

Fruit and Vegetables Consumption among Children and Adolescents: Determinants of Consumption and Possible Solutions

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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 fulfill 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 non-communicable diseases including cancer. The dietary fibre available in the outer skin of these foods could help to lower blood pressure, and together with phytochemicals such as plant sterols, flavonoids and other antioxidants found in fruit and vegetables may be important in modulating cholesterol and other biological processes. In addition, obesity and overweight among this age group is being associated with low intake of fruit and vegetables. The determinants for high consumption levels of fruit and vegetable are found to be related to female gender, socioeconomic status, high preferences for fruit and vegetables, large parental intake of fruit and vegetables and 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 will be discussed.

Keywords: Fruit and vegetable consumption; Sudan; Children; Determinants of intake

Introduction

Nutritional health during childhood and adolescence is important for supporting the growing body and for preventing future health problems. 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 known as phytochemicals such as plant sterols, flavonoids and other antioxidants may be important in modulating cholesterol and other biological processes thus protecting against chronic diseases such as hypertension [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.

Furthermore, obesity prevention from an early age has become a major public health priority. However, recent studies have linked obesity and overweight among this age group to low intake of fruit and vegetables [4,5]. Moreover, certain vegetables have been associated with reduced diarrhea-related deaths and morbidity probably due to their moderate amounts of α - and β -carotene [6]. In 2010, 6.7 million deaths were related to inadequate fruit and vegetables consumption. Adequate intake is defined as 400 to 500 grams per day (g/d) or 5 servings of fruit and/or vegetables [7]. 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 [8].

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 [9]. 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 findings indicated that fruits were only consumed as snacks. 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). Significant differences were found between boys and girls regarding their fruit consumption ($P=0.005$). On the other hand, 90% of the children did not consume vegetables on a daily basis with only 7.5% having potato chips. No significant differences were reported between boys and girls in terms of their vegetable consumption.

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 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 [2,8].

Interestingly, there was a significant correlation between the fathers' educational level and children's fruit and vegetable consumption ($P=0.02$, $r=0.2$).

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)

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

Moreover, our study team conducted another study including children ($n=100$), aged 6-9 years (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 [5,10]. 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 [11], socio-economic status [12] 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 [13]. Other interventions used school gardening as a tool as well as nutritional education [1,14]. 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. From personal experiences, having many children around the same table make feeding and eating situations more interesting and encouraging. Similar solution was stated previously [15]. Others suggested that by

letting children select vegetables themselves, this might have a positive significant effect on vegetable intake [10]. Preparing meals with children may also improve the intake of the children, enabling a positive experience with vegetables and fruits (from personal experience).

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