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Air germ numbers in Bougenville's care room at H. Andi Sulthan Daeng Radja Bulukumba Hospital[☆]



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Received 2 October 2019; accepted 17 October 2019

KEYWORDS

Air germ numbers;
Temperature;
Humidity;
Lighting;
Care room

Abstract 4

Objective: This study aims to determine the relationship of physical quality of air (temperature, humidity, lighting) with the numbers of air germs in the Bougenville's care room.

Methods: Type of research is observational analytic with cross sectional research design. Population and sample in this study were Bougenville care rooms totaling 6 rooms. Data collected using measurements of humidity, lighting, temperature and air germ numbers. Data were analyzed using Pearson correlation test.

Results: There was no relationship between the physical quality of air with the number of air germs in the Bougenville's care room with *p*-value greater than 0.05.

Conclusion: Our result confirmed to always monitor parameters of the physical quality of air in room, air germ number and use of disinfectants that can kill air germ numbers and restrictions on visitors in order to minimize the spread of germs into air.

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Introduction

A healthy environment very influenced by quality appropriate air with standard health, and quality air said it experience pollution, if composition air change.¹ One of rooms that need to be noticed in pollution air that is hospital. Hospital as institution service medical who does not ever

[☆] Peer-review under responsibility of the scientific committee of the 1st International Conference on Nutrition and Public Health (ICNPH 2019). Full-text and the content of it is under responsibility of authors of the article.

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free from existence a number of microorganisms pathogen. When sanitation hospital not guaranteed, then more big risk occurrence threat infection nosocomial, impact caused by infection nosocomial among risk exposed infection that doesn't only patient but officer health and visitors.²

Mode of transmission microorganism infection nosocomial that is happen through droplet, airborne or contact directly.³ Baharutan found that the bacteria that most often caused nosocomial was *Staphylococcus* sp and *Pseudomonas* sp.⁴ Febriani, about analysis number germs air in room care class III house DKT illness of the City of Bengkulu, shows number of air germs in room care class III specifically man is 511 CFU/m³ and room 2 specifically women is 556 CFU/m³ not meet terms corresponding with Decree of the Minister of Health.⁵

H. Andi Sulthan Daeng Radja Hospital is Hospital type B belongs to District Government Bulukumba. One care room that needs attention in a different isolation room (Bougenville) that must be maintained according to standards set by the Decree of the Minister of Health concerning Hospital Environmental Health Requirements. This research is aiming for knowing the relationship between the physical quality of air with the number of air germs in the Bougenville's care room at H. Andi Sulthan Daeng Radja Bulukumba Hospital.

Method

Location and design research

This research in Bougenville's care room⁶ at H. Andi Sulthan Daeng Radja Bulukumba Hospital. The research is analytic observational with cross sectional study design.

Population and sample

Variables examined in research is temperature, humidity, lighting and air germ numbers. Population and sample inside research this is Bougenville's care room consists of 6 rooms. Technique taking sample in research pulled out in a manner fluke (accidental sampling) member population, that is way obtain sample based on coincidence.

Method data collection

Data obtained from measurement and observation directly in location The research consisted from quality measurement physical air in room (temperature, humidity, lighting) as well measurement the number of air germs. Instruments used in research this is thermohygrometer for Humidity, thermohygrometer for temperature, Luxmeter for lighting and Microbiology Air Sampler for the number of air germs. Measurement the number of air germs in ward do by officer expert Laboratory Hall Technique Environmental Health and Control Accredited class I Disease in Makassar. While measurements of physical quality of air were carried out by the researchers themselves.

Table 1 Temperature, humidity, lighting measurement results. ¹

| Ward | Temperature | Humidity | Lighting | Information |
|--------|-------------|----------|----------|-------------|
| Room 1 | 28 | 61 | 24 | TMS |
| Room 2 | 29 | 64 | 24 | TMS |
| Room 3 | 29 | 62 | 31 | TMS |
| Room 4 | 29 | 63 | 42 | TMS |
| Room 5 | 30 | 61 | 40 | TMS |
| Room 6 | 30 | 61 | 50 | TMS |

TMS*: not eligible.

Table 2 Air germ numbers results. ¹

| Ward | Air germ number (CFU/m ³) | Information |
|--------|---------------------------------------|-------------|
| Room 1 | 1316 | TMS |
| Room 2 | 1172 | TMS |
| Room 3 | 652 | TMS |
| Room 4 | 1224 | TMS |
| Room 5 | 940 | TMS |
| Room 6 | 864 | TMS |

TMS*: not eligible.

Data analysis

Analysis in this study consisted of univariate analysis is used to determine the distribution of temperature, humidity, lighting and air germ numbers, and Bivariate analysis used to find out there is correlation between two variables. Statistical test used is Pearson's correlation test.

Results

Measurement physical quality of air in the Bougenville's care room shows quite different results in each room. The lowest temperature care room is 28 °C and the highest is 30 °C, the lowest humidity is 61% and the highest is 64%, while the lowest lighting equal to 24 lx and the highest 50 lx. The results of these measurements not yet meet terms corresponding standard that has been set by Decree of the Minister of Health (Table 1).

Results of measurements of air germs in care room obtained a high number of air germs. The highest the number of air germs in care room is 1316 CFU/m³ and the lowest is 652 CFU/m³. Air germs in the Bougenville's care room have not meet terms corresponding standard that has been set by Decree of the Minister of Health (Table 2).

The results of the analysis on test Pearson correlation between temperature with the number of air germs to show that not there is a meaningful relationship, because obtained p-value (0.239) greater than 0.05. Coefficient correlation at -0.569 to show correlation negative meaning more and more high temperature then the lower the number of air germs. Humidity with number germs air to show that not there is a meaningful relationship, because obtained p-value 0.590. Even though lighting also with the number of air germs to show that not there is a meaningful relationship, because obtained p-value 0.485. Coefficient correlation at -0.359 to show correlation negative which means more

Table 3 Pearson correlation test between temperature, humidity, lighting and air germ numbers.

| Variable | Air germ numbers | | |
|-------------|------------------|-------------------------|---------|
| | Amount | Coefficient correlation | p-value |
| Temperature | 6 | -0.569 | 0.239 |
| Humidity | 6 | 0.281 | 0.59 |
| Lighting | 6 | -0.359 | 0.485 |

high level of lighting then the number of air germs is lower (Table 3).

Discussion

The results of this study have no relationship between physical air quality (temperature, humidity, lighting) with the number of air germs in the Bougenville's care room at H. Andi Sulthan Daeng Radja Bulukumba Hospital. This can be affected by the physical air qualities of other such as dust. Dust can also affect the growth of air germs. Dust is one material that is often referred to as airborne particles (Suspended Particulate Matter). The amount of activity in the room can facilitate dust carried by the air.

The difference in the results of measurements of temperature, humidity, lighting and air germ numbers in each room of the treatment room is because there are some rooms where ventilation system and fans that are not functioning optimally. Ventilation that is rarely opened and the closing of the vent as a place for air exchange can affect the presence of air germs.⁶ This is reinforced by Rahmadani⁷ that ventilation system affects the air circulation in the room.

The results of Pearson correlation test show that temperature, humidity and lighting have no significant relationship with air germ numbers because the p value of each variable is greater than 0.05. In contrast to the results of Ningsih shows that temperature, humidity and lighting are related to the number of air germs.⁸ The number of air germs are not only affected by temperature, humidity and lighting, but include influenced by the biological environment (staff, visitors, and patients). Research Wulandari shows that visitors who come, higher the number of air germs in the inpatient room.³ Visitors can be a source of pollutants in tcare room through coughing, sneezing and talking will increase and spread germs into the air.⁹ The spread of germs also comes from outside the room from decaying organisms, dead carcasses, dead plants, etc.¹⁰

Results of research conducted by Paulutu found that the quality of the physical environment 100% did not meet established standards and had an influence on the physical environment of temperature, lighting and humidity to existence *S. aureus*.¹¹ Purnamasari found that temperature and humidity had a relationship with air microbiology, but there was no relationship to the intensity of lighting in the inpatient room.¹² This is reinforced with research Abdullah shows the proportion of the quality of the physical environment that does not meet the requirements is proportional to the proportion of germs that do not meet the requirements according to the Hospital Environmental Health Requirements as stipulated in the Decree

of the Minister of Health of the Republic of Indonesia Number:1204/MENKES/SK/X/2004.¹⁰ Contamination Indoor air germs can also be influenced several factors, the condition of the door that is open and area of the room, each room has a different number of germs according to the level of activity.¹³

Conclusions

Concluded that there is no relationship of physical quality of air with air germ numbers in Bougenville's care room and measurements of temperature, humidity, lighting and air germ numbers have not met the requirements according to the Hospital Environmental Health Requirements as stipulated in Decree of the Minister of Health of the Republic of Indonesia Number: 1204/MENKES/SK/X/2004. Therefore, it is advisable to the hospital to always monitor the parameters of the physical quality of air in the room, air germ number and use of disinfectants that can kill air germ numbers and restrictions on visitors in order to minimize the spread of germs into the air.

Conflict of interest

The authors declare no conflict of interest.

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