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CORRELATION OF ASTHMA SYMPTOMS CONTROL WITH WAIST CIRCUMFERENCE AND BMI IN SUBJECTS VISITING HEALTHCARE CENTERS IN INDIA

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ABSTRACT

Background: There is scarce data in the literature concerning the impact of abdominal obesity and symptoms of Asthma.

Aim: To assess the Correlation of Asthma symptoms control with waist circumference and BMI in subjects visiting healthcare centers in India.

Methods: The study assessed 220 subjects with asthma evaluated for asthma symptom control and severity, and correlation was done with the parameters of obesity like waist circumference based on WHO and Indian criteria.

Results: For Indian criteria, normal, overweight, and obese subjects having poorly controlled asthma were 2.24% (n=4), 15.73% (n=28), and 82.02% (n=146) respectively, whereas, well controlled were 14.28% (n=6), 23.80% (n=10), and 61.90% (n=26) subjects (p=0.04). In subjects with abdominal obesity, asthma was poorly controlled in 43.63% (n=96) subjects and was poorly controlled in 1.81% (n=4) study subjects respectively. For FEV1 of <60%, for moderately severe spirometry, poor and well controlled asthma was seen in 19.09% (n=42) and 0.90% (n=2) subjects, in severe spirometry, poor and well controlled asthma symptoms were seen in 19.09% (n=42) and 1.81% (n=4) study subjects, whereas, in very severe spirometry, poor and well controlled asthma symptoms were seen in 1.81% (n=4) study subjects and 0.90% (n=2) study subjects respectively

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Conclusion: In asthmatic obese subjects, the waist parameter is a vital and simple parameter to be evaluated. However, Indian parameters for BMI and waist circumference are found to be better for the assessment of asthma symptoms in Indians compared to the standards of WHO.

Keywords: Asthma, Abdominal obesity, Body mass index, Waist circumference

INTRODUCTION

Nearly 30% to 65% of the Indian population of the adult age group has either abdominal obesity, obesity, or are overweight. With the increase in the prevalence of overweight and obesity in the Indian subjects, there is a proportionate increase in the CVD (cardiovascular diseases) and metabolic syndrome in the Indian population posing the population at high risk of developing these risks.[1]

In comparison to Caucasians, Asian Indians have higher abdominal obesity and body fat percentage at a similar level of BMI (body mass index), For the development of Asthma, one of the proven and established risk factors is Obesity. Asthma is more prevalent in obese subjects compared to subjects with normal BMI. Also, obesity increase the risk of developing asthma by 2.5-2 times in adult subjects and child subjects respectively as reported by the previous literature data.[2]

Obese subjects with asthma usually have poor control of their asthmatic status owing to different inflammatory phenotypes and less atopic response. Another vital risk factor for asthma is excessive abdominal fat where poor control and more incidence of asthma are reported in subjects with more abdominal fat. However, the previous literature data suggesting this relationship is limited and scarce in the literature. Fewer literature data has assessed the abdominal obesity prevalence in asthmatic Indian subjects using the Indian parameters for obesity and its effect on the control of asthma.[3] Hence, the present study was aimed to assess the Correlation of Asthma symptoms control with waist circumference and BMI in subjects visiting healthcare centers in India.

MATERIALS AND METHODS

The present study was aimed to assess the Correlation between Asthma symptoms control with waist circumference and BMI in subjects visiting healthcare centres in India. The study participants were selected from the Outpatient Department of the Institute.

The inclusion criteria for the study were subjects of age >18 years, asthma on spirometry, previously confirmed asthma diagnosis, wheeze history that changed over time, tightness in the chest, breathlessness, cough, and meeting Abdominal obesity or BMI criteria of 2009 and Asian Indian-specific overweight, obesity and abdominal obesity consensus statement. The exclusion criteria for the study were subjects where spirometry could not be done, pregnant females, and subjects in exacerbation. After explaining the detailed study design, informed consent was taken from all participants in both verbal and written form.

The asthma was diagnosed based on 2018 guidelines by GINA (Global initiative for asthma)[4] where variable expiratory airflow limitation was assessed based on reduced FVC/FEV1 and

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>12% and >200ml raised FEV1 following salbutamol administration in 200-400mcg during spirometry. Spirometry was done with a turbine sensor spirometer. The subjects were classified as having mild, moderate, moderately severe, severe, and very severe asthma depending on FEV1 values of > 70%, 60-69%, 50-59%, 35-49%, and <35% respectively.

BMI (kg/m2) was assessed from height in cm and weight in kg. The flexible and non-stretchable tape was used to measure the waist circumference in a horizontal position at the midpoint of the lowermost rib and the iliac crest in erect and fasting conditions at normal expiration end. Normal BMI was 18-22.9kg/m2, obesity in >25kg/m2, and overweight as 23-24.9kg/m2. Abdominal obesity was considered at >90 cm waist circumference in males and >80cm in females, whereas, with WHO, >102 in males and >88 in females shows abdominal obesity.

Over the last 4 weeks, the GINA classification of 2018 was used to evaluate the asthma control using 4 parameters including activity limitation, more than two times reliever medication, night waking, and more than two times day asthma where 1 point was allotted to each symptom present. Depending on the outcomes, subjects were classified as uncontrolled (3-4 parameters), partly controlled (1-2 parameters), and well-controlled (no parameter). Waist circumference, BMI, and spirometry were done for all the subjects. All the newly diagnosed asthmatic subjects were given DPI (dry powder inhaler) or MDI with or without the spacer. The management was done following GINA guidelines with corticosteroid inhalational therapy with/without LABA (long-acting beta 2 agonists) with either low dose Formoterol or SABA (short-acting Beta 2 agonist).

The collected data were subjected to statistical evaluation using SPSS version 20, Chicago Inc., USA. The data were expressed in percentage and number, and mean and standard deviation. The level of significance was kept at $p<0.05$.

RESULTS

The present clinical study was aimed to assess the Correlation between Asthma symptoms control with waist circumference and BMI in subjects visiting healthcare centers in India. The study assessed 220 subjects of both genders with asthma. The mean age of the study subjects was 40.1±9.83 years and the age range of 19-76 years. There were 43.63% (n=96) males and 56.36% (n=124) females in the present study. The mean height, weight, and BMI of the study subjects were 157.73±8.06cm, 70.03±8.06kg, and 28.4±4.03kg/m2 respectively. Mean FEV1 was 58.46±11.8 which was <60%, mean FVC was 82.29±13.20 which was fairly preserved, and FEV1/FVC was 68.57±10.76 (Table 1).

For BMI classification based on Indian criteria, normal, overweight, and obese subjects having poorly controlled asthma were 2.24% (n=4), 15.73% (n=28), and 82.02% (n=146) respectively, whereas, well controlled were 14.28% (n=6), 23.80% (n=10), and 61.90% (n=26) subjects respectively. This was statistically significant with p=0.04. Using WHO criteria, normal, overweight, and obese subjects having poor controlled were 17.97% (n=32), 51.68% (n=92), and 30.33% (n=54) subjects respectively, whereas, well-controlled asthma was seen in 38.09% (n=16), 47.61% (n=20), and 14.28% (n=6) subjects respectively as shown in Table 2.

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Concerning waist circumference and asthma control, it was seen in subjects with normal waist circumference, asthma was well controlled in 50.90% (n=112) study subjects and was poorly controlled in lesser subjects with 3.63% (n=8) subjects. In subjects with abdominal obesity, asthma was poorly controlled in 43.63% (n=96) subjects and was poorly controlled in 1.81% (n=4) study subjects respectively as depicted in Table 3.

For FEV1 value of >60% mild spirometry severity, poorly controlled asthma was seen in 18.18% (n=40) study subjects and well-controlled in 6.36% (n=14) subjects, whereas, for moderate severity, poorly and well-controlled asthma was seen in 27.72% (n=50) and 9.09% (n=20) subjects respectively. For FEV1 of <60%, for moderately severe spirometry, poor and well-controlled asthma was seen in 19.09% (n=42) and 0.90% (n=2) subjects, in severe spirometry, poor and well-controlled asthma symptoms were seen in 19.09% (n=42) and 1.81% (n=4) study subjects, whereas, in very severe spirometry, poor and well controlled asthma symptoms were seen in 1.81% (n=4) study subjects and 0.90% (n=2) study subjects respectively (Table 4).

DISCUSSION

The present clinical study was aimed to assess the Correlation between Asthma symptoms control with waist circumference and BMI in subjects visiting healthcare centers in India. The study assessed 220 subjects of both genders with asthma. The mean age of the study subjects was 40.1±9.83 years and the age range of 19-76 years. There were 43.63% (n=96) males and 56.36% (n=124) females in the present study. The mean height, weight, and BMI of the study subjects were 157.73±8.06cm, 70.03±8.06kg, and 28.4±4.03kg/m2 respectively. Mean FEV1 was 58.46±11.8 which was <60%, mean FVC was 82.29±13.20 which was fairly preserved, and FEV1/FVC was 68.57±10.76. These demographic and disease characteristics were comparable to the studies of Juel Ct et al[5] in 2012 and Dias-Junior SA et al[6] in 2014 where authors assessed subjects with demographic and disease characteristics as in the present study.

Concerning BMI classification based on Indian criteria, normal, overweight, and obese subjects having poorly controlled asthma were 2.24% (n=4), 15.73% (n=28), and 82.02% (n=146) respectively, whereas, well-controlled were 14.28% (n=6), 23.80% (n=10), and 61.90% (n=26) subjects respectively. This was statistically significant with p=0.04. Using WHO criteria, normal, overweight, and obese subjects having poor controlled were 17.97% (n=32), 51.68% (n=92), and 30.33% (n=54) subjects respectively, whereas, well-controlled asthma was seen in 38.09% (n=16), 47.61% (n=20), and 14.28% (n=6) subjects respectively. These results were consistent with the studies of Ciprandi G et al[7] in 2018 and Zillmer LR et al[8] in 2014 where a similar association between BMI and asthma was reported by authors in their studies.

For the waist circumference and asthma control, it was seen in subjects with normal waist circumference, asthma was well controlled in 50.90% (n=112) study subjects and was poorly controlled in lesser subjects with 3.63% (n=8) subjects. In subjects with abdominal obesity, asthma was poorly controlled in 43.63% (n=96) subjects and was poorly controlled in 1.81% (n=4) study subjects respectively. These findings were in agreement with the findings of McCallister JW et al[9] in 2013 and Jiang D et al[10] in 2019 where authors reported a similar

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association between asthma control and waist circumference in their studies as in the present study.

On assessing the FEV1 value, at the FEV1 value of >60% mild spirometry severity, poorly controlled asthma was seen in 18.18% (n=40) study subjects and well-controlled in 6.36% (n=14) subjects, whereas, for moderate severity, poorly and well-controlled asthma was seen in 27.72% (n=50) and 9.09% (n=20) subjects respectively. For FEV1 of <60%, for moderately severe spirometry, poor and well-controlled asthma was seen in 19.09% (n=42) and 0.90% (n=2) subjects, in severe spirometry, poor and well-controlled asthma symptoms were seen in 19.09% (n=42) and 1.81% (n=4) study subjects, whereas, in very severe spirometry, poor and well-controlled asthma symptoms were seen in 1.81% (n=4) study subjects and 0.90% (n=2) study subjects respectively. These results were similar to the findings of Lv N et al[11] in 2014 and Jesus JPV et al[12] in 2018 where the association between poorly controlled asthma and spirometry severity was comparable to the present study as reported by the authors.

CONCLUSION

Considering its limitations, the present study concludes that in asthmatic obese subjects, the waist parameter is a vital and simple parameter to be evaluated. However, Indian parameters for BMI and waist circumference are found to be better for the assessment of asthma symptoms in Indians compared to the standards of WHO. However, the present study had a few limitations including a small sample size, short monitoring time, and geographical area biases. Hence, more longitudinal studies with a larger sample size and longer monitoring period will help reach a definitive conclusion.

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TABLES

Gender	**%**	**N=220**
Males	43.63	96
Females	56.36	124
Mean age (years)	40.1±9.83	
Age range (years)	19-76	
Mean Height (cm)	157.73±8.06	
Mean weight (kg)	70.03±8.06	
Mean BMI (kg/2)	28.4±4.03	
FEV1	58.46±11.8	
FVC	82.29±13.20	
FEV1/FVC	68.57±10.76	

Table 1: Demographic and asthma characteristics of the study subjects

BMI classification	**BMI criteria**	**Poorly controlled n (%)**	**Well-controlled n (%)**	**p-value**
Indian	**Normal**	4 (2.24)	6 (14.28)	**0.04**
	Overweight	28 (15.73)	10 (23.80)	
	Obese	146 (82.02)	26 (61.90)	
WHO	**Normal**	32 (17.97)	16 (38.09)	0.107
	Overweight	92 (51.68)	20 (47.61)	
	Obese	54 (30.33)	6 (14.28)	

Table 2: Correlation of asthma symptoms control and BMI in study subjects

Waist circumference	**Poorly controlled n (%)**	**Well-controlled n(%)**	**p-value**
Normal	8 (3.63)	112 (50.90)	0.67
Abdominal obesity	4 (1.81)	96 (43.63)	

Table 3: Correlation of asthma symptoms control and waist circumference in study subjects

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FEV1 value	Asthma spirometry severity	Poorly controlled n (%)	Well-controlled n (%)	Odds ratio	p-value
>60%	**Mild**	40 (18.18)	14 (6.36)	4.18	**0.01**
	Moderate	50 (27.72)	20 (9.09)		
<60%	**Moderately severe**	42 (19.09)	2 (0.90)		
	Severe	42 (19.09)	4 (1.81)		
	Very severe	4 (1.81)	2 (0.90)		

Table 4: Correlation of asthma symptoms control and asthma severity