ORIGINAL RESEARCH PAPER

Volume-8 | Issue-4 | April-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

NUTRITIONAL STATUS OF CHILDREN WITH BRONCHIAL ASTHMA

Clinical Research

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ABSTRACT

Asthma is a serious and most common chronic disease that affects health and wellbeing of children. Its effect on the nutritional status and lifestyle of young children is sparse. Hence, this study aimed at assessing the nutritional status and diet habits of children (7 – 12 yrs) with bronchial asthma.

Methods: 52 children who presented with asthma exacerbation at the Pulmonary OPD in Ernakulam were included. Information on demographic data, family history, asthma symptoms and triggers, participation in sports and physical activity was collected. Anthropometric and biophysical assessments were done. Dietary intake during and after an asthma attack was collected using a 24 hr diet recall. Pulmonary Function test value which is used to confirm and monitor asthma was also recorded.

Results:Most subjects had normal or above normal BMI. PFT value revealed poor asthma control in almost half of the subjects. Sports and physical activity was restricted due to asthma. Most subjects inherited asthma from either maternal or paternal grandparents. Skipping of generation was seen with regard to asthma inheritance. Cold, cough and environmental factors were considered as triggers. Food triggers included cold foods, chicken, eggs, shellfish, pulses, pickles, fried foods, bakery products, banana, chocolates and nuts. Diary and citrus fruits were commonly avoided during exacerbation. The intake of nutrients like calorie, iron, and vitamin A was grossly lesser than RDA for most children. A gross reduction in the food intake was observed during an asthma attack among all age groups.

Conclusion: The diet lacked variety,was insufficient and unbalanced. There was a further reduction in nutrient intake during an asthma attack. Educating parents and encouraging children to have sufficient and balanced food during an attack and otherwise is needed to build a healthy diet habit.

KEYWORDS

Asthma, food triggers, dietary intake

INTRODUCTION

Asthma, according to Global Initiative for Asthma)\ (GINA) (2016) is a heterogeneous disease characterized with chronic air way inflammation. It is defined with a history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and intensity, together with variable expiratory airflow limitation.Exercise, exposure to allergen, change in weather and viral respiratory infections are common triggers of asthma. (GINA, 2016)

While there are many studies relating to obesity and asthma, very few studies have been done on malnutrition in asthma. Malnutrition in asthma occurs due to low intake of food caused by poor asthma control and recurrent infections.

Long term cough and untreated asthma may reduce the child's ability to breast feed (Ostergaard,1998) which relates to lower weight and height in the age group of 3 – 10 years of age (Camargos, 2010 & Wu, 2011) and may lead to malnutrition in the long term (Kikafunda, 1998). Underlying asthma causing malnutrition can cause pneumonia/ respiratory infection in children (Ostergaard,2012).

Asthma particularly among children has grown in prevalence and is a worldwide public health burden. Food is a very important cause of asthma but is often overlooked, as sometimes skin allergy tests can be negative and history is not always helpful. In most of the patients symptoms appear gradually, hours or days after ingestion of food. It has been estimated that less than 10% may notice that their symptoms are provoked by certain foods or drinks. Children are more sensitive to foods than adults. (Gupta, 2007)

Various studies have been affirmed the role of diet and nutrients in improving or alleviating the symptoms and/severity of asthma.Anti oxidants like vitamin C, β – carotene, magnesium and selenium have been associated with reduction of asthma prevalence and limiting airway inflammation. Regular consumption of fruits and vegetables rich in antioxidants have shown to reduce the frequency and occurrence of asthma. (Kim, 2009)

Unhealthy dietary habits have been correlated to asthma. Changes in nutrient composition and quality in most western diets like reduction in antioxidants, n-3 Fatty Acid and increase in n-6 PUFAs and deficiency in vitamin D have all been associated with asthma (Peroni et al, 2012). On the other hand, intolerance to food also triggers asthma. A comprehensive study to understand the role of food in asthma and the effect of the disease on the nutritional status is essential.

Hence, the study was conducted to assess the nutritional status of children with bronchial asthma. A detailed evaluation of the food intake during an attack and otherwise was also done to understand the effect of the disease on the food intake of children.

MATERIAL AND METHODS

The study was conducted at the Pulmonary OPD of a multispeciality hospital in Kochi, Kerala for a period of four months. A total of 52 children, 30 boys and 22 girls between the age of 7 – 12 years who came with complaints of asthma exacerbation were evaluated. Children with tuberculosis, pneumonia and other lung disease were omitted from the study. An oral consent of the parents was taken prior to data collection.

A well structured interview schedule was used to gather data regarding socio demographic profile, anthropometric details, family history, symptoms/ trigger factors and allergies, participation in sports and physical activities. A 24 hour dietary recall during an attack and on other days was done. The PFT value was noted down from medical records.

The height was measured using a stadiometer. Children were asked to stand barefoot and straight with the back of the head, shoulders and heel touching the stadiometer rod and the height noted.

The weight of the subjects was measured on a weighing scale. The needle of the weighing scale was checked for zero error before every weighing. Children were asked to stand erect and look straight and weight was noted.

Body Mass Index or BMI

The Quetelet's Index (W/H^2) , the most widely used height – weight index commonly referred as body mass index (BMI) is a validated measure of nutritional status. The BMI was calculated using weight and height measurements and the results interpreted as shown in table 1.

Table – 1: BMI classification for children and adolescents

BMI percentile for age*	Weight status
< 5th percentile	Under weight
5th – 84th percentile	Normal weight
85th – 94th percentile	At risk of overweight
≥ 95th percentile	Obese

*CDC BMI –for –age growth charts (2000)

Pulmonary Function Test

The PFT value was recorded from the medical records of the selected subjects and was interpreted as given in Table 2. According to the American Academy of Asthma and Immunology, Pulmonary Function tests determine the lung function by measuring the amount of air the lungs hold and how fast air enters and exits the respiratory system. They aid diagnosis, help monitor response to treatment and can guide decision regarding further treatment and intervention.

Table – 2: Interpretation of Pulmonary Function Test in Children

FEV1/FVC	Interpretation
<0.9	Asthmatic
>0.9	Normal

GINA Pocket guidelines, 2015

Dietary assessment

A diet recall both during an exacerbation and when under control was collected to assess the effect of bronchitis on nutrient intake. Nutrient intake was calculated using dietcal software, version 5.0, 2015. The intake of calorie, protein, carbohydrate, fat, iron and beta- carotene was calculated and compared with the recommended dietary allowance for children as recommended by ICMR (2010).

RESULTS AND DISCUSSION:

The subjects included 30 (57.68%) boys and 22 (42.29%) girls of which majority of the boys (26.92%) were in the age of 9 – 10 years, and majority of the girls (17.30%) were in the age group of 11 – 12 years.

Among the 52 children surveyed in this study majority (65.38%) had a normal BMI, while 21.15% and 5.77% were overweight and obese. A small number of children (7.69%) were found to be underweight.

A study done to know the relationship between weight status and asthma concluded that obesity is more common than underweight among children with asthma (Lang, 2012). The same trend was seen in the current study where there were more children with above normal BMI, than under weight.

Of the 52 subjects only 33 had undertaken the spirometry test. In 51.52% of the subjects, the FEV1/FVC value was >0.9 indicating that the asthma was under control. However, the rest (48.48%) had a FEV1/FVC reading of <0.9 indicating restricted airflow or poor asthma control.

About 35 subjects had at least one family member with asthma. Among the children whose parents were asthmatic, 31.43% had an asthmatic mother while the fathers of 20% were asthmatic. Majority of the paternal grandparents had asthma and only 8.71% of their offspring i.e. father had asthma indicating skipping of generation. Such skipping of generation was found on maternal side as well. It was also noted that trait of asthma was passed to the grandchildren either from the maternal side or paternal side only and not both. Asthma inheritance was more from the grandparents than parents.

Children with asthma particularly those with moderate – to – severe asthma have a lower level of physical activity (Lam et al, 2016) . In this study only few subjects participated in sports and12 among them reported difficulty while participating.

Children reported asthma while participating in athletics (88%) and while climbing stairs (60%) which is a day to day task. A small fraction of subjects had asthma while cycling (8%) and playing football (4%).

Food Triggers

Cold foods were a major trigger for asthma (40.74%). Other than the common asthma triggers like dairy products (25.92%) , citrus fruits (18.91%), egg and chicken (14%), shell fish (7.4%), pulses (3.7%), fried food (7.4%), pickles (3.7%),bakery products(9.61%) banana, chocolates & nuts (3.7%) were also reported to trigger asthma.Some of the foods mentioned above were also reported as offending in a study by Raj Kumar et al (2010).

Children were asked to avoid cold foods (55.17%), citrus fruits/ juices (24.14%) and bakery foods (17.24%) by the consulting physician. In a study done in Calicut by Krishnankutty and Subburaman (2015) all home cooked foods were allowed except for "kadala curry", potato dry fry and fried foods. Of the food items bought from shops, only biscuits, rusk and bread were allowed. All other fried food, confectionaries and food items containing artificial taste makers, coloring and sweetening agents and health drink powders were asked to be avoided. the study concluded that this helped reduce asthma symptoms by 40% in just 2 weeks.

Majority of the parents avoided cold foods (76.92%), milk (36.54%) and chocolate (30.77%) during an asthma exacerbation. The other foods avoided were Chicken (26.92%), citrus fruits (23.08%), shell fish and soft drinks (13.46).

Nutrient intake

Table – 3: Percent difference in nutrient intake wrt to RDA

Nutrient	7-9 yrs	10-12	10-12yrs girls
Energy Kcal /d	-37.40%	-39.32%	-38.80%
Protein g/d	-22.03%	-4.76%	-18.32%
Fat g/d	-3.33%	-5.71%	-17.14%
Iron mg/d	-50%	-61.90%	-70.37%
Vit A µg (β – Carotene)	-80.45%	-87.16%	-83.19%

*RDA for Indians (ICMR, 2010)

Nutrient intake of the subjects was predominantly inadequate for their age. The intake of iron and vitamin A was grossly deficient than RDA among all age groups. Inadequate protein intake was noticed in both genders among all age groups except 7-9yrs where an overconsumption was seen.

Table – 4: Difference in nutrient intake during an asthma attack and when under control

Nutrient	7-9 yrs	10-12 yrs boys	10-12yrs girls
Energy Kcal /d	-28 %	-12%	-16%
Protein g/d	-30%	-16%	-9.09%
Fat g/d	-31%	-9.09%	-17.24%
Iron mg/d	-25%	-	-
Vit A µg (β – Carotene)	-8.85%	-3.30%	-55.14%

Data from table 4 shows that food intake of the children was affected during asthma exacerbations. A further decrease in the intake of food and correspondingly the intake of nutrients was seen.

Rice, meat and fried snacks were commonly consumed foods. They showed preference for store bought snack. The consumption of fruits and vegetables was very less.

CONCLUSION:

Nutritional status of children varied with duration and severity of the disease. In concordance with earlier studies, there were more children with above normal BMI than underweight. However more data is required to corroborate if BMI is a compounding factor for the disease. Of the 33 subject who underwent PFT, 16 had restricted airflow indicating poor asthma control while the rest had normal airflow. Involvement in sports/physical activities was restricted due to asthma. In the current sample asthma inheritance was more from the grandparents than parents.

Cold foods, dairy and citrus foods were the common food triggers for asthma and were avoided during an asthma attack. The food intake of this population was poor, unbalanced and lacked variety both during an attack and otherwise. Hence, it is essential to educate both parents regarding healthy eating habits that help in preventing recurrent infections and asthma flare-ups.

ACKNOWLEDGMENT:

The support extended by the staff of Pulmonary Department, Amrita Institute of Medical Sciences, Kochi in the conduct of this study is highly appreciated and acknowledged.

Funding:

None.

Conflict of Interest:

None

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