



Original article

Prevalence of Sick Building Syndrome - Related Factors among Hospital Workers at University Medical Center Ho Chi Minh City, Vietnam

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Abstract: Poor indoor air quality is one of the most important factor causing occupational health problems such as sick building syndrome (SBS). Most previous research on risk factors of SBS is evaluated in the office or school environments rather than in the hospital. The aim of this study is to investigate the prevalence of SBS and its related effect on hospital workers in poorly-ventilated and confined working environments through a set of the questionnaires completed from March to June of 2017. The relationship between SBS-Related symptoms, individual characteristics, work environment and conditions were analyzed using Poisson regression. The prevalence of sick building syndrome was 70.1%. The most common symptoms reported by hospital workers include fatigue, headache, and feeling heavy-headed. There was a significant relationship between the prevalence of syndrome and sex, overload of work, atopy as well as varying room temperature.

Keywords: Sick Building Syndrome, Hospital Workers, Vietnam.

1. INTRODUCTION

When talking about environmental pollution, most people think that contamination is triggered by industrial or vehicle emission and garbage. Moreover, many people also think outdoor pollution is much worse in terms of contamination than indoor pollution. But according to the United States Environmental Protection Agency [4], indoor air pollution level is much 2– 5 times higher than outdoor air pollution; yet, people spend most 90% their time indoor [5, 11]. Most big cities in the world, the building was designed with inadequate air ventilation because of urbanization and limited land. This has influenced working conditions and can cause SBS which can be present in office buildings, schools and hospitals [10]. One of the most important issues is sick building syndrome which can result in not only reducing the productivity of employees, increasing the absence from work but also raising the healthcare budget. Many studies already prove the high prevalence of sick building syndrome symptoms in the hospital environment [3, 9, 15]. Besides, hospital offices who take care of everyone everyday but those

people always ignore their health. There are many factors that influence SBS such as exposed to biological factors, chemical pollutants from medical drugs; work conditions and environmental factors. In this study, we conducted a questionnaire-based study of the health effects of indoor air in University Medical Center Ho Chi Minh City in Vietnam.

2. MATERIALS AND METHOD

Study Population

The study population was selected from hospital workers The University Medical Center of Ho Chi Minh City in Vietnam. Cluster sample 1 is performed in 2 steps. First, each department was chosen to be a cluster, total departments are 53 with 2279 health officers and number of hospital workers is not equal in each department from 16 to 119 ones. Second, a single randomized method approach to select 8 departments and survey all staff in selected departments. The filled-in questionnaires were returned by 207 of 255 (response rate 81.3%). Information on age, sex, working condition, and environmental factors were obtained from the questionnaire.

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The Questionnaire

This was a cross-sectional analysis study in which MM040NA questionnaire for sick building syndrome and indoor air quality is evaluated. The questionnaire was translated from English to Vietnamese. The validity and reliability after collecting the sample were confirmed by Cronbach's alpha test with the working environment and SBS syndrome was 0.85 and 0.82 respectively. This questionnaire contains twelve questions concerning sick building symptoms that are known to be related to indoor air problems, twelve other questions about working environment, four questions dealing with the working condition over the previous 3 months. Symptoms and environmental factors are recorded in statistical analysis as "yes, often (more than once a week)", "yes, sometimes (once a week)", and "no, never". Symptoms and environmental factors are determined as participants answer "yes, often" or "yes, sometimes". Temperature factor is defined which included weekly disturbances arising from any temperature factors (draughts and high, low or alternative room temperatures). Indoor-air-quality factor is defined from weekly disturbances originating from stuffy, dry air, unpleasant smells or environmental tobacco smoke. Dust factor is defined from weekly complaints stemming from "dust and dirt". Three groups of symptoms are employed in the analyses. "General symptoms" include weekly incidences of fatigue, heavy-headedness, headaches, dizziness or difficulties in concentrating, "mucous membrane irritations" – weekly symptoms from eyes, nose, throat or coughing – and "skin symptoms" – weekly skin symptoms. SBS was considered as positive for people who suffered from at least one general symptoms, mucous membrane irritations, and skin symptoms. Four work condition questions measure work satisfaction ("interesting or stimulating work"), work stress ("too much work to do"), personal control at work ("opportunity to influence working conditions") and social support ("getting help from your colleagues when you have a problem at work"). These questions had four possible answers: "yes, often", yes, sometimes", "no, seldom" and "no, never". Working condition is determined by participants answer "yes, often" or "yes, sometimes".

Statistical Analysis

Chi-square test and a Poisson regression model are used in this study. Throughout the statistical analysis, a 95% confidence interval was used. All statistical analyses are performed using STATA 12 software.

3. RESULTS AND DISCUSSION

Personal characteristics

Sample size results in only 207 hospital workers of University Medical Center Ho Chi Minh City participating in this study, 160 are females (77.3%) and 47 are males (22.7%). Because of the difficulties in recruiting since the

medical staff was on leave or postpartum leave, some staff members were on the faculty list but belonged to other departments; they were also either busy or do not agree to participate in research. The majority of working as nurses (54.6%) and their average age was 27 (range 22-53) years. Based on data from the questionnaires, the average total work experience of participants was 3 (range 0.5-15) years, 8 participants are exposed to tobacco smoke and 118 staff suffer from atopy. (Table 1)

Occurrence of symptoms

Prevalence of SBS was 70.1% (145 people) with general symptoms (46.9%), mucous membrane irritation symptoms (42.5%), skin ones (27.1%); of which a headache (89.6%), feeling heavy-headed (89.4%) and fatigue (98.6%) are the most common general symptoms; among the mucous membrane irritations and skin symptoms, with irritated-stuffy or runny nose (70.5%), dry throat (74.4%) and dryness of hand (55.1%). The hospital officers often disturbed by temperature (84.1%), indoor air quality (90.3%), dust (48.3%). Furthermore, almost those subjects felt work satisfaction (87.9%), social support (95.2%), overload of work (97.1%) and 60.9% with personal influence. (Table 1).

Associations between SBS-Related Symptoms, Personal Factors, work environment and conditions

The relationships among the sick building symptoms, personal factors, work environment and conditions are analyzed. SBS was significantly related to sex (PR=0.68, CI 0.50-0.91) in detail female reported about SBS more often than men. Furthermore, there is a significant relationship between SBS and varying room temperature (PR=1.32, CI 1.12-1.55) and overload of work (PR=2.13, CI 0.69-6.64). (Table 2)

There was no significant relationship between SBS and social support, personal influence, work satisfaction ($p > 0.05$). In this study, nearly 60% of health workers have atopy, which is much higher than a study in Sweden. The rate of hay fever was highest with 51.2% of medical staff (8.7% of asthma, 11.6% of eczema), which was consistent with the current situation of hay fever in Viet Nam, making the proportion of employees with atopy higher than other studies. Only 3.7% of health workers smoke because they understood the harmful effects of smoking, furthermore hospital regulations at the workplace, health workers set the example for patients to advise them to quit smoking. The prevalence of SBS among hospital workers in the study was 70.1% (145 people), this result of study was a little bit lower than previous similar researchers [3, 9]; but it was far higher than other studies that conducted in household, office or school [12, 14]. This show that hospital workers suffered from SBS much more than others. According to epidemiology study showed that SBS is related to high microbial indoor air [16]. Moreover, in a tropical climate country like Viet

Nam, factors such as high humid weather, many patients in hospital sectors which is led to growth microorganisms, contributing to the high prevalence of SBS in the hospital [9]. The symptoms such as a headache (89.9%), feeling heavy-headed (89.4%) and fatigue (89.6%) were the most popular signs of SBS. Although the rate of those symptoms was consistent with previous studies conducted in hospitals [1, 9], there were significantly higher than studies conducted in normal office environments [2, 6].

There was a significant association between the SBS and sex, the result of this study also was consistent with other studies such as [7, 13]. However, some studies reported the relation of SBS and gender were not statistically significant such as [3, 9] due to the small number of men in those studies. But most studies did recognize gender as is a risk factor for SBS. Environmental factors at work such as varying room temperature was the significant association with SBS. Nevertheless, the result of this study was different from hospital study [9] because of a different climate in those studies. In the study performed by [8, 9] conducted in the hospital, the nurse's overload of work was associated with SBS, which was consistent with results of this research. This result has shown that the work environment and physical factors associated with SBS. Therefore, director of the hospital need arrange reasonable work for staff to relieve overload of work and reduce stress in the workplace. Research on indoor air pollution in Vietnam is very little, especially with regards to sick building syndrome, so this topic is the premise to researchers who are concerned about this issue. Moreover, Vietnam has not set strict rules for the criteria that define the allowable limits of pollutants indoor air pollution as mentioned above.

4. CONCLUSION

This study shows a high prevalence of sick building syndrome symptoms in the hospital environment. We found varying temperature room, sex and overload of work to have significant effects on SBS-related symptoms among hospital workers. There should be steps implemented to improve environmental conditions, such as increasing the efficiency of the ventilation system, clearing air-conditioner every month and workplace after shift, increasing fresh air flow in the department. These results show that we can not ignore this health among hospital workers, especially as a lot of them suffer from atopy.

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Table 1. Personal characteristics, prevalence of SBS-related symptoms, work environment and conditions (n=207)

Variable	N	%
Male	47	22.7
Age*	27 (25-32)	
Smoker	8	3.9
Atopy**	118	57.0
Nursing	113	54.6
Doctor	33	15.9
SBS	145	70.1
General symptoms	97	46.9
Mucous membrane irritation symptoms	88	42.5
Skin symptoms	56	27.1
Fatigue	204	98.6
Headache	186	89.9
Feeling heaving-headed	185	89.4
Often disturbed by		
Temperature	174	84.1
Indoor air quality	187	90.3
Dust	100	48.3
Work satisfaction	182	87.9
Overload of work	201	97.1
Personal influence	126	60.9
Social support	197	95.2

*Median (inter-quartile)

**Asthma or hay fever

Table 2. Associations between personal factors, work environment, conditions and SBS (n=207)

Factor	Positive SBS	Negative SBS	P	PR (95% CI)**
Sex				
Male	24 (51.1)	23 (48.9)	<0.01	0.68 (0.50-0.91)
Female	121 (75.6)	39 (24.4)		
Smoke*				
Yes	3 (37.5)	5 (62.5)	0.22	1.90 (0.61-5.97)
No	142 (71.4)	57 (28.6)		
Atopy				
Yes	95 (80.5)	39 (43.8)	<0.01	1.43 (1.17-1.76)
No	50 (56.2)	23 (19.5)		
Varying room temperature				
Yes	53 (84.1)	10 (15.9)	<0.01	1.32 (1.12-1.55)
No	92 (63.9)	52 (36.1)		
Overload of work *				
Yes			<0.05	2.13 (0.69-6.64)
No	143 (71.1)	58 (28.9)		
	2 (33.3)	4 (66.7)		

* Fisher Exact

** 95% Confidence Intervals