SRIWIJAYA JOURNAL OF MEDICINE

Survey of the Relationship between Indoor Physical Air Quality (PM_1, $PM_{2.5}$, PM_{10}) and Symptoms of Sick Building Syndrome in Employees at the Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang 2024

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Abstract

Sick Building Syndrome (SBS) is a collection of symptoms that workers in office buildings experience that are related to the air quality and amount of time they spend there. One of the dangerous indoor air pollutants is particulate matter (PM). This study aims to determine the relationship between physical air quality (PM_1, $PM_{2.5}$, PM_{10}) in the room and symptoms of Sick Building Syndrome. This study is an observational analytic study with a cross-sectional design. This study used primary data in the form of measurement of physical air quality indicators and distribution of questionnaires regarding SBS at Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang. This study is only a survey. The research sample consisted of 74 respondents who satisfied the inclusion and exclusion criteria. The results of the univariate analysis showed that 48.6% of respondents experienced SBS and 51.4% did not experience SBS. 20.3% of respondents in this study were ≥45 years old, 93.2% of respondents were female, and 75.7% of respondents had worked for >3 years. Two rooms in Alang-Alang Lebar Primary Health Care did not meet the applicable particulate matter standards, namely the registration room (PM_1 50 $\mu g/m^3$, $PM_{2.5}$ 80 $\mu g/m^3$, and PM_{10} 108 $\mu g/m^3$) and the elderly general clinic (PM_1 33 $\mu g/m^3$ and $PM_{2.5}$ 49 $\mu g/m^3$). The highest prevalence of SBS symptoms were red, itchy, dry, or watery eyes (75%) and dizziness or headache (71.4%). Age (p = 0.907), gender (p = 0.358), tenure (p = 0.077), PM_1 (p = 0.873), $PM_{2.5}$ (p = 0, 873), and PM_{10} (p = 0.431) had no significant link with the symptoms of Sick Building Syndrome at Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang 2024.

Keywords: Sick building syndrome, building-related illnesses, physical air quality, PM_1, $PM_{2.5}$, PM_{10}, health facilities

1. Introduction

Indoor environmental elements significantly affect human health because most people spend 90% of their time indoors, especially at home or at work. According to estimates from the World Health Organization (WHO), indoor air pollution (IAP) is responsible for 3.8 million fatalities each year. Reduced indoor air quality can lead to illnesses associated with buildings, which can have a detrimental effect on human health. Sick Building Syndrome (SBS) is one of the health problems that can result from poor indoor air quality.[1,2]

Sick Building Syndrome (SBS) is a collection of symptoms that workers in office buildings experience that are related to the air quality and amount of time they spend there. There are several factors including chemical, physical, and biological factors, which can cause Sick Building Syndrome (SBS). Headache, dizziness, nausea, red eyes, itchy nose, sneezing, runny nose, nasal congestion, dry and scratchy throat, cough, shortness of breath, dry skin, itchy skin, and drowsiness are some of the symptoms of SBS. A person is considered to be suffering from SBS if they have at least two or more SBS symptoms simultaneously while indoors and the symptoms gradually disappear upon leaving the building or room.[3]

Numerous indoor air contaminants have been shown to negatively affect both human health and indoor air quality. Particulate matter is one of the most dangerous indoor air pollutants (PM). Particulate Matter (PM) or particulate dust is several solid or liquid particles of very small size that are suspended in the atmospheric aerosol system and contribute as air pollutants. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2023 concerning Environmental Health, it is stated that the required $PM_{2,5}$ particulate matter level is 25 µg/m^3 in 24 hours, and the required PM_{10} level is ≤70 µg/m^3 in 24 hours. Mortality due to cardiovascular disorders and respiratory disorders may increase by 0.36% and 0.42% respectively for every 10 µg/m^3 increase in indoor PM_{10}. A 10 µg/m^3 increase in $PM_{2,5}$ will also increase deaths from cardiovascular and respiratory disorders by 0.63% and 0.75%, respectively. Exposure to PM_1 is more harmful than $PM_{2.5}$ because the diameter of PM_1 is smaller than $PM_{2.5}$, but no threshold value has been set in Indonesia for PM_1 concentrations. Respiratory conditions such as asthma, wheezing, bronchitis, and lower respiratory tract infections are linked to exposure to inhaled particles (PM_{10}, PM2.5, and PM1).[2,4–7]

With this background, the researcher is interested in conducting a study with the title Survey of the Relationship between Indoor Physical Air Quality (PM_1, $PM_{2.5}$, PM_{10}) and Symptoms of Sick Building Syndrome in Employees at the Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang 2024.

2. Methods

The research conducted was an observational analytic study with a cross-sectional design. This study used primary data in the form of measuring physical air quality indicators and distributing questionnaires regarding SBS adopted from the U.S. Environmental Protection Agency with adjustments to the research to be conducted. Researchers conducted air sampling for 15 minutes in each room studied and this research was only a survey. This research was conducted from March to April 2024 in Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang. The study's samples were workers who satisfied the inclusion and exclusion criteria at Plaju and Alang-Alang Lebar Primary Health Care Palembang. Sampling using total sampling technique. The data collecting results were analyzed using the Statistical Package for Social Science (SPSS) 26.0 application. The analysis was both univariate and bivariate. In bivariate analysis, the chi-square test or Fisher's exact test is employed as an alternative.

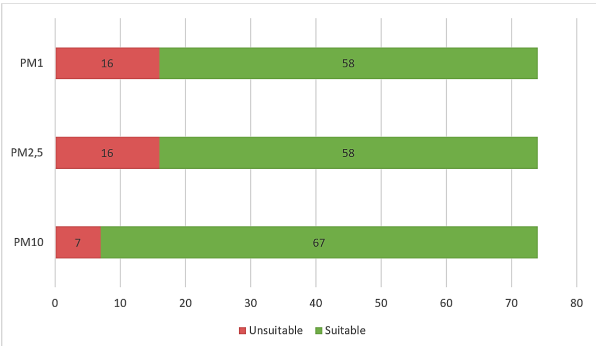
3. Results

The sample size for this study was 74 respondents. The research sample at Plaju Primary Health Care consisted of 7 respondents from the registration room, 10 respondents from the elderly general clinic, 4 respondents from the pediatric clinic, 6 respondents from the maternal and child health/family planning (MCH/FP) clinic, 3 respondents from the ARI clinic, and 6 respondents from the administration room. While at Alang-Alang Lebar Primary Health Care consisted of 7 respondents from the registration room, 9 respondents from the elderly general clinic, 4 respondents from the pediatric clinic, 6 respondents from the MCH/FP clinic, 3 respondents from the ARI clinic, and 9 respondents from the administration room. This study was conducted in 6 rooms at each health center, namely the registration room, elderly general clinic, pediatric clinic, MCH/FP clinic, ARI clinic, and administration room.

The results showed that out of a total of 74 respondents, 36 respondents (48.6%) experienced SBS and 38 respondents (51.4%) did not experience SBS. Consisting of 15 respondents with SBS at Plaju Primary Health Care and 21 respondents with SBS at Alang-Alang Lebar Primary Health Care Palembang.

A total of 15 respondents (20.3%) in this study were ≥45 years old and 59 respondents (79.7%) were <45 years old. Most of the respondents, 69 respondents (93.2%) were female and 5 respondents (6.8%) were male. A total of 56 respondents (75.7%) had worked for >3 years, while 18 respondents (24.3%) had only worked for ≤3 years.

Chart 1. Frequency Distribution of Respondents Based on Particulate Matter in Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang

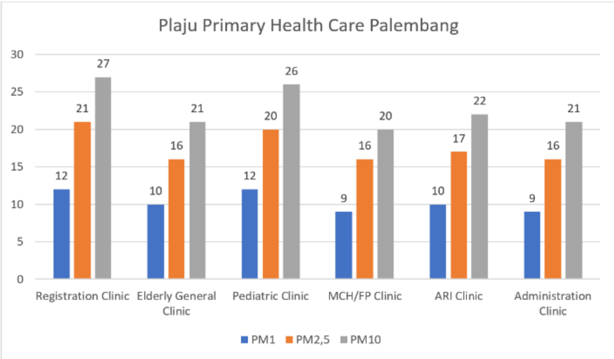


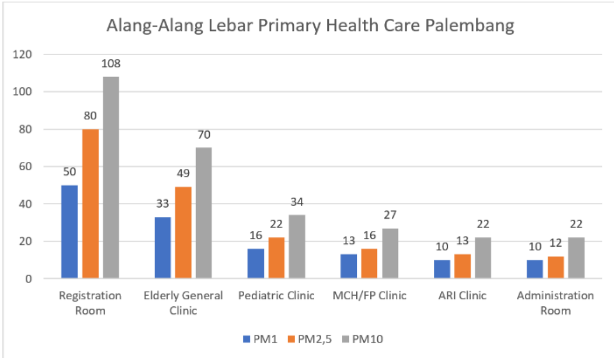
Based on chart 1, it can be concluded that there are 16 respondents (21.6%) who are in a room with unsuitable PM_1 (>25µg/m^3), while 58 respondents (78.4%) are in a room with suitable PM_1 (≤25µg/m^3). There were 16 respondents (21.6%) who were in rooms with unsuitable $PM_{2.5}$ (>25µg/m^3), while the other 58 respondents (78.4%) were in rooms with suitable $PM_{2.5}$ (≤25µg/m^3). There were 7 respondents (9.5%) who were in rooms with unsuitable PM_{10} (>70 µg/m^3), and the remaining 67 respondents (90.5%) were in rooms with suitable PM_{10} (≤70 µg/m^3).

Chart 2 illustrates the physical air quality at Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang. At Plaju Primary Health Care Palembang in the registration room, PM_1 levels were found to be 12 µg/m^3, $PM_{2.5}$ 21 µg/m^3, and PM_{10} 27 µg/m^3. In the elderly general clinic, PM_1 levels were found to be 10 µg/m^3, $PM_{2.5}$ 16 µg/m^3, and PM_{10} 21 µg/m^3. At the pediatric clinic, PM_1 levels were found to be 12 µg/m^3, $PM_{2.5}$ 20 µg/m^3, and PM_{10} 26 µg/m^3. At the MCH/FP clinic, PM_1 levels were 9 µg/m^3, $PM_{2.5}$ 16 µg/m^3, and PM_{10} 20 µg/m^3. At the ARI clinic, PM_1 levels of 10 µg/m^3, $PM_{2.5}$ 17 µg/m^3, and PM_{10} 22 µg/m^3 were obtained. In the administration room, PM_1 levels of 9 µg/m^3, $PM_{2.5}$ 16 µg/m^3, and PM_{10} 21 µg/m^3 were obtained. Based on these results, it can be concluded that all rooms studied at Plaju Primary Health Care Palembang have met the applicable particulate matter (PM_1, $PM_{2.5}$, and PM_{10}) standards.

At the Alang-Alang Lebar Palembang Health Center in the registration room, PM_1 levels of 50 µg/m^3, $PM_{2.5}$ 80 µg/m^3, and PM_{10} 108 µg/m^3 were obtained. In the elderly general clinic, PM_1 levels were found to be 33 µg/m^3, $PM_{2.5}$ 49 µg/m^3, and PM_{10} 70 µg/m^3. At the pediatric clinic, PM_1 levels were found to be 16 µg/m^3, $PM_{2.5}$ 22 µg/m^3, and PM_{10} 34 µg/m^3. At the MCH/FP clinic, PM_1 levels of 13 µg/m^3, $PM_{2.5}$ 16 µg/m^3, and PM_{10} 27 µg/m^3 were obtained. At the ARI clinic, PM_1 levels of 10 µg/m^3, $PM_{2.5}$ 13 µg/m^3, and PM_{10} 22 µg/m^3 were obtained. In the administration room, PM_1 levels of 10 µg/m^3, $PM_{2.5}$ 12 µg/m^3, and PM_{10} 22 µg/m^3 were obtained. Based on these findings, the registration rooms of PM_1, $PM_{2.5}$, and PM_{10} levels do not meet the appropriate particulate matter requirements. In the elderly general clinic, PM_1 and $PM_{2.5}$ levels also do not meet the applicable particulate matter standards.

Chart 2. Overview of Physical Air Quality (PM_1, $PM_{2.5}$, PM_{10}) by Room in Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang





The highest prevalence of SBS symptoms (chart 3) in the registration room of Plaju Primary Health Care Palembang was dizziness or headache (71.4%), followed by fatigue (57.1%). In the general clinic for the elderly, the most common symptoms were dizziness or headache (30%), followed by flu or sneezing, fatigue, and skin symptoms of dryness, itching, redness, or irritation (20%). In the pediatric clinic, the most common symptoms were red, itchy, dry, or watery eyes (75%), followed by dizziness or headache (50%). In the MCH/FP clinic, the most common symptoms included red, itchy, dry, or watery eyes and dizziness or headache (33.3%), followed by symptoms of fatigue, difficulty concentrating, and shortness of breath (16.6%). In the ARI clinic, the most common symptoms were dizziness or headache (66.6%), followed by symptoms of sore, dry throat, laryngitis, cough, drowsiness, and symptoms of dry, itchy, reddish or irritated skin (33.3%). In the administration room, the most common symptoms include runny nose, congestion, fatigue, dizziness or headache, and shortness of breath (16.6%).

The highest prevalence of SBS symptoms (chart 4) in the registration room of Alang-Alang Lebar Primary Health Care Palembang was the symptom of easy fatigue (28.5%), followed by symptoms of red, itchy, dry, or watery eyes and dizziness or headache (14.2%). In the general clinic for the elderly, the most common symptoms were dizziness or headache (55.5%), followed by symptoms of red, itchy, dry or watery eyes, fatigue, and drowsiness (22.2%). In the pediatric clinic, the most common symptoms were red, itchy, dry, or watery eyes (50%), followed by cold or sneezing, fatigue, difficulty concentrating, and dizziness or headache (25%). In the MCH/FP clinic, the most common symptoms included red, itchy, dry, or watery eyes, fatigue, and difficulty concentrating (33.3%), followed by symptoms of drowsiness and dizziness or headache (16.6%). In the ARI clinic, the most common symptoms include sore throat, dryness, sore throat, fatigue, drowsiness, difficulty concentrating, and dizziness or headache (33.3%). In the administration room, the most common symptoms included dizziness or headache (55.5%), followed by symptoms of red, itchy, dry, or watery eyes (44.4%).

Chart 3. Prevalence of SBS Symptoms by Room at Plaju Primary Health Care Palembang

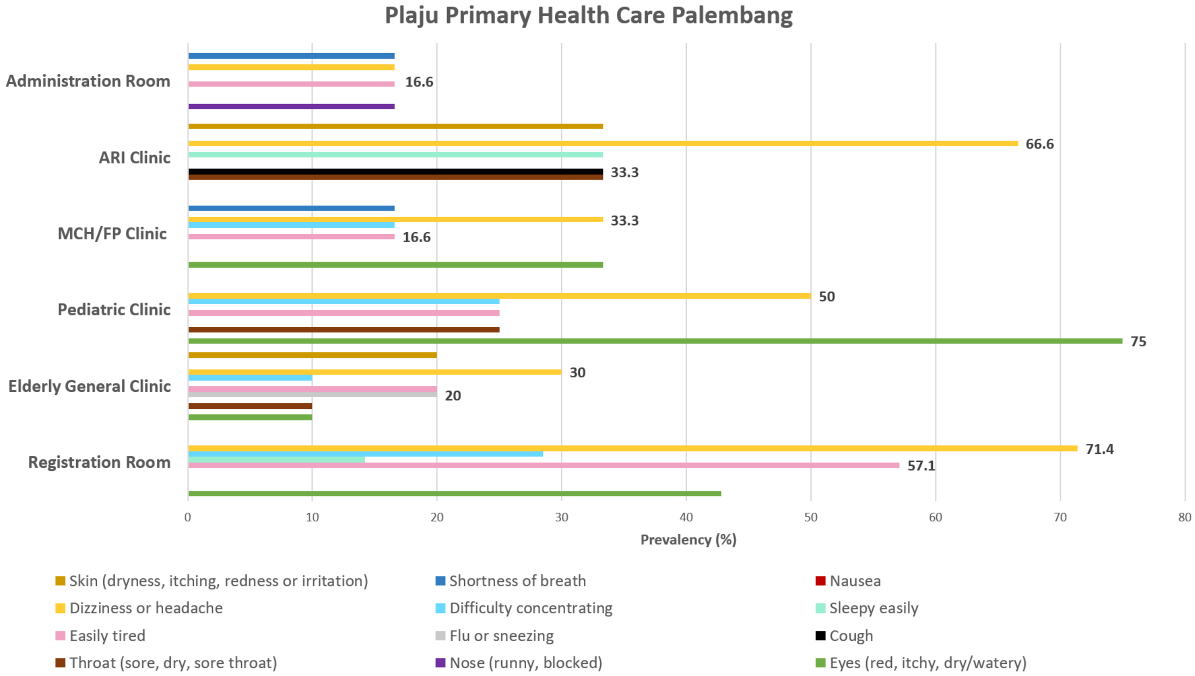


Chart 4. Prevalence of SBS Symptoms by Room at Alang-Alang Lebar Primary Health Care Palembang

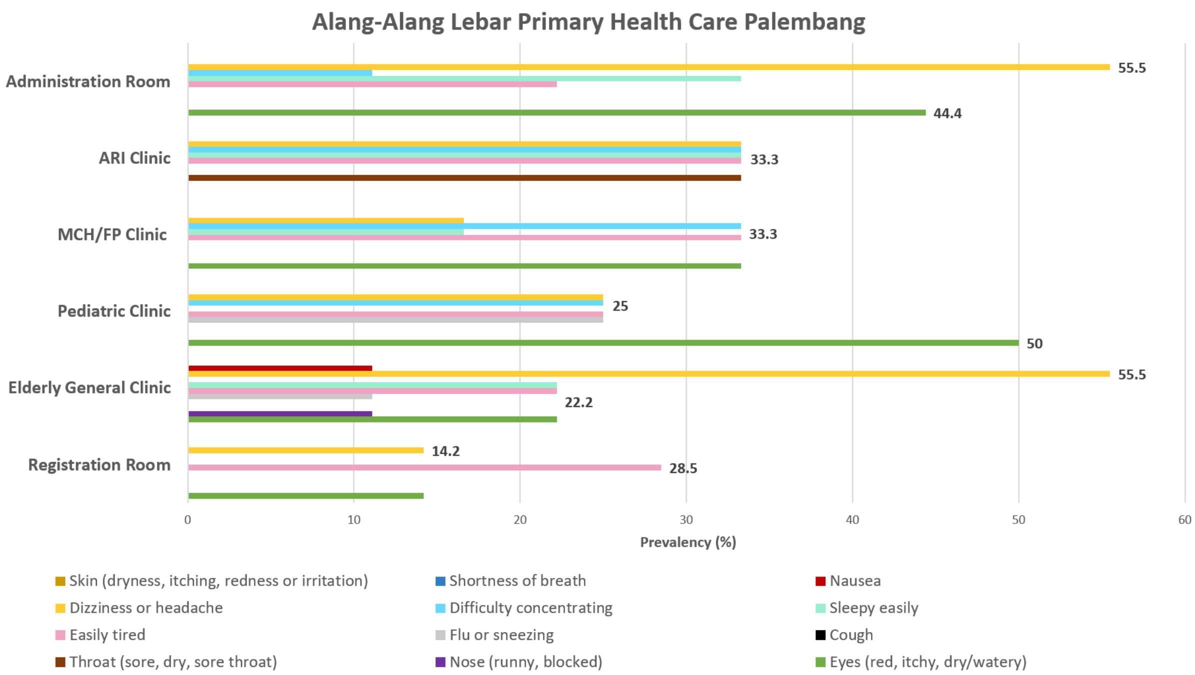


Table 1. Relationship between Respondents' Characteristics and Particulate Matter Level to SBS Symptoms in Plaju and Alang-Alang Lebar Primary Health Care Palembang

Variables		SBS				*p-value*	PR	95% CI
		Yes		No				
		n	%	n	%			
Age	≥45 years	8	53,3	7	46,7	0,907*	1,265	0,406–3,940
	<45 years	28	47,5	31	52,5			
Gender	Female	35	50,7	34	49,3	0,358**	4,118	0,438–38,739
	Male	1	20,0	4	80,0			
Tenure	>3 years	31	55,4	25	44,6	0,077*	3,224	1,013–10,266
	≤3 years	5	27,8	13	72,2			
PM_1	Non-Conforming (>25 μg/m^3)	7	43,8	9	56,3	0,873*	0,778	0,255–2,369
	Conform (≤25 μg/m^3)	29	50,0	29	50,0			
$PM_{2,5}$	Non-Conforming (>25 μg/m^3)	7	43,8	9	56,3	0, 873*	0,778	0,255–2,369
	Conform (≤25 μg/m^3)	29	50,0	29	50,0			
PM_{10}	Non-Conforming (>70 μg/m^3)	2	28,6	5	71,4	0, 431**	0,388	0,070–2,143
	Conform (≤70 μg/m^3)	34	50,7	33	49,3			

*Chi-Square test; **Fisher's Exact test

Table 1 presents the analysis results, which lead to the conclusion that age (p = 0.907), gender (p = 0.358), tenure (p = 0.077), PM_1 (p = 0.873), $PM_{2.5}$ (p = 0, 873), and PM_{10} (p = 0.431) had no significant link with the symptoms of Sick Building Syndrome in Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang 2024.

4. Discussion

Particulate Matter (PM) or particulate dust is several very small solid or liquid particles that are suspended in the atmospheric aerosol system and contribute to air pollution. PM is composed of inorganic ions (SO_4^{2-}, NO^{3-}, Na^+, NH^{4+}, K^+), transition metals (V, Cr, Ni, Cu, Zn), Pb, elements (Si, Al, Ca, Fe, Ti), and volatile organic molecules. The composition of PM varies by location.[2,8,9]

PM is divided into three categories: coarse PM (PM_{10}, PM with aerodynamic diameter ≤10 μm), fine PM ($PM_{2.5}$, PM with aerodynamic diameter ≤2.5 μm), and ultra-fine PM (PM_1, PM with aerodynamic diameter ≤ 1 μm). Indoor PM sources include (i) particles that migrate from the outside environment, and (ii) particles produced by indoor activities.[2,4,10]

Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2023 concerning Environmental Health states that indoor particulate levels in health care facilities include $PM_{2.5}$ which interprets the standard against fine particles or fine particulates required is 25 μg/m^3 in 24 hours, and PM_{10} levels which interprets the standard against coarse particles or coarse particles required is 150 μg/m^3 in 8 hours or ≤70 μg/m^3 in 24 hours. The Environmental Protection Agency (EPA) set a quality standard for $PM_{2.5}$ in 2006, with an annual average of 15 μg/m^3 and a 24-hour average of 35 μg/m^3. Meanwhile, the quality standard for $PM_{2.5}$ has been set by the World Health Organization (WHO) at an annual average of 10 μg/m^3 and a 24-hour average of 25 μg/m^3. ACGIH states that airborne concentrations should be less than 3 mg/m^3 for respirable particles and 10 mg/m^3 for inhalable particles and that particles that are physiologically inert, insoluble, or poorly soluble may have adverse effects.[5,11,12]

Indoor PM is made up of particles from the outdoors that drift indoors as well as particles from indoor activity. The main indoor PM sources are from specific activities, building design, and secondary organic aerosols. Due to air exchange, indoor PM also comes from outdoor sources, including natural sources (forest fires, dust, presence of pets, plant debris) and anthropogenic sources (gasoline emissions from transportation, oil burning). Dust can be produced by human habits like opening windows frequently and doing things indoors. Human walking can cause resuspension of indoor PM. As long as humans move and the soles of their feet are exposed to the air, It may result in a significant particulate matter resuspension, especially for PM_{10}. In addition to indoor sources, outdoor PM can migrate indoors through air movement. Osmosis, natural ventilation, and mechanical ventilation work together to create airflow, which allows particles from the outside to enter the interior space.[13]

Particle size, mass, concentration, and chemical or biological composition are all aspects of PM dispersion. The main element affecting PM's distribution is its mass. Low-density tiny particles can stay in the air for a long time and migrate readily from the source to the surroundings, lowering the quality of the air both indoor and outdoor. A number of variables, including geographic location, air exchange efficiency, penetration and deposition rates, occupancy rate, and particle presence, affect indoor PM levels. PM_{10} and $PM_{2.5}$ loads can vary from 3 to 202 $\mu g/m^3$ and 15 to 259 $\mu g/m^3$, respectively.[13]

The effects of PM exposure on people are especially pronounced in urban contexts, where higher population density results in more hazardous and frequent exposure to pollutants. Emissions in densely populated metropolitan areas are caused by fossil-fueled transportation, stoves, and space heating. $PM_{2.5}$ levels from the outdoors are significantly higher in rooms with insufficient air conditioning or mechanical ventilation. Temperature, humidity, and air ventilation are all essential factors in determining indoor PM levels. Indoor PM levels and the production of secondary aerosols are influenced by weather, wind speed, temperature, humidity, and sun radiation.[13]

Pneumonia, respiratory system disorders, eye irritation, allergies and chronic bronchitis can result from exposure to $PM_{2.5}$ and PM_{10}. Pulmonary emphysema, bronchial asthma, lung cancer, and cardiovascular disorders can be caused by $PM_{2.5}$ entering the lungs. Short-term increases in particulate matter concentrations can cause arrhythmias, aggravate heart failure, stimulate acute atherosclerosis, and cardiovascular damage such as ischemic heart disease. Temporary elevations in PM concentrations can raise the risk of ischemic stroke, myocardial ischemia, and coronary artery disease, as well as lower systolic and diastolic blood pressure. PM exposure may also increase the risk of deep vein thrombosis (DVT) and coagulation.[6,7,10,14,15]

The effectiveness of PM exposure is impacted by several local characteristics, including topography, weather, emission concentration, particle source, and surroundings. Smaller particles move faster and deeper into the respiratory tract. The human nose, cilia, and mucous filters may catch particulates larger than 10 µm in diameter. Coarser particles land in the trachea or bronchi, causing the body to sneeze and cough. Particles with a diameter of <10 µm are the most hazardous to human health due to their great penetration power into the alveoli. Particles having an aerodynamic diameter of 5-10 µm settle in tracheobronchial tubes, while those with an aerodynamic diameter of 1-5 µm settle in bronchioles and alveoli. Particles with a diameter of <1 µm can penetrate the alveoli and travel farther into cell tissues or the circulatory system.[8,9]

Metals included in PM cause airway damage via the Fenton reaction, a catalytic mechanism that turns hydrogen peroxide products of mitochondrial oxidative respiration into highly hazardous hydroxyl free radicals. Metals from PM, particularly iron, cause an increase in free radicals in cells. Free radicals damage cells and tissues, exacerbating inflammatory responses. Prolonged exposure to air pollutants has been associated with decreased lung function in adults.[8,9]

There are several defense mechanisms in the human respiratory system to prevent harmful and foreign particles from entering the lungs. The respiratory tract from the nose to the bronchioles is lined with mucus that covers the entire surface. The mucus catches small particles that enter so that they do not reach the alveoli. Particles that have been caught are then expelled through the coughing mechanism by the body. Nasal cilia and mucous membranes will make efforts to protect against particles that will enter the respiratory tract by filtering mechanisms. Non-specific defense mechanisms such as coughing, sneezing, disruption of microciliary transport, and macrophage phagocytosis will occur when particles enter the respiratory tract. Irritation, excessive mucus secretion, and narrowing of the respiratory tract are symptoms of respiratory tract disorders.[15]

In this study, the highest prevalence of SBS symptoms were red, itchy, dry, or watery eyes (75%) and dizziness or headache (71.4%). Eye disorders caused by air pollution often cause discomfort such as red, dry, burning, and gritty eyes. Constant exposure to air pollution can alter cells, leading to conjunctival epithelial goblet cell hyperplasia. Hyperosmolarity and tear film instability are two interrelated mechanisms that cause tear film dysfunction. Tear hyperosmolarity, by generating a sequence of inflammatory processes in the ocular epithelium, can change the ocular surface and cause the release of inflammatory mediators in the tears. Epithelial damage leads to goblet cell loss, apoptosis-induced cell death, and reduced mucus production, all of which make the tear film fragile. The ocular surface hyperosmolarity becomes unstable as a result of this instability, causing various eye discomforts. Hyperosmolarity and tear film instability are two interrelated mechanisms that cause tear film dysfunction. By causing a sequence of inflammations in the ocular epithelium, tear hyperosmolarity can impact the ocular surface by causing the tears to release inflammatory mediators. Because of epithelial damage, which results in goblet cell loss, apoptosis, and a reduction in mucus production, the tear film becomes unstable. This instability causes numerous eye discomforts.[16,17]

Through the olfactory tract, lower respiratory tract, or systemic circulation, air pollution can reach the nervous system. A few of them have the potential to trigger inflammatory reactions and release cytokines into the central nervous system. Neuroinflammation and neuronal cell death are caused by microglial activation, which also increases the production of inflammatory cytokines, complement activation, oxidative stress from reactive oxygen species (ROS), and proteinase. Chemical irritation of the trigeminal sensory endings activates the trigeminovascular system, resulting in headaches. Neurogenic inflammation is the primary migraine pathophysiology theory. The release of substance P and calcitonin gene-related peptide (CGRP) from the terminals of trigeminal sensory nerves results in neurogenic inflammation and dural vasodilation. Migraine is distinguished by enhanced neural sensitivity to a variety of stimuli. PM can act as a trigger, activating the trigeminovascular system and causing migraines.[18]

A large amount of indoor furniture as well as inappropriate use of air conditioning and lack of ventilation can lead to high particulate levels in a room. Inadequate ventilation is a major cause of complaints about indoor air quality. Inadequate ventilation per person and increased indoor chemical pollution can trigger SBS. Lack of fresh air intake is also caused by air ventilation problems and lack of maintenance of the ventilation system. Poor indoor air quality due to infiltration of pollutants from outdoor air or from production within the indoor work environment can lead to significant exposure levels. Adequate ventilation is essential to reduce indoor PM concentrations. Regular cleaning and disinfection of air conditioning systems is also essential, as is better ventilation rate, fresh air volume (filter), and air distribution. Interior décor like houseplants help lower PM levels and enhance indoor air quality. HEPA air purifiers are also excellent at lowering indoor air particle concentrations (>99.97% for 0.3 m particles).[8,13,19–21]

The lack of a significant relationship between the characteristics of respondents and the particulate matter levels studied may occur because this study only assessed the physical quality of air without assessing other factors such as chemical and biological factors so other possible factors that also affect SBS were not studied and analyzed, besides that there could also be bias in filling out the questionnaire by respondents due to lack of understanding and monitoring at the time of filling out the questionnaire.

5. Conclusion

According to the study's findings, 48.6% of respondents experienced SBS, whereas 51.4% did not. Two rooms in Alang-Alang Lebar Primary Health Care did not meet the standard particulate levels that have been set, namely in the registration room (PM_1 50 µg/m^3, $PM_{2.5}$ 80 µg/m^3, and PM_{10} 108 µg/m^3) and the elderly general clinic (PM_1 33 µg/m^3 and $PM_{2.5}$ 49 µg/m^3). The highest prevalence of SBS symptoms were red, itchy, dry, or watery eyes (75%) and dizziness or headache (71.4%). Age (p = 0.907), gender (p = 0.358), tenure (p = 0.077), PM_1 (p = 0.873), $PM_{2.5}$ (p = 0, 873), and PM_{10} (p = 0.431) had no significant link with the symptoms of Sick Building Syndrome at Plaju Primary Health Care and Alang-Alang Lebar Primary Health Care Palembang 2024. Health care should be able to manage the prevalence of SBS symptoms in staff members and perform regular assessments of the physical, chemical, and biological quality of the air in each workspace. It is also anticipated that the health center will educate people about sick-building syndrome. Employees of health centers are advised to maintain workplace hygiene and take occasional breaks to stretch their bodies and rest their eyes if they are feeling worn out or uncomfortable.

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