Original Article

Prevalence of Occupational Rhinitis in a Thai Medical Statistics Department

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Objective: To study the prevalence of occupational rhinitis [OR] among staffs in medical statistics department in the institution. The type of OR was also determined.

Materials and Methods: A prospective cross-sectional study was conducted in the medical statistics department in the authors' institution which is an urban teaching hospital in Bangkok, Thailand. The prevalence of OR was determined by using occupational rhinitis questionnaire and rhinitis symptoms visual analogue scale. Skin prick test was performed to demonstrate allergic response to specific allergens in volunteers who had symptoms of rhinitis.

Results: The prevalence of OR among staff in medical statistics department was 41.5% (17/41). The OR were classified as occupational allergic rhinitis 47.1% (8/17) and occupational non-allergic rhinitis 52.9% (9/17). Among occupational allergic rhinitis group, Dermatophagoides farinae (87.5%), house dust mite (37.5%), American cockroach (25%) and Dermatophagoides pteronyssinus (25%) were found to be common allergens. Dust (100%), low humidity/dry air (88.9%), rapid change of temperature (66.7%) and smoking (66.7%) were the most common environmental exposure in occupational non-allergic rhinitis group.

Conclusion: One third of medical statistic officer in one Thai university hospital had occupational rhinitis which nearly half and slightly over half were allergic and non-allergic rhinitis respectively.

Keywords: Occupational rhinitis, prevalence, skin prick test

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Occupational rhinitis [OR][1-3] is an inflammatory disease of the nose caused by the pathogenic substances contact at work. The presenting symptoms can be runny nose, itchy nose or nasal obstructive symptoms. The symptoms are usually worse in a work day and improve during the holidays. The prevalence of allergic rhinitis was 10 to 25% of the worldwide population[4,5]. The prevalence of OR were reported varying from 3 to 87% depending of work type in developed countries[6,7]. However, the prevalence and incidence of rhinitis from working in the general population had not been reported[8].

The occurrence of rhinitis from work correlated with the size of the exposure to disease (a dose response relationship)[9]. Siracusa et al found that OR was associated with allergic rhinitis in workers who had exposed to a high molecular weight substance, a carpenter or furniture technician who exposed with wood dust and an industrial worker extracted platinum drugs, such as antibiotics, psyllium metal who exposed to platinum[4,9] .

Occupational rhinitis can be divided into 2 groups: allergic rhinitis and non-allergic rhinitis. The occupational allergic rhinitis which is due to hypersensitivity towards the nose allergy in the workplace without the presentation of rhinitis symptoms before can be further divided into: IgE-mediated related caused by a high molecular weight substance such as proteins from plants and animals, and low molecular weight [LMW] substance such as platinum salts, reactive dyes, acid anhydrides, and non IgE-mediated related induced by LMW substance such

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as isocyanates, salts, woods. The non-allergic rhinitis from work is induced by working environment usually caused by irritation. Nasal symptoms occurred immediately after exposed to irritant substance, such as volatile substances, perfume, dust. However, exposure to high concentrations of those substances may cause inflammation of the nasal mucosa permanently[3].

Key points for a diagnosis of occupational rhinitis are based on evidence showing the relationship between a specific sensitizing agent in the workplace and the work activity. The working history is the most important point, to find an association between clinical symptoms and disease exposure from work.

Thailand, a middle-income country where the environment and culture may be difference from many countries that have been reported the prevalence of OR. To date there was a paucity of information for prevalence of OR in a Thai population.

Materials and Methods

A prospective cross-sectional study was performed in medical statistics department at one urban teaching hospital in Bangkok, Thailand from 1st January to 31st July 2016. The inclusion criteria were subjects aged 18 to 70 years who worked in medical statistics department. The exclusion criteria were subjects who had serious diseases such as AIDS, liver disease, kidney disease or diseases that may affect the immune system of the patient, had skin diseases that could not apply skin allergy testing, used of montelukast medication allergies or medications during the 1 week before the test, had received immunosuppressant's drug such as methotrexate, prednisolone.

The primary outcome was the prevalence of occupational rhinitis which was determine by using occupational rhinitis questionnaire[10] and rhinitis symptom visual analogue score[11].

The secondary outcome was the quality of life after subjects had occupational rhinitis which was determined by Rhinoconjunctivitis Quality of Life (Rcq-36)[12]. The criteria for discontinuation or withdrawal of research subjects from research were acute or severe allergic reactions during the test.

After inclusion and tested with 3 questionnaires, we performed the allergy test skin by pricking method (Skin prick test) for divided occupational rhinitis into allergic type and non-allergic type. This study was approved by hospital Ethics Committee Board.

Query the symptoms of rhinitis (Visual Analogue Scale) to store data, symptoms of rhinitis in work days. Saturday, Sunday, holidays or long weekends and earlier work in this Division by 0 is no symptoms at all and 10 is the most symptoms.

Where 0 indicates no symptoms, a score of 1-4 for mild symptoms that are easily tolerated, 5-7 for awareness of symptoms which are bothersome but tolerable (moderately symptom) and 8-10 is reserved for severe symptoms that are hard to tolerate and interfere with daily activity.

The present study used a skin allergy testing by pricking method (skin prick test) continue extraction cleaners, allergy to various diagnostics. Therefore, this histamine (positive control), German cockroach, American cockroach, *Alternaria spp.*, *D. pteronyssimus*, *D. farinae*, mixed mold #1, #2, mixed House dust, 50% glycerine (negative control) by testing positive at the time of 15 minutes, meaning there is a wheal with diameter larger than the negative control is greater than or equal to 3 mm.

Statistical analysis

Analysis of data analysis and presentation of information divided into 2 sections according to the type of data that is, quantitative data include age, duration nasal symptoms each time. Periods of time since the work began working in medical statistics until the onset of nose inflamed, life quality score (Rcq-36) offered by the average value and standard deviation. Working days, holidays, Saturday, Sunday, or holidays, and testing, statistical relationships by comparing the median values of each of the symptoms before working in this Department with work days and days in the holiday by using the Wilcoxon Signed Ranks test, assuming statistical significance when the p-value <0.05.

We used the IBM SPSS for windows version 22 for data analysis.

Results

We had 41 subjects participated in our study. The mean age was 39.02 ± 8.81 years. Twenty-five subjects had rhinitis symptoms. The onset of rhinitis after working at the medical statistics was 72.13 ± 62.56 months (Table 1).

The present study found 17 subjects (41.46%) had probable OA. Eight subjects had occupational allergic rhinitis and 9 subjects had occupational non-allergic rhinitis.

Allergy skin prick test showed that allergens found in groups from occupational allergic rhinitis were

Dermatophagoides farinae (87.5%), House dust (37.5%) , American Cockroach, (25%), *Dermatophagoides pteronyssinus* (25%), Alternaria spp. (25%), German Cockroach, (12.5%) and Mixed mold # 2 (12.5%). In the Group of occupational non-allergic rhinitis showed that the volunteers had exposed to dust (100%), low humidity/dry air (88.89%), rapid temperature changes (66.67%), smoke (66.67%) and windy (55.55%).

Symptoms of rhinitis have been reduced significantly in the weekend / holiday. However, VAS symptoms on working day showed more severity of symptoms when compared to the day before working at medical statistics department (Table 3).

There was no difference in the symptoms of rhinitis among non-occupational rhinitis (Table 4).

We found that the scores in various topics have no different except eye symptoms (itching, watery eyes, eye discomfort, eye). These eye symptoms were statistical significantly nuisance to the patient occupational allergic rhinitis rather than the non-occupational allergic rhinitis (Table 5).

Discussion

The present study identified rhinitis in 61% of medical statistics staff, being occupational rhinitis in 68% whereas the remaining 32% were not related to work. One study in Finland by Airaksinen et al[6] found 47% of OR diagnosed by the nasal provocation test. Another study from Canada by Gautrin et al[14] found 15% prevalence of probable OR diagnosed by nasal symptoms and with skin prick test, and reduced to 6% when confirmed by specific nasal provocation test. Moscato et al study[3] found that 2 to 87% prevalence of OR.

The prevalence of OR may vary in different countries, different jobs and substances, and also the method of diagnosis. The diagnosis made from questionnaire alone may be yield lower specificity comparing to a skin prick test or a standard of nasal

Table 1. Baseline demographic data

Variable	n (%)
Age, year (mean ± SD)	39.02±8.81
Gender, male	11 (26.83)
Smoking	3 (7.32)
Nasal symptoms (obstruction, sneezing, rhinorrhea, itching)	25 (60.97)
Present symptoms	25 (60.98)
Before working here	8 (32)
During working here	17 (68)
Duration symptom, min (mean ± SD)	33.36±35.40
Duration to start first symptom, months (mean ± SD)	72.13±62.56
Past illness history	
Asthma	1 (2.44)
Atopic dermatitis	2 (4.88)
Diabetes mellitus (DM)	2 (4.88)
Hypertension	1 (2.44)
Hyperlipidemia	1 (2.44)
Thalassemia	2 (4.88)
Gastroesophageal reflux (GERD)	2 (4.88)

Table 2. Prevalence of occupational rhinitis

Probable occupational rhinitis (n = 17) (68%)		Non-occupational rhinitis (n = 8) (32%)	
Allergic	Non-Allergic	Allergic	Non-Allergic
8 (47.06%)	9 (52.94%)	4 (50%)	4 (50%)

Table 3. VAS of nasal symptoms of occupational rhinitis compared before and after start working in here and VAS of nasal symptoms of occupational rhinitis compared working day and holiday (n = 17)

Symptoms	After start working here	Before working here	*p*-value	Working day	Holiday	*p*-value
Nasal obstruction	3 (1 to 5)	0 (0 to 1)	0.002	3 (1 to 5)	1 (0 to 2)	0.005
Rhinorrhea	2 (0 to 3)	0 (0 to 1)	0.007	2 (0 to 3)	1 (0 to 2)	0.007
Itching	3 (2 to 4)	0 (0 to 1)	0.001	3 (2 to 4)	1 (0 to 2)	0.001
Sneezing	2 (1 to 3)	0 (0 to 1)	0.001	2 (1 to 3)	1 (0 to 2)	0.005
Eye irritation	3 (1 to 8)	1 (0 to 2)	0.001	3 (2 to 4)	1 (0 to 2)	0.001

Table 4. VAS of Nasal Symptoms of non- occupational rhinitis compare working day and holiday and compare Before and After start working in here (n = 8)

Symptoms	After start working here	Before working here	*p*-value	Working day	Holiday	*p*-value
Nasal obstruction	2 (0.5 to 3.5)	2 (1 to 3)	0.705	2 (0.5 to 3.5)	2 (1 to 2)	0.357
Rhinorrhea	1.5 (0 to 3)	2 (1 to 3)	0.414	1.5 (0 to 3)	2.5 (0.5 to 3)	1.000
Itching	1 (1 to 2.5)	2 (0 to 3)	0.131	1 (1 to 2.5)	1.5 (0.5 to 2.5)	0.680
Sneezing	1 (0 to 2.5)	2 (0 to 2.5)	1.000	1 (0 to 2.5)	2 (0.5 to 3.5)	1.000
Eye irritation	2.5 (0.5 to 3)	2 (1.5 to 3)	0.655	2.5 (0.5 to 3)	2 (1 to 3)	0.785

Table 5. Quality of Life score (Rcq-36)

Symptoms occupational rhinitis	Mean scores probable non-occupational rhinitis	Mean scores	*p*-value
Rhinitis symptoms	8.76±2.840	7.00±3.162	0.617
Eye symptoms	8.35±3.534	5.13±1.808	0.006
Other symptoms	17.88±8.366	18.63±9.826	0.786
Physical functioning	4.47±1.841	3.63±1.188	0.262
Role limitation	4.29±1.896	3.88±1.246	0.329
Sleep	6.82±3.264	5.00±3.071	0.397
Social functioning	4.76±2.078	4.13±1.808	0.691
Emotions	9.71±4.312	7.25±3.412	0.482
Overall health	2.76±0.664	2.75±0.463	0.732

provocation test which is the gold standard for a definite diagnosis of OR[3].

Smith et al[6] found that latency period in nasal symptoms of inflammation was 7.3 years, which was consistent with the findings in this study. The duration of the symptoms of rhinitis after working in medical Statistics Department in this study was 72.1 years ± 62.6 months or average 6 years. The incidence of rhino conjunctivitis symptoms of work-related was highest during 12 to 20 months of work time and were more severe after 24 months[15-18] Moscato et al[3] recommended an exploration programs on work after entering the work and contact stimuli with an emphasis in first 2 to 5 years of work.

From the definition, OA[2,3] is an inflammatory disease of nose. Runny nose, itchy nose and nasal obstruction are common symptoms which are usually worse in work days and improved during holidays. Patients have no history of nasal symptoms before the start of working. From the questionnaires, the OR patients in this study had symptoms duration ranging from 5 to 120 minutes (average 33.4 minutes). The frequency of symptoms regarding duration and inflammation of nose may be inconsistent due to the questions used in the questionnaire.

A survey of rhinitis symptoms from Visual Analogue Scale operation [VAS] that asked about symptoms of runny nose, itchy nose, nasal obstruction, sneezing, itchy eyes, and eye irritation can generally demonstrate the frequency and severity of these symptoms[11]. The severity of symptoms during work days was significantly greater than those found during weekend or long holiday. This study compared the symptoms on the days before working at the Medical Department of statistics, and found more severe symptoms (on working days) than the days before working in the Medical Statistics Division statistical significantly in every rhinitis symptoms. The symptoms found in the study supported a diagnosis rhinitis from work.

From the questionnaire and allergy skin prick test, allergens found in the participants affected from allergic rhinitis in order of frequency were *Dermatopha goides farinae* (87.5%), house dust (37.5%), American cockroach, (25%), *Dermatophagoides pteronyssinus* (25%), Alternaria spp. (25%) and the least was the German cockroach (12.5%) and mixed mold # 2 (12.5%). These agents may be related to work places or not, so

the history of allergic symptoms before and after working must be studied in comparison. Thus, to classify the allergens that cause OR require specific nasal provocation test[19,20] to verify the types of allergens causing symptoms of nasal inflammation. This should be an exploration of work space environment to locate the cause of OR[21]. The results from this study which showed the disparity of symptoms before and after working could be interpreted that the allergic symptoms were related to their work or OR. Among the participants who had non-allergic OR, they were exposed to different inciting factors as the followings: dust (100%), low humidity/dry air (89%), rapid temperature changes (67%), smoke (67%) and electric-fan wind (56%).

We used Rcq-36 form to study allergic rhinitis or allergic conjunctivitis in term of quality of life and found no different in symptoms score except eye symptoms. This study found eye symptoms as more common than other symptoms of rhinitis. The finding was consistent with Groenewoud et al[22].

There were several limitations in this study. This study was performed at a single academic center in a middle- income country with potentially significant environmental differences form others country. The findings may not be generalizable. Due to small number of subjects, we could not be performed the analyses of risk factors.

Conclusion

Forty percent of medical statistic staff in a Thai university had occupational rhinitis. Nearly half of which was allergic and slightly over half was non-allergic rhinitis.

What is already known in this topic?

Occupational rhinitis can be divided into 2 groups: allergic rhinitis and non-allergic rhinitis. Occupational rhinitis affects people who work in many workplace such as bakery and beauty salon. Key points for a diagnosis of occupational rhinitis are based on evidence showing the relationship between a specific sensitizing agent in the workplace and the work activity.

What this study adds?

The present study was first study in occupational rhinitis in the back office of university hospital in Thailand. We can show the result of nasal symptom before and after working day of occupational rhinitis in back office area, we hope to see more other following study in this area.

Potential conflicts of interest

The authors declare no conflicts of interest.

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