ARTICLE IN PRESS

Clinical Epidemiology and Global Health xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Clinical Epidemiology and Global Health

journal homepage: www.elsevier.com/locate/cegh

Prevalence, morbidity and treatment seeking behavior for allergic conjunctivitis in children in a North Indian community☆

Payal Kahol[a,*], Manjula Thakur[a], Amit Gupta[b], Sushma Kumari Saini[a]

[a] National Institute of Nursing Education, PGIMER, Chandigarh, India
[b] Department of Ophthalmology, PGIMER, Chandigarh, India

ARTICLE INFO

Keywords:
Allergic conjunctivitis
Prevalence
Morbidity
Treatment seeking behavior
India

ABSTRACT

Purpose: To assess the prevalence, morbidity and treatment seeking behavior amongst children aged 5–15 years, suffering from allergic conjunctivitis.

Methods: A cross-sectional survey was done in a semiurban low-income community in Chandigarh, India. Children of age group 5–15 years, having allergic conjunctivitis were identified by systematic random sampling technique. A survey proforma and an interview schedule was used to gather information on socio demographic profile and data pertaining to allergic conjunctivitis and related morbidities among the study subjects. Intensity of symptoms of allergic conjunctivitis was also assessed using proforma and an observation checklist.

Results: A total of 217 subjects were enrolled. Prevalence of allergic conjunctivitis was 12.22%. Occurrence was more in males (13.44%) than females (10.71%). Itching and frequent eye rubbing were the commonly reported symptoms. Dust (35%) was the most common precipitating factor and perennial conjunctivitis was more common (54.8%). Reported co-morbidities included allergic rhinitis / hay fever (23.9%), dermatitis (9.7%) and asthma (0.5%). Only 44% subjects had sought treatment from a doctor; and barely 11% completed their treatment.

Conclusions: Allergic conjunctivitis has a high prevalence among children but is frequently overlooked. Inspite of its frequency, treatment seeking behavior is low amongst the affected population. Identification of patients and their appropriate treatment is important to improve the ophthalmic health of the community.

1. Introduction

Allergy is a medical problem which affects more than 15% of the world population.[9] Allergic tendency tends to target more than one organ system in the body and hence, the patient may have symptoms related to multiple organ systems.[6,12] However, ocular component is frequently the most prominent and disabling feature of their allergy as it leads to continuous symptoms like itching and watering of eyes, which leads to significant irritation.[3] The prevalence of allergic conjunctivitis is surprisingly high and it is supposed to be the most common allergic disorder. Currently it is estimated that at least 20% of the general population suffers from some form of allergic conjunctivitis.[5]

Numerous reports indicate that the incidence and prevalence of allergic conditions have increased dramatically all over the world during the past 40 years and they continue to rise.[4,11] This is because of rapid urbanization, industrialization, increased air pollution and dry-eye syndrome.[10]

Allergic conjunctivitis is often under-diagnosed and consequently undertreated. Recurrent symptoms for several years may turn patient behavior towards under-reporting of problems and ignoring ocular care. Patients of allergic conjunctivitis, having significant debilitating symptoms like itching, watering of eyes and ropy discharge have interference in their day to day activities, difficulty in concentrating in their work and these adversely affect their quality of life.[7] These aspects underscore the importance of estimating the disease burden and its consequent morbidity in the community. Hence the present study was undertaken to assess the prevalence, morbidity features and treatment seeking behavior amongst children of 5–15 years age group.

2. Material and methods

The study was conducted in a low income community of North

☆ The authors declare that this submission has not been published anywhere previously / presented anywhere and that it is not simultaneously being considered for any other publication.

* Corresponding author. National Institute of Nursing Education, PGIMER, Chandigarh, India.
E-mail address: palukahol@rediffmail.com (P. Kahol).

https://doi.org/10.1016/j.cegh.2018.07.001
Received 6 May 2017; Received in revised form 29 May 2018; Accepted 4 July 2018
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Chandigarh, India having 3003 numbered houses with a population of 18,000 approximately as per the official records. The residents of the colony are migrants from different states of India like Punjab, Haryana, Bihar, Rajasthan, Uttar Pradesh and neighbouring countries like Nepal. Majority of people residing here belong to a low socio economic group and are unaware of the diseases so they tend to ignore many health problems until their condition becomes severe. All the houses of the colony were divided into six strata of 500 houses each. Randomization of these strata was done to experimental and control by lottery method in which three groups of 500 houses each were in experimental group and three in control group. Sampling technique employed was systematic random sampling. Every 2nd house was surveyed (even numbered house, selected by lottery method) to identify the subjects of 5–15 years having allergic conjunctivitis. The tool was developed by relevant literature search on allergic conjunctivitis through books, national & international journals and internet search and validated by experts in the field of nursing and department of ophthalmology. The tools developed in the study included a survey proforma to identify the children suffering from allergic conjunctivitis; an interview schedule to gather information on socio demographic profile and data pertaining to allergic conjunctivitis in the study subjects. Assessment proforma and observation checklist were used to collect data on the intensity of the symptoms of in allergic conjunctivitis. A house to house survey was conducted to identify the study subjects. The children of age group 5–15 years and their care givers were interviewed as per survey proforma and children with the symptoms of allergic conjunctivitis were enrolled in the study. Any child, male or female in the age group of 5–15 years; presenting with any three of the following symptoms – itching, ropy discharge, frequent eye rubbing, redness or watering of eyes for minimum of one week was diagnosed as having Allergic Conjunctivitis.

The sample size was calculated by using "Statcalc Software" (Epi Info) taking prevalence of 15%, error interval of 5% at the confidence interval of 95% and 5% level of significance which came out to be 187 and by adding 10% of dropouts (187 × 10/100 = 18.7–19), so the sample required is 187 + 19 = 206–210. Total 1775 children were contacted out of which 217 were identified with the symptoms of allergic conjunctivitis. Subjects older than 10 years were interviewed as per interview schedule and the data was supplemented by their mothers, while in case of younger children of age less than 10 years, their mothers were interviewed.

Score for each symptom was categorized on a scale of (0–10). They were categorised as - no symptom – (0 score), mild– (0.1–3 score), moderate– (3.1–7 score) and severe– (7.1–10). The individual scores of all the symptoms were added and divided by 5 to obtain the average scores (0–10); i.e. overall intensity of symptoms of allergic conjunctivitis. This overall intensity of symptoms was further categorized as mild– (0.1–3 score), moderate– (3.1–7 score), severe– (7.1–10 score). The data was analysed using standard SPSS-16 software.

3. Results

Table 1 depicts the Socio demographic profile of the respondents. Mean age of the subjects was 9.59 ± 3.07 years with a range of 5–15 years. Male respondents were more than female. As per the educational level 38.2% of the subjects had upto primary level of education. Majority (94%) of the subjects were Hindus and 53.9% of the subjects were living in nuclear family. As per family size, 51.6% of the subjects had 5-8 members in their family and the range for the number of family members living together was 3–16.

Considering environmental factors, liquefied petroleum gas was the type of fuel used by majority (95%) of the families and most of the houses (82.4%) had separate kitchen in their house. Very few (10.1%) had kept a pet in their house.

Table 1
Socio-demographic profile of the respondents N = 217.

Socio-demographic character	n (%)
Age (yrs)[a]	
5–8	83 (38.2)
9–11	69 (31.8)
12–15	65 (30.0)
Sex	
Male	132 (60.8)
Female	85 (39.2)
Education of the child[b]	
upto Primary school (upto 5th std)	83 (38.2)
upto Middle school (5th – 8th)	69 (31.8)
upto High school (9th – 10th)	65 (30.0)
Religion	
Hindu	204 (94.0)
Muslim	2 (0.9)
Sikh	8 (3.7)
Christian	3 (1.4)
Type of family	
Nuclear family	117 (53.9)
Joint family	100 (46.1)
Family size (Total living house members)[c]	
< 4	69 (31.8)
5–8	112 (51.6)
9–12	30 (13.8)
13–16	6 (2.8)
Type of fuel used	
LPG	206 (94.9)
Kerosene oil/cow dung/coal/wood	11 (5.1)
Separate Kitchen in the house	179 (82.4)
Pet kept in the house	22 (10.1)

[a] Mean ± S. D (Range) in yrs: 9.59 ± 3.07 (1–11).
[b] Range:1–11 class.
[c] Range: 3–16.

3.1. Prevalence of allergic conjunctivitis

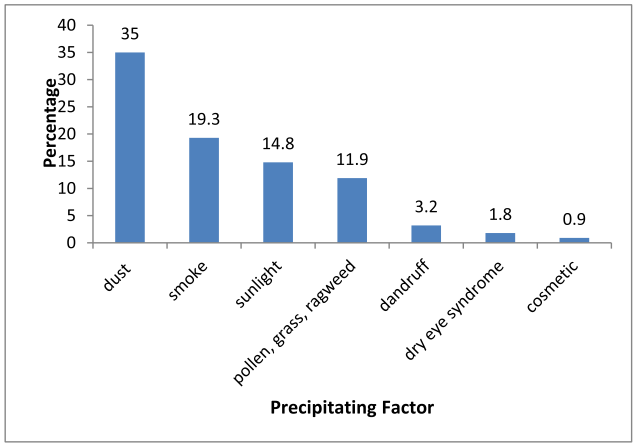
From the total 1775 children surveyed, allergic conjunctivitis was found to be prevalent in 217 (12.22%) subjects. Prevalence was higher amongst males (13.44%) than in females (10.71%).

3.2. Episodes of allergic conjunctivitis during the last three months

Children had single to multiple episodes of the symptoms of allergic conjunctivitis during the last three months of the period of enquiry and very frequent recurrence was reported. During the previous three months, 40.5% of the subjects had reported 3 episodes of allergic conjunctivitis, 35.9% had 2 episodes and 15.2% had 4 episodes. A few subjects (4.6%) had as many as 5 episodes while 3.7% had only a single episode of allergic conjunctivitis.

3.3. Precipitating factors and seasonal variation in allergic conjunctivitis

Dust, smoke, sunlight pollen/grass/weed, dandruff, dry eyes and cream (cosmetic) were the reported precipitating factors for allergic conjunctivitis (Fig. 1). One third (35%) of the subjects had reported dust as the most common precipitating factor followed by smoke (19.3%) and sunlight (14.8%). Other allergens included pollen, grass and ragweed (11.9%), dandruff (3.2%), dry eye syndrome (1.8%) and cosmetics (1.9%).



*More than one precipitating factor was reported by the subject

Fig. 1. Prevalence of precipitating factors* of Allergic Conjunctivitis among study subjects. N-217*More than one precipitating factor was reported by the subject.

More than half (54.8%) of the subjects reported having symptoms of allergic conjunctivitis throughout the year i.e. perennial allergic conjunctivitis while others reported seasonal variation in the appearance of symptoms. Nearly 22.6% of the subjects reported having symptoms of allergic conjunctivitis mostly during rainy season whereas 18.8% reported severe symptoms during the summer season and 4.6% in winter.

3.4. Family history of allergic conjunctivitis and co morbidities reported by study subjects

Most of the subjects (81.1%) had no family history of allergic conjunctivitis. In the rest, 14.7% of the parents/grandparents and 4.1% of the siblings had history of allergic conjunctivitis.

It was further observed (Fig. 2) that 23.9% of the subjects had allergic rhinitis/hay fever and few (9.7%) had associated dermatitis present along with allergic conjunctivitis; while asthma was present in only one subject (0.5%). Almost 2/3rd of the subjects (65.8%) had no associated co morbidity along with allergic conjunctivitis while.

3.5. Symptoms of allergic conjunctivitis present in the study subjects

It was observed that 70.5% of the subjects had reported 3 symptoms, 23% had reported 4 symptoms while only 6.5% of the subjects had reported all the five symptoms in allergic conjunctivitis i.e. itching, frequent eye rubbing, watering of eyes, redness and ropy discharge.

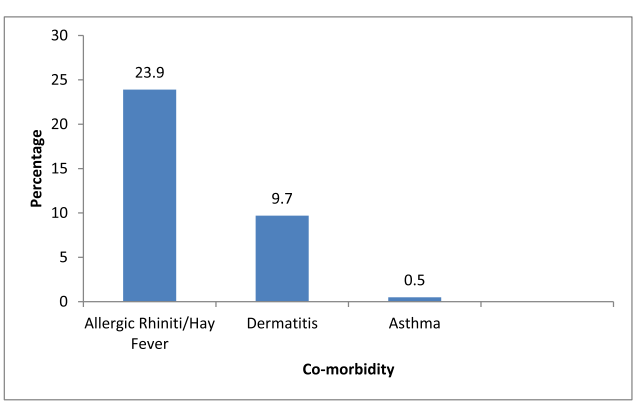


Fig. 2. Co morbidities reported by study subjects N- 217.

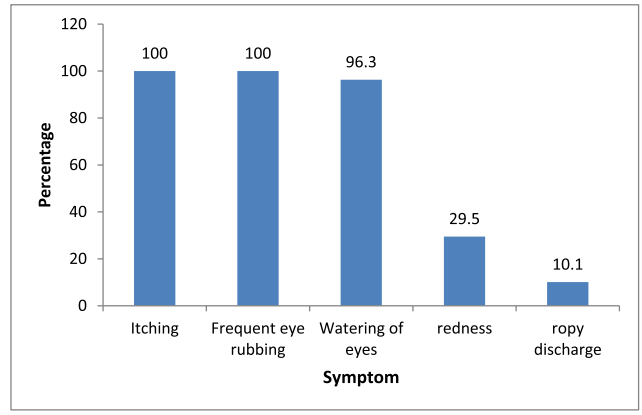


Fig. 3. Symptoms of Allergic Conjunctivitis present in the study subjects N-217.

Table 2
Intensity of symptoms of Allergic conjunctivitis N-217.

Symptom	Intensity of symptom			
	Symptom not present	Mild	Moderate	Severe
Itching	0 (0)	2 (0.9)	175 (80.6)	40 (18.4)
Frequent eye rubbing	0 (0)	2 (0.9)	175 (80.6)	40 (18.4)
Watering of eyes	8 (3.6)	10 (4.6)	175 (80.6)	24 (11.1)
Redness	153 (70.5)	13 (5.9)	41 (18.9)	10 (4.6)
Ropy discharge	195 (89.8)	2 (0.9)	17 (7.8)	3 (1.3)
Overall intensity of all the symptoms[a]	-	66 (30.4)	147 (67.7)	4 (1.8)

[a] Average scores of all the symptoms.

Itching and frequent eye rubbing were observed in all the subjects; followed by watering of eyes (96.3%); while redness was observed in 29.5% and ropy discharge in 10.1% of the subject (Fig. 3).

3.6. Intensity of symptoms of allergic conjunctivitis

As seen in Table 2, majority of the subjects (81%) had moderate intensity of itching, frequent eye rubbing and watering of eyes while 18.4% had severe itching and frequent eye rubbing and 11% had severe watering of eyes. Moderate intensity redness was present in some subjects (19%) and ropy discharge in 7.8% subjects. Severe intensity of redness and ropy discharge was observed in 4.6% and 1.3% of the subjects respectively.

Moreover if we see the overall intensity of symptoms of allergic conjunctivitis, most (68%) of the subjects had moderate intensity of symptoms while 30.4% had mild symptoms and only few (1.8%) had severe symptoms (Table 2).

3.7. Treatment seeking behavior of the subjects

Treatment seeking behavior revealed that about 57% of the subjects had not consulted any physician for their problem of allergic conjunctivitis. Out of those who consulted a physician, very few (4.6%) completed their treatment.

It was also observed that 69.7% of the subjects with mild intensity of symptoms had not taken any treatment for their symptoms. But as the severity of symptoms increased there was increase in treatment seeking behavior though the treatment was still irregular. It was also observed that 42% of the subjects with moderate intensity of symptoms

had taken irregular treatment while 75% of the subjects with severe intensity of symptoms had taken treatment; that was again, irregular.

Further, only 27% of the subjects adopted some home based remedial measure for getting relief from symptoms of allergic conjunctivitis - 17.9% of the subjects washed their eyes with running water and a few (7.3%) washed their eyes with cold water. One subject had also put gulab jal (rose water extract) in his eyes to get relief from the symptoms of allergic conjunctivitis.

4. Discussion

Allergies affect 10 to 20% of the population.[6,9] They often run in families. People who have allergies are more likely to develop allergic conjunctivitis as conjunctiva is easily accessible for the allergens to cause allergic reaction and produce symptoms. When the eyes are exposed to allergens like pollen or mold spores, dust, animal dander, perfumes, cosmetics etc. they may become itchy, red and produce watery discharge. The problem of allergic conjunctivitis is associated more with its frequency (episodes) than its severity; as, a single episode may not be very severe but repeated episodes might be debilitating for patients. Although the burden of allergic conjunctivitis is high, ranging from 15 to 20%[1,3,9,12]; it is frequently overlooked by patients and this condition remains under diagnosed in a majority of the population.[5]

The prevalence of allergic conjunctivitis is reasonably high. In our study, amongst children of age group 5–15 years, prevalence was found to be 12.22%.

In the present study it was observed that most of the general population does not know the actual cause of the allergies; thus, it becomes difficult for them to avoid the allergen. Supporting this observation, in the present study, the precipitating cause for allergic conjunctivitis was not known to more than half of the subjects; though rest of the subjects had reported known inciting factors like dust, smoke, sunlight, pollen/grass/ragweed, dandruff, dry eyes and cosmetics. A few subjects reported more than one precipitating factor. Dust and smoke were the common allergens, while pollen, grass or ragweed was reported only in few subjects.

Itching is the most important symptom of this condition, so much so that if itching is absent, the diagnosis of allergic conjunctivitis ought to be questioned.[2] In the present study, itching and frequent eye rubbing was reported by all the subjects and these symptoms were the basis for the selection of the study subjects.

Ocular allergy in majority of the cases is overlooked and in spite of its interference in day to day activities, people don't seek medical attention. A cross sectional study supported this finding in which only 19.4% of the subjects had consulted an ophthalmologist and 56.1% had started with self-treatment.[8] This was an interesting pointer towards tendency to access medical attention; in the present study it was found that about 57% of the subjects did not seek any medical treatment from a doctor, however it was noted that with increasing severity of symptoms subjects increasingly sought medical attention.

Health professionals working in community can play a very important role in creating awareness amongst the general public regarding signs and symptoms of allergic conjunctivitis; and they can also identify patients having this affliction. Patients should be made aware of the consequences of neglecting their ocular health; they can also be taught simple cost effective measures like cold compress for getting relief from their symptoms.

5. Strengths of the study

- It's a close survey (door to door study) thus enabling picking up of many patients who will otherwise not go to hospital.
- Responding to the questions of this survey proforma enabled patients and their families to increase health awareness about this condition.

6. Weaknesses of the study

- As the study relies mainly on subjective responses so 100% sensitivity and specificity is not ensured.
- Personnel and time limitation did not enable every house to be surveyed.

7. Conclusion

The magnitude of allergic conjunctivitis was found 12.22% which is reasonably high and majority of the subjects had not taken any treatment for getting relief from their symptoms.

Ethical clearance

Ethical clearance was taken from the Institute ethical committee (PGIMER, Chandigarh). Written informed consent was taken from the study subject. Subjects were empowered with the full autonomy to participate in the research and withdraw at any time. The trial is also registered with ***Clinical Trials Registry- India*** (***CTRI***) with registration number ***CTRI/2016/02/006586***.

Conflict of interest

The authors declare that none of the authors have any proprietary interests or conflicts of interest related to this submission.

Source of funding

The authors declare that no financial grant was taken for the study project, the study was self sponsored by the primary author.

Annexure I

A. Survey Proforma to Identify the Subjects of Allergic Conjunctivitis

Identi-ficationNo	S. no	H.no.	Name of the Child D/o or S/o	Age (yrs)	(M/F)	Symptoms of Allergic conjunctivitis presentmark ( ), if present and mark (X) if not present					If yes, for how long		Cases of Allergic conjunctivitis	
						Itch-ng	Freque-nt eye rubbing	Ropy discha-rge	Redd-ness	Water-ing of eyes	< 1 wks	≥1 wks	Yes ( )	No (X)

Id.no. _____

Date of interview _____

Interview Schedule of Subjects With allergic Conjunctivitis

A**. Socio demographic Profile**

1. H.No. :- _____
2. Name of the Child / adolescent:- _____
3. Gender:
   a. Male _____
   b. Female _____
4. Age of the child: _____ years
5. If the child is studying
   a.Yes_____ , specify class_____
   b. No _____,specify reason_____
6. Religion:
   a. Hindu
   b. Muslim
   c. Sikh
   d. Christian
   e. If other, specify_____
7. Type of family
   a. Nuclear family
   b. Joint family
   c. Extended family
8. Number of family members:- _____
9. Number of children between 5-15 years of age:-_____
10. Education of Parents

	Mother	Father
a.Illiterate	_____	_____
b.Primary School or literate	_____	_____
c.Middle School Certificate	_____	_____
d.High School Certificate	_____	_____
e.Intermediate or Post-High-School Diploma	_____	_____
f.Graduate or Post-Graduate	_____	_____
g.Professional or Honours	_____	_____

11.Occupation of Parents

	Mother	Father
a. Unemployed	_____	_____
b.Unskilled worker	_____	_____
c. Semi-skilled worker	_____	_____
d. Skilled worker	_____	_____
e. Clerical,shop-owner, Farmer	_____	_____
f. Semi-Profession	_____	_____
g. Profession	_____	_____

12.Monthly income of the family Rs _____
13. Per capita income Rs_____
14.Type of house:
   a. Pucca
   b. Semi pucca
   c. Katcha
15. Type of fuel is used:
   a. Coal
   b. Wood
   c. Cow dung
   d. Kerosene oil
   e. LP Gas
16. Ifthere is separate kitchenin the house?
   a. Yes
   b. No
17.If any pet kept in the house?
   a. If yes , Is there separate shed /place for the pet
      I. Yes_____
      II. No_____
   b. No

B. <u>Questions related to allergic conjunctivitis</u>

Q. 1 How many times did you experience the symptoms in the last three month?
Ans . _____

Q.2 Do you experience these symptoms during particular month/months of the year?

a. Yes, specifymonth_____
b.No

Q.3 Do you think there is any precipitating factor of the symptoms of allergic conjunctivis?

a.Yes, which
   i. Pollen from trees, grass and ragweed
   ii. Animal fur and secretions such as saliva
   iii. Dust mites
   iv. Smoke
   v. Cosmetics
   vi. Contact lenses and lens solution
   vii. Perfumes
   viii. Diesel exhaust

ix. Medicines
x. Eye drops
xi. Dry eye syndrome
xii. Any other , specify
b. No

Q.4 Are you taking any special precautions when the symptoms of allergic conjunctivitis are present?

a. Yes
b. No

Q. 5 Are you taking any treatment from the doctor for this condition of allergic conjunctivitis?

a. If yes,whether the treatment is
I. Regular
II. Irregular
b. No

Q.6 Have you adopted any otherremedialmeasure for getting relief from the symptoms of allergic conjunctivitis?

a. If yes, Specify the treatment _____, whether the is
I. Regular
II. Irregular
b. No

Q. 7 If any other member of the familyis suffering from allergic conjunctivitis?

a.If yes, who_____, have they taken any treatment for it?

I. Yes
II. No
b. No

Q. 8 Are you suffering from any of the following conditions?

a. Asthma
b. Dermatitis
c. Allergic Rhinitis
d. Hay fever
e. No

Q. 9 If Kajal is applied on the eyes of the child?

a. Yes
b. No

C. Assessment of intensity of the symptoms related to allergic conjunctivitis

What is the intensity of the following symptoms	Day	1 10 paise	2 20 paise	3 30 paise	4 40 paise	5 50 paise	6 60 paise	7 70 paise	8 80 paise	9 90 paise	10 100 paise
1.Itching	I										
	II										
	III										
	IV										
	V										
	VI										
2.Ropy discharge	I										
	II										
	III										
	IV										
	V										
	VI										
3.Frequent eye rubbing	I										
	II										
	III										
	IV										
	V										
	VI										
4.Reddness	I										
	II										
	III										
	IV										
	V										
	VI										

5.Watering of eyes	I
	II
	III
	IV
	V
	VI

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