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Prevalence Of Allergic Rhinitis and Its Perceived Effect on Academic Activity Among College Students – A Cross-Sectional Study

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ABSTRACT

Background: Allergic rhinitis (AR) is a widespread and under diagnosed upper airway disease. It has significant social and economic burden. Symptoms may cause fatigue, mood changes and difficult sleep that may have deleterious effect on student's academic activity.

Methods: This was an observational cross-sectional study among 1337 college students in Vadodara city of Gujarat, selected by cluster sampling method. Response was recorded using SFAR (Score for allergic rhinitis) scale and a semi structured questionnaire.

Results: Prevalence of AR using SFAR was 19.22% among college students, out of them 65.4% were girls and 34.6% boys. The prevalence of two major variant of AR, perennial and seasonal was 38.91% and 51.75% respectively. 81.32% were aware about their allergy, 20.23% had gone for allergy test and 73.08% among them resulted positive. 82.49% students had perceived that AR is affecting their academic activity among SFAR≥7 group.

Conclusion: The results of this survey showed elevated prevalence of AR among college students in Vadodara city; however, allergy tests and physician visits for AR conditions were less. Major proportion that had self-reported AR has shown associated comorbidity. Students with AR, perceive a negative effect on their academic activity that equally affects girls and boys.

Key words: Allergic rhinitis, Academic activity, Cross sectional study, Prevalence, Co morbidity

INTRODUCTION

AR (Allergic rhinitis) is an immunoglobulin E (IgE) mediated inflammation of nasal mucosa. Its major symptoms are rhinorrhoea, sneezing, nasal congestion and itchy nose.[1] AR is mostly caused by exposure to allergen present in indoor or outdoor environments, thus it can be classified into seasonal and perennial on the basis of type of exposure. Recently introduced classification classifies AR into intermittent and persistent on the basis of severity of symptoms.[2] AR affects people of all ages, and its peak is noted in adolescents. In spite of towering prevalence and condition of clinical importance, AR often goes unnoticed, misdiagnosed or inadequately treated, which has social cost as well as deleterious to health.[3] 10% to 40% of the world population and 20-30% of the Indian population suffer from AR.[4-6] We found two survey studies in major cities of India to measure the prevalence of AR; Delhi reported 11.03% (excluding those with asthma) while another study in Jaipur reported 24.31% prevalence.[5,7]

Allergic rhinitis may cause significant comorbidity such as sleep impairment, fatigue and mood changes.[8-9] Studies advocate co-existence of atopic diseases

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like asthma and eczema with AR.[10] AR and Sinusitis or sinus headache are most commonly associated conditions often confused with migraine.[11] AR link to otitis media and laryngitis is still debatable and needs further research.[12,13] A study to evaluate workplace productivity reveals 3.6 days of absence per year and unproductive 2.3 hour per day during symptom manifestation of AR. Study further conclude that allergies are the major contributor for health related absenteeism and productivity.[14]

The present study aims to determine prevalence of Allergic Rhinitis among college students in Vadodara city of Gujarat using SFAR (score for allergic rhinitis). SFAR is validated questionnaire; consist of 8 questions which investigates major symptoms such as sneezing, rhinorrhoea, nasal congestion and watery eyes as well as other related factors such as triggering agent, time of exposure, perceived allergy status, allergy test, clinical diagnosis and family history. This study further investigates most bothersome symptom, comorbidity and perceived effect on academic activity by using a semi structured questionnaire.

MATERIALS AND METHODS

Participants: The current study is an observational, cross-sectional study. Students studying in institutes or departments under various universities situated in Vadodara city of Gujarat were included. The participants were included from 7 different universities.

Sample size calculation: Considering college student's population size as ten thousand, confidence level 95% and 2.5% margin of error, required sample size was 1332. Accounting 5% for non-response rate, the required size was rounded off to 1398.

Ethical approval and consent: Ethical approval was taken from the Institutional Ethical committee of S-vyasa Bangalore. Consent of participants was taken in Google form itself. Permission from the head of the institute or concerned person of the department was taken prior to sample collection.

Sampling Method: The current survey used cluster sampling method; commenced in July 2018 and completed in January 2019. Students were asked to fill survey questionnaire form through Google form link sent to their android phones. Students who were having difficulty in assessing the internet or students who were not having android phones or internet connectivity were given printed copies and data was uploaded later on.

Data collection: Data was collected through Google forms. Form was prepared into three parts; initial part registered demographic details, second part was SFAR form and last part consists of a semi structured questionnaire. Diagnosis for AR was made on the basis SFAR scoring. This scale has 8 questions and its scoring ranges from 0 to 16. SFAR≥ 7 was considered as cut off for AR. This scale has sensitivity of 74% and a specificity of 83% for SFAR≥7.[15]

This study further analyses AR group for semi structured questionnaire regarding bothersome symptoms, associated comorbidity and subjective effect of AR on academic activity. To evaluate the most bothersome symptom, respondents were asked to rate their experience for three major symptoms in terms of no problem, minor, moderate and major problem for each symptom. For obtaining comorbid conditions, students were given the list of comorbid conditions with the option of multiple selections. Perceived effect of AR on academic activity due to AR symptoms and associated co-morbidity is recorded on visual analogue scale (VAS) with rating 0 to 10. Scale score is categorized into four; 0 indicates no effect, 1-3 mild effect (awareness of symptoms but not affecting academic activities), 4-7 moderate effect (facing little difficulty in academic activities), and 7-10 severe effect (severely affecting academic activities) for last one year. All the answers were subjective or self-reported, no documentary proof was asked from the participants.

STATISTICAL METHODS & ANALYSIS

Collected survey data was first entered into Microsoft excel worksheet. The data was checked for missing details, duplicate entries and followed by questionnaire scoring. Two groups were formed on the basis of SFAR scoring "AR" (SFAR≥7) and "Non-AR" (SFAR<7) respectively. Both the groups were compared for demographic details (age and gender) and symptoms. The semi structured questionnaire regarding most bothersome symptom, comorbid conditions and deleterious perceived effect on academic activity was analyzed for AR group only. Chi square test was used to calculate significance for categorical variables. Value of $P<0.05$ was considered significant.

RESULTS

Demography and prevalence: In this observational study, 1388 filled questionnaire forms were received, out of which 1337 (96.32%) were included in the study after removing 51 (3.67%) duplicates or foul entries. So, a total of 1337 volunteers were included in the study out of which 862 (64.47%) were girls and 475 (35.53%) were boys. Age of participants ranges between 16 to 38 years.

Based on the SFAR scale, a total of 257 students had SFAR≥7 and were considered as having AR as per the study criteria. Thus, the prevalence of AR calculated was 19.22%. The mean age of students with AR was 20.37±2.04 years, among which 168 (65.37%) were girls with mean age of 20.29±1.86 years and boys were 89 (34.63%) with mean age of 20.51±2.33 years. Rest of 1080 (80.78%) participants who had SFAR<7 was considered as otherwise healthy or non-AR. Non-AR participant's average age was 20.21± 2.14 years, of whom 694 (64.30%) with mean age of 20.25±2.14 years were girls and 386 (35.70%) with mean age 20.15±2.54 years were boys (Table-1).

Table 1: Age and gender distribution in population

	Male		Female		Total	
	Frequency	Mean age ± SD	Frequency	Mean age ± SD	Frequency	Mean age ± SD
AR	89 (34.63)	20.51 ±2.33	168 (65.37)	20.29 ±1.86	257 (19.22)	20.37 ±2.04
NAR	386 (35.7)	20.15 ±2.54	694 (64.3)	20.25 ±2.14	1080 (80.8)	20.21 ±2.14
Total	475(35.5)	20.21 ±2.51	862 (64.5)	20.26 ±1.87	1337 (100)	20.24 ±2.12

AR=allergic rhinitis; non-AR= non allergic rhinitis

Table-2: Comparison of occurrence of symptoms and other components of SFAR between AR and without AR groups

	AR (SFAR≥7) (n=257)	AR (SFAR<7) (n=1080)	Chi-square score	p-value
Symptoms				
Sneezing	216(84.05)	287(26.57)	292.197	0.000*
Runny Nose	185(71.98)	198(18.33)	292.347	0.000*
Nose block	183(71.21)	275(25.46)	192.88	0.000*
Watery eyes	201(78.21)	134(12.41)	478.7	0.000*
Types				
Perennial	100(38.91)	76(7.04)	184.502	0.000*
Seasonal	133(51.75)	469(43.43)	5.813	0.016
Triggering agents				
House dust and pollen	227(88.33)	272(25.19)	352.52	0.000*
Perceived allergy	209(81.32)	131(12.13)	524.134	0.000*
Allergy test done	52(20.23)	64(5.93)	53.635	0.000*
Positive result	38(73.08)	8(12.5)	123.272	0.000*
Positive clinical diagnosis	66(25.68)	31(2.87)	160.534	0.000*
Positive family history	96(37.35)	101(9.35)	129.569	0.000*

SFAR assesses for common symptoms of AR during the preceding year (both nasal and ocular), variant of AR (seasonal and perennial), potential triggering agent, allergy test (IgE/SPT), clinical diagnosis and family history of atopic disorders. Participants with score ≥ 7 i.e., with AR had symptoms including sneezing 216 (84.05%), runny nose 185 (71.98%), nasal congestion 183 (71.21%) and eye itching or epiphora was 201 (78.21%). There was a significant difference in symptoms as compared to the non-AR group (P< 0.01) (Table-2).

The prevalence of two variants of allergic rhinitis was also calculated separately based on the time of allergen exposure. Participants, who had presented symptoms only during pollen season i.e., winter and spring, were kept under seasonal allergic rhinitis (SAR) and if symptoms were present round the year or more than 6 months in a year, they were categorized under perennial allergic rhinitis (PAR) group. The number of AR positive participants who were presented with PAR and SAR symptoms were 100(38.91%) and 133(51.75%) respectively. The difference was statistically significant as compared to the non-AR group (P= 0.016) (Table-2).

Apart from house dust and pollen, we have found many allergens or provoking agents such as, seasonal/atmospheric change, animal dander, wind/cold air and perfumes or strong smell. SFAR≥7 group shows house dust and pollen as triggering agents in 227(88.33%) and 30(11.67%) were not able to identify allergen. There was a significant difference in allergic response to triggering agent as compared to non-AR group (P<0.01) (Table-2).

Questionnaire further reveals that 209 (81.32%) participants were aware of their allergy while 52 (20.62%) already undergone allergy test (IgE or SPT), out of which 38 (73.08%) received positive results in the AR positive group (P< 0.01) (Table-2).

Clinical diagnosis by physician for atopic condition was found in 66 (25.68%) students in the AR positive group (P< 0.01). Furthermore 96 (37.35%) students of the AR positive group were having positive family history of atopic disorder i.e., asthma, allergic rhinitis or eczema (P< 0.01) (Table-2).

The study further investigated the most bothersome symptom, associated co morbidity and its effect on academic activity among the students in AR group (n=257) only. Study reveals sneezing as the most bothersome symptom for 46 (17.89%) students whereas runny nose and nasal congestion was approved most bothersome for 30(11.67%) students for each. And 23 (8.95%) out of 257 could not point out the most problematic symptom among three major symptoms namely sneezing, running nose and nasal congestion.

Regarding answer to co morbidity associated among AR group; this study found that Asthma 23 (8.94%), headache 99 (38.52%), recurrent coughing 39 (15.17%), sleep difficulty 65 (25.29%), sinusitis 48 (18.67%), otitis media 4 (1.55%), atopic dermatitis 10 (3.89%) and laryngitis 8 (2.11%) as associated co morbidity while 81 (31.52%) out of 257 SFAR≥7 students could not find any associated co morbidity (Table-3).

To assess the impact of AR on academic activity, SFAR≥7 group was bifurcated into male and female for comparative assessment. Among male participants 13 (14.60%) perceive no effect, 24 (27%) mild effect, 38 (42.70%) moderate and 14 (5.70%) had perceived severely affecting academic activity.

Table 3: Co morbidities associated with AR group

Co morbidity	Frequency (%)
Asthma	23(8.94)
Headache	99(38.52)
Recurrent coughing	39(15.17)
Sleep difficulty	65(25.29)
sinusitis	48(18.67)
Otitis media	4 (1.55)
Atopic dermatitis	10(3.89)
laryngitis	8(2.11)
No co morbidity	81(31.52)

Table4: Perceived effect of Allergic Rhinitis on academic activity

	No effect	Mild	Moderate	Severe
Male	13(14.60)	24(27)	38(42.70)	14(5.70)
Female	32 (19)	37(22)	75(44.60)	24(14.30)
Total	45(17.51)	61(23.74)	113(43.97)	38(14.78)

Chisquare value = 1.386; P value 0.709
Figure in parenthesis indicate percentage

On the other hand, 32 (19%) perceive no effect, 37 (22%), 75 (44.60%) and 24 (14.30%) perceive mild, moderate and severe effects respectively among female students. The difference between male and female was not significant (p-value 0.709), thus concluding that there is no gender difference in perceived effect of academic activity (Table-4).

DISCUSSION

The key objective of this study was to estimate the prevalence of allergic rhinitis, related symptoms among college students and compare it with non-AR group in the city of Vadodara (Western region of India and central region of Gujarat). The secondary aim of the study was to assess the burden of comorbid conditions and perceived effect on academic activity among students having been diagnosed with AR on the basis of SFAR score. The results of the current study estimated self-reported prevalence of AR as 19.22%. The prevalence percentage to AR and symptoms are approximately in line with other study done at Iran reported 19.3% while another study at turkey reported little higher incidences 29.6%.[16,17] A greater prevalence (47.90%) was seen among people affected with war noise in Syria middle east which indicate towards psychological aspect of disease development by using the same tool.[18] We found three survey studies in India that reported AR prevalence; one by using the same tool and two with different tools. A pilot study in eastern India conducted at a medicine outdoor to the tertiary care setting reported 28% incidence by using the SFAR tool. [19] Among the two studies with different tool, one study at Jaipur reported 24.31% prevalence among children aged 6-18 yrs while another study at Delhi found 11.69% prevalence excluding the patients with asthma which can be a region of lowered incidence rate.[5,7] Both the prevalence studies in India were at different setting and may not be comparable with present study. Allergy status may be dependent on many factors such as increase in pollen exposure as most of the college campus are surrounded with greenery and change in habitat, as many students shift from their home to hostel campus during college days.

Among the AR group students, 81.32% were conscious about their allergy, however out of them 20.23% only had an allergy test done and majority of them, that is 73.08% reported positive results. The results may be compared with a study in China which reported 61.6% perceived allergy out of 87% who reported positive.[20]

This study also reported about the triggering agent and presence of SAR (Seasonal Allergic rhinitis) and PAR (perennial Allergic rhinitis). Students were found to suffer more with SAR than PAR. Among the allergens, house dust and pollens were most common while some students reported atmospheric change, perfumes, air pollution, smell from spices and animal dander as additional triggering agents etc.

Among the three major symptoms of allergic rhinitis, as per our study, most of the students consider sneezing has been most bothersome. There is sufficient previous evidence showing negative effects of AR on work activity,[14] student's quality of life,[20] and poor examination performance.[21] Presenting study shows that 82.49% students from AR group felt mild to severe detrimental perceived effect of AR on their academic activity. The results are in consistency with previous study on detrimental effect of seasonal allergic rhinitis on examination activity.[21]

LIMITATIONS

Presenting study does not reveal the presence of deviated nasal septum (DNS), nasal polyp and status of medication. This study does not reveal impact of AR on different aspects of academic activity such as reading hours, attentiveness and college attendance etc. Our study was limited to a city. Since the study was targeted to only college students, subjects were adolescents and young adults. Diagnosis was based on questionnaire only, no lab test was performed, no proofs or documents were asked. The information collected is totally based on their statements. This study shows high prevalence, the reason behind may be the greenery around the college campus that may lead to more pollen contact. This can be investigated more in future studies.

CONCLUSION

In our cross-sectional population-based study, the reported prevalence of allergic rhinitis is found to be quite common among college students in Vadodara city. SAR is found to be more common than PAR. Though most of the AR sufferers were aware of their allergic status, only a small number had an allergy test. It was also reported that around one third of AR students do not have any co morbidity while the rest of the two third had one or more. Headache, sinusitis, sleep difficulty, recurrent coughing and asthma had

been common co morbidities. A major proportion of AR group students perceived that AR and associated co morbidities have deleterious effects on their academic activity. Our findings may contribute to the formulation of public health policy for respiratory health. High prevalence and its perceived effect on academics indicate the need for early diagnosis of AR so as to devise preventive measures. Future studies are needed to identify the risk factors.

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