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The Impact of the use of Anti-Mosquito Coil on Hemoglobin (Hb) and Hematocrit Levels in Elderly Social Homes Tresna Werdha Sabai Nan Aluih, Sicincin, Padang Pariaman

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ABSTRACT

Background and Aim: The content of chemical compounds is harmful to human health in all anti-mosquito repellent on the domestic market. Exposure to toxic substances derived from anti-mosquito repellent are known to reduce large amounts of iron and important protein in forming hemoglobin so that it can directly cause the incidence of acute anemia.
Material and Method: This study is a Quasi Experimental study with a posttest group only design in which the administration is carried out at the end of the treatment period to see the relationship of the independent variable, exposure to the smoke of mosquito coils to the dependent variable, hemoglobin and hematocrit levels. This research sample uses purposive sampling technique with certain criteria with the number of samples that can be 90 elderly people. The results of the study will be analyzed using the independent sample T test (<0.05) to see the effect of the independent variable on the dependent variable, by first conducting a normality test using the Kolmogorov - Smirnov test.
Result: From the results of statistical analysis using the independent sample T test, it was found that there was a significant effect between the exposure of anti-mosquito smoke to the levels of hemoglobin and hematocrit levels (p-value 0.00). then it is also known that there are significant differences between the hemoglobin levels and hematocrit levels of each group.
Conclusion: In this study it can be concluded that there is a significant effect of anti-mosquito smoke exposure on hemoglobin levels and elderly hematocrit levels.

Keywords: mosquito repellent, hemoglobin, hematocrit, elderly

INTRODUCTION

Anemia is a medical condition in which a number of red blood cells or hemoglobin is less than normal[10]. Normal hemoglobin levels are generally different in men and women[3]. For men, anemia is usually defined as a hemoglobin level of less than 13.5 gr%[30] and in women as a hemoglobin of less than 12.0 gr%[35]. Aging is a natural process which means that a person has gone through three stages of his life, childhood, adulthood, and old age. Where in old age it experienced physical and psychological setbacks[26]. One of the most common illnesses in the elderly is anemia which is a hematological disorder[12]. The prevalence increases with age.

The prevalence of anemia in the elderly increases significantly around 8-44% after the age of 85 years and its incidence in men is 27-40% and women 16-22% before the age of 55 years, but after age 55 years anemia is more often found in men[16]. The most common causes of anemia in the elderly are chronic disease and iron deficiency[33]. With age, the body's physiological functions decline, especially if the lifestyle and eating habits in youth are

not good. Although anemia can be caused by various reasons based on research that has been done, but it is known that most of the anemia in Indonesia occurs due to lack of iron which is a mineral that forms hemoglobin[22].

Mosquito coils are often used because of their practical use and affordable prices. The use of mosquito coils will produce smoke that contains active ingredients harmful to the body especially in the respiratory tract[2]. The content of chemical compounds is harmful to human health in all anti-mosquito drugs circulating in the domestic market, both in the form of spray, electric, fuel and liquid drugs in the form of dichlorvos, propoxur and several types of pyrethroid in the form of d-allethrin, transfluthrin, bioallethrin, prallethrin, d-phenothrin, and esbiothrin[28]. Chronic Inhalation Exposure Has Generated Shock Due to Increased Cholinesterase, Headaches, Vomiting, and Nausea in Humans[11]. In addition, exposure to toxic substances derived from ant mosquito repellents are known to reduce large amounts of iron and important proteins in forming hemoglobin so that it can directly cause the incidence of acute anemia[14].

Mosquito repellent smoke can indeed be harmful to health. This is caused by the content of dichlorovinyl dimethyl phosphate which is in mosquito coils[18]. This can cause serious damage to the nervous system, breathing, and trigger cancer if it is continuously exposed for a long time[20].

The Tresna Werdha Sabai nan Aluih Sicincin social homes is a social institution with the largest elderly population with a total number 110 compared to the number of other social institution residents in western Sumatra. Located in area height of 135 m above sea level with rainfall 233.00/4720 mm, as well as a location in the vicinity of the forest with vegetation trees and shrubs that are high, making the location a place for developing which is quite ideal for mosquito populations so that the reason for the elder use mosquito coils as an alternative choice in preventing mosquito bites. Preliminary survey results prove that almost all the elderly use mosquito coils for more than 10 hours, starting at 6:00 PM until 6:00 AM. Besides that, residents of the social home who are actively using the anti-mosquito repellent also complained about breathing problems such as coughing and shortness due to the use of smoke.

Aim And Objective of Study

Therefore, researchers interested in conducting research with the title "The Impact of the Use of Anti- Mosquito Burns Against Hemoglobin (Hb) and Hematocrit Levels in the Elderly Social Homes of Tresna Werdha Sabai Nan Aluih, Sicincin Kab. Padang Pariaman "

MATERIAL AND METHOD

This study was a quasi-experimental with post-test-control-only design by dividing the research group into two groups, the treatment group and the control group. The data analysis by comparing the results of HB and HTC analysis was conducted at the end of the study. The population in this study is all elderly residents recorded in the social care center of the village of Waiwai Sabai Nan Aluih Sicincin as many as 110 people. The research sample was taken using purposive sampling technique, in which the number of samples obtained in this study were 90 people. The sample is divided into two groups, where the group given exposure became the treatment group and the group not given exposure became the control or comparison group with the number of members each group 45 consisting of 23 men and 22 women. Hypothesis testing with the help of SPSS version 17 using the Independent Sample-T-Test. This test is also used to test the effect of independent variables on the dependent variable. This test is used to determine the effect of anti-mosquito smoke exposure to elderly hemoglobin and hematocrit levels.

Statistical Analysis

The results of the study will be analyzed using
the independent sample t test (<0.05) to see the effect of the independent variable on the dependent variable, by first conducting a normality test using the Kolmogorov Smirnov test.

RESULT

Assumption Test

Table 1. Normality test using KolmogorovSmirnof

Hematocrit Level			Hemoglobin level		
Statistic	Df	Sig.	Statistic	Df	Sig.
0.91	90	0.2*	.963	60	0.06

The results of the normality test on the variables of hemoglobin (HB) and Hematocrit (HTC) levels using the Statistical Packages for Social Sciences (SPSS) Release 20.00 program, using the Saphiro Wilk Test, showed results of 0.2 for Hb levels and 0.06 for hematocrit where p>0.05. The results show that the data is normally distributed.

Effect of exposure to mosquito coils on hemoglobin levels

Tabel 2. Independent Samples Test

Variabel	Sig. (2-tailed)	Mean Difference	Std.	Lower	Upper
Hemoglobin	0.000	1.08	0.07	0.94	1.22

Based on table 2. It is known that the results of the analysis using the T test show that there is a significant effect of exposure to mosquito coils on the respondent's hemoglobin level, where p-value <0.05 with a large p-value of 0.00.

Table 3. The average difference in hemoglobin levels

Variable	Gorup	N	Mean	Std. Deviation
Hemoglobin	Control	45	13.94	.32
	Treatment	45	12.86	.36

N : 60 sample

based on table 3. It is known that the total sample in this study was 60 people who were divided into two groups with the number of each sample in the group as many as 30 people. The table also shows that there is a difference in the average hemoglobin level of the control group with a hemoglobin level of 14.07 and the average hemoglobin value of the treatment group with a value of 12.85. It can be concluded that there was a decrease in hemoglobin levels in the group that used mosquito repellent during the observation period when compared to the control group who did not use mosquito repellent drugs.

Effect Of Exposure to Mosquito Coils on Hematocrit Levels

Tabel 4. Independent Samples Test

Variabel	Sig. (2-tailed)	Mean Difference	Std.	Lower	Upper
Hematocrit	.000	9.95	.77	8.43	11.48

Based on table 4. It is known that the results of the analysis using the T test show that there is a significant effect of exposure to mosquito coils on the respondents' hematocrit levels, where p-value <0.05 with a large p-value of 0.00.

Table 5. The average difference in hemoglobin levels

Variabel	Group	N	Mean	Std	Std. Error Mean
Hematocrit	Control	45	46.87	4.28	0.64
	Treatmen	45	36.91	2.87	0.43

From table 5. It is known that there was a decrease in hematocrit levels in the treatment group with an average hematocrit of 36.91, compared to the control group with an average hematocrit of 46.87. From these data it can be concluded that the group that used mosquito repellent during the observation period was known to have lower hematocrit levels than the group that did not use mosquito repellent drugs.

DISCUSSION

There is a significant relationship between the use of mosquito coils on hemoglobin levels and hematocrit levels in the elderly, this can be seen from the results of statistical analysis using the independent T test showing a p value of 0.00 which is smaller than the 95% confidence level

analysis constant. The results of this study are in accordance with a study conducted by the Citizens Campaign for the Environment and Citizens Environmental Research Institute, New York (2002) regarding the effect of pesticides in controlling the use of mosquito repellent. pesticides that can harm human health. Some of the findings reported in this study, especially regarding the activity of toxic substances against mosquito coils on human health, include reports on the accumulation of carcinogenic substances in mosquito repellents, melatonin disorders, pregnant women, morphological dysfunction of the bleeding system and leukemia.

The use of mosquito coils is indeed very economical and effective in preventing mosquito bites, but long-term exposure directly can have various adverse effects, especially on the hematological system. Research found that transfluthrin exposure contained in mosquito repellents can directly cause morphological changes in the erythrocyte group[15]. Various forms of erythrocyte abnormalities were found in variable blood smears exposed to transfluthrin, including oval shape, water drop shape, sickle shape, cristae shape, oval and others. Morphological changes in shape can affect general physiological function and can reduce hemoglobin levels significantly. These changes can also increase the incidence of hemolytic anemia in which abnormal shapes tend to have much lower hemoglobin than erythrocytes with normal shapes and sizes.

Changes in organ structure, especially in the liver as the main point in the process of metabolism of toxic substances can also occur and be the reason for changes in hemoglobin products due to a decrease in various enzymes in the liver[11]. Various blood indicators are used as a reference in toxicological studies including the number of red blood cells, white blood cell counts, hemoglobin, hematocrit and various other indicators. In line with this study, the decreased hematocrit levels in the treatment group indicated a significant physiological change. Research showed changes in the number of red blood cells in the bodies of experimental animals exposed to mosquito coils[17]. The study also found changes in liver physiological function and an increase in pro-inflammatory cytokines in the blood samples of experimental animals. IL-2 and TNF-alpha are immunological modulators that appear to be quite high found in the experimental group of animals exposed to toxic substances in mosquito repellent. Furthermore, these two modulators are known to be modulators of changes and proliferation of cancer cells, as well as changes in immune status[28].

Various studies have found many adverse effects caused by exposure to toxic substances and insecticides contained in mosquito repellents, especially on the hematological and immunological systems. Research found that out of 100 with an age range of 16-60 years who participated in an interview survey, it was stated that around 1.39% experienced allergic reactions such as itching sensation, redness of the skin, sore throat, difficulty breathing[11]. breathing, coughing and redness of the eyes. Another study found that exposure to allethrin found in mosquito repellent is known to have immuno-pathological abilities which work as immunosuppressants and physical/ behavioral changes[5]. Decreased food intake and hair loss in the tested animals were also found, as well as in the humoral and cellular immune systems, the higher the quantity of allethrin received by the experimental animals, the lower the immunological indicators were also quite significant.

Various other toxic substances pyrethroid, propoxur, DEET and other insecticides are also known to have a much worse effect when combined into one product. Research exposure for 12 weeks is known to have been able to provide significant changes in morphological changes in blood cells, immunity and various organs[19]. Both mosquito coils, sprays and ointments can directly affect changes in the physiological functions of body organs, the research which compared the toxicological effects of

mosquito coils, electric and liquid repellents, it is known that all three have the same ability to increase subcellular poisoning in various vital organs[13].Various reaction indicators were found, especially in necrosis, which was quite high in mosquito coils, while immune cell aggregation was found in experimental animals exposed to mosquito repellent.

Research explains that the use of mosquito repellent, especially DEET (N,N-Diethyl-m-toluamide) can result in sensory decline, damage to motor capacity, memory, and learning ability[6]. In addition, the use of DEET in mosquito repellent is not recommended for use in children, this is because long-term use and in high quantity can cause encephalopathy and other adverse effects. The same thing was found that mosquito coils could affect the biochemical elements and the histological structure of the hematological system[2].

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