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Analysis of Symptoms of Sick Building Syndrome for Nurses

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Abstract: Sick Building syndrome is a symptom that is felt by someone who carries out activities in the building caused by poor indoor air quality conditions that can cause several symptoms of health problems. The purpose of this study was to analyze complaints of sick building syndrome among nurses in hospital inpatient rooms. This research method uses quantitative methods with analytic survey types. The design used was a cross-sectional study with a total sample of 120 people. Data analysis used the chi-square test. The results of this study showed that as many as 40% of nurses experienced symptoms of sick-building syndrome with the most common complaints being sneezing, runny nose/flu, dry skin, dry lips, and feeling tired. And the factors associated with the symptoms of sick building syndrome in nurses are temperature, humidity, lighting, occupancy density, air circulation, years of service, and age. So hospital management needs to periodically check the physical environment in hospital inpatient rooms.

Keywords: Nurse; Sick building syndrome; Symptoms

Introduction

Sick Building Syndrome (SBS) is a collection of symptoms felt by a person when carrying out activities in the building. These symptoms can cause occupants of the room to experience health problems such as headaches, eye, and nose pain, throat irritation, dry cough, dry or itchy skin, dizziness and nausea, difficulty concentrating, as well as fatigue, and reduced sensitivity to odors. This condition is caused by poor indoor air quality, but these symptoms will disappear when someone leaves the building (Smajlović et al., 2019).

The Occupational Safety and Health Administration (OSHA) explains that indoor air quality is disturbed due to inadequate ventilation (52%), sources of contamination indoors (16%) and outdoors (10%), presence of microbes (5%), contaminated materials from building materials (4%), and others (13%) (Michaels et al., 2020). This situation can be exacerbated if the building uses an Air Conditioner (AC) that is not maintained (Asri et al., 2019). According to the Environmental Protection Agency of America (EPA), buildings that use air conditioning can grow Legionella pathogenic bacteria which can cause Legionellosis disease and SBS (Adiningsih et al, 2021).

SBS is related to the appearance of irritation to the skin and mucous membranes and other symptoms including headaches, fatigue, and difficulty concentrating that are complained of by workers in the building (Wismana, 2016). SBS is caused by many factors including chemical factors such as CO, CO^2, formaldehyde, asbestos, and dust, then physical factors related to temperature, humidity, airflow velocity, and lighting, while biological factors are influenced by bacteria and fungi, as well as individual characteristic factors such as age, gender, smoking, length of work and psychosocial factors (Sarkin Gobir et al., 2017).

According to WHO (2009), as many as 20% of the population in the United States and 20% of the population in the western part of the world are places where SBS occurs. A study in nine malls in Seoul, South Korea noted the prevalence of symptoms of SBS 65.6% experienced respiratory problems, 62.4% eye irritation, and 43.6% skin irritation (Kim et al., 2019).

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Based on the results of the initial preliminary study by conducting interviews with nurses, several health complaints were found from nurses in the inpatient room at the hospital. It is necessary to conduct further investigations related to the symptoms felt by nurses. Based on these problems, the purpose of this study was to analyze complaints of SBS among nurses in hospital inpatient rooms.

Method

This study uses a quantitative method with the type of analytic survey. The design used was a cross-sectional study because in this study the independent and dependent variables were observed at the same time (period). The dependent variable in this study was SBS symptoms in nurses in hospital inpatient rooms. The independent variables in this study are the physical environment such as temperature, humidity, lighting, and air circulation as well as individual characteristics such as years of service and age. The population in this study amounted to 120 people. This study used a total sampling method so the sample used was 120 people. Measuring tools used are questionnaires, thermometers, hygrometers, and lux meters. Data analysis was performed using a statistical data processing software program. In this study, for bivariate analysis using the Chi-Square.

Result and Discussion

Research analysis of symptoms of sick building syndrome for nurses in hospital inpatient rooms has been successfully carried out.

Symptoms of Sick Building Syndrome

Distribution of Respondents Based on Symptoms of SBS among nurses in hospital inpatient rooms (Table 1).

Table 1. Distribution of Respondents

Symptoms of Sick Building Syndrome	N	Percentage (%)
Yes	48	40
No	72	60

Based on the results of the study in Table 1, shows that 40% (n=48) experienced symptoms of SBS and 60% (n=72) experienced no symptoms of SBS. The results of this study are in line with the research of (Azhar Ulfa et al., 2022) and (Ridwan et al., 2018.) that the incidence symptoms of SBS experienced is below 50% of the symptoms felt. However, there is a difference between the results of research by Asri et al. (2019) that the incidence of SBS is more than 50%. According to Suma'mur (2013) that SBS events occur due to poor design, operation, and maintenance of buildings so they pay less attention to comfort in buildings such as temperature, humidity, airflow, and lighting which can cause symptoms of SBS (Table 2).

Table 2. Distribution of Respondents Experiencing Symptoms of SBS (n=48)

SBS	Often n (%)	Sometimes n (%)
Red Eye	5 (10.40)	43 (89.60)
Watery eyes	6 (12.50)	42 (87.50)
Itchy eyes	3 (6.30)	45 (93.80)
Eyes feel hot	2 (4.20)	46 (95.80)
Itchy nose	9 (18.80)	39 (81.30)
Dry nose	7 (14.60)	41 (85.40)
Sneeze	33 (68.80)	15 (31.30)
Dry in the throat	8 (16.70)	40 (83.30)
Hoarse in the throat	6 (12.50)	42 (87.50)
Itching in the throat	8 (16.70)	40 (83.30)
Dry skin	26 (54.20)	22 (45.80)
Itchy skin	3 (6.30)	45 (93.80)
Red skin	2 (4.20)	46 (95.80)
Dryness on the lips	23 (47.90)	25 (52.10)
Headache	11 (22.90)	37 (77.10)
Difficulty concentrating	1 (2.10)	47 (97.90)
Feeling tired	13 (27.10)	35 (72.90)
Coughing	11 (22.90)	37 (77.10)
Cold or Flu	32 (66.70)	16 (33.30)
Ear pain	1 (2.10)	47 (97.90)
Breathing difficulties	2 (4.20)	46 (95.80)
Nausea and dizziness	4 (8.30)	44 (91.70)

Based on Table 2, 40% of symptoms of SBS were experienced by nurses, so there were several health complaints felt by nurses. The five complaints most often felt by nurses were 68.8% of nurses experiencing sneezing, 66.7% of nurses experiencing colds/flu, 54.2% of nurses experiencing dry skin, 47.9% of nurses experiencing dry lips, and 27. 1% of nurses experience fatigue. The presence of symptoms felt by nurses can be caused by several things, namely the amount of work done, a lot of workload, and working in an air-conditioned room can also affect the occurrence of symptoms of SBS (Simatupang et al., 2020). There is a lot of monotonous work done by nurses and there are no stretching sessions while doing work, causing drowsiness and fatigue (Asri et al., 2019). This is also in line with Ridwan et al. (2018) that the most commonly felt symptoms of SBS are headaches and fatigue caused by a lot of work pressure. In addition, there are also symptoms of SBS that are felt such as eye irritation, dry skin, headaches, coughs, and runny nose.

Physical Environment and Individual Characteristics

Distribution of respondents based on measurements of the physical environment and the characteristics of nurses in hospital inpatient rooms (Table 3).

Table 3. Distribution of Respondents

Variable	Frequency (n=120)	Percentage (%)
Temperature		
Unsuitable	89	74.20
Corresponding	31	25.80
Humidity		
Unsuitable	86	71.70
Corresponding	34	28.30
Lighting		
Unsuitable	29	24.20
Corresponding	91	75.80
Air Circulation		
Unsuitable	68	56.70
Corresponding	52	43.30
Working Time		
≥ 5 years	71	59.20
< 5 years	49	40.80
Age		
≥ 30 years	64	53.30
< 30 years	56	46.70

Based on Table 3, that from physical environmental measurements consisting of 74.2% inappropriate temperature and 25.8% appropriate temperature, 71.7% inappropriate humidity and 28.3% appropriate humidity, 75 appropriate lighting 8% and inappropriate lighting 24.2%, unsuitable air circulation 56.7% and appropriate air circulation 43.3%, service period ≥ 5 years 59.2% and service period < 5 years 40 .8%, age ≥ 30 years was 53.3% and age < 30 years was 46.7%.

Factors Associated with SBS Syndrome

There are several factors related to SBS, such as temperature, humidity, light, air circulation, working time, and age (Table 4). Based on table 4 above, a statistically significant relationship was obtained regarding the factors associated with the symptoms of SBS in nurses in hospital inpatient rooms as follows: Temperature has a significant relationship to the symptoms of SBS with p-value = 0.002 (POR 5.029 CI 95% = 1.623 - 15.584). This means that the temperature that is not suitable has a risk of 5 times causing Sick Building Syndrome symptoms compared to the appropriate temperature.

This is in line with Ridwan's research (2018) that temperature is related to Sick Building Syndrome. The results of this study found that the inappropriate temperature was 74.2%. The temperature meets the standard of 18-28^{0}C, and the comfortable temperature for working in the room is 24-26^{0}C (Suma'mur, 2013). The results of observations of temperature measurements in this study exceeded the quality standard values. This condition is a parameter of the physical environment that can affect the symptoms of sick building syndrome caused by poor temperature conditions in the room. High temperatures can interfere with the conditions of workers and patients who are hospitalized, causing anxiety and discomfort (Rahayu et al., 2019). In addition, hot temperatures in the room can reduce work concentration and interfere with work capacity it can inhibit one's nerves and motor skills. The removal of air contaminants and the control of room temperature control in the range of 68-76^{0}F and humidity control in the range of 20-60% (Mannan et al., 2021).

Table 4. Factors Associated with SBS in Nurses in Hospital Inpatient Rooms

Variable	Symptoms of Sick Building syndrome			
	Yes	No	P value	POR (95% CI)
Temperature				
- Unsuitable	38 (42.70%)	51 (57.30%)	0.002	5.029
- Corresponding	4 (12.90%)	27 (87.10%)		(1.623-15.584)
Humidity				
- Unsuitable	40 (46.50%)	46 (53.50%)	0.001	13.913
- Corresponding	2 (5.90%)	32 (94.10%)		(3.135-61.738)
Lighting				
- Unsuitable	26 (89.70%)	3 (10.30%)	0.001	40.000
- Corresponding	16 (17.60%)	75 (82.40%)		(10.947-150.761)
Air Circulation				
- Unsuitable	40 (58.80%)	28 (41.20%)	0.001	35.714
- Corresponding	2 (3.80%)	50 (96.20%)		(8.020-159.036)
Working Time				
- ≥ 5 years	37 (52.10%)	34 (47.90%)	0.001	9.576
- < 5 years	5 (10.20%)	44 (89.80%)		(3.400-26.974)
Age				
- ≥ 30 years	39 (60.90%)	25 (39.10%)	0.001	27.560
- < 30 years	3 (5.40%)	53 (94.60%)		(7.763-97.837)

Humidity has a significant relationship to the symptoms of Sick Building Syndrome with a p-value = 0.001 (POR 13.913 95% CI 3.135-61.738). This means that unsuitable humidity has 13 times the risk of causing Sick Building Syndrome symptoms compared to suitable humidity. This is in line with Rahayu et al. (2019) and Murniati (2018) that humidity is related to the symptoms of Sick Building Syndrome. The results of the study obtained that the humidity was not suitable at 71.7%. Relatively high humidity in the air can hurt health, especially the symptoms of sick-building syndrome. Moisture allows indoor mold to reproduce on building materials and surfaces. People in the building can be exposed to microbes that can worsen the health condition of someone in the room (NIOSH, 2018). Temperature and humidity, which are thee the external

factors of thermal comfort, can have drastic effects on health (Alonso et al., 2021).

Lighting has a significant relationship to the symptoms of SBS with a p-value = 0.001 (POR 40,000 CI 95% 10,947-150,761). This means that inappropriate lighting has 40 times the risk of causing SBS symptoms compared to appropriate lighting. This is in line with Asri's research (2019) that there is a relationship between lighting and the symptoms of SBS. The results of the study obtained inappropriate lighting as much as 24.2%. Lighting that is too bright can cause symptoms of headaches and reduce concentration when doing work so the eyes become easily tired and can interfere with work comfort (Ratodi et al., 2017). Other researchers are also in line, with that poor lighting, especially during the day, can be a factor causing SBS symptoms. If this continues to happen, it will interfere with employees doing their jobs and danger the health of these employees (Afolabi et al., 2020).

Air circulation has a significant relationship to the symptoms of Sick Building Syndrome with p-value = 0.001 (POR 35.714 CI 95% = 8.020–159.036). This means that poor air circulation has 35 times the risk of causing Sick Building Syndrome symptoms compared to good air circulation. This is in line with research Karlina et al., (2021) and Adiningsih et al., (2021) which states that airflow has a significant relationship with complaints of sick building syndrome. Ventilation is intended to remove or dilute pollutants and to control the thermal environment and humidity in buildings (WHO, 2009). Ventilation can be provided by various natural and mechanical methods. These usually improve health but may also have adverse effects (Wang et al., 2022).

Working time has a significant relationship to the symptoms of Sick Building Syndrome with p-value = 0.001 (POR 9.576 CI 95% = 3.400-26.974). This means that a working period≥ 5 years has a risk of 9 times causing symptoms of SBS compared to a working period < 5 years. The results of this study are more workers whose working period is ≥ 5 years. The longer a person's working period, the greater the possibility of being exposed to pollutants in the room so many health problems are experienced. The long working period affects the level of exposure of respondents to pollution in the room with inadequate room conditions which can cause symptoms of SBS (Belachew et al., 2018). Chronic health problems can occur due to exposure to dust over a long period with high levels that cannot be determined in a short time. The length of a person's working period determines the amount of exposure to toxic substances from an unhealthy work environment both in terms of physical, chemical, and biological terms so that a person's stamina decreases and he is more susceptible to SBS (Suma'mur, 2013).

Age has a significant relationship to the symptoms of SBS with pa -value = 0.001 (POR 27.560 CI 95% = 7.763-97.837). This means that those aged ≥ 30 years have 27 times the risk of causing symptoms of SBS compared to those aged < 30 years. This is in line with research Nopiyanti et al. (2019) age is also one that can cause symptoms of sick-building syndrome. Age can affect a person's immune system, the older the age, the lower the stamina of the body. Age is very influential on the level of risk of occurrence of a work-related disease including the incidence of SBS. The results of Mawarni et al. (2021) show that the amount of work that takes longer time indoors is not only for older workers but for young workers who are also prone to experiencing sick building syndrome symptoms.

Conclusion

This study concludes that on average nurse experience symptoms of sick-building syndrome with the most common complaints being sneezing, runny nose/flu, dry skin, dry lips, and feeling tired. And the factors associated with the symptoms of sick building syndrome in nurses are temperature, humidity, lighting, occupancy density, air circulation, years of service, and age. So that hospital management needs to periodically check the physical environment in hospital inpatient rooms.

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