



# The

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CHILDREN'S HEALTH



## Editorial

### Time matters

Once upon a time, in such an old period that I can hardly remember, children were taught to eat a sufficient amount of good foods in order to become tall and strong. How this was working, nobody really knew. Therefore, I was surprised when, because of my old knowledge in nutrition, I was asked to provide some comments about worrying medical news. I thought that this modern world was at least improving health.

Food choices have actually expanded in such huge proportion that within a country, or even a community, including the smallest one, the family eating patterns may differ strikingly. This widening of food choices leads to confusion between choosing for immediate pleasure and choosing for real health benefits.

Three recent examples, around the world, remind us that modern foods may be safer but still need to be part of a balanced diet, beginning in childhood.

In Turkey, children, and not only women or grand mothers, those eating less fruits and vegetables (and less fibres) were more likely to suffer constipation.

In Canada, the risk of suffering from severe inflammatory bowel disease (Crohn's disease) is reduced by 30 % in children eating higher amounts of vegetable and by 60 % in those eating higher amounts of fruit. The effect is proportional to the amount eaten. Dietary fibres seem to contribute to the overall benefit in combination with vitamins. Higher consumption of nuts and fish also prove to be beneficial. Although Crohn's disease is rare in children, a reason for its increased occurrence may be due to a decreased protection against inflammation provided by a high fat, low fibre but modern diet. Unbalanced intakes of the different fatty acids may also trigger inflammatory processes that are exacerbated in Crohn's disease.

In Europe, about 16 million children are now overweight or obese, an unknown situation 30 years ago. The occurrence of various cardiovascular risk factors (the so called "metabolic syndrome") was analysed in 5 different countries: Greece, Italy, Poland, Hungary and France. It was found that about one out of two of these young obese already has an enhanced cardiovascular risk, i.e. they become old before time. This suggests that negative changes in the environment such as less fruit and vegetable in the diet, are now overtaking health protective factors.

These three examples illustrate how several risks can be increased early in life. Does reducing them just mean doing the opposite? Yes. How far is it achievable? As much as we really want it...and I want it for sure for my grand children.

Yours faithfully,

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# Childhood constipation and fruit and vegetable intake

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Constipation is a common problem among children which adversely affects the daily life of both children and parents. It leads to a high number of medical visits and generates health-care costs as a result of the procedures involved in diagnosing it as well as the associated medical problems. Its frequency is vary from 7% to 28%<sup>[1,2]</sup> and girls are more affected than boys<sup>[3]</sup>. Constipation is seen frequently in children at about 1 year up to 9 years of age<sup>[1,3]</sup>.

According to Benninga and colleagues<sup>[4]</sup> the definition of childhood constipation is the occurrence of two or more of the following characteristics during the previous 8 weeks: (i) frequency of bowel movements less than three per week, (ii) more than one episode of fecal incontinence per week, (iii) the passing of stools so large that they obstruct the toilet, (iv) retentive posturing and withholding behaviour, and (v) painful defecation. The pathophysiology of constipation in children is not completely known. Two pathophysiologic mechanisms are used to explain constipation. The first of these is colonic inertia (slow-transit constipation), in which a failure of peristalsis that moves luminal contents through the colon prolongs the time for bacterial degradation of solids and more time for salt and water absorption, thus dramatically reducing stool frequency and stool weight. Interestingly, water and solids appear to be reduced proportionally in the stool of patients with constipation. The second mechanism is the outlet functional obstruction, in which an abnormal function of the pelvic floor or of rectum and anus results in transient obstruction and dyschezia. It is known that dietary factors such as a low fiber diet and low caloric intake are associated with constipation<sup>[5]</sup>.

Fruits and vegetables are particularly interesting for child health for their content of minerals, antioxidant vitamins, phytochemicals and dietary fiber. All these substances are related to lower risk for the development of health problems, such as certain types of cancer, cardiovascular diseases, type 2 diabetes, obesity, diverticulosis, and especially constipation<sup>[6]</sup>. Diet, particularly dietary fiber, has often been regarded as an important determinant of constipation, although personal factors

may be important as well<sup>[3,7]</sup>. Dietary fiber is known to exert a beneficial effect on constipation as a result of its fecal bolus mass-incrementing effect, water retention properties, and increase in colon bacteria and gas production, with an acceleration of colon transit<sup>[7]</sup>. Our study group in Turkey found that, compared to non-constipated children, those who were constipated had a lower consumption of fruit and vegetables and a higher consumption of bread, biscuits and macaroni which contained low fiber<sup>[1]</sup>. Comas and Polanco<sup>[8]</sup> showed the same results in Spain. Today, it is clear that low dietary fiber intake is a major risk factor for childhood constipation.

Constipation is a problem both in developed and developing countries. In the world literature, there are some studies reporting the relationship between fruit and vegetable consumption and constipation, but very few pertain to children. According to Dennison and colleagues<sup>[9]</sup> the majority of children do not consume the recommended number of fruit and vegetable servings/day. In this age group, over 70% of the population consume less than 3 portions of fruit every day on average. Naturally, those children are at risk for constipation<sup>[4]</sup>. Serving vegetables several times a day (i.e., for snacks, lunch, and dinner) and serving more than one vegetable at a time are ways to increase children's consumption of vegetables. Encouraging parents and day care providers to not only offer a variety of fruits and vegetables, but to also model eating them is probably one of the best ways to increase children's fruit and vegetable consumption<sup>[9]</sup>.

In conclusion, the most important preventive factors against childhood constipation are water, fruit and vegetable consumption and training on the use of the toilet. This preventive intervention should be reinforced at school. Family physicians, pediatricians, nurses, psychiatrists and paediatric surgeons should be aware of the potential risks of childhood constipation as a community problem. Detailed studies are needed to clarify the effects of fruit and vegetable consumption on childhood constipation.



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# Crohn's disease and its association with dietary vegetable and fruit consumption

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Crohn's disease (CD) is a chronic, relapsing disease resulting from inflammation of the gastrointestinal tract. Of unknown etiology, the disease is thought to result from complex interactions between genetic, environmental and immunological factors. Genetic susceptibility is well established and numerous genes associated with disease have been identified. The delineation of putative environmental factors such as diet has however been difficult and less successful. In spite of extensive research over nearly three decades, evidence for a link between dietary foods/nutrients and CD remains controversial. Given the relative rarity of disease, diet-CD associations have been most commonly studied using the case-control methodology. Implementing such designs in particular for CD is challenging as there can be substantial delays from symptom-onset to disease diagnosis. Given that patients are likely to modify their diets with the onset of disease, it is unclear whether the dietary information captured is "pre-illness" diet or "post-illness" diet. It is thus not surprising that reports of association between specific dietary elements such as vegetables, fruits and fats and CD have been quite inconsistent.

Children are increasingly susceptible for CD. In Canadian children the incidence of CD is about 8.3/105, numbers that seem to approach those in adults (13.4/105)<sup>(1)</sup>. Children affected with CD pose major public health challenges in particular as most children are affected during adolescence and consequently, growth delay is a major complication. Based on suggestions that Canadian children do not consume recommended amounts of fruits and vegetables<sup>(2, 3)</sup>, we investigated whether these imbalances could predispose to CD. We examined<sup>(4)</sup> whether diet during the 12 month prior to disease diagnosis was associated with disease. We utilized the case-control design based on newly-diagnosed cases, excluded those who reported changes in diet prior to disease diagnosis and assessed diet within 1 month of diagnosis. We assessed food consumption using a food-frequency questionnaire specifically validated in children. After controlling for potential confounding variables, we observed that consuming high amounts of vegetables and fruits was associated with significantly lower risks for CD. A dose-response relationship was evident indicating a trend for increasing risks with decreasing consumption.

Assessment of associations between individual foods and/or nutrients

vis-à-vis risk for disease has both advantages and disadvantages. On one hand the putative dietary elements that are protective or risk-conferring can be tracked out; however, assessing dietary patterns is likely to be more beneficial with regards to prevention and clinical intervention. This is because individuals tend to eat foods in combination and interactions between these foods are likely to underlie disease etiopathogenesis. Thus, in a follow-up to the above study in an enhanced cohort of subjects we first examined the characteristic dietary patterns prevalent in Canadian children and secondly, we evaluated whether any particular pattern was associated with the development of CD<sup>(5)</sup>. We observed that by and large, two dietary patterns were common between boys and girls: a traditional western pattern, characterized by meat, fried foods, fast foods, snacks and desserts, and a prudent pattern characterized by vegetables, fruits, dairy products, eggs, olive oil, dark breads, grains, fish and nuts. In both boys and girls, the prudent pattern was associated with significant reductions in risk for CD, whereas, the western pattern was associated with significantly elevated risks for CD, particularly in girls. We further analyzed whether the protection offered by the prudent pattern was related to consumption of vegetables and fruits using multivariate regression modeling. We observed that in girls much of the protective effects of a prudent pattern were related to vegetable consumption, but not fruits. However in boys, neither vegetables or fruits contributed to the protective effects associated with this pattern. These findings are extremely interesting and highlight the complex relationship between dietary consumption and CD pathogenesis.

Findings from our two studies seem to suggest that both vegetables and fruits individually or a prudent pattern heavily comprised of vegetables may provide protection from chronic diseases such as CD. We have speculated on the mechanisms whereby vegetables can provide this protection<sup>(6)</sup>. Constituents of vegetables are known to modify the levels and activities of detoxifying enzymes. Therefore, higher consumption may enhance and facilitate the clearance of toxic metabolites (viz. reactive oxygen species) that are routinely generated in body tissues including the gut. The latter can prevent recurrent gut injury and modify inflammatory processes that are characteristic of CD. Additional studies, preferably with prospectively ascertained dietary information, are required to shed further light on the associations between vegetables and fruits in CD etiopathogenesis.



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# Consequences of childhood obesity

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The growing epidemic of childhood obesity draws the attention to accompanying risk factors and co-morbidities. According to the most recent data, 22 million children in Europe are overweight and 5 million obese, increasing yearly by 300 000 children. The importance and significance of childhood obesity is indicated by the increasing societal and health burdens.

Traditional cardiovascular risk factors associated with obesity are frequently detected in children and especially in adolescents. Odds ratios for these risk factors are the following: 2.4 for raised diastolic blood pressure, 3.0 for raised low density lipoprotein cholesterol, 3.4 for low high density lipoprotein cholesterol, 4.5 for elevated systolic blood pressure, 7.1 for elevated triglycerides and 12.6 for high fasting insulin. In another study from Europe obese children had a 19.35 times higher risk of developing at least one risk factor, including increased blood pressure, hyperinsulinaemia/insulin resistance, impaired glucose tolerance/type 2 diabetes mellitus, increased LDL-cholesterol, decreased HDL-cholesterol or increased triglyceride level. They had 6.29 times higher risk of having more than one risk factor as compared to normal weight controls.

Overweight and obesity in youth also plays a central role in the development of the metabolic syndrome (MS), defined as clustering of the above listed risk factors<sup>2</sup>. A recent publication estimated the prevalence of MS in Europe on the basis of data obtained from a literature search and extrapolated them to the 25 member states. According to this study, the prevalence of MS among obese European children and adolescents is 23.9% (1.21 million children)<sup>1</sup>.

Population-based data suggest that the epidemic of adult obesity is being followed by an epidemic of type 2 diabetes mellitus (T2DM). In recent years, type 2 diabetes has increasingly been reported among overweight and obese children and adolescents. Currently, children with T2DM are usually diagnosed over the age of 10 years during middle to late puberty. As the childhood population becomes increasingly overweight, the occurrence of T2DM may be expected to shift to younger, prepubertal children. However, the prevalence of T2DM is still less than 2% in European obese children.<sup>3</sup>

Unfavourable psychosocial consequences, as a result of altered

physical appearance and physical handicap, are also common<sup>4</sup>. Children as young as 6 years may be labelled negatively, suffer rejection, have poorer interpersonal relationship and become socially isolated, or acquire a distorted body image. Obese children show depressive symptoms and signs. These psychosocial and psychological problems can persist into adulthood.

The social burden of obesity also affects educational attainment: learning difficulties<sup>5</sup> (due to night hypoventilation or sleep apnoea and malnutrition due to energy-dense, nutrient-poor foods) may lead to completing fewer years of schooling and decreased socio-economic status in adulthood.

Hormonal and pubertal developmental alterations may be the most distressing problems: pseudogynecomastia and pseudo-hypogonadism for obese boys; hirsutism and increased acne formation in obese girls, which can be aggravated by early menarche, irregular cycles or polycystic ovary syndrome.

Well-known and obvious orthopaedic complications, pseudotumor cerebri, skin alterations and impaired antioxidant status<sup>6</sup> are also observable in obese children.

The fast track of childhood obesity shown by epidemiological data from all over the world underscores that effort should be concentrated on determining the proper assessment of risk status and defining screening criteria. However, the dynamics of pathogenesis demonstrates that growing severity and /or prolonged duration of obesity leads to the increasing number of unfavourable parameters. Thus even the less pathological findings in early childhood carry increased risk of the development of obesity-associated diseases in early adulthood.

Furthermore, childhood obesity tends to persist to later life: the risk of adult obesity is twice as great for overweight as compared to non-overweight children. A review of the persistence of obesity in children indicated that 26-41% of obese preschoolers and 42-63% of obese school-age children became obese adults.

Taking all this into account, the growing body of convincing evidence suggests that attention should be focused on early childhood screening and prevention, and this is a shared responsibility of parents, caregivers and medical society



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