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Causes of Nutritional Deficiency Among Young Girls

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ABSTRACT: Young girls undernutrition is a major public health problem. Inadequate dietary intake of nutrients is the major determinants of undernutrition. However, the adequacy of dietary intake among young girls was not sufficiently explored. The present study aims to estimate the inadequacy of nutrient intake among young girls. The contribution of carbohydrate, protein and fat for the total energy was 80, 10 and 8 %, respectively. The prevalence of inadequate intake of protein was 60.9 %. The prevalence of inadequate intake of iron for early young girls and late young girls was 82 and 53 %, respectively. The prevalence of inadequate intake of folate was 83.9 % and zinc was 58 %. The prevalence of inadequate intake was greater than 90 % for vitamin B12, vitamin C and calcium. The present study found an alarmingly high prevalence of inadequate intake of some nutrients among young girls.

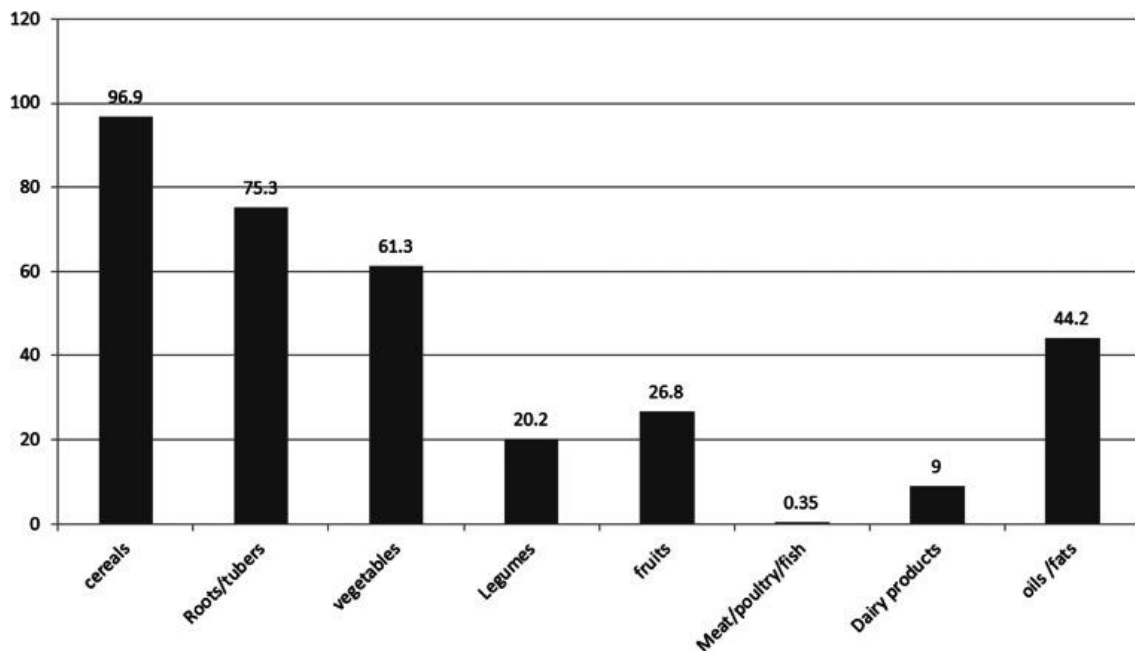
KEYWORDS: young girls, nutrition, deficiency, balanced diet, vitamin, carbohydrate, folate, calcium

I. INTRODUCTION

Young girls are nutritionally vulnerable due to the rapid changes in growth, development change in way of life and dietary pattern that impact both dietary intake and nutrient requirement⁽¹⁾. It is a period where they reach nearly 15 % of their ultimate adult height, nearly half of their adult skeletal mass and half of the optimum adult weight⁽²⁾. At the height of their growth spurt, Young girls need a high amount of macro and micronutrients. The calcium, iron and zinc requirements double during adolescence⁽²⁾. Adolescence undernutrition has been linked to delayed growth spurt⁽¹⁾ and increases the risk of morbidity and mortality^(3,4). Ensuring that adolescent girls are nutritionally fit before they become mothers is vital to disrupt the vicious cycle of malnutrition. For many Young girls in developing countries, inadequate dietary intake of nutrients is one of the primary causes of malnutrition⁽⁵⁾. The sources of energy for Young girls in middle- and low-income countries particularly for Young girls from low socioeconomic status were restricted to a repetitive consumption of limited staples⁽⁶⁻⁸⁾. The national food consumption survey also reported that a monotonous diet in households was common across different regions⁽⁹⁾. The consumption of calories was reported to be insufficient for the majority of schoolchildren and Young girls in developing countries⁽¹⁰⁾. Studies conducted in a peri-urban setting in different countries reported that only 17.3–64 % among school-age children and Young girls receive adequate calories⁽¹¹⁻¹³⁾. Micronutrient intake among Young girls in low and middle-income countries is generally suboptimal⁽¹⁴⁾. For instance, inadequate vitamin A intake among school children was 85 %⁽¹⁵⁾. The prevalence of inadequacy for vitamins ranged from 20 % for vitamin A to 80 % for folate, particularly among girls⁽¹⁶⁾. In Young girls, an inadequate intake of vitamin B12, folate and vitamin A was reported to be 83.9, 81 and 45.3 %, respectively, while on the other hand⁽¹⁷⁾ in post young girls the average intakes of calcium and zinc were 56 and 70 % of the RDA⁽¹⁸⁾. In school children, calcium and iron intakes were 56 and 70 % of the RDA, respectively⁽¹⁹⁾. Even though in some cases iron intake was adequate, majorly it is from plant sources⁽²⁰⁾ with limited bioavailability. The recommended dietary allowance for protein, iron, calcium and zinc among Young girls depends on age and sex. Studies conducted in some parts of world showed that Stunting, thinness and anaemia among Young girls are major public health problems⁽²¹⁻²³⁾. The government has developed the national nutritional programme (NNP) and set a target to prevent and control malnutrition. One of the strategic objectives of this programme is to improve the nutritional status of Young girls⁽²⁴⁾. Even though the government is committed to alleviate adolescent malnutrition in all its forms, there is a lack of information to deliver targeted evidence-based intervention in regard to the intake of nutrition quality and quantity. Hence, the present study aims to estimate the inadequacy of nutrient intake among adolescent girls.

II. DISCUSSION

Plant-based foods such as cereal (96.9 %), leafy vegetables (61.3 %), and roots and tubers (75.3 %) were the most consumed food groups. However, flesh foods (0.35 %) and dairy products (9 %) were the least consumed food groups. Most of the adolescent girls (96.7 %) consumed coffee drinks (coffee beans and leaves) with their meals.



On an average, The mean energy intake was 1452.7 ± 356.3 kcal/d. The contribution of carbohydrate, protein and fat for the total energy was 80, 10 and 8 %, respectively. The mean intake of carbohydrates was 305.6 ± 2.4 g, which accounted for about 80 % of the total diet. The mean intake of protein among the Young girls was 33.57 ± 13.3 g, which was around 10 % of their diet. The median total fat intake was 13.4 g (IQR 8.8, 19.8), which accounted for 8 % of their diet. The median intake of vitamin A was 1952.8 IQR (99.1, 2737.9). Whereas the intake of dietary fibre was 18.6 ± 13.3 . Nearly all Young girls are consuming inadequate vitamins C (98.8 %), B12 (98.8 %) and calcium (98.4 %). Similarly, 83.9 and 86.9 % of Young girls were consuming inadequate intake of B12 and folate, respectively. The prevalence of inadequate intake of protein was 83.9 %. The prevalence of inadequate intake of iron was 82 and 53 % for early Young girls (10–14 years) and late Young girls (15–19 years), respectively. The present study found that the total energy contribution of carbohydrate, protein and fat was 80, 10 and 8 %, respectively. The contribution of carbohydrate to total energy intake was found to be higher than acceptable limits set by the Institute of Medicine for carbohydrates. However, it was below the limit for protein and fat⁽³²⁾. A systematic review conducted among adolescent girls in developing countries reports similar findings that carbohydrates contribute the largest share of the total energy intake of Young girls⁽³³⁾. Except for carbohydrate, these finding was lower than the national food consumption survey among other age groups⁽⁹⁾.

The prevalence of inadequate intake of iron was 82 and 53 % for Young girls and years respectively. This might be due to the low consumption of animal source foods and vitamin C rich fruits. Similarly, the intake of iron among Young girls in low and middle-income countries is low⁽¹⁷⁾. Young girls from low-income countries experience monotonous or less diversified types of diets dominated by cereals, whole grains, roots and tubers; these plant-based staple foods, which are unrefined, are rich in phytates that can bind and significantly reduce the absorption of non-hem iron by forming insoluble Fe complexes. Unleavened bread made of unrefined maize flour was commonly consumed among the Young girls of the study area Cereals, such as whole-maize flour, containing 1–2 % phytic acid⁽³⁴⁾. Vitamin C from fruits and vegetables is important in enhancing the absorption of non-haem iron from plant-based diets⁽³⁵⁾. However, in the present study, only 0.35 % of adolescent girls consume meat, poultry and fish. The prevalence of inadequacy for vitamin C was found out to be 98.8 %. This high inadequacy could be due to low dietary intake of citrus fruits and vitamin C-rich foods. The inadequacy of Vitamin C decreases the absorption of non-haem iron. Furthermore, most of the Young girls consumed coffee drinks with their meals. Coffee is high in Phenolic compound which has marked iron-binding properties and inhibits its absorption. Even though we did not examine the effect of coffee on serum ferritin; several studies have shown that coffee consumption is associated with low serum ferritin⁽³⁶⁾. A similar study also showed that a cup of coffee reduced iron absorption from a hamburger meal by 39 %⁽³⁷⁾. Moreover, coffee consumption has been associated with anaemia^(38,39). Calcium also interferes with iron absorption which was not a concern in the

present study due to low intake of milk and milk products. We also observed foods consumed in the study area were highly cooked; this might result in loss of substantial amounts of folate during cooking. Making a comparison with other studies conducted in other countries is limited due to the different recommendations and criteria for adequate intake were used. However, we can observe a low intake of calcium among low-, middle-low- and middle-income countries.

III.RESULTS AND CONCLUSIONS

Young girls gain up to nearly half of their skeletal mass during this age group. Due to this, calcium requirement is high for bone growth and skeletal development⁽⁴²⁾. However, calcium was one of the nutrients with the highest prevalence of inadequacy among adolescent girls. This could be due to the low consumption of milk products which are the main sources of calcium in the present study. Similar findings have been reported by studies conducted in both developed and developing countries where the prevalence of calcium inadequacy is high^(33,43-46). A study done among 13 year olds showed that calcium and vitamin D were consumed the least (<50 % of the recommended nutrient intake (RNI)), for females⁽⁴⁷⁾. Young girls had inadequate intake of calcium 71 %⁽⁴⁶⁾. The intake of calcium was found to be significantly far below the RDA among adolescent girls of India⁽⁴⁴⁾ and also in other developing countries the average intake of calcium was only 56 % of the RDA⁽⁸⁾. Similar studies conducted in developed countries have reported higher calcium intakes. It also showed that calcium intake in Young girls aged from 11 to 14 years was 993 mg/d⁽⁴⁸⁾, and the mean calcium intake evaluated on Young girls aged from 11 to 18 was estimated to be 1172 mg/d⁽⁴⁹⁾. In a study conducted in eight cities showed that the mean of calcium intake was 859.9 ± 249.2 mg/d⁽⁵⁰⁾.

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| Volume 10, Issue 3, May 2023 |

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