

Original Research Article

Effect of Exercise in Allergic Rhinitis- A Comparative Study

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ABSTRACT

Introduction

Allergic Rhinitis is defined clinically as having two or more symptoms of anterior or posterior rhinorrhoea, sneezing, nasal blockage and or itching of nose during two or more consecutive days for more than one hour on most days. Exercise induces modulation in innate and adaptive immune system, dependent on host defence, activity level and disease susceptibility. This study was conducted to evaluate the effect of exercise on allergic rhinitis.

Methods

We report a comparative study conducted among 43 MBBS students of Mysore medical college and research institute. The study was conducted from March 2022 to December 2022. The study subjects were selected based on SFAR (score for allergic rhinitis) score and they were divided into two groups. Those students with allergic rhinitis and performed exercise of 30 minutes for 5 days a week were considered cases and those who didn't exercise but had allergic rhinitis were placed in the control group. They were followed up for a period of 9 months. The effect of exercise on allergic rhinitis was determined by SFAR score obtained by the students at the end of the study period.

Result

43 MBBS students were included in this study. 22 were cases (those with allergic rhinitis and performed exercise) and 21 were controls (those with allergic rhinitis but didn't exercise). 13 students (59.1%) from the case group reported improvement in their allergic symptoms with exercise. 8 (61.5%) out of the 13 students who reported improvement were involved in indoor sports activity. 5 (22.7%) of the cases reported no change in severity of symptoms with exercise. While 4 (18.2%) of the cases reported worsening of their symptoms with exercise.

Conclusion

During exercise, autonomic reflexes improve nasal efficiency. In dynamic exercise training due to an increase of nasal sympathetic activity, venous sinusoids constrict. This study showed that exercise has a beneficial effect on allergic rhinitis.

Keywords

Allergic Rhinitis, Exercise, Questionnaire

Introduction

Allergic Rhinitis is defined clinically as having two or more symptoms of anterior or posterior rhinorrhoea, sneezing, nasal blockage and or itching of nose during two or more consecutive days for more than one hour on most days.^[1,2]

Allergic rhinitis is diagnosed when the symptoms are caused by allergen exposure leading to an IgE mediated reaction.^[1] It affects between 0.8-39.7% of world population (depending on location).^[2] It causes significant disability and is often poorly managed.^[3]

Allergic inflammation is the basic mechanism of this disease and classically is considered to be biphasic, mediated by an early and a late phase.^[4] Early phase response occurs within the first 0-60 min following allergen exposure and is mediated by mast cell degranulation and mediator release.^[4] The late phase reaction involves inflammation, mediated by recruitment of several inflammatory cells, specifically Th2 mediated response.^[5]

Exercise induces modulation in innate and adaptive immune system, dependent on host defense, activity level and disease susceptibility. During exercise, autonomic reflexes improve nasal efficiency.^[4] In dynamic exercise training due to an increase of nasal sympathetic activity, venous sinusoids constrict. The same does not happen with isometric exercise types.

During training, athletes are repeatedly exposed to several risk factors (allergen, cold air and pollutants) increasing rhinitis symptoms in susceptible individuals.^[3] In swimmers, chlorine inhalation (an irritant) induces nasal congestion in a more pronounced way in subjects with allergic rhinitis than in non-rhinitic. Some experience improvement with exercise mediated by nasal sympathetic tone others may have their symptoms worsen.^[3]

Our study is conducted to determine the effect of exercise in allergic rhinitis patients

Methods

43 MBBS students from Mysore medical college and research institute, Mysore with allergic rhinitis were selected randomly. All MBBS students from first year of study to internship were given a questionnaire (Table1) to fill and only those who were diagnosed with allergic rhinitis were included in our study. Swimmers were excluded from our study.

Item	Score
Blocked nose, runny nose, sneezing in the past year	1 for each symptom
Months of the year	1 for perennial 1 for pollen season
Nasal symptoms + itchy eyes	2
Triggers	
• Pollen, house dust mites, dust	2
• Epithelia (cats, dogs)	1
Perceived allergic status	2
Previous positive allergic test	2
Previous medical diagnosis of allergy	1
Family history of allergy	2
Table 1: SFAR Scoring system	

The SFAR questionnaire was sent to all the students and the answers provided were linked to Microsoft excel. Those with score ≥ 7 were considered to have allergic rhinitis and included in the study. The students were asked to fill in the SFAR score at the end of the study period.

The statistical analysis was done using SPSS version 20.0. p value less than 0.05 was considered statistically significant.

Results

43 eligible participants were selected from all batches of MBBS students of Mysore medical college and research institute, Mysore. The study was conducted from March 2022 to December 2022. Those with allergic rhinitis (SFAR score ≥ 7) and exercised for 30 minutes for 5 days a week were placed in the group of cases and those who didn't exercise but had allergic rhinitis (SFAR score ≥ 7) were placed in the control group of our study as shown in **figure 1**.

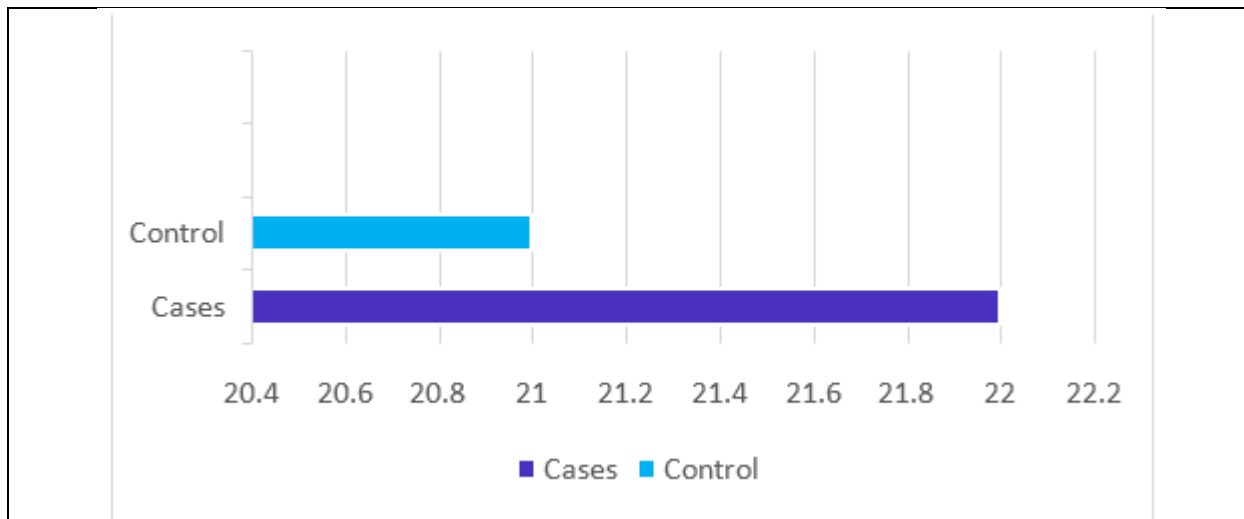


Figure 1

Sex distribution

Sl. No.	Gender	Cases(n=22)	Control (n=21)
1.	Female	4(18.2%)	14(66.7%)
2.	Male	18(81.8%)	7(33.3%)

Table 2: Sex distribution

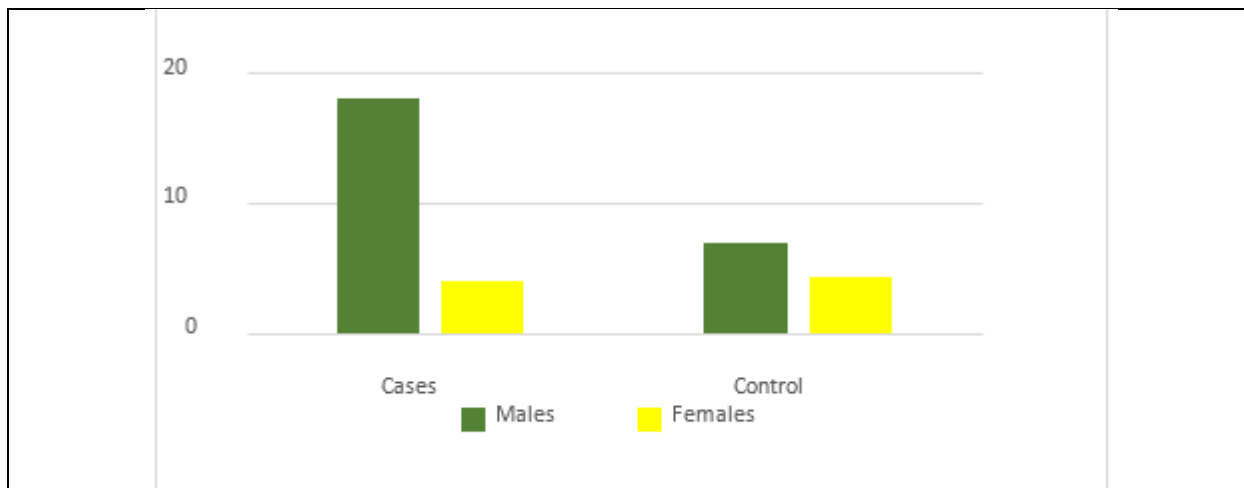


Figure 2

Of the 22 cases, 18(81.8%) were males and 4(18.2%) were females. In the control group (n=21), 14(66.7%) were females and 7(33.3%) were males.

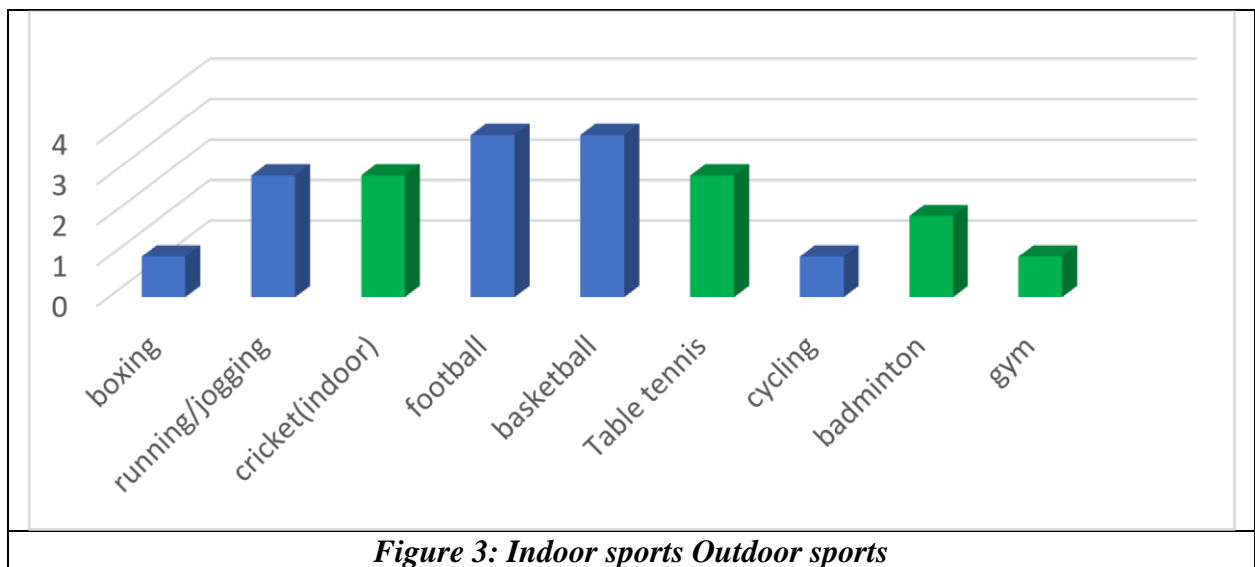
Sl. No.	Symptoms	Cases	Controls
1	Running nose	14(63.6%)	14(66.7%)
2	Sneezing	7(31.8%)	7(33.3%)
3	Both	1(4.5%)	0

Table 3. Symptom distribution

Running nose was the most common symptom of allergic rhinitis for both cases and controls contributing 63.6% and 66.7% respectively. Sneezing was the next common symptom in both cases and controls. one student from the case group complained of both running nose and sneezing.

Physical activity

10 students in the case group were engaged in indoor sports activities such as table tennis, badminton etc. while 12 were engaged in outdoor sports activity. Details are given in **figure 3**.



Triggers (Food/pollen/pet allergy)

Food allergy was reported by 2 students from case group, of which one had peanut allergy and the other had allergy to seafood's. 8 students from the control group had food allergy (peanut allergy in three of them and seafood allergy in six of them). Pollen allergy was reported by 6 (27.3%) from case group and 5(23.8%) from control group.

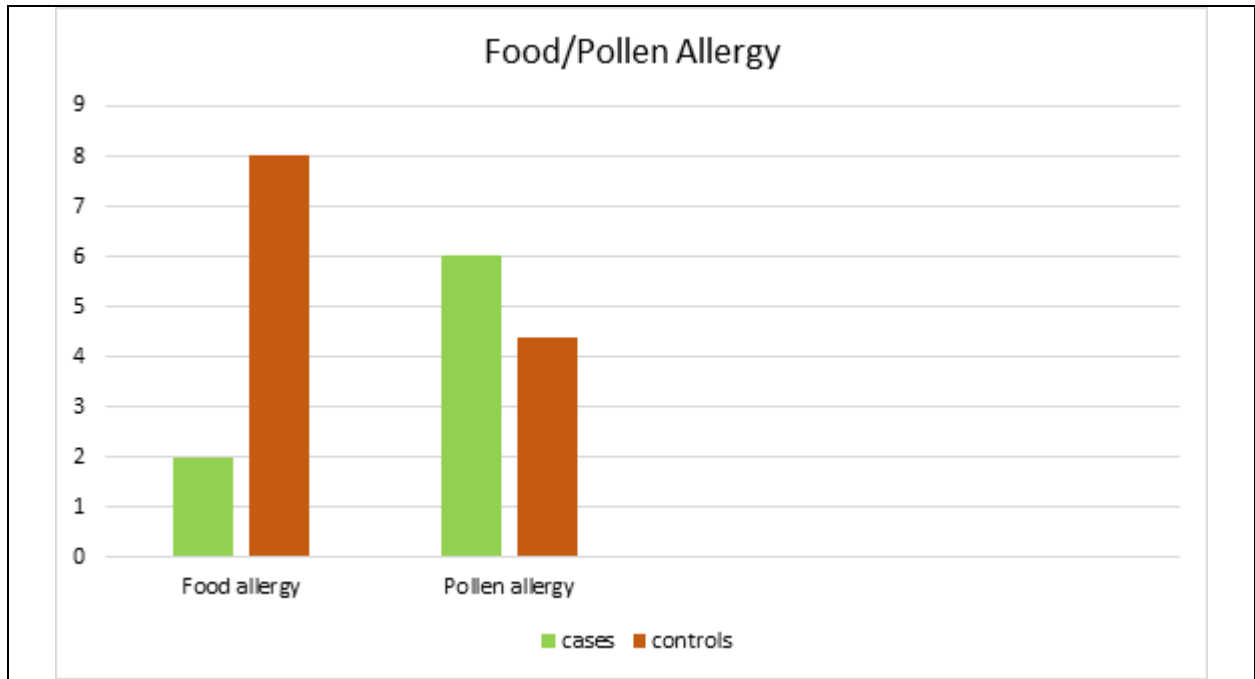


Figure 4

Allergic medications

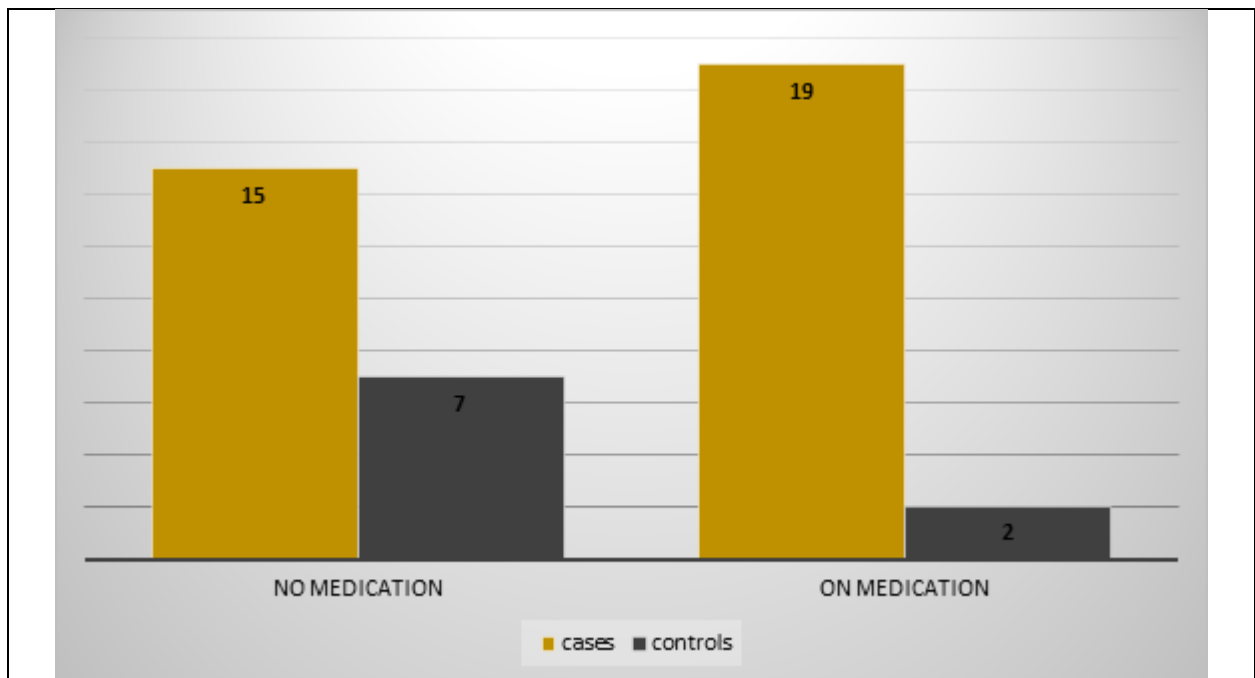


Figure 5

In our study, 15(68%) students from case group were not on any medications while 7 (32%) students were on antihistamines. In the control group, 2(10%) of them were on antihistamines while 19(90%) were not on any medications.

Association of exercise with allergic symptoms

Cases (n=22)	SFAR score at the beginning of study	SFAR score at the end of study	change in dosage of medications	S.IgE at the beginning (normal range 150-300IU/ml)	S.IgE at the end of study	Improvement/worsening
1	8	7	-	350	340	I
2	7	8	-	320	400	W
3	9	9	-	400	440	No Change
4	8	9	-	380	480	W
5	10	8	decreased	450	380	I
6	9	7	-	440	370	I
7	10	9	decreased	460	400	I
8	7	7	-	340	360	No Change
9	8	7	-	360	320	I
10	7	9	-	450	600	W
11	11	9	decreased	430	410	I
12	10	9	decreased	550	530	I
13	9	9	-	430	422	No Change
14	8	10	-	380	600	W
15	8	7	-	460	440	I
16	7	7	-	340	330	No Change
17	9	8	decreased	444	411	I
18	8	7	-	550	500	I
19	7	7	-	370	350	No Change
20	8	7	-	500	480	I
21	11	8	decreased	560	550	I
22	12	9	decreased	700	500	I

Table 4: SFAR- Score for Allergic Rhinitis, S.IgE- Serum Immunoglobulin E, I-Improvement, W- Worsen

In our study it was observed that 13 students out of 22 cases experienced improvement in their symptoms which was objectively verified by serum immunoglobulin E (Ig E) values and 7 out of 13 students who showed improvement also decreased the dosage of their regular allergic medications. However, 4 students experienced worsening of their symptoms and an elevation in Ig E values.

Controls (n=21)	SFAR score at the beginning of study	SFAR score at the end of study	S.IgE at the beginning (normal range 150-300IU/ml)	S.IgE at the end of study	Improvement/worsening
1	8	8	370	350	No Change
2	7	7	330	344	No Change
3	8	8	400	440	No Change
4	8	10	380	500	W
5	9	9	450	420	No Change
6	9	11	440	600	W
7	7	7	460	400	No Change
8	7	7	370	360	No Change
9	8	8	360	320	No Change
10	7	10	450	600	W

11	10	10	430	410	No Change
12	9	11	550	650	W
13	8	8	430	422	No Change
14	8	8	380	370	No Change
15	7	11	460	700	W
16	7	7	340	330	No Change
17	8	10	444	550	W
18	8	8	550	500	No Change
19	7	7	370	350	No Change
20	8	10	500	740	W
21	9	9	560	550	No Change
Table 5: SFAR- Score for Allergic Rhinitis, S.IgE- Serum Immunoglobulin E, I-Improvement, W- Worsen					

It was observed from our study that out of 21 controls (those with allergic rhinitis but didn't exercise), 14 of them had no change in their SFAR score during the study period, however there were variations in their final values of Ig E. 7 students experienced worsening of their symptoms which was objectively confirmed with elevated Ig E values.

Association of exercise with allergic symptoms	Cases(n=22)	Controls(n=21)
Improvement	13	-
Worsening	4	7
No Change	5	14
Table 6		
[p value<0.001]		

In our study, it was observed that 13(59%) of the cases reported an improvement in their symptoms with exercise while 4(18.2%) of them had worsening of symptoms during exercise for which they had to take medications and one of them had to be hospitalized. Five of the cases didn't experience any change in their symptoms with exercise. In the control group, 14 (66.6%) had no change in their symptoms since diagnosis of allergic rhinitis while 7 of them had worsening of symptoms.

Gender and association of exercise with allergic rhinitis

Gender	Effect of Exercise on allergic rhinitis		
	Improvement	worsen	No effect
N=22			
Male	12	2	4
Female	1	2	1
Table 7			

It is observed from our study that of the 13(59%) cases who reported improvement of their symptoms with exercise 12(92.3%) were males while only one was female. This may be because males engage in more vigorous physical activities than female. Worsening of symptoms with exercise was reported equally by both males and females.

Association of outdoor/indoor sports activity with allergic rhinitis

Sports activity	Effect of exercise on allergic rhinitis
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N=22	Improvement	Worsen	No effect
Indoor	8	0	2
Outdoor	5	4	3
Table 8			

It is observed from our study that of the 13 cases who reported an improvement in their allergic rhinitis with exercise, 8 of them performed indoor activities and 5 of them were engaged in outdoor activities. 4 cases who reported worsening of their symptoms, all belonged to the outdoor sports activity group. This may be due to the exposure to allergens in outdoor group. 2 students in the indoor group and 3 from the outdoor group didn't experience any change in their symptoms with exercise.

Discussion

In this study we investigated the effect of exercise on allergic rhinitis. All MBBS students with allergic rhinitis (SFAR score ≥ 7) who exercise for 30 minutes 5 times a week are included under cases and those with allergic rhinitis (SFAR score ≥ 7) who didn't exercise for 30 minutes 5 times a week are included under controls. All study subjects were followed up. They were asked to maintain a daily diary entrée of their symptoms and asked to fill SFAR questionnaire at the end of study period. SFAR^[5] is a subjective and quantitative measure of an individual's well-being, in the form of a questionnaire. The score for allergic rhinitis (SFAR) includes 8 components, including the following: (1) nasal symptoms in the past year, includes sneezing, running nose and blocked nose; (2) rhinoconjunctivitis; (3) months of year in which nasal symptoms occur; (4) triggers which include pollen and house dust; (5) previous allergic status; (6) previous medical diagnosis of allergy; (7) previous positive test for allergy; (8) family history of allergy. SFAR cut-off value ≥ 7 was found to help discriminate between individuals with allergic rhinitis from those without.^[6] Serum IgE was checked before the start of the study as well as at the end of study. Out of the 43 eligible students, 21 were enrolled under control group and 22 under cases. Rhinorrhoea, epiphora, itching of eyes and nose were most common and bothersome symptoms. Dust, changes in weather, colds, air conditioning, pollen and pets were the most common triggers of symptoms. In the study by Helbing et al^[7], rhinorrhoea (16.8%) was the most common symptom in a survey conducted on 2961 elite Swiss athletes. This is comparable to our study, in which rhinorrhoea was the most common symptom among both cases and controls.

Out of the 22 cases, 10 (45.5%) were engaged in indoor sports activity and 12(54.5%) were engaged in outdoor sports activity. 13(59%) students from the case group reported an improvement in their symptoms with exercise. Of the 13, eight (62%) of them were engaged in indoor sports activity and 5(35%) in outdoor sports activity. Only 4 from the case group reported worsening of their allergic rhinitis symptoms with exercise and all these 4 belonged to the outdoor sports activity group. This may be due to the exposure to dust, mites and pollen in the outside environment. There was no worsening of symptoms in the indoor sport's group, which may be due to non-exposure to allergens such as pollen, dust, etc. In the control group comprising of 21 students with allergic rhinitis and those who don't exercise for 30 minutes for 5 days a week, 14 had no change in their allergic symptoms since the time of their diagnosis, while 7 of them had worsening of symptoms and had to increase the medicine dosage. The results of our study are comparable with the study conducted by Wannaporn Tongtako et al^[8] study, where they also observed a significant reduction in allergic rhinitis symptoms in exercise group compared to control group. In Helenius et al^[9] study, only 8 out of 32 elite athletes experienced exercise induced bronchospasm.

The principal finding of present study is that exercise has a beneficial role in allergic rhinitis. The reduction in rhinitis symptoms following exercise may be due to decreased nasal resistance resulted from decreased sympathetic vasoconstriction in the nasal mucosa. The fall in nasal resistance may be caused by reducing blood flow, leading to reduced nasal congestion.

There are a number of limitations to the study

1. The number of subjects in each group is small
2. The results obtained were based on questionnaire hence there are chances of participant bias.
3. Serum Ig E value was found to be within normal limits in some allergic rhinitis patients.

Conclusions

The present study demonstrates that exercise has beneficial effect in allergic rhinitis patients by reducing their symptoms. Allergic medications were either not required for decreased in these patients. We recommend regular physical activity for allergic rhinitis patients to have improved quality of life.

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