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Statistical Study of Asthma in North-west Rajasthan, India

V.K. Gaur, Bhawani Shankar Tanwar

Government of Dunagr PG College, Bikaner, Rajasthan, India.

Abstract:

No information is available on epidemiology of bronchial asthma in children below 15 years of age. One or more respiratory symptoms Rajasthan. A field study was therefore, undertaken to estimate were present in 5.3% of the subjects. Asthma was diagnosed in 1.86%, prevalence of bronchial asthma and to define the risk factors 1.44%, 0.51 and 0.38% of the rural male, rural female, urban male influencing the disease prevalence in [Bikaner district of the state using and urban female respondents respectively, with an overall prevalence a previously validated questionnaire. Besides demographic data, of 0.96%. History of atopy in self and/or history of asthma in information on smoking habits, domestic cooking fuel used, atopic the first-degree relative were found to be the most important risk symptoms and family history suggestive of asthma was also collected. factors. Advancing age, usual residence in rural area and tobacco Multivariate logistic regression analysis was performed to calculate smoking, especially hookah smoking, were also associated with odds ratio of various potential risk factors. Data from 8863 significantly higher odds of having asthma.

Keywords : Asthma in North-west area, Statistics of Asthma.

1. INTRODUCTION

Data on prevalence of asthma are now available from several countries including India. Prevalence varies from region to region depending upon the definition used for diagnosis of asthma. 1-10 Diagnosed asthma (i.e. asthma ever diagnosed by a clinician) in adults is generally reported as 2.7 to 4.0% in most European countries, 12.0% in England and 7.1% in US. In Australia, the prevalence is rather high (9.5 to 17.9%). Tristan da Cunha is an unique example where more than half the population (56%) is reported to suffer from asthma, supporting a strong genetic link.? Aggarwal *et al.*[1] has reported a prevalence of 2.38% in Indian population based on a survey conducted in Delhi, Chandigarh, Kanpur and Banglore. India is a vast country with immense geographical, economical, racial, religious and socio-political diversity. There are obvious differences in prevalence of disease and the above data can not automatically be applied to Rajasthan. Since it is an enormously difficult and costly proposition to collect statewise statistics, as it requires coordination and cooperation between several centers spread across the State, a field study was undertaken at Bikaner district of the State.

2. MATERIAL AND METHOD

The Material and methods used in the present study were essentially similar to those used in the nationwide study by Aggarwal *et al.*[1] The essential components of this study design were (a) a single definition of asthma developed prior to initiation of data collection, (b) a standardized and validated Hindi study questionnaire developed at the Central Coordinating Centre i.e., Chandigarh, (c) uniform method of data collection and input of data at Bikaner and (d) data analysis at the coordinating centre.

Bikaner district in Rajasthan has a population of 644400 (Census 2011). their are 338442 males and 305964 are females Of this 72.1% are the urbanites of Bikaner - 108 villages. The remaining 27.9% are living in rural areas, constituted by 108 villages. It was planned to sample 15000 subjects (about 0.03% of the population) for the purpose of this study. Ten wards of Bikaner city, 2 towns and 50 villages of the district were randomly selected to act as clusters of the study. Author formed a sampling unit and it had to fill up 35 to 45 questionnaires each day in the assigned area, namely Bikaner city (164 units), Deshnoke (10 units), Nokha (11 units), Dungargarh, Loonkaransar (3-4 units each with total of 190 units) district of Bikaner.

A separate questionnaire form was completed for each respondent in a households. Interview started in the selected household. The field workers carried out interviews of all the members in each household, moving to the next selected house once the previous one was exhausted, and continued till the requisite sample had been covered. Interviews were conducted face to face in privacy and in homes of the respondents. Help was taken from one of the parents in case the subject was aged less then 15 years of age. In case a selected household was locked or a respondent was not available, the field worker noted it as such, and returned at a subsequent date at a time convenient to the respondent to fill the questionnaire. If such attempt at meeting residents of a household was unsuccessful, the household was dropped from the list.

A field supervisor at each participating centre collected the list of all households visited by the field workers, and later made a visit to five percent randomly selected households to verify if the interview was actually conducted. He also administered the questionnaire again to randomly selected respondents to check for any mistakes made by the interviewer. Data input was carried out at Bikaner on a computer programme, specifically written for this project, using the software *EpiInfo* (version 6). All data were later transferred to SPSS (version 10.0) software (SPSS Inc., Chicago, IL) for further analysis. Data related to respondents below the age of less then 15

years of age were excluded from the further analysis. Asthma was diagnosed if the respondent answered affirmatively both to (a) wheezing or whistling sound from chest, or chest tightness or breathlessness in morning, and (b) having suffered from asthma or having an attack of asthma in past 12 months, or using inhaled or oral bronchodilators. Prevalence of asthma was calculated as the number of subjects categorized as having asthma (based on the definition described above) divided by the total number of subjects in that particular group. Multivariate logistic regression modeling was also performed to assess odds ratio for each potential risk factor after adjusting for others.

3. RESULTS

The survey started in August' 2016 and was completed in February' 2017. Out of the expected 15000, a total of 12805 responses were collected from the study population (85.4%). The response was better in urban areas as compared to rural areas. After exclusion of 3942 subjects below 15 years of age (questionnaire has not been yet validated for this group) , data collected from the 8863 adult respondents was analysed. There were 5010 (56.5%) men and 3853 (43.5%) women. 4860 of the subjects (54.7%) were urbanites, the remaining 4003 (46.3%) belonged to rural areas. More then half of the subjects (54.7%) were aged between 15 and 34 years and only 4.0 percent individuals were aged 65 years or more. (Table 1). The distribution of the subjects based on occupation, education and socio-economic status are shown in Tables 2, 3 and 4, respectively.

Table - l

Age & Sex distribution of the subjects

Age (in years)	Male	Female	Total	
15-24	1698	1076	2774	(31.4%)
25-34	1042	1113	2155	(24.3%)
35-44	1028	783	1811	(20.4%)
45-54	556	448	l004	(11.3%)
55-64	405	288	693	(07.8%)
65-74	200	104	304	(03.4%)
≥75	81	31	112	(01.3%)
Total	5010	3853	8863	

Table - 2 : Place of domicile & occupation of the subjects according to sex

	Rural		Urban		Total
	Male	Female	Male	Female	
Household work only	8	1345	46	1577	2976 (33.6%)
Unskilled labourer	147	1	258	32	438 (04.9%)
Skilled labourer	56	1	47	2	106 (01.2%)
Business/Self-professional employed	347	4	1021	35	1407 (15.9%)
Farmer	815	7	9	1	832 (09.4%)
Government/Private service Worker	106	1	378	51	536 (06.0%)
Government/Private service-Supervisor	2	2	111	6	121 (01.4%)
Government/Private service- Officer	--	--	96	7	113 (01.3%)
Unemployed/Retired	783	374	772	406	2335 (26.3%)
Total	4003		4860		8863

Table - 3 : Education status of the subjects

Education in years	Rural		Urban		Total	
	Male	Female	Male	Female		
Illiterate	646	1074	419	694	2833	(32.0%)
> 5 years	392	287	289	238	1206	(13.6%)
6-10 years	913	313	714	449	2389	(27.0%)
11-15 years	296	57	1057	604	2014	(22.7%)
>15 years	13	2	230	97	357	(0.40%)

Table - 4 : Socio-economic Status of the Subjects

	Rural		Urban		Total
	Male	Female	Male	Female	
Low SES	884	734	359	272	2249 (25.4%)
Medium SES	1384	1001	2372	1831	6588 (74.3%)
High SES	--	--	11	15	26 (00.3%)

Table 5 shows the smoking status of the subjects. Less women smoked (52 out of 3835) as compared to men (1332 out of 4986), this difference being more marked in urban areas. Cigarette and bidi were the commonest forms of tobacco smoked by the study subjects. Only a small minority of smokers had quit smoking, majority of them doing so in the recent past. Environmental Tobacco Smoking (ETS) was very common in the study subjects, more so in females on account of smoking by their spouses (Table 5). About one third of the study subjects studied (35%) were regularly cooking food at home. Vast majorities of these subjects were women. While liquefied petroleum gas (LPG) was the commonest cooking fuel used in urban areas, solid fuels (e.g. coal and dung) were more common in use in rural areas (Table 6).

Table 5: Smoking habits

	Rural		Urban		Total
	Male	Female	Male	Female	
Ever smoker					
No	1270	1692	2384	2094	7437 (83.9%)
Yes	993	39	339	13	1384 (15.6%)
Information NA	5	4	19	14	42 (00.5%)
Current smoker					
Current smoker	951	39	333	13	1336 (15.1%)
Left smoking (<1 year back)	38	--	3	--	41 (00.5%)
Type of Smoking					
Cigarette	604	11	233	12	860 (09.7%)
Bidi	258	28	2	--	288 (03.3%)
Hookah	124	--	--	--	124 (01.4%)
Others	7	--	4	1	1 (00.0%)
ETS exposure					
No	365	468	2081	1756	
Yes	910	1228	321	348	
Other tobacco product					
No	2061	1714	2665	2088	8528 (96.2%)
Yes	168	12	52	6	238 (0.27%)
Information NA	39	9	25	24	97 (0.1.1%)

Based on the criteria used in the survey, asthma was diagnosed in 0.96% of the respondents in Bikaner district of Rajasthan. History of atopy in self or a family member was the most important risk factor ($p < 0.001$). Rural domicile, history of hoookah smoking and advancing age were also identified as significant risk factors for occurrence of asthma (Table 7). On univariant analysis male sex, low socioeconomic status, other forms of smoking and cooking with kerosene or dung also figured as risk factors to asthma but on multiple logistic regression analysis, it was found to be insignificant (Table 6).

Table - 6 : History of cooking in the subjects

	Rural		Urban		Total
	Male	Female	Male	Female	
History of Cooking					
No	2233	419	2597	378	5627 (63.5%)
Yes	10	1311	64	1725	3110 (35.1%)
Information NA	25	5	81	15	126 (01.4%)
Type of Fuel					
LPG	2	22	45	1381	1450 (16.4%)
Kerosene	--	46	9	127	182 (02.1%)
Coal	5	811	5	159	980 (11.1%)
Wood	--	2	5	56	63 (00.7%)
Dung	3	418	--	2	423 (04.8%)
Others	--	12	--	--	12 (00.1%)

Table – 7 : Correlation of Asthma Diagnosis With Various Factors

Adjusted Odds (95%) confidential interval)			
Sex	Male	01.00	
	Female	01.26	(0.6-2.7
Age	15-24	01.00	
	25-34	01.98	(0.3-11.4)
	35-44	03.09	(0.6-15.8)
	45-54	06.28	(1.2-31.8)
	55-64	27.82	(6.1-126.6)
	65-74	34.23	(7.0-165.6)
	>75	84.20	(16.4-431.7)
SES	Low	01.00	
	Medium	00.68	(0.4-1.3)
Atopy	No	01.00	
	Yes	12.09	(7.0-20.6)
F/H atopy	No	01.00	
	Yes	64.49	(9.7-388.2)
Smoking	No	01.00	
	Yes	--	
	Cigarette	01.25	(0.5-3.0)
	Bidi	01.46	(0.6-3.6)
	Hookah	04.03	(1.5-10.9)
Cooking	No	01.00	
	Yes	--	
	LPG	01.26	(0.4)
	Kerosene	03.05	(0.8-11.2)
	Coal	00.76	(0.2-2.9)
	Dung	01.57	(0.4-6.4)
	Wood	--	

4. DISCUSSION

To correctly identify asthmatics from the symptomatic a questionnaire which has been validated against physician-diagnosed asthma under both hospital and field conditions was used. Based on this questionnaire Aggarwal *et al*.[1] have estimated that about 2.38% of Indian population suffers from asthma. This estimate was found to be closed to an earlier estimate of 2.78%, reported three decades ago in a middle-aged urban population. Using the same methodology, the prevalence of asthma in our study population was found to be 0.96%. Our estimates of prevalence of asthma in Bikaner district of Rajasthan are low as compared to the National figures. We have tried to analyze the possible reasons of this. We have followed the same methodology, data analysis and definition of asthma as was used by Aggarwal *et al*.[1]

Data on the importance of tobacco smoking in relationship to prevalence of asthma are conflicting. Tobacco smoking by hookah emerged a highly significant risk factor in our study population even after adjusting for other confounding factors like age, gender and socioeconomic factors. Smoking cigarette or bidi also increased chances of asthma but the effect was not significant. It is, therefore, possible that tobacco smoking through hookah is an independent risk factor for bronchial asthma. The higher prevalence of asthma in rural areas of the study population is also possibly related to hookah smoking. Active smoking was observed to have an association with bronchial asthma by some but not by others. Cooking food with kerosene also appeared to be associated with a higher risk of asthma in our study population.

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