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Relationship between Sick Building Syndrome with Headache and Drowsiness

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Abstracts:
Based on previous researches and current research indoor contaminations in most of the time were more than outdoor contaminations. In according to, most of our times have been spent in indoor environments (85-90%), therefore, it is necessary to investigate indoor environments. Symptoms of sick building syndrome are Headache, dizziness, drowsiness. Unknown reasons of disease above mentioned and improvement and Fixing problems have emerged in people after moving from these buildings. In this research, we investigated basic symptoms of syndrome in illnesses of sick buildings. We designed a questionnaire and asked from male of dormitory residence. Questions of the questionnaire were more about known symptoms of buildings (Shortness of breath, inflammation, swelling and burning eyes, runny nose, malaise and fatigue, drowsiness, headache). Results of research indicated that lack of ventilation system, noises, contaminated materials, cars smoke, noses of crowded streets and high humidity are that most important reasons of sick building syndrome respectively.

Key words: Syndrome, Headache, Drowsiness

SICK BUILDING SYNDROME

The term "sick building syndrome" (SBS) more specifically termed "nonspecific building-related illness," describes a set of common and nonspecific symptoms that are experienced by individuals in office and other nonindustrial workplace settings but remit when the individuals are away from that environment. Symptoms typically include fatigue; cognitive complaints; headache; shortness of breath; irritation of the nose, oropharynx, and eyes; rashes; and complaints of unpleasant odor in the workplace. It is critical to distinguish SBS from building-related illness, which refers to conditions more readily diagnosable by practitioners and characterized by abnormal signs. These include carbon monoxide poisoning, asthma,

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hypersensitivity pneumonitis, and upper respiratory infections. The symptoms and paucity of signs that characterize SBS overlap substantially with the symptoms of various other medically unexplained syndromes such as chronic fatigue syndrome, fibromyalgia, multiple chemical sensitivities, and even psychiatric conditions characterized by somatic symptoms. The key is that with SBS the symptoms wax and wane with exposure to a particular building environment. Sorting out their diverse causal influences is the key to prevention, and involves integration across many fields.

Hodgeson et al (1991) believed Symptoms of SBS have been identified in several researches and factors, which contribute to sick building syndrome, have been shown by experimental research. Although, there remains much uncertainty about specifics of exposure, dose, susceptibility, and in particular the development of chronic symptoms once, an afflicted individual is removed from a building exposure. Most of research also show high relative of symptoms in office workers in various climates and countries. Some workers and clerks report such symptoms even in non-problem buildings (At least 20 to 35 percent). Mechanical ventilation systems are one essential reasons of sick building syndrome and may be due to lack of natural ventilation system. Relative humidity below 20 percent and above 60 percent are correlated with mucous membrane discomfort or general symptoms (Lynch and Kipen, 1998).

It is clear from controlled exposure studies, as well as observational studies, that even relatively low levels of volatile organic compounds (VOCs) can acutely produce many of the symptoms of SBS, and that these symptoms remit once exposure is terminated. Attempts to document objective correlates of these symptoms with neuropsychological or respiratory tests have not been very successful. VOCs are emitted from many construction materials as well as office products, and while most noticeable with new buildings, many emission sources are chronic. VOCs can also be reintroduced during building maintenance and renovation, as well as normal business activities (Mendel et al, 1996).

Based on previous researches, we know that symptoms are increasing and moisture's buildings are one of places for growing fast of bacterial and mold growth and they lead to increase rate of symptoms. Tendency to be allergic (Atopy) is a risk factor for symptoms, perhaps due to allergies to fungi and bacteria. Much work remains to be done in sorting out whether those reporting symptoms have a specific building related illness (e.g., asthma, rhino-sinusitis, interstitial lung disease) as opposed to SBS. Reports of systemic disease and immune system damage from mycotoxins also requires further study and verification, but there is compelling preventive logic to taking steps to avoid excessive moisture in buildings and to responding promptly when it occurs to reduce microbial growth (Menizies and Bourbeau, 1997).

Drowsiness

Daytime drowsiness is a common symptom and most often related to not getting enough sleep. When drowsiness occurs most of the time or causes a person to fall asleep at inappropriate times, quality of life and performance can be affected.

Feeling drowsy during the day is often related to not getting enough quality sleep. However, sometimes this can be a symptom of an underlying disorder.

Morning headaches with drowsiness may be an important clue that you have a potentially more serious disorder.

Headache:

A headache or cephalalgia is pain anywhere in the region of the head or neck. It can be a symptom of a number of different conditions of the head and neck. The brain tissue itself is not sensitive to pain because it lacks pain receptors. Rather, the pain is caused by disturbance of the pain-sensitive structures around the brain. Nine areas of the head and neck have these pain-sensitive structures, which are the cranium (periosteum of the skull), muscles, nerves, arteries and veins, subcutaneous tissues, eyes, ears, sinuses and mucous membranes.

There are a number of different classification systems for headaches. The most well-recognized is that of the International Headache Society. Headache is a non-specific symptom, which means that it has many possible causes. Treatment of a headache depends on the underlying etiology or cause, but commonly involves analgesics.

Literature review:

One indoor place of the most important for student is university and dormitory and their environment are effective on students and can increase symptoms. Therefore, ventilation system and indoor air quality (IAQ) are also effective performance and health of students (Daisey et al., 2003), However, Meyer et al., 2004 and Saijo et al., 2010 found relationship between measured microbial exposure and dampness. Sick building syndrome of students related to exposure of microbe. Bacteria, molds, yeast and various components are Indoor microbial contaminants Endotoxins are integral components of the outer membrane of Gram-negative bacteria, and LPS is responsible for most of the immunological properties of bacterial endotoxins (WHO, 2009). Muramic acid (MuA) is a cell wall compound found in all bacteria, but since the walls of Gram-positive bacteria are much thicker than those of Gram-negative bacteria, it is considered to be mainly an indicator of Gram-positive bacteria (Sebastian et al., 2004).

China has the largest population in the world, but we found no publication on SBS from mainland China, and, with respect to SBS in children, only a few from Taiwan. We have previously studied associations between microbial components in school dust (LPS; MuA; Erg) and asthmatic symptoms in school children in a cross-sectional study in Taiyuan City, China, where we found mainly negative associations for bacterial components (LPS; MuA) and positive associations for Erg (Zhao et al., 2008). With these findings in mind, we performed a two-year follow-up study on SBS in schoolchildren in the same schools.

In this study, our aim was to measure selected microbial components in school dust, selected fungal DNA, and furry pet allergens in schools and to study associations between this exposure and two-year incidence and two-year remission of SBS symptoms. The study was performed in school pupils in Taiyuan, a city in north China. To our knowledge, this is the first longitudinal study on associations between microbial exposure and SBS in China.

Methodology:

We used proposed questionnaire of Denmark weather for building research institute, questionnaire of NIOSH and proposed questionnaire model. Eventually, we combine all of them

and we create a proposed questionnaire and use it in the research. This study is descriptive. All of data were gathered from 13 male dormitories of, 340 respondents at Tehran University in 2011.Furthermore, 340 respondents selected randomly, and physical features of dormitories investigated base on presence or absence of air condition and air quality of interior buildings. Following, Existence of symptoms like headache, drowsiness, used as criteria of sick building syndrome. We asked some issues in the questionnaire such as symptoms arose in inhabitants, most causes of symptoms, tools, and equipment using by respondent more than 10% of their time and main building problems.

Hypotheses:

H_1: Significant relationship exists between sick building syndrome (SBS) and drowsiness

H_2: Significant relationship exists between sick building syndrome (SBS) and headache

Methods of measuring carbon monoxide:

Common methods for determining density of carbon monoxide collected and transferring to laboratory by special bags and measure by chromatography. The Answer belongs to one area and short time of period and another problem of chromatography are determining CO for density less than 10PMM. Therefore, 1970 invented a new methods by (Bareta and et al, 1978) and in this way, first CO transfer to methane and then calculate by measuring methane.

Table 1: Some Gases and their effects on human body:

Gases / Effects	CO	NO	NO_2	SO_2	O_3
Fatigue	**1**	**1**	**1**	**0**	**0**
Malaise	**1**	**1**	**1**	**0**	**0**
Headache	**1**	**0**	**0**	**0**	**0**
Dizziness	**1**	**0**	**0**	**0**	**0**
Drowsiness	**1**	**0**	**0**	**0**	**0**
Anesthesia	**1**	**0**	**0**	**0**	**0**

Effective= One
Non-Effective= Zero

Fig 1: Reasons of symptoms

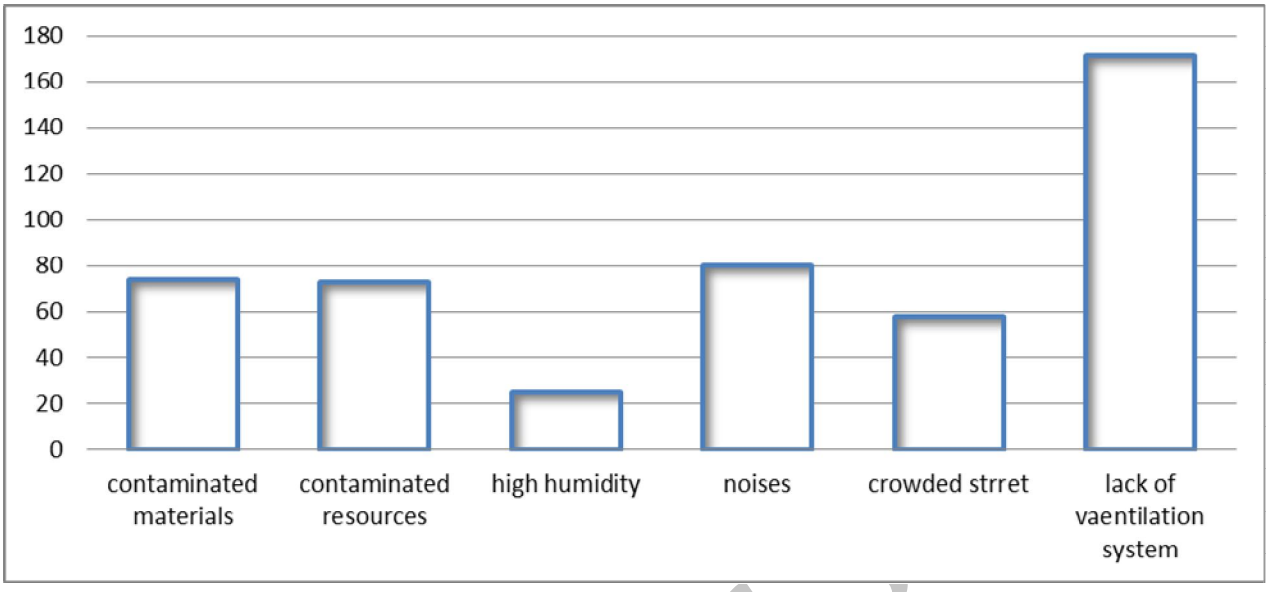
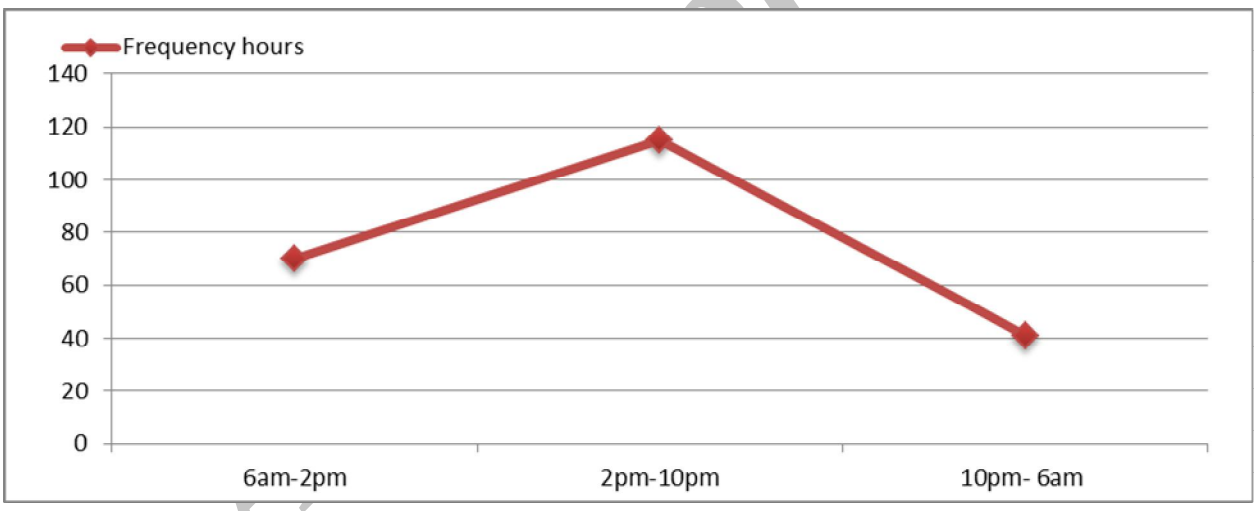


Fig2: Frequency hours of sick building syndrome in the interval periods



Conclusion and Discussions:

Most of residence believed lack of ventilation system is the first reason of sick building syndrome and it is substantially higher than other problems and it is consistence with research of Sundell J (1994). Following, noises is the second reason of sick building syndrome. The third reason is contaminated materials. Then, fourth reason belongs to cars smoke, steam and cooking smoke, airborne dust. Fifth reason is noises of residents. Finally, high humidity is sixth reason of sick building syndrome. The most important places for severity of symptoms are in rooms (131people), toilets (84), corridors (61) almost of everywhere of buildings (53) kitchen (52) and upper floors (14). The most hours exacerbate symptoms between 2pm-10 pm, period time of 6

am- 2pm the second worse symptoms and 10 pm to 6 am is the least hours of symptoms in among residence. Eventually, another factor that can be cited existence tools and equipments which residence use of them more than 10% of their time, they play role in creating sick building syndrome symptoms, and in among these equipments personal computer has the most important role. Meanwhile, using gas cookers, use of copiers and printers have substantial less important role for creating sick building syndrome.
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In according to results of the research in among 340 of respondents who all were men; 222 (65%) of respondents were unsatisfied and they accounted as sick building syndrome, whereas, 118 of respondents (35%) were satisfied from air quality of indoor buildings.

In this research, for residence symptoms like malaise and fatigue with 180 people, drowsiness constitutes 166 people, headache includes 110 people, runny nose with 92 people, inflammation, swelling and irritation of the eyes 65 persons and finally asthma constitutes 35 people were the most common problems of residence respectively. We achieved reasonable reasons and documentaries based on, empirical data of the residence and interior condition of rooms, buildings environmental and physical condition and eventually, the most important reasons are as following:

All symptoms of sick building syndrome may be due to other factors like insomnia, Scleritis, mental health problems and they are not related just sick building syndrome. Other factors like material of construction, age of building, high humidity, and fluctuation of temperature, high artificial light, color and isolation of the building, crowded city, pollutant carpets, and plates can be effective for increasing symptoms in students.

Recommendations:

1. Re-building and repair old buildings and rooms should be larger and number of students in each room should be reduced
2. Minimize exposure of interior building products to exterior
3. Heating, Ventilation and Air-Conditioning (HVAC): Using of this tool provides high limitations. Since, high quality filters are expensive also; mechanical filters cannot purify gases contaminations. Generally, HVAC systems are suitable strategies, however, limited application.
4. Monitor and maintain integrity of building impermeable envelope
5. Increase the amount of air ventilation: There is an effective factor for reducing level of pollutants indoors. Generally, HVAC systems design in order to achieve standard ventilation. It is recommended that local ventilation for specific places like copying and printing rooms.
6. Minimize moisture accumulation during construction

7. Protect stored materials from moisture.
8. Air Purifiers or air conditions: it can be useful strategy for improving quality of indoor airs
9. Remove source of the contamination: this happens when source of contamination are known. As an example, HVAC systems should be cleaned or replaced filters regularly.
10. _ Check material delivered clean and dry e reject wet or mouldy material

11. _ Balance HVAC systems to control thermal comfort and humidity

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