

Fruit and vegetables' consumption among children and adolescents: determinants of consumption and possible solutions

Abstract

Nutritional health during childhood and adolescence is important for supporting the growing body and for preventing future health problems. Fruits and vegetables are important components of a healthy diet. Their consumption varies considerably among and within countries. Large proportions of children do not fulfil the World Health Organization recommendation of eating fruit and vegetables per day. Reduced fruit and vegetables' consumption is linked to poor health, constipation and increased risk of overweight, obesity, noncommunicable diseases including cancer. The determinants for high consumption levels of fruit and vegetable are found to be related to socioeconomic status, high preferences for fruit and vegetables, high availability/accessibility of fruit and vegetables at home as well as peer influence. Possible solutions to improve fruit and vegetables' consumption include behavioural interventions and improvements in agricultural and food systems.

Keywords: fruit, vegetable consumption, children, adolescents, determinants

Volume 6 Issue 5 - 2017

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Received: January 19, 2017 | **Published:** May 09, 2017

Introduction

Nutritional health during childhood and adolescence is important for supporting the growing body and for preventing future health problems¹. Eating behaviour during this developmentally critical age period affects later life growth and disease prevention. Fruit and vegetables are important components of a healthy diet and their consumption is linked to improved health and reduced risk of various diseases including non-communicable diseases,¹ certain types of cancers, as well as improving school performance and productivity.²

In addition, specific components of fruit and vegetables have important health effects.^{3,4} Phytoestrogens and phytoosterols found in vegetables are antioxidants which inhibit growth of cancer cells. Moreover, phytoestrogens further play a preventative role in heart disease and hypertension by decreasing blood cholesterol levels and platelet aggregation.^{3,4} Antioxidative flavinoids, present in these foods, are protective against cancer, heart disease, stroke and hypertension.^{1,3} They are also very high in water content, relatively high in carbohydrates, low in fat and proteins and are vital sources of vitamins such as vitamin C, thiamine, niacin, pyridoxine, folacin and many others.⁵

Furthermore, obesity prevention from an early age has become a major public health priority. In the same context, recent studies have linked obesity and overweight among this age group to low intake of fruit and vegetables.⁶ Children who had low vegetable consumption had two times higher risk for obesity compared to their counterparts. That was attributed to the low energy density of vegetables and thus few calorie consumption.⁶ However, other studies did not find a relationship between fruit and vegetable consumption among children.⁷ Moreover, certain vegetables have been associated with reduced diarrhoea-related deaths and morbidity probably due to their moderate amounts of α - and β -carotene.⁸ In 2010, 6.7 million deaths were related to inadequate fruit and vegetables consumption.¹ Adequate intake is defined as 400 to 500 grams per day (g/d) or 5 servings of fruit and/or vegetables.⁹

The consumption of fruit and vegetables varies considerably among and within countries. For instance, in the United States, the per capita consumption of total vegetables among children aged 6-12 years decreased steeply from 386 in 2009 to 375 in 2014. Also, the per capita consumption of total fruit amongst those aged <6 years decreased from 474 in 2009 to 416 in 2014.¹⁰

Fruit and vegetable consumption amongst Sudanese children

Khartoum, the capital of Sudan, is one of the main areas for the production of fruit and vegetables in general and for their export in particular.¹¹ Our research team conducted a study on university students (n=121) aged 16-19 (mean 17.7±0.5) years aiming at determining their dietary pattern. Repeated 24 hour recall records (n=3) were used. The mean intake of fruits among boys was only 2.1±0.97 and 1.57±0.87 amongst girls (P=0.007). The amount is far below the recommended amounts by the WHO.⁹ Students (60%; 43% boys compared to 68% girls) did not consume fruits and only 7% had whole fruit pieces whereas 33% had fruit juices (50% boys whereas 25% girls). The findings indicated that fruits were only consumed as snacks. Moreover, 90% of the children did not consume vegetables on a daily basis with only 7.5% having potato chips. The mean intake of vegetables amongst boys was 1.02±0.2 whereas among girls was 1.1.8±0.5 (P=0.02) which is also less than the recommended daily intake.⁹

In another study conducted in Khartoum, aiming at determining the fruit and vegetables consumptions amongst children (n=150) aged 7-12 (mean 10±1.7) years, a specifically designed food frequency questionnaire was used. Children (59.3%) did not consume vegetables at all compared to 28.6% for fruit. The main reason for this was their dislike to the taste (49%) whereas as the remaining children reported no consumption mainly due to high, unaffordable price as well as taste preferences. The servings consumed by fruit and vegetable consumers are shown on (Table 1). Similar reasons were reported elsewhere.^{2,10} Interestingly, there was a significant correlation between the fathers'

educational level and children's fruit and vegetable consumption ($P=0.02$, $r=0.2$). Parents' education was shown previously to affect the consumption of these commodities.¹²

Table 1 Number of servings consumed by children from the vegetable and fruit groups: Number and percent are shown

| Number of Servings | N (%) |
|------------------------------|-----------|
| Vegetable consumption | |
| Not eaten | 89 (59.3) |
| 1-2 servings | 22 (14.7) |
| 3-4 servings | 39 (26) |
| Fruit consumption | |
| Not eaten | 89 (28.6) |
| 1-2 servings | 43 (28.6) |
| 3-4 servings | 18 (12.0) |

Moreover, our study team conducted another study including children ($n=100$) aged 6-9years (mean 89.5 ± 15.7 months). The mean daily intake of fresh fruit and vegetables was 89 g and 180 g respectively. Parental consumption of these foods affected their children's consumption positively. Similar findings were reported elsewhere.¹⁰ Other studies conducted in various countries found that the consumption of fruit and vegetables among children was determined by factors such as gender where boys' intake was lower than their counterparts,¹³ socio-economic status¹⁴ and peers and/or teacher influence.²

Possible solutions to improve fruit and vegetable consumption amongst children

According to the WHO recommendations, behavioural interventions and improvements in the agricultural and food systems play important roles in increasing fruit and vegetable consumption.¹ In a country such as Sudan, reducing the price of these commodities might help improve children's intake. One study found that a school cooking and tasting intervention helped in increasing the preferences for a variety of vegetables.¹⁵ Other interventions used school gardening as a tool as well as nutritional education.^{1,16} School gardening was very successful in the past in Sudan; however, it is no longer available. Nutrition education should not just target children but also their parents who, as stated earlier, could influence their children's intake. Moreover, education could explain the future health implications of not consuming fruit and vegetables. In an interesting effort to encourage children to consume fruit and vegetables, Sharp and co-workers in 2013 found that role modelling initiated by watching a short movie Food Dudes programme enjoyed by children had a successful effect on increasing the intake of these foods. That was followed by rewarding those children by prizes which increased the chance of repeating the experience of consuming the fruit and vegetables liked by children.^{17,18} This intervention had helped increase the consumption of these foods statistically not just in the school by even at home. In addition, parents were satisfied and recommended that the programme be applied to all nursery classes.

From personal experiences, having many children around the same table make feeding and eating situations more interesting and encouraging. Similar solution was stated previously. Others suggested that by letting children select vegetables themselves, this might have a positive significant effect on vegetable intake¹³ and focussing on

female gender is encouraged. Preparing meals with children may also improve the intake of the children, enabling a positive experience with vegetables and fruit (from personal experience).

Conclusion

Fruit and vegetables' consumption could protect children and reduce the risk of non-communicable diseases. Further studies are required for the determination of other causes for low intakes of their commodities. The possible solutions to solve those causes should be addressed by governments, health and education authorities. This could be achieved by the development of educational programmes targeting school children, teachers and families. These programmes could be broadcasted through mass medias, computer games, creative animations and so forth.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

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