INCIDENCE OF ALLERGIC SYMPTOMS AMONG POPULATIONS OF DIFFERENT SOCIOECONOMIC STATUS IN WEST BENGAL, INDIA

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The association of socioeconomic status in the incident of allergic diseases is uncertain. In the developing countries, the dearth of space sometimes forces to cook inside living room. Thus such household air pollution from burning biomass or fossil fuels is a major root of morbidity and/or mortality especially in low-income backgrounds worldwide. The present paper aimed to find out the prevalence of various allergic symptoms among local inhabitants of different socioeconomic status. Out of 5491 subjects, 3673 allergic subjects were studied through a questionnaire both at Bolpur sub-divisional hospital and Durgapur sub-divisional hospital in presence of the clinicians. Out of 3673 allergic subjects, about 71.4% patients were recorded from poor socioeconomic class people, while 28.6% patients were encountered in middle/higher socioeconomic class. Significant Association in Odd ratio analysis with a confidence interval of 95% was found between the economic status and the prevalence of cough 2.54 (1.987-3.24), skin diseases 2.743 (2.19-3.42), rhinitis 0.158 (0.125-0.201), conjunctivitis 10.11 (5.82-17.53), etc. Evidences acquired from the present systematic study suggest that the prevalence of allergic diseases is a bit higher in lower socioeconomic populations, thus the prevalence of allergic symptoms is significantly associated with socioeconomic status of populations.

Key Words: Allergic symptoms, Questionnaire, Hospitalization data, Odd ratio, Socioeconomic status, West Bengal, India

Received: 23.05.2022 Revised: 08.06.2022 Accepted: 10.06.2022

INTRODUCTION

The prevalence of asthma and allergic diseases varies widely among countries/geographical regions and also within countries with different socioeconomic status[1,2]. The INSEARCH (Indian Study on Epidemiology of Asthma, Respiratory Symptoms and Chronic Bronchitis) study[3] in adults estimated that the national burden of asthma among 17.23 million people showed an overall prevalence of 2.05%. The recent Global Burden of Disease (GBD, 1990-2019) estimated that the total burden of asthma in India among 34.3 million population is accounting for 13.09% of the global burden[4].

In relation to socioeconomic status, the "hygiene hypothesis" is the most acceptable theory that features most prominently in the explanation of the association between disease prevalence and socioeconomic status[5]. In addition, the evidence on the relationship between socioeconomic status and asthma as well as allergy prevalence has been conflicting where both low and high socioeconomic status also being reported as a risk factor[6].

In some studies, the socioeconomic status was reported to have an association with asthmatic symptoms. This includes parental education and income. Evidences indicated that children from lower-income group were more prone to asthma culminating to hospitalization compared to children with asthma from higher-income group[7]. Crowded house is associated with several infectious diseases including lung and skin infections, meningococcal disease, and rheumatic fever[8].

In a Brazilian study[9] it was reported that monthly family income was a key factor for prevalence of asthma. At the beginning of the study, the patients with uncontrolled asthma had a median monthly family income of US$ 372.09, whereas those with controlled asthma had higher incomes (median = US$ 558.13). At the end of the study, this difference persisted (uncontrolled asthma: median = US$ 372.09 versus controlled asthma: median = US$ 604.65).

A health survey was conducted[10] at a rural tribal low-income community in sub-Saharan Africa. Each tribal group had distinctive practices when it came to staple

food, cooking tradition, sleeping areas, and smoking habits, which largely affected levels of exposure to biomass fuel smoke and tobacco smoke. Generally speaking, wood is the major source of biomass fuel for cooking and heating. The poorest people in the rural areas are mostly exposed to biomass fuel smoke as they cannot afford a separate cooking place and used to cook in a leaving room along with other family members. Societal roles are largely determined by gender, with the result that women are much more exposed to biomass smoke than men, starting at a young age.

Keeping the above view in mind, in the present study an attempt has been made to record the prevalence of allergic symptoms among local inhabitants in two unexplored sites of West Bengal with regard to their socioeconomic status

METERIALS AND METHODS

Hospitalization data

The health survey was conducted in two sub-divisional hospitals namely, Bolpur sub-divisional hospital and Durgapur sub-divisional hospital. A total of 5491 subjects (2826 from Durgapur and 2665 from Santiniketan) were studied covering an age limit from 5 years to 78 years at both the Durgapur and Bolpur sub-divisional hospitals from 2013 to 2016. In the present investigation, among the overall 5491 subjects a total of 3673 allergic subjects were studied after excluding those who were active smokers (n = 127), had congenital diseases (n = 38), not interested to take part to answer the questions (n = 89) and non-allergic subjects (n = 1668). Out of 3673 allergic subjects, a sum of 2623(71.4%) patients belonging to 1397 male and 1226 female were recorded among poor socioeconomic class people (Table 5.1). Among middle/higher economic class people 1050 patients (28.6%) were encountered belonging to 582 male and 478 female (Table 5.1).

The survey of 3673 allergic subjects in relation to their health hazards in the seasonal changes, together with their lifestyle, smoking habit, family history, occupation, etc., were taken into account, because such factors may enhance the chance of susceptibility to allergy-related symptoms[11-13].

Questionnaire study and Health survey

A health survey of local patients was carried out by visiting the outpatients' department of the sub-divisional hospitals in each study area. The data on the demographic and medical history of the studied allergic patients were collected in presence of the physicians using a standard questionnaire which was prepared according to WHO (2010) with some modifications based on local socio-economic conditions. The patients were clinically examined by the physician before collecting information from them. The questions on concerning allergic symptom include cough, breathlessness, allergic rhinitis, allergic conjunctivitis, allergy-related skin disease and food allergy. The pattern of symptoms, whether seasonal, perennial or irregular, worst month and time of onset of symptoms were also recorded.

RESULTS

In the present study, a total of 3673 allergic subjects were divided into two categories according to their socio-economic status. Those who have a monthly family income maximum of INR 10,000 per month have been considered as poor economic class people (2623 subjects) and those who have a family income of more than INR 10,000 per month are treated as the middle (M) or higher (H) economic class people (1050 subjects). The number of studied poor economic class subjects was higher because the study was conducted at Govt. sub-divisional hospitals where mainly economically poor class population visit for medical treatments according to present Indian socio-economic context.

A total of 25 different types of allergic diseases were recorded from both the study sites. Eleven (11) types of allergic diseases were reported among the economically middle/higher (M/H) class population, while 24 types were recorded among the poor (P) economically class population (Table 5.1). Certain diseases were highly prevalent in M/H class than that of P class people such as allergic urticaria (M/H-15.2%, P-7.9%), allergic rhinitis (H/M-27.05%, P-7.1%), undetermined insect bite allergy (M/H-11.5%, P-2.6%). Except for such types, all other diseases were highly prevalent in the poor (P) economic class population (Table 5.1). A total of eleven urticarial skin diseases were reported in poor (P) class population, while only five such diseases (urticaria, dermatographism, angioedema, skin rash, acne) were registered in the M/H class population. Acne vulgaris urticaria was only noted among M/H class

Table 5.1: Prevalence of allergic diseases among the population of study areas (Durgapur and Santiniketan) in relation to socioeconomic status.

Allergic symptoms Study subjects (N) = 3673	**Poor economic class** Study subjects (N) = 2623 [M = 543, F = 497] (Percentage)	**Middle/Higher economic class** Study subjects (N) = 1050 [M = 280, F = 211] (Percentage)
Allergic Skin Diseases	625 (23.8)	174 (16.6)
(i) Atopic Dermatitis (691.8 ICD9-CM)	52 (1.9)	
(ii) Eczema(acute/chronic)(Infantile) L20.83 ICD-10	23 (0.9)	
Dermatitis due to other radiation		
(i) Solar allergy/Polymorphous light eruption(L56.4 ICD 10)	17 (0.6)	
(ii) Dermatitis chronic	6 (0.2)	
Urticaria		
(i) Allergic urticaria (L50.0 ICD 10) (acute, atopic)	207 (7.9)	160 (15.2)
(ii) Idiopathic urticaria (L50.1 ICD 10)	14 (0.5)	
(iii) Cold and heat urticaria (L50.2 ICD 10)	12 (0.45)	
(iv) Dermatographism (L50.3 ICD 10)	18 (0.7)	4 (0.38)
(v) Chlinergic urticaria (L50.5 ICD 10)	19 (0.72)	
(vi) Chronic urticaria (L50.8 ICD 10)	85 (3.24)	
(vii) Allergic contact dermatitis (L23 ICD10)	12 (0.45)	
(viii) Angioedema	6 (0.2)	1 (0.09)
(ix) Skin rash (R21)	146 (5.6)	7 (0.7)
(x) Papular urticarial	4 (0.15)	
(xi) Pitrasis rosea	2 (0.076)	
(xii) Acne vulgaris		2 (0.18)
Cough R05	440 (16.8)	
Allergic Asthma J45	399 (15.2)	
Allergic Rhinitis J30.9	186 (7.1)	
Chronic allergic conjunctivitis H10.45 (ICD-10-CM) (perennial, seasonal)	238 (9.07)	
Undetermined insects bite allergy	68 (2.6)	
Rhinosinusitis	20 (0.76)	
Genetic allergy	6 (0.22)	
Food allergy	18 (0.7)	

N = No. of the population; **M** = Male; **F** = Female

population. Prevalence of allergic asthma was more or less similar in both the community (H/M-16.47%, P-15.2%), but the prevalence of allergic cough was higher in the poor economic class population (16.8%) than M/H class population (10.48%). Genetic allergy, rhino-sinusitis, and food allergy were not revealed in M/H class population may be due to the small sample size.

DISCUSSION

An Odds ratio (OR) is a measure of association between exposure and its outcome. The OR represents the odds that an outcome will occur given a particular exposure of a setup, compared to the odds of the outcome occurring in the absence of that exposure of the setup[14]. OR of 1 would suggest that there is no difference between the groups, OR of >1 suggests that the odds of exposure are positively associated with the adverse outcome compared to the odds of not being exposed, and OR of <1 suggests that the odds of exposure are negatively associated with the adverse outcomes compared to the odds of not being exposed. Odds ratios (OR) and 95% confidence intervals (CI) were adjusted for important potential confounders (Table 5.2). To assess the joint effect and interactions between socioeconomic status and allergic disease occurrence the subjects were stratified into four groups such as

(i) high-income status and prevalence of a particular disease (viz. relation between asthma prevalence in high-income status individual),

(ii) high-income status and absence of a particular disease,

(iii) low-income status and prevalence of a particular disease,

(iv) low-income status and absence of a particular disease.

Association between the economic status of the local inhabitants played a significant role behind some allergic diseases like cough 2.54 (1.987-3.24), skin diseases 2.743 (2.19-3.42), rhinitis 0.158 (0.125-0.201), conjunctivitis 10.11 (5.82-17.53), other diseases 0.213 (0.115-0.294), sneezing 0.744 (0.584-0.949) and food allergy 8.64 (1.151-64.94) (Table 5.2). There is a strong association between asthma prevalence with socioeconomic status 1.144 (0.915-1.43), but the relationship is not significant (p-0.236).

CONCLUSION

The lower economy class population showed the highest allergic symptoms (eg. Skin diseases, cough, asthma and eye diseases) than middle or higher economic class population. Proper maintenance of health and hygiene, cleanliness of the surrounding environment, lack of proper drainage system, cooking inside living room, use of polluted pond water for sanitation, lack of sufficient food and nutrition, lack of space, sometimes occupational hazard also responsible behind allergic prevalence which is partly associated with socio-economic status.

ACKNOWLEDGEMENTS

We express our sincere thanks to Dr. Prasanta Dutta and Dr. Mukunda Das of Bolpur sub-divisional hospital and Dr. Sarmistha Das of Durgapur sub-divisional hospital

Table 5.2: Association between the prevalence of allergic diseases with socio-economic status of local people

Symptoms	Chi-square	P-value	Odds ratio	95% CI	Remark
Asthma	1.40	0.236	1.144	0.915-1.43	
Cough	2.54	<0.0001	2.54	1.987-3.24	AF
Skin diseases	81.28	<0.0001	2.743	2.19-3.42	AF
Rhinitis	250.30	<0.0001	0.158	0.125-0.201	AF
Conjunctivitis	97.35	<0.0001	10.11	5.82-17.53	AF
Other diseases	11.04	<0.0001	0.213	0.155-0.294	AF
Sneezing	5.68	0.017	0.744	0.584-0.949	AF
Cold	119.30	<0.0001	0.271	0.213-0.34	AF
Food allergy	6.36	0.01	8.64	1.151-64.96	AF

for their kind help. UGC is gratefully acknowledged for financial assistance to the first author (PK).

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