

# The Study of Prevalence of Bronchial Asthma among School Going Children in South India.

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## ABSTRACT

**Background:** Bronchial asthma (asthma) is the chronic illness in the childhood resulting in morbidity as it is not correctly diagnosed and treated properly. It is basically an allergic disorder; certain respiratory infection and air pollution also contributes to its etiology. **Methods:** This study focusses on prevalence of asthma among school going children and also record the demographic profile. This study also highlights to spread the awareness and policy decision making in the diagnosis and treatment of asthma in children. **Results:** The prevalence of asthma among school children in the current study was found to be 4.5%. Maximum numbers of positive cases were found at the age of 15 years, 10 (5.37 %) cases. In the current study the prevalence of asthma was found to be 4.24% in the 12-13 years age group and prevalence was found to be 4.73% in the 14-15 years age group. The prevalence of asthma was found to be higher among boys (5.14%) than of girls (3.77%). **Conclusion:** This study could identify an array of risk factors possibly involved in the prevalence of asthma in this region. Recognition of the risk factors will help parents, medical personnel and health planner's device preventive and early intervention programs to reduce the burden of asthma in the community.

**Key words:** Asthma, Demography, Etiology, Prevalence.

## INTRODUCTION

The prevalence of allergic disorders is increasing worldwide. It is estimated that 20% of the world population suffer from allergic diseases.<sup>[1]</sup> While genetic factors have probably not changed, environmental factors have altered markedly. On one hand, environmental pollution has increased with potentially adverse effects on the impact of environmental allergens. On the other hand, excess hygiene and limited exposure to microbial antigens may also be responsible for the higher rate of development of allergic disorders.

Allergy is a condition with wide spectrum of manifestations; it ranges from individuals with positive skin prick test without clinical features, to individuals affected by different forms of disease such as Allergic rhinitis, Atopic dermatitis, Asthma, Urticaria, Conjunctivitis, Enteritis and its most severe clinical manifestation Anaphylactic shock.

Asthma is an inflammatory disorder of the bronchial airways produced by allergies, viral respiratory infections and airborne irritants, while genetic factors predispose to develop asthma.<sup>[2]</sup>

Asthma is one of the most important chronic diseases of childhood, causing substantial morbidity.

Asthma creates a substantial burden on individuals and families as it is more often under-diagnosed and undertreated. It also accounts for high disease related morbidity measured on indices such as the school or work absenteeism, emergency-room visits and hospitalization.

The prevalence of asthma in different countries varies widely, but the disparity is narrowing due to rising prevalence in low and middle income countries and plateauing in high income countries.<sup>[3,4]</sup> An estimated 300 million people worldwide suffer from asthma, with 250,000 annual deaths attributed to the disease. It is estimated that the number of people with asthma will grow by more than 100 million by 2025. Approximately 250,000 people die prematurely each year from asthma. Almost all of these deaths are avoidable. About 70% of asthmatics also have allergies.<sup>[5]</sup> Asthma accounts for an overall prevalence of around two per cent in both children and adults in India in various population-surveys. Recent studies shows a wide variation (4-19%) in the prevalence of asthma in school-going children from different geographic areas in India.<sup>[6]</sup> Recognizing the problem in children is very essential, since the spectrum of presentation is variable and multiple for proper management.<sup>[7]</sup> The International Study of Asthma and Allergy in Childhood (ISAAC) developed a standardized method for describing the prevalence of asthma and other atopic disorders.<sup>[8]</sup> There is limited data on epidemiology of asthma in developing countries including India. Very few community-based studies had been conducted on the prevalence of

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asthma in Indian children. There is paucity of data on exposure to its various risk factors that include family history of asthma, indoor air pollution and type of fuel used, pet animals, smoking among family members, birth order, outdoor air pollution, aggravating with exercise, allergens like hey and others. Risk factors may be different in different geographical locations and no studies had been conducted with regard to this in this area. Such studies will be useful for taking specific interventional measures at community level. So, we conducted a school based cross sectional study to determine the prevalence of asthma symptoms and its associated factors in North Karnataka. Hence by means of this study we intend to study the prevalence of asthma among school going children aged between 12 to 15 years in Raichur, Karnataka with the help of ISAAC questionnaire.

**MATERIALS AND METHODS**

Four Major Schools (Kendriya Vidyalaya, Sri Chaithanya Techno School, Navodaya Public School, and Karnataka Welfare Trust School) from the Raichur town was selected for the study purpose. After obtaining the consent from the Principals of the schools, classes from 8<sup>th</sup> to 10<sup>th</sup> standards were selected and relevant questions from (The International Study of Asthma and Allergies in Childhood) ISAAC questionnaire was issued to the children. The children were asked to answer the questionnaire with the help of their parents, and were asked to return the

questionnaires the following day. The completed questionnaires were collected and the data were analyzed.

Inclusion Criteria: Age group between 12 – 15 yrs. Exclusion Criteria: A) Those not willing to participate in the study. B) Children with pre-existing congenital heart diseases. C) Children with pre-existing lung diseases. D) Children with any musculoskeletal disorders.

Duration of study was from August 2012 to September 2012. This is an epidemiological, Community based cross-sectional study. Total 550 children satisfying the inclusion and exclusion criteria were selected for the study. Approval was taken from the institutional ethics committee prior to the study.

Statistical Analysis: Descriptive statistics such as mean, SD and percentage were used to present the data. Association between prevalence of asthma and risk factors was analyzed by chi-square test. A p-value less than 0.05 were considered as significant. Data was analysed by using software SPSS v16.0.

**RESULTS**

This study was a community based cross sectional study based on ISAAC questionnaire among the school going children of Raichur from August 2012 to September 2012.

**Table 1:** Prevalence of asthma according to age groups.

Age (yrs)	No. of children	No. with asthma(n)	Prevalence (%)	95 % CI
12	112	4	3.57	0.13 (-7.01)
13	100	5	5.0	0.73 (-9.27)
14	152	6	3.95	0.85 (- 7.05)
15	186	10	5.37	2.31 (- 8.61)

$\chi^2$  for linear trend =1.86, df = 1, p = 0.12

The study group had children among the age group between 12 and 15 years of age and the mean age was found to be 13.68 years. Among the children with 12 years of age (n=112), the prevalence of asthma was found to be 3.57 % (n=4; 95% CI = 0.13 - 7.01). Among the children of 13 years age group (n=100), the prevalence of asthma was

found to be 5.0 % (n=5; 95% CI = 0.73 - 9.27). Among the children of 14 years age group (n=152), the prevalence of asthma was found to be 3.95 % (n=6; 95% CI =0.85 - 7.05). Among the children of 15 years age group (n=186), the prevalence of asthma was found to be 5.37 % (n=10; 95% CI =2.31 - 8.61).

**Table 2:** Prevalence of asthma according to gender:

Gender	No. of children	No. with asthma (n)	Prevalence (%)	95 % CI
Boys	311	16	5.14	2.69 (-7.59)
Girls	239	9	3.77	1.36 (-6.18)

Among the study group of 550 children, 311 were boys and 239 were girls. The prevalence of asthma was found to be 5.14% (n=16), and the prevalence of asthma was found to be 3.77% (n=9) on the basis of ISAAC scoring.

Maximum numbers of positive cases were found at the age of 15 years, 10 (5.37 %) cases. Out of the

25 positive cases, 8 (32%) had wheezing or whistling in the chest in the past 12 months. Among 25 positive cases, from last 12 months, 6 children (24%) had attack of wheezing, maximum number of children had 4-12 times (67%) attack of wheezing. In the past 12 months, on average, less than one night per week and One or more nights

per week, sleep has been disturbed due to wheezing 1%). In the past 12 months, 5 (0.9%) had wheezing ever been severe enough to limit speech to only one or two words at a time between

breaths. 11 (2%) ever had asthma. In the past 12 months, chest sounded wheezy during or after exercise were 7 (1.27%). 31 (5.64%) had a dry cough at night.

**Table 3:** Prevalence of asthma among study group in relation to mother's education.

Mother's education	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P - value
Primary	77	4	5.19	0.24 (-10.14)	>0.05
Secondary	170	4	2.35	0.07 (-4.63)	>0.05
Tertiary	303	17	5.61	3.02 (-8.2)	>0.05

Among the study group, the prevalence of asthma among the group with primary level of mother's education (n=77) was found to be 5.19% (n=4). The prevalence of asthma in the group with mother's education upto secondary education (n=170) was found to be 2.35% (n=4), and in the

other group which includes higher education among mothers, (n=303) the prevalence of asthma among the study group was found to be 5.61% (n=17). There was no statistical significance among all the groups (p>0.05).

**Table 4:** Prevalence of asthma among the study group in relation to physical activity:

Physical activity	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P -value
1 or 2 week	116	4	3.45	0.13 (-6.77)	>0.05
>3 week	118	7	5.93	1.67 (-10.19)	>0.05
Never/occasionally	316	14	4.43	2.16 (-6.7)	>0.05

The prevalence of asthma among the group doing physical activity 1 or 2 in a week (n=116) was found to be 3.45% (n=4). The prevalence of asthma among the group doing physical activity 3 or more in a week (118) was found to be 5.93%

(n=7) and among the study group who did not indulge in any physical activities or occasionally (n=316) the prevalence of asthma was found to be 4.43% (n=14). There was no statistical significance among any of the groups (p>0.05).

**Table 5:** Prevalence of asthma among the study group in relation to television watching.

Television Watching in hours (Days)	Percentage (%)	95% CI	P value
<1	4.35	0.18 (-8.52)	>0.05
1-3	5.34	2.69 (-7.99)	>0.05
3-5	3.06	0.35 (-6.47)	>0.05
≥5	-	-	-
Never	5.88	0.58 (-12.34)	>0.05

The prevalence of asthma among the study group in relation to television watching was divided into 5 groups according to the number of hours of television watching in a day. The prevalence of asthma was found to be 4.35% (n=4) among those who watched television for less than an hour in a day. The prevalence was 5.34% (n=15) among those who watched television for 1-3 hours in a

day. The prevalence was 3.06% (n=3) among the group who watched television for 3-5 hours in a day and 5.88% (n=3) among the group who never watched television. There was no statistical significant among the various study groups (p>0.05).

**Table 6:** Prevalence of asthma among the study group in relation to the number of elder siblings

No. of Older Siblings	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P-value
0	239	12	5.02	2.25 (-7.79)	>0.05
1	196	5	2.5	0.34 (-4.76)	>0.05
2	65	4	6.15	0.31 (-11.91)	>0.05
3	22	0	-	-	-
4	7	0	-	-	-
≥5	21	4	19.05	2.25-	>0.05

Among the study group, the prevalence of asthma was found to be 5.02% (n=12) among the group who did not have any older siblings. The prevalence of asthma was found to be 2.5% (n=5)

among the group who had one elder sibling. The prevalence of asthma was found to be 6.15% (n=4) among the group who had two elder siblings and the prevalence was found to be 19.05% (n=4)

among the group who had more than five elder siblings. There was no asthmatics among the group who had three or four elder siblings. There was no

statistical significance among any of the age groups ( $p>0.05$ ).

**Table 7:** Prevalence of asthma among the study group in relation to the number of younger siblings.

No. of Younger Siblings	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P - value
0	235	13	5.53	2.61 (-8.45)	>0.05
1	208	8	3.85	1.24 (-6.46)	>0.05
2	69	0	-	-	-
3	21	0	-	-	-
4	3	0	-	-	-
≥5	14	4	28.57	4.91 (-52.23)	>0.05

Among the study group, the prevalence of asthma was found to be 5.53% (n=13) among the group who did not have any younger siblings. The prevalence of asthma was found to be 3.85% (n=8) among the group who had one younger sibling. The prevalence of asthma was found to be 28.57%

(n=4) among the group who had more than five younger siblings. There was no asthmatics among the group who had two, three or four younger siblings. There was no statistical significance among any of the age groups ( $p>0.05$ ).

**Table 8:** The prevalence of asthma in relation with the type of fuel used for cooking.

Type of fuel used	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P - value
Electricity	2	0	-	-	>0.05
Gas and Electricity	15	2	13.33	3.87 (-30.53)	<0.001
Gas and Other Source	3	1	33.3	20.03 (-86.63)	>0.05
Gas	522	20	3.83	2.18 (-5.48)	<0.001
Open fire	8	2	25	5.01 (-55.01)	>0.05

The prevalence of asthma was found to be 13.33% (n=2, 95% CI=-3.87-30.53) among the study group who used gas and electricity. The prevalence of asthma was found to be 33.3% (n=1, 95% CI= -20.03-86.63) among the study group who used gas and other sources. The prevalence of asthma was found to be 3.83 (n=20, 95% CI=2.18-5.48) in the group which used gas for cooking purposes. The prevalence of asthma was found to be 25% (n=2,

95% CI=-5.01-55.01) among the group which used open fire for cooking purposes. There were no asthmatics who used electricity alone. There were no significant statistical relationship with groups using gas and other source and open fire ( $p>0.05$ ). Groups using gas and gas and electricity who had asthma were also statistically found to be significant ( $p<0.001$ ).

**Table 9:** Prevalence of asthma among the study group in relation with drugs used for fever.

Drugs used for fever	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P - value
Once per Month	51	2	3.92	-1.41-9.25	>0.05
Once in a Year	279	10	3.58	1.4-5.76	>0.05
Never	220	13	5.91	2.79-9.03	>0.05

The prevalence of asthma among the group who used drugs for fever once a month was found to be 3.92% (n=2), whereas the prevalence of asthma was 3.58% (n=10) who used drugs for fever once a

year. The prevalence of asthma among the group who never used drugs for fever was found to be 5.91% (n=13). There was no statistical significance among any of the groups ( $p>0.05$ ).

**Table 10:** The prevalence of asthma among the study group in relation to automobile pollution.

Vehicles passing nearby the house	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P value
Almost the whole day	116	6	5.17	1.14 (-9.2)	>0.05
Frequently	103	4	3.88	0.15 (-7.61)	>0.05
Seldom	129	6	4.65	1.02 (-8.28)	>0.05
Never	202	9	4.45	1.61 (-7.29)	>0.05

The prevalence of asthma among the group who had vehicles passing nearby the group almost the

whole day was found to be 5.17% (n=6, 95% CI=1.14-9.2). The prevalence of asthma was found

to be 3.88% (n=4, 95% CI = 0.15-7.61) in the group who had vehicles passing nearby the house frequently. The prevalence of asthma was found to be 4.65% (n=6, 95% CI=1.02-8.28) among the group who had seldom noticed the vehicles passing nearby the house whereas, the prevalence

of asthma was found to be 4.45% (n=9, 95% CI= 1.61-7.29) among the group who had never noticed any vehicles passing nearby their homes. There was no statistical significance among any of the groups (p>0.05).

**Table 11:** The prevalence of asthma among the study group in relation to the exposure to pet animals.

Exposure to pets in the house	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P value
Cat	63	4	6.35	0.33 (-12.37)	>0.05
Dog	39	1	2.56	-2.4 (-7.52)	>0.05
Both	20	2	10	-3.15 (-23.15)	>0.05
No	428	18	4.21	2.31 (-6.11)	>0.05

The prevalence of asthma was found to be 6.35% (n=4, 95% CI=0.33-12.37) among the group who had cats as their pets. The prevalence of asthma was found to be 2.56% (n=1, 95%CI= -2.4-7.52) among the group who had dogs as their pets. In the group who had both cats and dogs as their pets the prevalence of asthma was found to be 10% (n=2,

95% CI= - 3.15-23.15) and among the study group who did not have any pets the prevalence of asthma was found to be 4.21% (n=18, 95% CI= 2.31-6.11). There was no statistical significance among any of the groups (p>0.05).

**Table 12:** The prevalence of asthma in relation to exposure to smoking in the house.

Exposure to smoking in the house	Total number	Positive cases of asthma (n)	Percentage (%)	95% CI	P value
Yes	57	3	5.26	-0.54-11.06	>0.05
No	493	22	4.46	2.64-6.28	>0.05

The prevalence of asthma was found to be 5.26% (n=3, 95% CI= -0.54-11.06) among the group who had exposure to smoking in their homes and the prevalence of asthma was found to be 4.46%

(n=22, 95% CI= 2.64-6.28) among the group who did not give history of smoking in the house. There was no statistical significance among both the groups (p>0.05).

**Table 13:** Prevalence of Asthma.

Total No of Children	No of children with asthma	Prevalence of Asthma
550	25	4.50%

Among the study group of 550 children, 25 children were suffering from asthma. The prevalence of Asthma was found to be 4.5% in the current study.

## DISCUSSION

The completed questionnaires were collected and the data were analyzed with previous study.

**Table 14:** Age distribution in comparison with other studies.

Study	Age (years)	No. of children	No. with asthma	Prevalence (Percent)
Current Study	12-13	212	9	4.24
	14-15	338	16	4.73
Ganesh Kumar et al <sup>[9]</sup>	12-13	105	12	11.4
	14-15	170	12	7.1

In the current study the prevalence of asthma was found to be 4.24% in the 12-13 years age group and prevalence was found to be 4.73% in the 14-15 years age group. In a similar study done by Ganesh Kumar et al [9], the prevalence of asthma was found to be 11.4% in the 12-13 years age group

and the prevalence was found to be 7.1% in the 14-15 years age group. The difference in the prevalence studies could be attributed to the smaller sample size of the other study (n=275) [Table 14].

**Table 15:** Sex distribution in comparison with other studies.

Study	Gender	No. of children	No. with asthma (n)	Prevalence (%)
Current Study	Boys	311	16	5.14
	Girls	239	9	3.77
Ganesh Kumar et al <sup>[9]</sup>	Boys	149	15	10.1
	Girls	126	9	7.1



The prevalence of asthma was found to be higher among boys (5.14%) than of girls (3.77%). This is comparable to the study done by Ganesh et al<sup>[9]</sup> which has prevalence of asthma in boys as

10.1% and in girls was 7.1% and other studies as well [Table 15].

**Table 16:** Asthma prevalence in relation to mother's education in comparison with other studies.

Risk Factors	Present study prevalence (%)	Awasthi et al (%) <sup>[10]</sup>
Tertiary education of mother	5.61	7.3

The prevalence of asthma was highest among the group who had their mother's with tertiary education (5.61%). This was comparable to the study done by Awasthi et al<sup>[10]</sup> who reported tertiary education of mother to be a risk factor for childhood asthma (7.3%). The difference in the prevalence rate of the present study may be attributable to the small sample size (550) compared to that of 3000.

Since there is no plausible direct link of maternal education with asthma, there are likely to be unmeasured confounders associated with life-style. Our findings are in contrast to study by Celedon, et al<sup>[11]</sup> from Costa Rica, which showed that low parental education was a significant risk factor for asthma [Table 16].

**Table 17:** Prevalence of asthma in relation with physical activity in comparison with other studies.

Physical activity	Percentage (%)	95% CI	P- value
1 or 2 week	3.45	0.13 (-6.77)	>0.05
3 or more week	5.93	1.67 (-10.19)	>0.05

The prevalence of asthma was found to be higher among the group which had physical activity for three or more in a week (5.93%). This was comparable to that of the study done by Awasthi et

al.<sup>[10]</sup> which showed a similar trend of 10.6% of asthma among the population who had regular physical activity [Table 17].

**Table 18:** Prevalence of asthma in relation to television watching in comparison with other studies.

Television watching in hours/day	Percentage (%)	95% CI	P-value
<1	4.35	0.18 (-8.52)	>0.05
1-3	5.34	2.69 (-7.99)	>0.05
3-5	3.06	0.35 (-6.47)	>0.05

The prevalence of asthma was found to be highest (5.34%) among the group who watches television for 1-3 hours in a day and lowest among the group who watches television for 3-5 hours. A similar study by Mathew AC et al,<sup>[12]</sup> the prevalence of

asthma was found to be highest among children who watches television more than two hours a day (9.90%), when compared with 0-2 hours of television watching (5.80%) which was not statistically significant (p>0.05) [Table 18].

**Table 19:** Prevalence of asthma in relation to the birth order in comparison with other studies.

Older siblings	Percentage (%)	95% CI	P-value
0	5.02	2.25 (-7.79)	>0.05
1	2.5	0.34 (-4.76)	>0.05
2	6.15	0.31 (-11.99)	>0.05
≥5	19.05	2.25 (-35.85)	>0.05

The prevalence of asthma was found to be highest among the group having more than five older siblings (19.05%). This pattern was similar to the study done by Weitzman M et al.<sup>[13]</sup> who observed that Asthma was positively associated with having

a large family size (more than 6 members). This is in contrary to the popular view that asthma is inversely related to birth order. The prevalence of asthma was found to be lowest among the group which had one elder sibling (2.5%) [Table 19].

**Table 20:** Prevalence of asthma in relation to the birth order in comparison with other studies.

Younger siblings	Percentage (%)	95% CI	P-value
0	5.53	2.61 (-8.45)	>0.05
1	3.85	1.24 (-6.46)	>0.05
≥5	28.57	4.91 (-52.23)	>0.05

The prevalence of asthma was found to be highest in the group which had  $\geq 5$  younger siblings (28.57%). This was similar to the pattern observed in the study by Ganesh Kumar et al, [9] who showed that the prevalence of asthma decreases

when the birth order increases. The third born child was least affected by asthma (1.8%), whereas the first born child had 9.5% and the prevalence of asthma among the second born child was 11.8% [Table 20].

**Table 21:** The prevalence of asthma in relation to the type of fuel used comparison to other studies.

Type of fuel used	Percentage (%)	95% CI	P-value
Electricity	-	-	>0.05
Gas and Electricity	13.33	3.87 (-30.53)	<0.001
Gas and other source	33.3	20.03 (-86.63)	>0.05
Gas	3.83	2.18 (-5.48)	<0.001
Firewood	25	5.01 (-55.01)	>0.05

The prevalence of asthma was found to be highest among the group which used gas and other sources for cooking purposes (33.3%). There were no asthmatics in the group which used electricity for cooking purposes. In a similar study done by Ganesh Kumar et al,<sup>[9]</sup> the prevalence of asthma was found to be highest among the group which used electricity (9.3%) and no asthmatics were

reported in the group which used firewood for cooking. There were no significant statistical relationship with groups using gas and other source and open fire ( $p > 0.05$ ). Groups using gas and gas and electricity who had asthma were also statistically found to be significant ( $p < 0.001$ ) [Table 21].

**Table 22:** Prevalence of asthma in relation with drugs used for fever in comparison to other studies.

Drugs used for fever	Percentage (%)	95% CI	P-value
Once per month	3.92	-1.41 (-9.25)	>0.05
Once in a year	3.58	1.4 (-5.76)	>0.05
Never	5.91	2.79 (-9.03)	>0.05

The prevalence of asthma was found to be highest among the group who had never taken any drugs for fever (5.91%). The prevalence of asthma was found to be lowest among the group who had taken drugs for fever atleast once in a year. A similar

study done by Sharma SK [14] found that paracetamol intake of more than once a month (OR: 95% CI, 1.9 [1.4-2.6]) was independently associated with occurrence of recent wheezing (in the last 12 months) [Table 22].

**Table 23:** The prevalence of asthma in relation with automobile pollution in comparison to other studies.

Vehicles passing nearby the house	Percentage (%)	95% CI	P-value
Almost the whole day	5.17	1.14 (-9.2)	>0.05
Frequently	3.88	0.15 (-7.61)	>0.05
Seldom	4.65	1.02 (-8.28)	>0.05
Never	4.45	1.61-7.29	>0.05

The prevalence of asthma was found to be highest among the group which had vehicles passing nearby the house almost the whole day (5.17%). A similar pattern was observed in a study by Sharma SK [14] who found that frequent passage of trucks

through the street near home was independently associated with occurrence of recent wheezing (in the last 12 months). ([OR]: 95% CI, 1.7 [1.2-2.4]) [Table 23].

**Table 24:** Prevalence of asthma in relation to exposure to pet animals in comparison to other studies.

Exposure to pets in the house	Positive cases of asthma (n)	Percentage (%)	95% CI	P-value
Cat	4	6.35	0.33 (-12.37)	>0.05
Dog	1	2.56	-2.4 (-7.52)	>0.05
Both	2	10	-3.15 (-23.15)	>0.05
No	18	4.21	2.31 (-6.11)	>0.05

The prevalence of asthma increased with the presence of pet animals. The prevalence of asthma in the group which had both pets (cats and dogs) was the highest (10%) [Table 24]. The prevalence of asthma was found to be 4.21% in the group which had no pets. In

a similar study done by Ganesh Kumar et al,<sup>[9]</sup> showed a prevalence of 7.1% prevalence of asthma in the presence of pet animals and 10.4% prevalence of asthma when there were no pets in the house.

**Table 25:** Prevalence of asthma in relation with exposure to smoking in the house in comparison with other studies.

Smoking in family members	Percentage (%)	95% CI	P-value
Yes	5.26	-0.54 (-11.06)	>0.05
No	4.46	2.64-6.28	>0.05

The prevalence of asthma was found to be higher in the group where they were exposed to smoking in the house (5.26%), whereas the prevalence of asthma was lower in the group which were not exposed to smoking in the house. A similar pattern was observed in the study done by Ganesh Kumar et al,<sup>[9]</sup> who

observed that the prevalence of asthma in the group who were exposed to smoking in the house were higher 9.8% whereas the prevalence of asthma was lower in the group who were not exposed to smoking in the house (8.3%) [Table 25].

**Table 26:** Prevalence of asthma in comparison to other studies.

Author	Shah JR et al <sup>[15]</sup>	Current Study
Asthma Prevalence	4.5%	4.5%

In this study, the prevalence of asthma was found to be 4.5% among the age group of 12-15 years. There are three studies already published from South India. Data from Kerala during the ISSAC study reported a prevalence of 4.5% in 13-14 yr old and children. A study from south Karnataka among rural children aged 6-15 years reported a prevalence of 10.5%. For the 13-14 year children, prevalence of asthma ranged from 2.1 to 4.4 % in China, Indonesia and Russia, while in Australia, New Zealand and UK it was 29.1 to 32.2%. Our study is similar to the study done by Shah JR et al,<sup>[15]</sup> where the prevalence of bronchial asthma was found to be 4.5% [Table 26].

The low figures from India and China may be erroneous since very few representative nationwide studies have been done in these countries. More large scale studies are required in India to get a clearer picture regarding the overall prevalence and to document if the increase in prevalence is only in selected areas. Higher prevalence of asthma observed may be correlated with demographic changes in the city such as increase in the number of industries, density of population, and the number of automobile.

be 4.73% in the 14-15 years age group. The prevalence of asthma was found to be higher among boys (5.14%) than of girls (3.77%). This study helps in building awareness among children and their families regarding asthma.

This study helps in creating awareness among the various risk factors that are likely to be involved in the occurrence of asthma eg tertiary education of mother, exposure to fuel used for cooking, exposure to automobile pollution, exposure to pets, physical activity.

There is a wide inter-city difference in prevalence of asthma in India. However this study could identify an array of risk factors possibly involved in the prevalence of asthma in this region. Asthma among school children is a public health problem in this area. Recognition of the risk factors will help parents, medical personnel and health planner's device preventive and early intervention programs to reduce the burden of asthma in the community. More large community based surveys with the interviewer directly collecting information from parents and children can through more light on this obscure area.

## CONCLUSION

The prevalence of asthma among school children in the current study was found to be 4.5%. Maximum numbers of positive cases were found at the age of 15 years, 10 (5.37 %) cases. In the current study the prevalence of asthma was found to be 4.24% in the 12-13 years age group and prevalence was found to

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