# Relation between bronchial asthma and parasitic (nematodes) infection in egyptian children

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## ABSTRACT

***BACKGROUND***: Among the many factors influencing the prevalence of asthma in developing countries from the tropics are geo-helminthic infections.

***AIMS****:* This work aims to study the relation between bronchial asthma and parasitic infestation in Egyptian children.

***PATIENTS AND METHODS****:* A cross-section, analytical study design was chosen to perform this research on 100 school aged children. All children were interviewed and examined clinically andlaboratory

***RESULTS:*** Statistically significantly Negative correlations were found between blood level of IgE and FEV1% of predicted in patients with bronchial asthma as well as patients with parasitic infestation with r=-0.381, -0.325 at p=0.006, 0.021 respectively.Inverse relationship was found between blood level of IgE and FEV1/FVC% in patients with parasitic infestation with r= -0.358 with statistical significant difference at p=0.011.

CONCLUSIONS: 86%of patients with bronchial asthma lived in urban areas, while 64% of patients with parasitic infestation lived in rural areas.

***RECOMMENDATION:***Improving personal and environmental hygiene and regular screening, treatment and health education for children as regard parasitic infections is recommended**.**

**Key words:**Parasitic,FEV1,FEV1/FVC,urban,rural

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## INTRODUCTION

Asthma is one of the most common chronic diseases in the world. It is estimated that around 300 million people in the world currently have asthma.[1] Asthma has become more common in both children and adults around the world in recent decades. The increase in the prevalence of this disease has been associated with an increase in atopic sensitization, and is paralleled by similar increases in other allergic disorders such as eczema and rhinitis.[1] Among the many factors influencing the prevalence

of asthma in developing countries from the tropics are geo-helminthic infections,[2] including those caused by Ascaris lumbricoides, Trichuris trichiura and hookworm (Ancylostoma duodenale and Necator americanus). These infections have a worldwide distribution being present in almost all geographic and climatic regions. The prevalence of these infections tends to be highest in warm, moist climates; also they are closely correlated with poor environmental hygiene and lack of access to health services.[3,4]

## MATERIAL AND METHODS

The present study included 100 children, in school aged from 6 year old to 18 year old. The study was enrolled from February2014 to November 2015. Patients were divided into two groups:

Two groups (I&II) will be studied:

1. History taking:

Asthma and Screening questionnaire from ISSAC (*International Study of Asthma and Allergies in* Childhood). [5]

2. Complete clinical examination:
3. Complete blood count (CBC).
4. Total serum immunoglobulin E (IgE) level: Quantitative IgE.
5. Chest radiograghy:P.A &lat view.
6. Stool examination: for detection of parasitic ova.
7. Pulmonary function test

## RESULTS

- The mean ±SD age of group I was 10.78 ± 2.94 years while that of group II was 11.66 ± 2.08 years with statistical significant difference with t= 1.730 , at p= 0.005.

Regarding Residence of studied patients, 43 patients that is to say 86%of patients with bronchial asthma lived in urban areas while 7 patients were found to live in rural communities. On the other hand, 18 patients with parasitic infestation were found in urban areas and 32 patients lived in rural zones.

Statistically significance higher values of IgE were found in patients with parasitic infestation (400.79±196.79 I.U/ML) compared to patients with bronchial asthma (258.35±106.58 I.U/ML).It was noted that patients with combined bronchial asthma and parasitic infestation demonstrated statistically significance higher values of IgE (938.40±63.56 I.U/ML) compared to previous two studied groups which suggest a possible synergistic effect of two diseases.

-Statistically significantly Negative correlations were found between blood level of IgE and FEV1% of predicted in patients with bronchial asthma as well as patients with parasitic infestation with r=-0.381, -0.325 at p=0.006, 0.021 respectively.Inverse relationship was found between blood level of IgE and FEV1/FVC% in patients with parasitic infestation with r= -0.358 with statistical significant difference at p=0.011.

**Table (1):Comparison between the two studied groups according to demographic data**

| | Asthmatic (n= 50) | | Parasitic (n= 50) | | Test of sig. | p-value |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| **Age (years)** | | | | | | |
| ≤ 10 | 28 | 56.0 | 14 | 28.0 | $\chi^2$= 8.046 | 0.005* |
| > 10 | 22 | 44.0 | 36 | 72.0 | | |
| Min. – Max. | 6.0 – 17.0 | | 7.0 – 16.0 | | | |
| Mean ± SD. | 10.78 ± 2.94 | | 11.66 ± 2.08 | | t= 1.730 | 0.087 |
| Median | 10.0 | | 11.0 | | | |
| **Sex** | | | | | | |
| Male | 29 | 58.0 | 24 | 48.0 | $\chi^2$= 1.004 | 0.316 |
| Female | 21 | 42.0 | 26 | 52.0 | | |
| **Family history** | | | | | | |
| Negative | 37 | 74.0 | 49 | 98.0 | $\chi^2$= 11.96 | 0.001* |

| | | | | | | |
|---|---|---|---|---|---|---|
| Positive | 13 | 26.0 | 1 | 2.0 | | |

**t: t-test X²: Chi-Square test MCP: Monte Carlo test *significant at P≤0.05.**

**Table(2):Comparison between the three groups according to IgE:**

| | Asthmatic (n= 48) | Parasitic (n= 47) | Combined (n= 5) | KW | p |
|---|---|---|---|---|---|
| **IgE** | | | | | |
| Min. – Max. | 100.0-490.0 | 122.0-900.0 | 850.0-1003.0 | | |
| Mean ± SD. | 258.35±106.58 | 400.79±196.79 | 938.40±63.56 | 26.302* | <0.001* |
| Median | 247.0 | 344.0 | 950.0 | | |
| **Sig. Bet. Grps.** | $p_1$<0.001*, $p_2$<0.001*, $p_3$<0.001* | | | | |

KW: Kruskal Wallis test, Sig. bet. grps was done using Mann Whitney test

$p_1$: p value for comparing between asthmatic and parasitic group

$p_2$: p value for comparing between asthmatic and combined group

$p_3$: p value for comparing between parasitic and combined group

*: Statistically significant at p ≤ 0.05.

**Table**

**(3):Correlation between IgE with pulmonary function parameters in each studied group:**

| | | IgE | |
|---|---|---|---|
| | | Asthmatic | Parasitic |
| **FEV1 (%) predicted** | $r_s$ | -0.381* | -0.325* |
| | p | 0.006* | 0.021* |
| **FVC (%) predicted** | $r_s$ | -0.342* | 0.073 |
| | p | 0.015* | 0.615 |
| **FEV1/FVC (%)** | $r_s$ | -0.217 | -0.358* |
| | p | 0.130 | 0.011* |

$r_s$: Spearman coefficient

*: Statistically significant at p ≤ 0.05

## DISCUSSION

Analysis of the demographic data of the studied groups of patients showed the age spectrum of patients in this study was between 6 years old to 18 years old, , this is in agreement with age spectrum reported by ***Lyle J. Palmer et al,(2002)***(6) in which the patients aged 8-18 years, as regard the study included 2,164 subjects in anqing,China. While it was different from what was reported by ***Maria Teresa Nascimento Silva et al,(2003)***(7) ; in which the age spectrum was between 2 years old to 10 years old,as regard the study included 742 children in Campina Grande (Paraíba, Brazil). Prevalence of parasitic (nematodes) infestation was 2 patients (4%) out of 50 patients with bronchial asthma, this was in agreement with ***P.JURIŠ et al,(2014)***(8)**;**as Out of helminthoses the greatest representation was in Ascaris lumbricoides 4.41 % of total 272 paediatric patient, while it was different from what reported by ***Lyle J. Palmer et al(2002)*** (6) ***;*** A. lumbricoides infection was present 12.2% (n264) out of 3,372 subjects in Anqing, China.

Prevalence of combined bronchial asthma and parasitic (nematodes) infestation was 5 patients (5%) out of total 100 patients, this was in agreement with ***P.JURIŠ et al,(2014)***(8)**;**as Out of helminthoses the greatest representation was in Ascaris lumbricoides 4.41 % of total 272 paediatric patient, while it was different from what reported by ***Maria Teresa Nascimento Silva et al (2003)***(7) ***;*** 57.1% with ascariasis (253/443) patients aged (2-10) years old in the low income neighborhood of Pedregal, in Campina Grande (Paraíba, Brazil).

higher values of IgE were found in patients with parasitic infestation

(400.79±196.79 I.U/ML) (Min. – Max. 122.0-900.0) compared to patients with bronchial asthma (258.35±106.58 I.U/ML) (Min. – Max. 100.0-490.0), and more higher values of IgE (938.40±63.56 I.U/ML) (Min. – Max. 850.0-1003.0)in patients with combined bronchial asthma and parasitic infestation compared to previous two studied groups which suggest a possible synergistic effect of two diseases, this was in agreement with ***Emiro Buendía et al,(2015)[9];***higher values of IgE (585.4 ± 1412.1 I.U/ML) in patients with combined bronchial asthma and parasitic infestation, while it was different from what reported by ***Lyle J. Palmer et al,(2002)[6];*** Serum total IgE levels ranged from 2.0 to 10,137.5 IU/ml .

Negative correlations were found between blood level of IgE and FEV1% of predicted in patients with bronchial asthma as well as patients with parasitic infestation and Inverse relationship was found between blood level of IgE and FEV1/FVC% in patients with parasitic infestation, this was in agreement with ***BEGUM JA et al,(2010);***[10] Subjects were classified as having high IgE if their total IgE level was greater than or equal to 100 IU /ml .Subjects were classified as having low IgE if their total IgE level was less than 100 IU /ml,in this study were found that The mean percentage of predicted values of FEV1, FVC, FEV1/FVC% were significantly lower in high Ig E (>100 IU/ml)level group in comparison with low Ig E(<100 IU/ml) group.

## CONCLUSION

-86%of patients with bronchial asthma lived in urban areas, while 64% of patients with parasitic infestation lived in rural areas..Stool examination of studied patients with bronchial asthma revealed that 4% of the patients showed evidence of ascaris lumbricoids and Trichuris trichura infestation.Statistically significance higher values of IgE were found in patients with parasitic infestation compared to patients with bronchial asthma .It was noted that patients with combined bronchial asthma and parasitic infestation demonstrated statistically significance higher values of IgE compared to previous two studied groups which suggest a possible synergistic effect of two diseases.Statistically significantly Negative correlations were found between blood level of IgE and FEV1% of predicted in patients with bronchial asthma as well as patients with parasitic infestation.Inverse relationship was found between blood level of IgE and FEV1/FVC% in patients with parasitic infestation .

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