Conference Paper

The Evidence of Sick Building Syndrome (Sbs) among Oil Gas Refinery Officers

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Abstract

The sick building syndrome comprises of various non-specific symptoms that occur in the occupants of a building. It commonly increases sickness absenteeism and causes a decrease in productivity of the workers. Evidence suggests that what is called the Sick Building Syndrome are at least three separate entities, which has at least one cause. The following are some of the factors that might be primarily responsible for Sick Building Syndrome such as: Chemical contaminants, Biological contaminants, inadequate ventilation and Electromagnetic radiation. In many cases, it is due to insufficient maintenance of the HVAC (heating, ventilation, air conditioning) system in the building. As this syndrome is increasingly becoming a major occupational hazard, the analytic cross-sectional design was used. Based on data obtained, 80 percent of respondents reported significant on-going health problems in the eyes, head, and the nose. About 60 percent had bad symptoms in the throat, the stomach and cough, 50 percent had gastrointestinal disorders, 40 percent fatigue and 25 percent had all symptoms of sick building syndrome. Forty respondents were recruited to the study, with a mean age of 35 years (range 20–55). To support the evidence of Sick Building Syndrome, further checks are needed for some of the factors in next research, that is, measurement of Chemical contaminants, Biological contaminants, inadequate ventilation and Electromagnetic radiation.

Keywords: indoor air pollution, sick building syndrome, occupational health

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1. Introduction

The sick building syndrome comprises of various non-specific symptoms that occur in the occupants of a building. This feeling of ill health increases sickness absenteeism and causes a decrease in productivity of the workers [1]. It is commonly accepted

to represent eye, nose, and throat irritation, headaches, lethargy, difficulty concentrating, and sometimes dizziness, nausea, chest tightness, and other symptoms. Evidence suggests that what is called the SBS is at least three separate entities, each of which has at least one cause. It is a multi-factorial event which may include Chemical contaminants, Biological contaminants, inadequate ventilation and Electromagnetic radiation. In many studies, prevalence of sick building syndrome symptoms has also been associated with characteristics of HVAC (heating, ventilation, air conditioning) systems [2].

Cases of the SBS typically report vague symptoms which cannot be objectively measured, and sufferers usually show no clinical signs of illness. SBS symptoms include headache, lethargy, eye, nose and throat irritation, breathing problems, and skin irritation [3]. SBS symptoms are linked to building occupancy because they get better on leaving the building. IAQ surveys of sick buildings often fail to find pollution problems, even though complaints are chronic and symptom prevalence among occupants is high with up to 80 percent of workers reporting at least one symptom [4]. In newly constructed or recently remodeled spaces, reports of SBS can be acute and temporary, typically dissipating within 6 months. Many of these symptoms are thought to stem from acute exposure to volatile organic compounds (VOCs) emitted from new building materials, paints, furniture, and finishes, although research evidence for this remains inconclusive. In permanently 'sick' buildings, a high symptom prevalence can persist for several years and exposure to VOCs emissions from new materials cannot explain symptoms. Moreover, concentrations of indoor air pollutants invariably are low. Never the less, poor IAQ is suspected as the cause of symptoms because these are alleviated when sufferers are away from the building.

Buildings with a high prevalence of SBS cases are labelled 'sick' buildings, although there is no standardized method for gauging symptom prevalence and no agreement on the criteria which can discriminate between 'sick' and 'healthy' buildings. Regrettably, there is no consensus on the number, pattern, severity, or frequency of symptoms which are define an SBS case, on how to measure symptoms, over what time period, or even what symptoms should be measured. There is also no agreement on the criteria for classifying a building as 'sick'.

On average, people spend about 90 percent of their time indoors. Sixty-five percent of that is spent at home. To make matters worse, those who are most susceptible to indoor air pollution are the ones who are home the most: children, pregnant women, the elderly, and those with chronic illnesses. Children breathe in 50 percent more air per pound of body weight than adults do. EPA studies have found that pollutant levels

inside can be two to five times higher than outdoors. After some activities, indoor air pollution levels can be 100 times higher than outdoors [5].

Several types of indoor air quality (IAQ) problems can arise in buildings: complaints about IAQ; reports of the sick building syndrome (SBS); toxic reactions from acute or chronic exposures to contaminated air; and building-related illnesses (BRIs).Toxic reactions from acute or chronic toxic exposures can be verified by measuring concentrations of indoor air contaminants. Episodes of BRI can be diagnosed because sufferers develop measurable physiological changes and show clinical signs, such as a high temperature. Symptoms of BRIs usually are similar to those of other acute respiratory diseases and they persist when the person is away from the building, only being alleviated when the illness is treated or has run its course. BRIs often indicate indoor air which is contaminated by microorganisms, and again is objectively measurable. In both types of complaints remedial action involves treating affected workers and removing or controlling contaminant sources [6]. In buildings where the air is shown to be contaminated, however, not all occupants will develop problems because various non-environmental factors affect individual susceptibilities.

2. Methods

A quantitative methodology was used, namely through the analytic cross-sectional design, site visits to identify SBS or BRI by collecting questionnaire from the workers in the same time.

Investigations of IAQ and the SBS usually use unstandardized, self-administered questionnaires to gauge the prevalence of symptoms and IAQ complaints.

Questionnaires usually collect data on workers' perceptions of environmental conditions and health over extended periods of time, such as one month, 3 months, 1 year, whereas measures of environmental conditions seldom are taken over such extensive periods. Moreover, such measurements normally are not taken for each individual location in a building. Thus, it is perhaps not surprising that little association between self-reported symptoms and measured IAQ has been found.

Data retrieval in Main Control Room PT. PERTAMINA Persero Refinery Unit II Dumai, located in Jayamukti Village, Dumai Timur District, Dumai City, Riau Province.

Figure 1: Oil & gas refinery (front).

Figure 2: Oil & gas refinery.

3. Results

Forty respondents were recruited to the study, with a mean age of 35 years (range 20–55). 17/40 (42.5%) were male. Diagnoses were varied and represented of the population. Based on data obtained from 40 respondents there were 10 cases or 25 percent occurred sick building syndrome (> 4 symptoms). Eighty percent of respondents reported significant ongoing health problems in the eyes, head, and the nose. Sixty

Figure 3: Control room (room 1).

Figure 4: Office (room 2).

percent had bad symptoms in the throat, the stomach and cough, 50 percent had gastrointestinal disorders, and 40 percent with fatigue.

Table 1: Data of symptoms of SBS.

Respondents	Symptoms of SBS									Remark	
	1	2	3	4	5	6	7	8	9	SBS	No SBS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-01					v				v		No
R-02			v								No
R-03			v		v						No
R-04									v		No
R-05	v		v		v						No
R-06							v				No
R-07			v		v						No
R-08			v								No
R-09			v								No
R-10			v		v						No
R-11			v								No
R-12					v			v			No
R-13	v		v		v		v			Yes	
R-14	v			v	v		v		v	Yes	
R-15	v					v		v	v	Yes	
R-16			v					v			No
R-17			v								No
R-18			v		v						No
R-19	v	v	v								No
R-20						v		v			No
R-21		v		v	v	v	v			Yes	
R-22	v	v						v			No
R-23			v					v	v		No
R-24				v	v			v			No
R-25		v	v					v			No
R-26	v	v	v			v			v	Yes	
R-27	v	v					v	v	v	Yes	
R-28		v			v						No
R-29	v		v	v	v				v	Yes	
R-30		v						v			No
R-31		v			v						No
R-32			v		v						No
R-33	v				v						No
R-34		v	v				v				No
R-35	v	v		v				v		Yes	
R-36	v	v									No

Respondents	Symptoms of SBS										Remark
R-37		v			v						No
R-38	v	v	v		v		v			Yes	
R-39							v				No
R-40	v		v		v				v	Yes	
Totally	14	14	21	5	19	4	8	11	9	10	30

Table 2: Data age of respondent.

Age	Room I	Room II	Total	%
20–30	1	5	6	15%
31–40	2	20	22	55%
41–55	2	10	12	30%
Total	5	35	40	100%

Table 3: Data frequency of SBS symptoms.

SYMTOMPS	SBS (10 people)	
	f	%
Eye	8	80
Head	8	80
Fever	8	80
Throat irritation	6	60
Nose/breathing problems	8	80
Stomach	5	50
Gastrointestinal disorders	6	60
Fatigue	4	40
Cough	6	60

Table 4: Data period of time.

Time of work	Room I	Room II	Total	%
< 3 month	0	0	0	0%
≥ 3 month	5	35	40	100%
Total	5	35	40	100%

Table 5: Data nutrition of respondent.

Nutrition	Room I	Room II	Total	%
Bad	0	0	0	0%
Bad	0	0	0	0%
Good	3	30	33	82.5%
Over	2	5	7	17.5%
Totally	5	35	40	100%

4. Disscussion

Evidence suggests that SBS is at least three separate entities with at least one cause. Chemical and/or biological contaminants, inadequate ventilation, and electromagnetic radiation may be the factors primarily responsible for SBS. In many cases, SBS is due to insufficient maintenance of a building's heating, ventilation, and air conditioning (HVAC) system, and it is increasingly becoming a major occupational hazard. The study employs an analytic, cross-sectional design. Based on the data obtained, 80 percent of respondents reported significant, ongoing health problems with their eyes, head, and nose. Sixty percent reported negative symptoms in the throat, stomach, and/or a cough, 50 percent had gastrointestinal disorders, 40 percent fatigue, and 25 percent reported each of these symptoms of SBS. Forty respondents were recruited to the study, with a mean age of 35 years (range 20–55).

5. Conclusions

This pilot study is limited by the small sample size. Based on the results of the study can be drawn the conclusion that the case of sick building syndrome (SBS) in the oil gas refinery occurred as many as 10 people or 25 percent occurred sick building syndrome, so it evidence sick building syndrome (SBS).Further research is required to answer all the health problem of sick building syndrome and the impact to such workers by taking more samples in order to test the strength of better.

Based on the syndrome it can be stated that SBS has occurred, for BRI (building related illness) not found.

Recommendation: To measure multi factor contaminants such as: Measurement of Chemical contaminants, Biological contaminants, inadequate ventilation & Electromagnetic radiation.

Conflict of Interest

The authors declare that they have no competing financial, professional or personal interest that might have influenced the performance or presentation of the work described in this article.

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