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PROTEINS OF HIGH BIOLOGICAL VALUE FROM VEGETABLES FOR CHILD DEVELOPMENT

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INTRODUCTION & AIM

There are two types of amino acids (AA) in human nutrition. Some are synthesized by the human body and dispensable AA (DAA: alanine, arginine, asparagine, aspartic acid, cysteine, glutamine, glutamic acid, glycine, proline, serine, and tyrosine) or proteinogenic. Other AAs are not synthesized and are indispensable AA (IAA: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine), and diet is their only source of protein. In some human risk groups, such as premature infants, who need adequate intake to compensate for insufficient synthesis, some DAA becomes conditional and IAA. Human requirements for protein intake refer to a protein source with a complete IAA profile and must be fully digestible (DIAAS ≥ 100).

Nonetheless, many proteins do not comply with these criteria because they lack one or more IAAs in adequate amounts or due to their low digestibility. Compared to animal-based proteins (ABPs), plant-based proteins (PBPs) have a less complete proportion of AAs due to lower digestibility and source-specific deficiencies in essential AAs. In personalized nutrition, we must develop dietary recommendations adapted to the specific needs humans undergo at each stage of their growth and development, considering their nutritional, health, and inflammatory status, for example, chronic diseases that begin even during gestation, like cystic fibrosis. Therefore, the main aim of this study was to review the current findings on the biological value of plant-based protein sources on the growth and development of children and adolescents.

METHOD

We conducted a literature review of articles on vegetable proteins in child and adolescent development. We used electronic databases (PubMed and Google Scholar) for all publications available in English and published between January 2019 and June 2024, searching the following keywords: vegetable and fruit proteins, protein needs in children and adolescents, and protein bioavailability, in pediatric populations between birth and 19 years of age. We excluded articles about acute or chronic diseases, people over 19 years, and pregnant adolescents.

RESULTS & DISCUSSION

It is crucial to consider that animal and aquatic proteins, such as meat, milk, eggs, and fish, provide all the essential macro- and micronutrients necessary for optimal growth and development in the pediatric population. Nevertheless, in childhood, a diet very high in protein could accelerate growth and increase the risk of overweight and obesity in childhood and later. Compared to ABP, a PBP diet is associated with increased risks of nutrient deficiencies, especially in vulnerable groups. Around the world, many people have a restrictive ABP diet for cultural, religious, or socioeconomic reasons. In vegetarian and vegan diets, the more limited the diet and the younger the child, the greater the risk of suffering nutritional deficiency related to the quantity and quality of proteins, iron, zinc, selenium, calcium, riboflavin, vitamins A, D, B12, and essential fatty acids. PBPs contain antinutritional factors and bioactive compounds, such as phytic acid, protease inhibitors, hemagglutinins, glucosinolates, tannins, and gossypol, affecting their digestibility. The PBP digestibility and bioavailability concerns could be improved by various suitable processing technologies, but the quality of absorbable AA will depend on the PBP source (vegetables and fruits). The effects of the processing applied to foods can intervene in their digestibility and AA modification, affecting the quality of the proteins. They also decrease the bioaccessibility or bioactivity of AA, generating negative nutritional concerns. However, PBPs may reduce atherosclerosis because it can begin in childhood and become a risk factor for cardiovascular disease into adulthood. PBP intake of 30 g/meal or more could be an effective strategy to improve lean body mass, mainly muscle mass. In contrast to ABP, PBPs have a lower facility to stimulate protein synthesis at the skeletal muscle level and induce muscle mass gain.

CONCLUSION

Even though switching to plant-based diets is recommended to reduce the environmental burden related to livestock farming globally, it is essential to ensure an adequate amount of protein depending on each individual's characteristics, that is, age, sex, health status, illness, sociocultural factors, etc. verifying that they receive the nine essential AA and appropriate supply with vitamins and minerals according to whether they are on an ABP, PBP or mixed diet.

FUTURE WORK / REFERENCES

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