, such as increased cytotoxic T lymphocyte activity, natural killer cells, macrophage activity, and apoptosis.

Programmed cell death or apoptosis, the normal physiological response to various

motivations, including irreversible DNA damage, plays an important role in the growth of normal and malignant cells. In cancer, the balance between proliferation and programmed cell death is broken, and defects in the signaling pathways that lead to apoptosis allow cells with genetic abnormalities to survive. It is known that retinoids are potent regulators of cell growth, differentiation and apoptosis. Studies conducted so far point to natural and synthetic retinoids as capable of controlling both differentiation and proliferation.

Vitamin A is a potent agent in the chemoprevention of different types of cancer, it is worth highlighting the high percentages of inadequate consumption observed for this vitamin, shown in the population studies conducted in the country, which was of the order of 80% and 92% according POF 2008-2009 and Brazos study , respectively.

However studies also showed lower serum retinol and carotenoids in individuals with obesity compared to eutrophic individuals, with no significant difference in the dietary intake of these nutrients sources, obtained from dietary survey [12]. Thus, the greater serum inadequacy of antioxidant nutrients may be due to the higher metabolic utilization of these nutrients against oxidative stress to which overweight individuals are more exposed than eutrophic ones.

Accordingly, [13] researched vitamin A nutritional status through biochemical and functional indicators and its association with body fat in individuals with dietary intake of vitamin A in the recommended advice and observed a significant reduction of the concentrations retinol according to body weight increase ($p < 0.001$). Similarly noted the same behavior in respect to serum concentrations of beta- carotene ($p=0.005$). The author concluded that inadequate nutritional status of vitamin A (retinol and beta carotene) was associated with overweight and obesity, demonstrating that this may represent an important cause of retinol and carotenoid depletion and is considered an aggravating factor of deficiencies of these nutrients.

The findings of Bento and co-workers [13] bring an important point of reflection on the deficiency of retinol and beta-carotene, by demonstrating that, despite a food intake within the recommended recommendations, the increased demands of these nutrients are related to the increase of BMI, and depending on the latter, the nutritional needs of both may be well above current recommendations. In addition to calling attention to a fact that goes beyond the recommended nutritional care: overweight and obesity seem to be a major cause of vitamin A depletion, and may also be considered an aggravating factor of vitamin A deficiency.

Others studies demonstrate that visceral fat accumulation and increased BMI are related to increased lipid peroxidation and lower serum retinol and beta-carotene concentrations, and therefore are associated with a negative antioxidant system [14], in addition, the findings that refer to vitamin A consumption in such situations demonstrate that vitamin A intake is below daily recommendations.

Folchetti [15] found a similar finding to investigate the association between high intake of fruits and vegetables with biomarkers of cardio metabolic risk and concluded that individuals with higher consumption of vitamins and minerals showed a better profile cardio metabolic. However points out that, although quantity of fruit and vegetables appear to be adequate to the analysis of the specific intake of micronutrients with antioxidant function in the diet revealed consumption below the internationally recommended and was associated with markers of oxidative, inflammatory status and insulin sensitivity.

Studies have shown an important role of vitamin A in preventing and/or delaying the atherogenesis process, by inhibiting low density lipoproteins-cholestero (LDL-c) oxidation and reducing spongy cell formation. In addition, vitamin A has been considered a modulator of adipose tissue. Their deficiency leads to the recruitment of pre-adipocytes that differentiate and through reduced apoptosis increase the number of body adipocytes, in addition to reducing adaptive thermogenesis, contributing to obesity [16]. Thus, in addition to the effects directly caused by vitamin A deficiency, such as changes in visual acuity, immune system and decreased antioxidant defenses, this nutritional condition may be regulates metabolic pathways implicated in the pathogenesis of obesity and diabetes, such as hepatic lipid metabolism, adipogenesis and pancreatic β cell function [17,18].

Recently, an inverse association between serum beta-carotene concentrations and the risk of diabetes has been demonstrated [19]. Similarly, an experimental study showed that vitamin A deprivation in the diet caused hyperglycemia and reduced insulin secretion [17].

Serum vitamin A concentrations were investigated in type I and II diabetic subjects with and without complications in a case-control study. Significantly lower concentrations of this vitamin were observed in diabetics of both types when compared to controls, suggesting an association of diabetes mellitus with change in serum antioxidant concentrations [20]. Furthermore, oxidative stress may play an important role in the pathogenesis of diabetes mellitus and its complications micro and macro vasculares, and maintaining euglycemia, and the use of antioxidant vitamins can minimize these manifestations [21].

Vitamin E, one of the most important non-enzymatic antioxidants lipophilic, is present at LDL-c and the cell membranes and appears to be an important agent in the neutralization of peroxynitrite and is among the most important lipophilic antioxidants, protecting phospholipids Unsaturated membranes of oxidative degeneration due to highly reactive oxygen species and other free radicals. Vitamin E performs this function through its ability to reduce such radicals to non-harmful metabolites in a process called free radical scavenging.

To achieve the current recommendation of vitamin E is necessary to eat large quantities of food rich in unsaturated fatty acids, which, therefore, increase the need for vitamin E for prevent oxidation. A diet rich in fruits and vegetables and low in fat probably contains less

than 15mg of α-tocopherol unless there is an increase in the intake of oils, whole nuts, and supplements.

The tocotrienols may suppress the growth of different malignancies, including breast, lung, ovarian, prostate, liver, brain, colon, pancreas and myeloma. These findings, together mind with the safety profile reported d the tocotrienols in individuals healthy humans, encourage further research into the potential application of these compounds in the prevention and treatment of cancer. T al fact occurs, the Deeds will the possible molecular mechanisms of tocotrienols in different models of cancer ,as well as, the possible effects of vitamin E on several important signs of cancer, ie, cell proliferation, apoptosis, angiogenesis, metastasis and inflammation [22].

Vitamin E selenium has related biological function. Selenium is an essential component in the formation of glutathione peroxidase, an enzyme involved in hydrogen peroxide detoxification and lipid hydroperoxidation, as well as a component of selenium proteins in the immune and neurophysiological systems, making this essential element an important antioxidant.

The inadequacy of selenium observed in POF (2008-2009) was 13.5%, which was similar prevalence of 13.4% found by Medeiros Pinheiro et al and a value close to 21.1% prevalence found by Fernandes et al [23] to evaluate patients with s Metabolic Syndrome with similar age range covered by individual members of two national surveys.

There is evidence suggesting a possible involvement of zinc in the pathogenesis of cardiovascular disease. Many hypotheses have been proposed for this purpose. Briefly, it is believed that low zinc concentrations, when minimal trauma occurs inside the vessels, are not able to protect them against oxidative stress, initiating the process of atherosclerosis. This is because zinc is a constituent of a potent antioxidant enzyme, copper, zinc-superoxide dismutase [Cu, Zn-SOD], which converts the superoxide radical into hydrogen peroxide, protecting the body from free radical attack.

In addition to its antioxidant action, zinc plays an essential role in glucose metabolism. Insulin biosynthesis, storage and secretion are dependent on its presence. Under conditions of low zinc availability, the synthesis of antioxidant enzymes but not insulin is decreased, which may contribute to tissue damage. Patient with DM2 may culminate with low serum zinc concentrations. A study of patients with DM2 for 7 years showed that patients with low serum zinc concentrations had a higher risk of death from coronary disease than those with adequate concentrations. It is suggested that in DM2, due to the demand for insulin production, less zinc could be available for the composition of antioxidant enzymes, contributing to a pro-oxidant state [24].

In addition, this metal is required for liver synthesis and secretion of retinol carrier protein (RBP). Studies show that in situations of zinc deficiency, RBP synthesis may be impaired, resulting in secondary vitamin A deficiency, even in the presence of adequate hepatic reserves of this vitamin [25].

Vitamin C is one of the admittedly most important water soluble antioxidant agents. Inactivates the hydroxyl free radical and protects the body against lipid and LDL peroxidation. Studies indicate that vitamin C works in partnership with vitamin E. When these vitamins are taken together they have a greater effect than when they are taken separately. This is because vitamin C regenerates vitamin E after it has been inactivated by combining it with a free radical.

Vitamin C has been gaining attention as a potential treatment for human malignancies. Several experimental studies have shown the ability of pharmacological doses of vitamin C alone or in combination with clinically used drugs to exert beneficial effects on various human cancer models. High-dose cytotoxicity of vitamin C in cancer cells appears to be related to the excessive generation of reactive oxygen species and the resulting suppression of energy production via glycolysis. A feature of cancer cells is highly regulated aerobic glycolysis, which increases their relative importance as a source of ATP (adenosine 5'-triphosphate). Aerobic glycolysis is maintained by highly increased glucose uptake, which is made possible by the up-regulated expression of its transporters, such as GLUT-1, GLUT-3 and GLUT-4. These proteins may also carry the oxidized form of vitamin C, dehydroascorbate, allowing their preferential absorption by cancer cells with the subsequent depletion of critical cell reducers as a result of ascorbate formation. The ascorbate also has a potential to affect other aspects of metabolism of cancerous cells due to their ability to promote the reduction of iron (III) to iron (II) numerous metalloenzymes cell. The altered metabolism of cancer cells by vitamin C may be beneficial by itself and promote specific drug activity [26].

Magnesium is another micronutrient that deserves attention given the magnitude of its inadequate diet (73% and 96%), observed in the two large population-based studies conducted in Brazil, POF 2008-2009 and BRAZOS Study 2006, respectively. This mineral plays an important role in glucose metabolism and its lack affects the pancreatic ability to secrete insulin. Magnesium deficiency may decrease enzyme activity involved in insulin signaling, favoring the development of insulin resistance [27]. These findings are even more worrying considering that approximately 30% to 40% of dietary magnesium is absorbed and that their bioavailability is influenced, among other factors, by excessive amounts of free fatty acids and oxalates, which decrease their absorption and utilization. .

Low concentrations of vitamin B12 in conjunction with folate and vitamin B6 deficiency are closely related to the metabolism of homocysteine. The hyperhomocysteinemia

is associated with increased bone turnover markers and, therefore, increased risk of fracture. Thus, hyperhomocysteinemia caused by vitamin B12 deficiency, as well as folate, may be considered as new risk factors for osteoporosis related to micronutrient deficiency [28].

The association between vitamin B12 levels, low bone mineral density and fracture risk has been described in the literature, the real impact of vitamin B12 deficiency on bone health and the mechanisms associated with bone metabolism are in increasing discovery. Further studies are of paramount importance, especially in vulnerable groups such as postmenopausal women who are greatly affected by vitamin D deficiency. This also reinforces the relevance of identifying individuals who may benefit from adequate therapeutic intervention in time to reduce morbidity and mortality associated with decreased bone mineral density [29].

A vitamin D deficiency has been considered a problem that affects more than 1 billion people around the world, what worries the public health worldwide, since this vitamin be related to prevention of several chronic diseases. The deficiency of vitamin D has been linked to exacerbation of osteoporosis in adults and increased risk of death from cancer, cardiovascular disease and diabetes [30].

The usual consumption estimates provided by the POF 2008-2009 show a high percentage of inadequacy for vitamin D, similar to the data reported by Medeiros Pinheiro et al. [9], in the Brazos study. Commenting on the findings of POF, Araujo et al. reports itself to simple way to obtain the necessary amount of vitamin D, through moderate sun exposure. The authors reinforce the face of exposure, arms and hands or arms and legs to the sun for five to ten minutes, two to three times a week, is sufficient not only to meet the needs, as well as, to stock sufficient amounts of vitamin D in periods when sun exposure is impossible.

Foods are a reasonable source of vitamin D and increased dietary intake may vary from country to country depending on the dietary patterns adopted in each of them. Dietary sources of vitamin D include liver oil fish liver, fish oil (although often not be consumed in amounts necessary for populations), egg yolk , butter and milk which can be less consumed due of increased cholesterol content. However, even in these source foods, vitamin D levels are highly variable, making the amount of this circulating hormone almost exclusively dependent on skin synthesis. The main exogenous source of 25-hydroxy-vitamin D (25(OH)D) is the exposure to sunlight, however, other individual factors such as age, fat mass, skin color, polymorphism, sex , use of filters solar and lifestyle influence the status of vitamin D plasma .

Vitamin D deficiency/insufficiency has been considered a public health problem worldwide. Reduced vitamin D concentrations are often observed in individuals with obesity, and they are twice as likely to develop vitamin D deficiency compared to eutrophic individuals. Tidwell & Valliant [31] observed that vitamin D deficiency was associated with increased body adiposity, findings corroborated by the study by Moy & Bulgida [32] that found

vitamin D deficiency associated with increased abdominal obesity and diagnosis of Metabolic Syndrome.

As the prevalence of obesity increases, the prevalence of non-alcoholic steatohepatitis (NASH) also increases, and is projected to become the most common form of liver disease. NASH occurs in 40-80% of cases of obesity, and body fat distribution is a more important component than total body fat, since visceral fat accumulation has been more related to its development.

Epidemiological studies point to an association between hypovitaminosis D and the presence of NAFLD and NASH, regardless of confounding factors such as obesity and insulin resistance. In addition, several experimental data have shown the antifibrotic, anti-inflammatory, and insulin-sensitizing properties of vitamin D exerted on liver cells [33].

For Earthman et al [34]. The inverse relationship between serum vitamin D concentrations and increased adiposity is due to the presence of receptors of this vitamin in the fatty tissue, which would promote its setup in the fat mass and consequent reduction in its availability for attending target tissues. In addition, vitamin D deficiency has been associated with increased risk of cancer, cardiovascular disease, DM2 and osteoporosis.

Inadequate intake of other micronutrients has also been related to NCDs. The inadequacy of complex B vitamins intake is associated with increased plasma homocysteine increase the risk of atherosclerosis and cardiovascular diseases. Also commonly it is highlighted the involvement of B complex vitamins in preventing chronic complications in individuals with diabetes mellitus; in addition to the antioxidant role of vitamins E, C and A in the prevention and treatment of DM2 and cancer .

5. Conclusion

The population of adult has a double load diseases related with food intake, which can be evidenced by the increase of overweight and obesity and inadequacies of micronutrients observed worldwide by recent studies. These facts denote that they need to be priority components in public health strategies in order to advance of such nutritional problems considered of high collective impact.

Dietary intake data reinforce the thesis that inadequate intake of source foods is the main etiological factor in the epidemiological level of micronutrient deficiency in the population. However, it is noteworthy that overweight and obesity represent an important cause of micronutrient depletion, and can be considered an aggravating factor of the deficiency of many of these.

It is extremely important to take into consideration both quantitative (energy intake) and qualitative (nutritional quality) factors in good nutrition, aiming at adequate nutritional support for the prevention and/or treatment of NCDs in adulthood. In the field of public health, strategies for coping with the current situation can be based on the food itself, that is, by promoting healthy eating habits through educational practices, food fortification and multiple micronutrient supplementation, always taking into consideration the state their nutritional status, accompanied by the impact assessment of the intervention measures adopted in the adult population.

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