

ORIGINAL ARTICLE

INVESTIGATING SPIROMETRY INDICES IN CHILDREN WITH ASTHMA

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ABSTRACT

Background: Asthma is the most common cause of school absenteeism and the third cause of admission to hospitals and medical centers among children and adolescents. The aim of this study was to assess spirometry indices in asthma children referred to public and private clinics in Ilam city.

Materials & Methods: This observational study was conducted in public clinics (Imam Khomeini Hospital) and private offices of asthma and allergy specialists and subspecialists in Ilam city from 1st January 2022 to 31st December 2022. Patients with asthma confirmed by their treating physician were included in study. In order to ensure the correct diagnosis of asthma cases and assessment of spirometry indices, International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire was used. Basic spirometry and then a bronchodilator challenge spirometry test were performed for all patients. The collected data was entered in SPSS ver. 16, and then data analysis was carried out using descriptive and analytical statistical tests.

Results: Total 102 patients were studied, 49 (73.1%) were male and 26 (74.3%) were female. Mean age of patients was 9.49+/-2.21 and mean BMI was 19.17+/-4.69. The spirometric indices, were FVC = 102.14+/-86.42, FVC V = 98.55 +/-19.42, FEV₁ = 91.49 +/-20.13, FEV₁ FVC = 95.70+/-12.6, index MEF 25-50 was 92.02+/-29.49 and MEF 2550 V index was 103.63(27.62).

Conclusion: Considering the changes in the spirometry indices of asthma children and the difference of these indices with other normal people, it is necessary to train nurses and physicians in order to identify these indices more effectively.

KEY WORDS: Spirometry; Children; Asthma.

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INTRODUCTION

Lung diseases play a decisive role in the health of patients.^{1,2} Despite the progress in the management of childhood asthma, children with this disease still suffer from symptoms such as nocturnal cough, shortness of breath, disturbed nighttime sleep, and daytime sleepiness.³⁻⁵ Also, despite better understanding and progress in preventive programs, there is still high prevalence, complications and mortality from this disease. This is an important global health issue and necessary prevention

measures, better diagnosis and timely treatment should be a priority.^{6,7}

Asthma is the most common childhood disease that has been growing in the world during the last three decades,⁸ and has been growing in the world during the last 3 decades. This disease causes various complications for children. Asthma is the most common cause of school absenteeism and the third cause of admission to hospitals and medical centers among children and adolescents.^{9, 10, 11} Asthma persists to affect other aspects of life, such as school attendance, family dynamics, physical activity, and mental functioning, and makes parents, in addition to their main role as father or mother, act as a healthcare care provider. Consequently, the roles and functions such as observing and monitoring the child's symptoms and prescribing medicine are among these roles that lead to care pressure a lot of mental and psychological complications for the main patient caregivers.¹²⁻¹⁴

There are more than 25 million people with asthma in the United States, and this disease causes the death

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of about 3500 people per year.¹⁵ It is also predicted that the number of asthma patients in the world will increase to more than 400 million people by 2025.¹⁶ ¹⁷ There have been various studies in different cities of IRAN regarding asthma prevalence. In this regard, the asthma prevalence was reported 5.3% in a study by Assadi et al., in Bushehr city with a sample size of 1085,¹⁸ 10.3% in the study by Gooya et al., in Asalouye city with a sample size of 413 patients,¹⁹ 7.5% in the study by Mehravar et al., in the city of Golestan with a sample size of 1706 patients,²⁰ 2% in the study by Shabestari et al., in the city of Tabriz with a sample size of 1508.²¹ Also, the overall prevalence of asthma in Iranian children was reported as 5.1% in a meta-analysis study of 33 articles with a sample size of 97,205 and participants' the age range of 1-16 years.¹⁶

The asthma prevalence and its accompanying complications are growing increasingly, and lead to physical, psychological, and economic problems for patients and their families. For this reason, this study was aimed to assess the spirometry indices in asthma children referred to public and private clinics in Ilam city.

MATERIALS AND METHODS

This observational study was conducted in public clinics (Imam Khomeini Hospital) and private offices of asthma and allergy specialists and subspecialists in Ilam city from 1st January 2022 to 31st December 2022. Patients with asthma confirmed by their treating physician were included in study.

The study began after being approved by the University Research Ethics Committee and legal

procedures were completed, and 6-12-year-old asthma children were investigated. First, informed written consent was obtained from the parents of the patients, and if they had consent to participate in the study, questioning and clinical examinations and diagnostic tests began. Patients with asthma confirmed by their treating physician were included in study. In order to ensure the correct diagnosis of asthma cases, a clinical examination and screening was carried out using the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire.^{22,23}

To assess the spirometry indices, according to relevant valid international guidelines ^{24, 25} basic spirometry and then a bronchodilator challenge spirometry test were performed for all patients. Spirometry test was performed for all patients using a device whose validity and reliability were confirmed. The tests included FVC, FVC V, FEV 1, RFE V1, FEV1 FVC, RFEV1 FVC, MEF 25-50, FEV1 V, RFEV1 V, FEV1 FVCV, RFE V1 FVCV, and MEF 2550 V, per change FVC, per change FEV1, per change FEV1 FVC and per change MEF 2550.

In order to maintain ethics in the research, while obtaining informed written consent and explaining the research objectives to the participants, all the diagnostic procedures were performed for them free of charge. The collected data entered into SPSS ver. 16 for analysis.

RESULTS

Total 102 patients were studied, 49 (73.1%) were male and 26 (74.3%) were female. Table 1 shows demographic variables in the researched patients.

Table 1-Comparison of the demographic characteristics of the researched patients

Variable		Total	Male	Female
Age (M, SD)		9.49(2.21)	9.27(2.07)	9.91(2.43)
BMI (M, SD)		19.17(4.69)	19.33(5.17)	18.86(3.66)
Gender (N, %)		102(100%)	67(65.7%)	35(34.3%)
Smoking history in parents (N, %)	Yes	27(26.5%)	18(26.9%)	9(25.7%)
	No	75(73.5%)	49(73.1%)	26(74.3%)

Table 2-Comparison of spirometry indicators in the patients studied

Spirometry indices	Total M(SD)	Male M(SD)	Female M(SD)	P , F
FVC	102.14(86.42)	107.12(105.70)	92.60(18.85)	0.42, 0.77
FVC V	98.55(19.42)	97.73(18.72)	100.11(20.87)	0.55, 1.13
FEV 1	91.49(20.13)	92.61(19.10)	90.66(22.21)	0.64, 0.01
RFE V1	1.61(0.97)	1.58(0.98)	1.68(0.96)	0.61, 0.18
FEV1 FVC	95.70(12.6)	94.15(14.14)	98.69(8.33)	0.08, 0.28
RFEV1 FVC	1.15(0.50)	1.17(0.52)	1.11(0.47)	0.53, 1.34
MEF 25-50	92.02(29.49)	89.24(28.71)	97.34(30.64)	0.18, 0.03
FEV1 V	108.74(90.11)	111.61(110.53)	103.23(19.0)	0.65, 0.83
RFEV1 V	1.36(0.79)	1.40(0.87)	1.28(0.62)	0.48, 2.60
FEV1 FVCV	99.17(7.27)	98.22(7.08)	100.97(7.39)	0.07, 0.30
RFE V1 FVCV	1.04(0.21)	1.05(0.23)	1.02(0.16)	0.49, 1.96
MEF 2550 V	103.63(27.62)	101.1(28.05)	108.46(26.49)	0.20, 0.03
Per change FVC	6.36(11.81)	4.88(8.32)	9.29(16.33)	0.07, 3.04
Per change FEV1	8.96(12.55)	7.73(10.80)	11.31(15.26)	0.17, 1.07
Per change FEV1 FVC	3.07(5.29)	3.54(5.45)	2.17(4.90)	0.21, 0.003
Per change MEF 2550	15.36(21.87)	16.33(23.31)	13.51(16.51)	0.52, 1.27

Table 2 shows the spirometry indicators in the patients studied. According to the findings, there was no statistical difference between male and female patients in any of the spirometric indices. ($p > 0.05$)

DISCUSSION

The child may suffer from various diseases, including chronic diseases.²⁷ Respiratory diseases, including respiratory infectious diseases or chronic diseases such as asthma, leads to short-term and long-term complications in the children.^{28, 29} These diseases involve all aspects of a child's life and can also lead to mental and physical complications in parents.^{30, 31} Regarding the history of asthma, both parents (mother and father) or one of them had a history of asthma in most of the studied patients. In the meta-analysis study on 6283 patients Johnson et al. reported that 2017 (37.2%) of patients had a history of asthma in either or both parents.³²

Result showed, there was no difference between the two groups in terms of number of boys and girls with asthma. In the meta-analysis study by Johnson et al., it was shown that 3172 (50.5%) of the patients were male and 3110 (49.5%) were female.³² In a study on

5188 children aged 6-9 years, Nahhas et al; reported that the asthma prevalence was 16.9% and 12.2% in boys and girls, respectively.³³ Also, in a study on 3073 children aged 16-18 years, Ghobain et al; reported that the asthma prevalence was 21.9% and 17.8% in boys and girls, respectively.³⁴ Similarly, in a study on 1700 children aged 18 years, Hamam et al; reported that the asthma prevalence was 12.4% and 14.4% in boys and girls, respectively.³⁵ In a study on 1085 children, Assadi et al; reported that 305 male patients and 211 female patients were in the age range of 6-7 years, and 296 male patients and 273 female patients were in the age range of 13-14 years, which showed no statistically significantly difference.²² The results of the aforementioned studies confirm that there is no difference between girls and boys in terms of asthma prevalence.

With regard to spirometry indices, results showed that these types of indices had undergone changes in asthma patients. In this regard, in a study of spirometric indices in Russian asthma patients, Krasilnikova et al; in showed that the spirometric indices of these patients had undergone changes.³⁶

CONCLUSION

Considering the changes in the spirometry indices of asthma children and the difference of these indices with other normal people, it is necessary to train nurses and physicians in order to identify these indices more effectively.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	BD, MS
Acquisition, Analysis or Interpretation of Data:	BD, MS, EB, FS
Manuscript Writing & Approval:	BD, MS, EB, FS

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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