Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Community Medicine

Obesity and its Determinants among the Children with Bronchial Asthma

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DOI: 10.36347/sjams.2022.v10i08.004 | **Received:** 28.06.2022 | **Accepted:** 03.08.2022 | **Published:** 07.08.2022

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Abstract **Original Research Article**

Childhood Asthma is a major health problem and obesity is a grave consequence of its treatment among the children. The cross sectional study was conducted among 104 children with Bronchial Asthma at the outpatient department of National Asthma Centre, Dhaka during the period January to June, 2012 to determine obesity and its determinants among the children with Bronchial Asthma. Data were collected through face-to-face interview and reviewing medical records by using a semi-structured questionnaire and checklist respectively. Majority (67.0%) of the asthmatic children was male and the mean age of the children was 11.5 (+4.075) years. Most (88.5%) of them were Muslim and majority (54.8%) had 5-7 family members with average family size 4.84 (+23.1). Average monthly family income was Tk.19750.00 (±10233.915). Among the children 65.4% had family history of asthma and majority was fathers (30.9%). Majority (63.7%) of children performed physical exercise and majority (45.5%) did for 30 minutes. Aggravating factors for asthma included cold exposure (50.0%), hot weather (48.1%), dust exposure (36.5%) and allergy (13.5%). Majority (67.3%) attended to Government hospitals and doctors chamber (61.5%) for treatment. Regarding food habit, majority (51.9%) were fond of meat followed by fast food (24.0%), sweet food (21.2%), and soft drinks (17.3%). Regarding obesity 11.5% children were overweight, 15.4% were class 1 (moderate) obese and 54.0% had family history of obesity. Drugs used by the children were montelukast (59.6%), theophylline (59.6%), steroid (42.3%), ketotifen (23.1%) and salbutamol (32.7%). Most (98%) children used the drugs for 2-12 months. Overweight and obesity were significantly **(**χ^2, $p<0.01$) higher among users of steroid (54.5%), montelukast (35.5%), ketotifen (79.2%) and salbutamol (67.6%) than non-users of steroid (6.6%), montelukast (14.2%), ketotifen (11.3%) and salbutamol (7.2%). Obesity was significantly **(**χ^2, $p< 0.01$) higher among who had family history of obesity (45.5%) than who had not (4.2%). Obesity was significantly **(**χ^2, $p< 0.01$) low among the children who practiced regular physical exercise (9.1%) than who did not (26.3%) The study recommends measures/intervention like rational use of asthmatic drugs, increasing awareness of both parents and physicians regarding obesity, physical exercise and change in dietary habit for prevention of obesity among the asthmatic children.

Keywords: prevention, physical exercise, Obesity, Bronchial Asthma.

INTRODUCTION

Asthma is characterized by chronic airway inflammation and increased airway hyper responsiveness leading to symptoms of wheeze, cough, chest tightness and dyspnoea. It is characterized functionally by the presence of airflow obstruction which is variable over short periods of time, or is reversible with treatment [1]. The prevalence of asthma increased steadily over the latter part of last century in countries with a western life style and is also increasing in developing countries. Current estimate suggest that 300 million people world- wide suffer from asthma and an additional 100 million may be diagnosed with asthma by 2025. In child hood asthma is more common in boys, but following puberty females are more frequently affected. The socio-economic impact of asthma is enormous, particularly when poor control leads to days lost from school or work, hospital, admission and for some patients, a premature death [1]. The increase in asthma may also be linked to rise of obesity in western-society through mechanical mechanism such as gastro-oesophageal, reflux. Shared genetic trait, modification of the immune system by diet or alteration of airway responsiveness by hormones are, however alternative explanations. Obesity can be

defined as bodily accumulation of fat in the adipose tissue. Obesity is widely regarded as a pandemic with potentially disastrous consequences for human health. More than 20% of adults in the UK, and more than 30% is USA, are obese. The prevalence of obesity has increased three fold within last 20 years and continues to rise. In developing countries average national rates of obesity are not nearly so high, but these figures disguise alarming by high rates of obesity in many urban communities [1]. Obesity can be quantified conveniently using the body mass index (BMI). BMI is calculated as the person's weight in kilogram divided by the square of his/her height in meters (kg/m^2) [1]. According to National Asthma prevalence study, 2010, in Bangladesh the prevalence of asthma is 6.9% of total population. Majority of these patients are in 1-15 years age group, that is 7.4% of total pediatric population of our country is suffering from asthma [2]. Asthma in Bangladesh appears to be a substantial public health problem. An estimated 11.6 million people including 4.1 million children suffer from asthma related symptoms [3]. According to a study among schools of Dhaka city obesity prevalence is 17.9% [4]. It is evidenced that children with bronchial asthma become obese due to consumption of weight gaining medications, lack of physical activity or other dietary and familial cause. On the other to hand obesity itself an established risk factor for bronchial asthma. This study intends to find out obesity and its determinants among children with Bronchial Asthma.

METHODOLOGY

Study Design

A cross sectional study was conducted at the National Asthma centre to assess obesity and its determinants among the children with Bronchial Asthma

Study Period

The duration of study period was 6 months (From January to June, 2012).

Study Place

The study was conducted at the outpatient department, National Asthma Centre of National Institute of Disease Chest and Hospital (NIDCH) Mohakhali, Dhaka.

Study Population

All children attended at the outpatient department of National Asthma Centre.

Sample Size

The sample size is to be measured by using following formula:

$n=Z^2 PQ/d^2$

Sample size 226.

Considering research constrains 104 asthmatic children were included in the study.

So, finally sample size 104

Selection Criteria

Inclusion Criteria

- Children with established Bronchial Asthma
- Children aged 5-18 years
- Both male and female children were included in the study
- Children whose legal guardian gave consent.

Exclusion Criteria

- Children aged <5 years and >18 years
- Seriously ill children
- Children whose legal guardian did not give consent.

Sampling Technique

Convenient sampling technique was adopted. All OPD patients of National Asthma Centre, during the data collection period who fulfilled the selection criteria were included in the study and 104 samples were collected during time frame.

Data Analysis

Data was analyzed with the help of Statistical Package for Social Science (SPSS), with 19 versions. Both descriptive (Mean, Median, Mode SD) and inferential $(x^2\ test)$ statistics were considered during data analysis.

RESULTS

The cross sectional study was conducted among the OPD patients of National Asthma Centre of NIDCH, Dhaka-104 respondent was taken for study purpose.

Distribution of the Children by Age

It was found that among the asthmatic children 5-10 years group were 46 (44.5%), 11-15 years group were 30 (28.6%), 16-18 years group were 28 (26.9%). It is shown in table-1.

Table 1: Distribution of the children by age (n=104)

Age (Years)	Frequency	Percent
5-10	46	44.5
11-15	30	28.6
16-18	28	26.9
Total	**104**	**100.0**
Mean +SD	**11.5 + 4.075**	

Distribution of the Respondents by Relation with Children

It was found that 34 (32.7%) were mothers, 54 (51.9%) were fathers, 6 (5.8%) were brothers, 5 (4.8%) were sisters and 5 (4.8%) were others. It is shown in table-2.

Table 2: Distribution of the respondents by relation with children (n = 104)

Relation	Frequency	Percent
Mother	34	32.7
Father	54	51.9
Brother	6	5.8
Sisters	5	4.8
Others	5	4.8
Total	**104**	**100.0**

Distribution of Fathers by Education

The study revealed that majority 26 (25.0%) of fathers were graduate. The rest were illiterate 14 (13.5%), SSC 12 (11.5%), HSC 18 (1.3%) and post graduate 16 (15.4%) It is shown in table-3.

Table 3: Distribution of fathers by Educational (n = 104)

Education	Frequency	Percent
Illiterate	14	13.5
Primary	2	1.9
Secondary	16	15.4
SSC	12	11.5
HSC	18	17.3
Graduate	26	25.0
Post-graduate	16	15.4
Total	**104**	**100.0**

Distribution of Monthly Family Income

It was found that average monthly income of family of was Tk. 19750 (±10233.915). Highest group were 46 (44.2%) Tk. 11,000-20,000 and lowest group were 14 (13.5%) Tk. 31,000 – 50,000 other groups were 24 (23.1%) Tk. 8000-10,000, 20 (19.2%) Tk. 21,000-30,000. It is shown in table-4.

Table 4: Distribution of Monthly Family Income (n = 104)

Income (Tk.)	Frequency	Percent
8000-10000	24	23.1
11000-20000	46	44.2
21000-30000	20	19.2
31000-50000	14	13.5
Total	**104**	**100.0**
Mean ± SD	**19750.00±10233.915**	

Distribution of Fathers by Occupation

The study revealed that by occupation majority of fathers were in service and business 46 (44.2%), day labor 8 (7.7%). Agriculture 2 (1.9%) and others 2 (1.9%) it is shown in table-5.

Table 5: Distribution of fathers by Occupation (n = 104)

Occupation	Frequency	Percent
Service	46	44.2
Business	46	44.2
Day Labor	8	7.7
Agriculture	2	1.9
Others	2	1.9
Total	**104**	**100.0**

Distribution of Children by Religion

It was found that among all children 88.5% were Muslim 5.8% Hindu 3.8% Christian and 1.9% Buddhist. It is shown in figure -1.

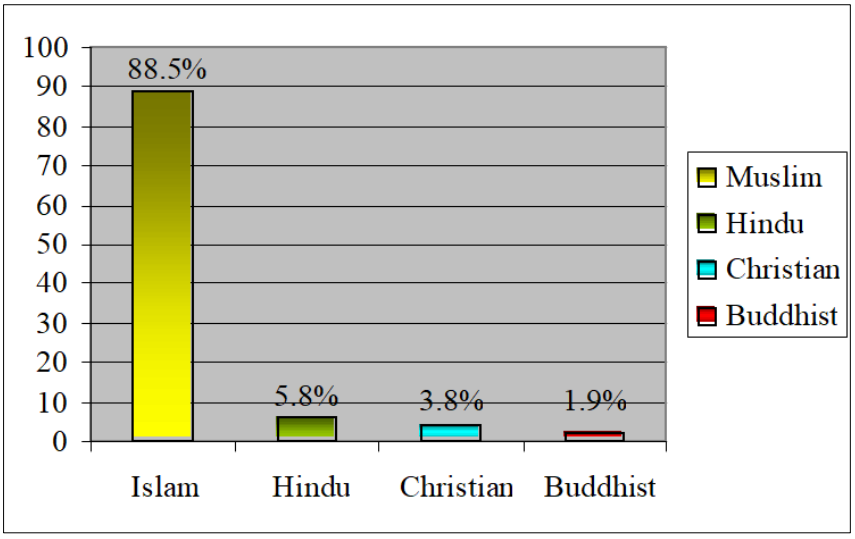

Figure 1: Distribution of children by religion (n = 104)

Distribution of the Children

Among 104 children, 70 (67%) were male and 34 (33%) were female which is shown in figure 3 as pie chart.

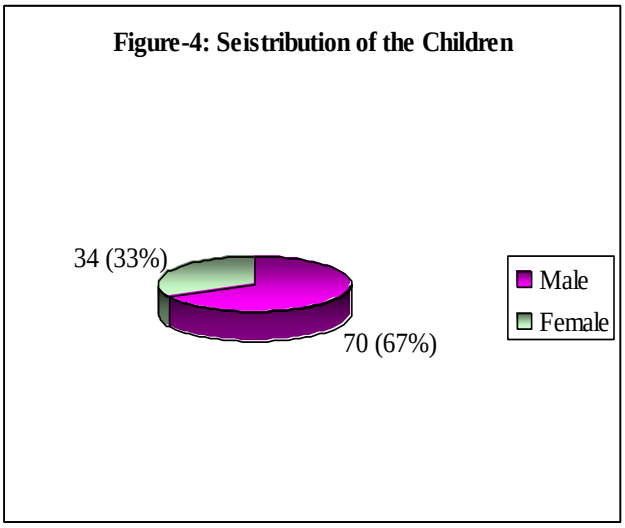

Figure 2: Distribution of the Children (n = 104)

Distribution of Family History of Bronchial Asthma

It was found that 65.4% children had family history of asthma and 34.6% had no family history of asthma. It is shown in figure 3 as bar chart.

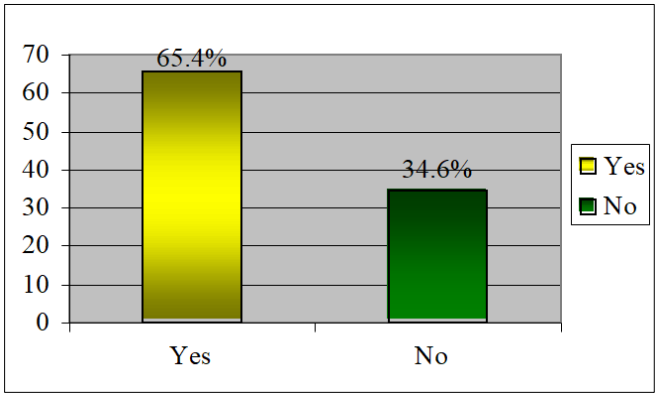

Figure 3: Family History of Bronchial Asthma (n = 104)

Distribution of Physical Exercise of Children

It was found that 63.5% of children gave history of physical exercise and 36.5% children had no history of exercise. It is shown in figure 4 as bar chart. Majority had history of 30 minutes (45.5%) exercise regularly, in the form of playing games regularly which is shown in table-6.

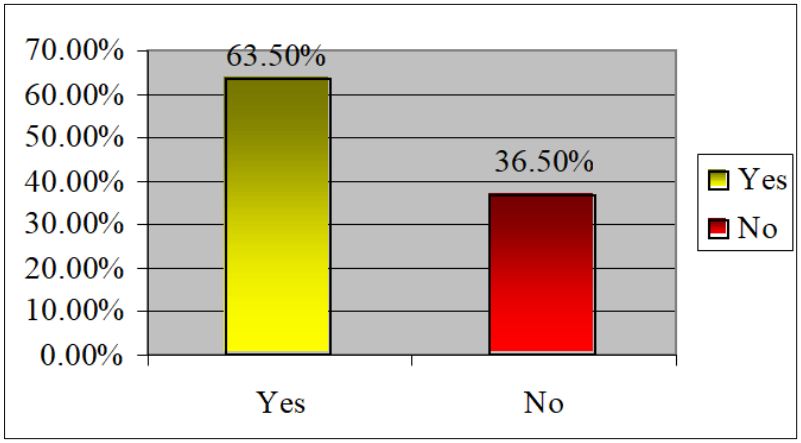

Figure 5: Distribution of Physical Exercise of children (n = 104)

Table 6: Distribution of Duration Physical Exercise (Minutes)

Duration (Minutes)	Frequency	Percent
15	02	3.0
30	30	45.5
45	24	36.4
60	10	15.2
Total	**66**	**100.0**
Mean +SD	**39.55+11.660**	

Distribution of Sources of Treatment for Asthma

It was based on multiple responses. 67.5% of the children used to come at Govt. hospital, 15.4% come at private hospital, 61.5% come at Doctors chamber. It is shown in table-7.

Table 7: Distributions of Sources of Treatment for Asthma (n = 104)

Source	Frequency	Percent
Govt. Hospital	70	67.3
Private Hospital	16	15.4
Doctor's Chamber	64	61.5
Homeopath Doctor	12	11.5

* Multiple Responses

Distribution of Foods Chosen by the Children

It was found that regarding choice of food the following preference was found. Fast food 25 (24%), sweet food 22 (21.2%), soft drinks 18 (17.3%), fatty foods 12 (11.5%) rice /carbohydrate 12 (11.5%) fish 18 (17.3%) meat 54 (51.9%). egg 10 (9.6%). It was based on multiple responses and it is shown in table-8.

Table 8: Distribution of Foods Chosen by the Children (n = 104)

Food	Frequency	Percent
Fast food	25	24.0
Sweet food	22	21.2
Soft drinks	18	17.3
Fatty foods	12	11.5
Rice/Carbohydrate	12	11.5
Fish	18	17.3
Meat	54	51.9
Egg	10	9.6

* Multiple Responses

Distribution of Duration of Treatment of Asthma (year)

The study revealed that duration of treatment of asthma were 1-3 years 83 (79.8%), 4-6 years 15(14.4%), 7-9 years 6 (5.8%). It is shown in table-9.

Table 9: Distribution of duration of Treatment of Asthma (Years) (n = 104)

Duration (Years)	Frequency	Percent
1-3	83	79.8
4-6	15	14.4
7-9	6	5.8
Total	**104**	**100.0**
Mean +SD	**3.63+2.353**	

Distribution of the Children by BMI

The study revealed BMI status of children. Among the children underweight 50 (48.1%). normal range 26 (25%) over weight 12 (11.5%) class 1 (moderate) obese 16 (15.4%). It is shown in table-10.

Table 10: Distribution of the children by BMI (n= 104)

BMI	Frequency	Percent
Underweight	50	48.1
Normal Range	26	25.0
Overweight	12	11.5
Class I (Moderate) Obese	16	15.4
Total	**104**	**100.0**

Distribution of Association between Sex and BMI of the Children

The study showed among male children under-weight 36 (51.4%). Normal Range 14 (20.0%), Over weight and moderate obese each 10 (14.3%). Among female children under-weight 14 (41.2%), normal 12 (35.3%), Overweight 2 (5.9%), Moderate obese 6 (17.6%). So obesity were majority in male, $x^2 = 4.2$, df = 3, p = 0.240, So p>0.05 and Statistically not significant. It is shown in table-11.

Table 11: Distribution of Association between sex and BMI of the children: (n = 104)

Sex of the Child	BMI of the Children				Total
	Underweight	Normal Range	Overweight	Moderate Obese	
Male	36	14	10	10	70
	51.4%	20.0%	14.3%	14.3%	100.0%
Female	14	12	2	6	34
	41.2%	35.3%	5.9%	17.6%	100.0%
Total	50	26	12	16	104
	48.1%	25.0%	11.5%	15.4%	100.0%
Significance	**χ^2 = 4.21, df=3, p=0.240**				

Distribution of Association between Age & BMI of the Children

According to study we categorize 3 groups to determine relationship of Age and BMI of children. In 5-10 years group underweight 26 (56.5%), Normal 12 (26.1%), Over weight and moderate obese 4 (8.7%) in each group. In 11-15 years group-underweight 16 (53.3%), Normal 2(6.7%), overweight 4 (13.3%) and moderate obese 8 (26.7%), in 16-18 years group underweight 8 (28.6%), Normal 12 (42.9%) and overweight and moderate obese 4 (14.3%) in each group χ^2 = 15.13, df = 6, p = 0.019, Sop>0.05 and statistically not significant. It is shown in table 12.

Table 12: Distribution of Association between Age & BMI of the children (n = 104)

Age (Years)	BMI of the Children				Total
	Underweight	Normal Range	Overweight	Moderate Obese	
5-10	26	12	4	4	46
	56.5%	26.1%	8.7%	8.7%	100.0%
11-15	16	2	4	8	30
	53.3%	6.7%	13.3%	26.7%	100.0%
16-18	8	12	4	4	28
	28.6%	42.9%	14.3%	14.3%	100.0%
Total	50	26	12	16	104
	48.1%	25.0%	11.5%	15.4%	100.0%
Significance	**χ^2 = 15.13, df=6, p=0.019**				

Association between Duration of Asthma and BMI of the Children

It was revealed in the study that when duration of asthma were 1-3 years, then underweight 30 (71.4%), Normal 8 (19.0%), Overweight 0%, moderate obese 4 (9.5%). At 4-6 years duration underweight 16 (33.3%), Normal 12 (25%), Overweight 12 (25.0%) moderate obese 8 (16.7%). At 7-10 years duration underweight 4 (28.6%). Normal 6 (42.9%), Over weight and moderate obese 4 (28.6%). χ^2 = 26.99, df = 6, p = 0.001, So p<0.05, and statistically significant. It is shown in table-13.

Table 13: Association between duration of Asthma and BMI of the Children (n = 104)

Duration of Asthma (Years)	BMI of the Children				Total
	Underweight	Normal Range	Overweight	Moderate Obese	
1-3	30	8	0	4	42
	71.4%	19.0%	.0%	9.5%	100.0%
4-6	16	12	12	8	48
	33.3%	25.0%	25.0%	16.7%	100.0%
7-10	4	6	0	4	14
	28.6%	42.9%	.0%	28.6%	100.0%
Total	50	26	12	16	104
	48.1%	25.0%	11.5%	15.4%	100.0%
Significance	χ^2 = 26.99, df=6, p=0.001				

Association between Physical Exercise and BMI of the Children

It was found in the study that among the children who had history of physical exercise it was found that underweight 34 (51.5%) normal 14 (21.2%), overweight 12 (18.2%), Moderate obese 6 (9.1%). On the other hand those who had no history of physical exercise among them underweight 16 (42.1%), normal 12 (13.6%) over weight 0% and moderate obese 10 (26.3%). χ^2 = 13.04, df = 3, p = 0.005, where p<0.05 and statistically significant. It is shown in table- 14.

Table 14: Association between physical exercise and BMI of the Children (n = 104)

Regularly Playing	BMI of the Children				Total
	Underweight	Normal Range	Overweight	Moderate Obese	
Yes	34	14	12	6	66
	51.5%	21.2%	18.2%	9.1%	100.0%
No	16	12	0	10	38
	42.1%	31.6%	.0%	26.3%	100.0%
Total	50	26	12	16	104
	48.1%	25.0%	11.5%	15.4%	100.0%
Significance	χ^2 = 13.04, df=3, p=0.005				

Table 15: Distribution of Drugs used by the children (n = 104)

Drug	Frequency	Percent
Steroid	44	42.3
Montelukast	62	59.6
Ketotifen	24	23.1
Theophylline	62	59.6
Salbutamol	34	32.7

* Multiple Responses

Distribution of Drugs used by the Children

It was found that among the asthmatic children for purpose of treatment Steroid use were 44 (42.3%), Montelukast were 62 (59.6%). Ketotifen were 24 (23.1%) Theophylline was 62 (59.6%) and Salbutamol was 34 (32.7%). It is shown in table 15. According to study regarding regular use of drugs for treatment purpose it was found that duration of treatment 2-12 month were 98 (94.2%), 12-24 month were 4 (3.8%), 25-60 month 2 (1.9%). It was found in the study that among steroid users, 10 (22.7%) were overweight and 14 (31.8%) were moderate obese. Only 5 (11.4%) were under weight and 15 (34.1%) were normal. On the other hand among steroid non-users of steroid majority were under-weight 45 (75%), 11 (18.3) were normal found. 2 (3.3%) were in both over weight and moderate obese group. χ^2 = 45.57, df = 3, p = 0.001, where P <0.05 and which was statistically significant.

DISCUSSION

The cross sectional study was aimed to assess obesity and its determinants among the children with Bronchial Asthma. The study was conducted at National Asthma Centre, NIDCH, Dhaka. The majority of respond was fathers 54 (51.9%) and mothers 34 (32.7%). Among fathers majority were graduate 26 (25.0%) and post graduate 16 (15.4%) and among mothers, majority were above secondary level 60% (57.6%). A good number of graduate 16 (15.4%) and post graduate 10 (9.6%) were also found among mothers. In both cases illiterate 13.5%. According to national literacy rate in Dhaka male 69.58% and female 58.74%. Educational status did not reflect national status, possibly the taken sample had high literacy rate [5]. It was found that 5-7 family members were majority 57 (54.8%) and 2-4 members 42 (40.4%) Average monthly family income was. Tk. 19750 (10233.915) Hence majority income group were 46 (44.2%) having range Tk. 11000-20000, lowest income group 24 (23.1%) range Tk. 8000-10000. Highest income group 14 (13.5%) range Tk. 31000-50000. In case of occupation of fathers majority were service and business both 46 (44.2%). But among mothers, 96

(92%) were housewives and only 8 (8%) in service, which almost reflect employment status of country [5]. Among all respondent majorities were Muslim 88.5% and lowest group Buddhist 1.9% Hindu and Christian were lower group respectively. The study was similar to national statistics, where Muslim 88%. In the family majority had 2 children 58 (55.8%) and 3 children 34 (32.7%). Among asthmatic children 70 (67%) were male and 34 (33%) were female. It was found in the study that majority 65.4% had family history of asthma and 34.6% had no family history. Among the children majority 63.5% had history of physical exercise and majority had duration of exercise 30-45 minutes were 54 (81.9%). During acute asthmatic stage majority 70 (67.3%) attended to govt. hospital and large number 64 (61.5%) also attended to doctors chamber. We want to find out cause of aggravation majority of asthma, had history of cold exposure 52 (50.0%) and not weather 50 (48.1%) in addition 38 (36.5%) had history of dust exposure. It had multiple responses. According to family history of asthma majority were either father as mother 39 (57.4%). Brother Sister and other relatives also had history of asthma respectively. Regarding choice of food majority had choice of meat 54 (51.9%), fast food and sweet food and soft drinks were respectively. Fatty foods and rice/carbohydrate had lower limit of choice 12 (11.5%). Obesity status of family members. Showed majority were father 20 (35.7% and mother 18 (32.2%) grand- parents had also history of obesity in both side 20 (35.7%). Other study showed obesity of both parents or one tends to be a genetic factor of obesity [6]. It was found in the study that duration of asthma was majority 4-6 years 48 (46.2%) and interval of severe attack of asthma 4-6 month was majority group 52 (50.0%). Finally duration of treatment of asthma was 1-3 years majority 83 (79.8%). Weight of the children were measured majority were 50(48.1%) at 31-50 kg group regarding height measurement majority were (40.4%) at 1.02 - 1.31 meter group. Finally we calculate BMI. Hence Over weight and moderate obese 28 (26.9%) under-weight 50 (48.1%) and Normal range 26 (25.0%). According to study of drugs used by the children, showed majority group taken montelukast and theophylline 62 (59.6%) steroid 44 (42.3%). Salbutamol 34 (32.7%) and lowest ketotifen 24 (23.1%). Duration of drug use was found out; 2-12 months of duration were 98 (94.2%). In case of association between steroid use and BMI of children, it was found among steroid users 24 (54.5%) were over-weight and moderate obese. Among non-users of steroid 45 (75.0%) were under weight, which, was statistically significant ($p = 0.001$, $p< 0.05$). Block M. and associates denotes in the study higher consumption of steroid causes obesity [7]. Among montelukast users 22 (35.5%) were over-weight and moderate obese, and non-users 33 (78.6%) were underweight, which was statistically significant ($p = 0.001$, $p <0.05$). Among ketotifen users 19 (79.2%) were over-weight and moderate obese and non-users 9 (11.3%) obese and 50 (62.5%) were underweight, which was statistically significant ($p = 0.001$, $p <0.05$.). In case of theoplylline users 21 (33.8%), were over-weight and obese and among non-users 22 (52.4%) were under weight, which was not statistically significant ($p = 0.201$, $p>0.05$). Finally salbutamol users 23 (67.6%) were overweight and moderate obese and non-users 5 (7.2%) were obese, 48 (68.6%) under-weight, which was statistically significant ($p = 0.001$, $p <0.05$.). In case of sex and BMI of children it was found among male 20 (28.6%) were overweight and obese and among female 6 (23.5%) were such, which was not statistically significant ($p = 0.240$, $p>0.05$). But it was supported by study of Gilliland FD and associates [8] were male was found obese than female. The study showed almost similar findings as Mohsin F and associates, where prevalence of obesity higher in male (19.9%) than female (15.3%) [4]. Duration of asthma and BMI was measured. When duration of asthma is categorized 4-6 years. Then over weight and moderate obese were found 20 (41.7%) when duration 1-3 years, then moderate obese 4 (9.5%). The study was statistically significant ($p = 0.005$, $p <0.05$). Those who played games regularly, among them under-weight 34 (51.5%) and those did not play games regularly under-weight 16 (42.1%) and moderate obese 10 (26.3%), which was statistically significant ($p = 0.005$, $p <0.05$). It was supported by study of Gilliland FD and associates [8]. According to study of Dehgan M. obesity depends on life style, genetic factor and environmental factor, where life style denotes physical exercise and healthy dietary habit [9]. The study of Weiss R. and Caprio S. also denotes physical activity and healthy diet regarding obesity [10]. Finally the study revealed association with family history of obesity with BMI, who had family history of obesity 26 (46.5%) were over-weight and moderate obese and among who had not family history of obesity 2 (4.2%). The previous discussion of Dehgan M. showed similar genetic factor for obesity [9]. Regarding relationship of asthma prevalence and obesity, according to study of Bibi H. and associates showed asthma prevalence was higher in obese children [11]. Another study of Gilliland F.D. and associates showed prevalence of obesity was higher in newly diagnosed asthmatic children. As there were no significant study were done with obesity with and above mentioned variables. So comparison could not be done.

CONCLUSION

The cross sectional study was carried out to assess obesity and its determinants among children with bronchial asthma. Most of the respondents were fathers and by religion most of them were Muslim. By education majority of fathers were graduate and most of mothers had above secondary level of education. Majority had 5-7 members in family and most of them had 2 children. By occupation most of fathers were in service, business and most of mothers were house wives. Majority of asthmatic children were male and they had family history of asthma, where mainly fathers

were asthmatic. Majority of children had history physical exercise regularly for about half an hour. Majority of children were fond of meat and fast food. Almost equal majority of them developed severity of asthma due to cold exposure and hot weather. Majority of them went to Govt. hospital for emergency treatment and intervals between severe attacks were 4-6 months and their disease duration was 4-6 years with duration of treatment were 1-3 years. Regarding Body Mass Index about half of them were under weight and about quarter of asthmatic children had obesity. Maximum findings of weight were in 31-50kg groups and after assessment of BMI, it was found that majority of children were under-weight although a good number of children were over-weight and moderate obese. Regarding drug use, it was found that montelukast, theoplylline, steroid was used mainly, and most of their duration of drug use was 2-12 months. Among montelukast, steroid ketotifen, salbutamol users a group of children were found obese. Family history of obesity, duration of treatment and lack of physical exercise were also found relation with development of obesity among the children with Bronchial Asthma. Rational use of drugs should be practiced and awareness of both physician and parents should be increased regarding obesity. Changing of life style regarding exercise and diet is recommended to prevent obesity of the children.

RECOMMENDATIONS

The Following Recommendations are Made Based on Study Findings:

- Rational use of drugs like steroid, montelukast, ketotifen should be ensured for treatment of Bronchial Asthma to prevent obesity among asthmatic children.
- Awareness of both physician and parents regarding obesity should be increased through necessary intervention.
- Special attention should be given those asthmatic children who have family history of obesity.
- To prevent obesity among the asthmatic children, specific measure in respect of physical exercise and low fat intake should be taken for the children.

Limitations of the Study

Although optimum care had been tried by the researcher in every steps of this study, still some limitation existed.

- Due to time and resource, constraints, the study was conducted in only one centre. If it could be conducted in different institute, it would be more fruitful.
- Due to time limitation, all children could not be reached for interview. So it might not explore many facts among the children.
- In some cases medical records were not adequate.
- Some respondents could not give proper information of asthmatic children.
- If sample size would large, more information could be found out.
- For the measurement of nutritional status BMI was measured. But Z score would be more effective for children.

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