

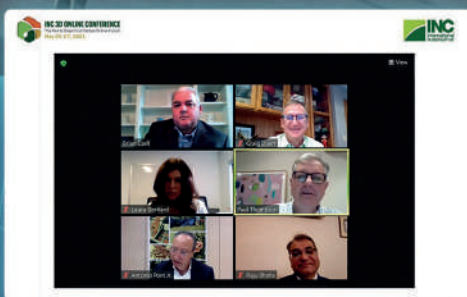
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Tree Nut Consumption Effects on Health: What We Know in Children and Adolescents?



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“Frequent nut consumption has specifically shown to have beneficial effects on the cardiovascular system, but also cognition, cancer prevention, and other health dimensions.”

One of the main characteristics of childhood and adolescence corresponds to Growth and Development, defined as a critical, biological, and temporal process which consists of endogenous and exogenous changes on the organism through time in order to optimize its functions¹.

The important role of nutrition in Growth and Development is self-evident; it is vital for the maintenance of life and, in the early stages, it also contributes to predict adulthood health². Nuts have been a part of the human diet since the beginning, and their nutritional properties have just begun to be investigated over the last decades, chiefly in adults³. Nuts are nutritionally dense foods consisting of a unique matrix of macronutrients, micronutrients, fiber, fat-soluble bioactive components, and phytochemicals³. Frequent nut consumption has specifically shown to have beneficial effects on the cardiovascular system (but also cognition, cancer prevention, and other health dimensions) with hundreds of epidemiologic studies conducted in adults. However, less attention has been paid to the health benefits in early life (children and adolescents)³.

In the case of children and adolescents, frequent nut consumption has been associated with some health benefits and emerging evidence suggests that it also may play an important role in mediating the quality of dietary patterns³. A study including children and adolescents revealed that replacing snacks with tree nuts or almonds led to an enrichment of diet, decreasing the consumption of empty calories and sodium, and increasing the intake of unsaturated fatty acids⁴. This improvement in diet quality has also been reported after daily consumption of almonds in parents and their children⁵.

In addition, it is well known that dietary patterns have an impact on the composition of gut microbiota, which at the same time, has been observed to influence health and disease³. Nuts' prebiotic effects have been explored recently in adults but also in children. An experimental study with a



short intervention based on hazelnut consumption showed a potential beneficial effect in fecal microbiota composition, more evident in hyperlipidemic subjects⁶. Besides, effects in the composition of different types of gut bacterial species were reported as well in parents-children binomials after an almond consumption intervention using a crossover study design. Additionally, these differences varied between adults and children⁵.

In children, nut consumption may have beneficial effects on neurodevelopment. Brain tissue has a very high energy demand, thereby greater levels of dietary fat are necessary to support its metabolic rate¹. During gestation, maternal nutrition appears to be an important factor contributing to an adequate fetal neurodevelopment with long-term outcomes. Certain nuts are an excellent source of “brain nutrients” like polyunsaturated fatty acids, polyphenols, folic acid and others that may have effects on brain function. In a recent study, a higher maternal nut intake in early pregnancy was associated with enhanced neuropsychological outcomes in offspring at 8 years old⁷, demonstrating the potential benefits of nut consumption on neurodevelopment.

As stated before, most of the research on nuts has focused on its effects on metabolism and cardiovascular protection³. Nuts have demonstrated beneficial effects on lipid profile, glucose metabolism, endothelial function, inflammation and other intermediate cardiovascular risk factors³. In adolescents, a few authors revealed that different types of nuts may decrease body mass index (BMI), BMI z-score as well as lower density lipoprotein cholesterol (LDL-c) and total cholesterol levels in nut consumers^{8,9}. Furthermore, in a randomized controlled trial conducted with Brazil nuts, a reduction in plasma triglycerides levels in female adolescents, compared to a placebo control group was reported⁹. On the other hand, an 8-week hazelnut intervention in children and adolescents diagnosed with hyperlipidemia did not improve LDL-c (“bad” cholesterol) but induced a decrease in DNA endogenous cell damage, which theoretically may

induce cardiovascular dysfunction¹². In an additional study conducted on a pediatric population with excess weight, an inverse association between nut consumption and carotid intima media thickness was reported, reflecting subclinical atherosclerosis during early life¹⁰. Data analyzed on adolescents from the National Health and Nutrition Examination Survey in the United States revealed that daily consumption of tree nuts was associated with a lower risk of developing metabolic syndrome and therefore, an improvement in some cardiovascular risk factors¹¹.

In relation to cancer, limited epidemiologic studies have been conducted in early stages of life. Over the last decades, cancer incidence has increased among young subjects, suggesting that it is no longer an “old man’s” disease³. Existing evidence like the “Nurses’ Health” studies have shown associations in early life stages between the consumption of vegetable fat, dietary fiber, vegetable protein and nuts¹³ and breast cancer risk. In a retrospective case-control study conducted in American adolescents, the frequency of nut consumption was inversely associated to future breast cancer risk and this was limited largely to postmenopausal women¹³.

Concluding, nuts are nutrient-dense foods with a great potential to influence human health, beginning in the early stages of life, and therefore, this could mean an important protection factor for adulthood health. However, further research is required to increase the level of evidence that will lead us to establish conclusions and potential recommendations. ■

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