

The Effect Of Types Of Lamps On Ability To See The Object

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Abstract

The right lighting is needed in every workplace so as to avoid accidents and occupational diseases. LDE lamp is an energy-saving lamp that is right for use in the workplace, but it is not yet known which type of lamp is best used so that workers are able to see work objects. The market is very much in the form of TL LEDs, LED bulbs, LED PAR (compact), and LED Bulb (halogen)

This study was a quasi-experimental study with a posttest pre-test design with 6 repetitions, and the number of research objects was 24 people who were in accordance with the inclusion criteria. The purpose of this study was to see differences in the ability to see objects before and after the installation of various types of lights. The type of lamp used is TL LED, LED Bohlamp, LED PAR and LED Bulb. The ability to see using a visual acuity test with a snellen card, carried out by Dr. The analysis used for different tests before and after using the Wilcoxon Signeg Ranks Test. To determine the effect of the four types of lights, the Kruskal Wallis Test was carried out, while to determine the type of lamp with different changes, the Man Withney Test was used.

The results obtained there are differences in the ability to see objects on TL LED lights, PAR LEDs and LED Bulp. There is no difference in the ability to see when using a Bohlamp LED light, and there is the influence of various types of lights on the ability to see objects. Types of lights that change different LED Bulbs and TL LEDs, TL LEDs and LED PAR, TL LEDs and LED Bulbs.

It is recommended to paint the walls with white and not shiny.

Keywords: viewing ability, TL LED lights, LED Bohlamp, LED PAR and LED Bulb

PRELIMINARY

Occupational health and safety are efforts that must always be carried out in every workplace. This is done so that workers can carry out their work properly and maximally so as to produce the highest productivity in accordance with the field of work done, without experiencing work-related illnesses or work accidents. Occupational Diseases (PAK) are any illnesses caused by work or the work environment. PAK is often regarded as the silent killer, not only damaging workers who have unconsciously contracted occupational diseases, but also causes social and economic losses and decreases productivity. In carrying out daily work, workers in various sectors will be exposed to the risk of PAK. This risk varies from the mildest to the most severe depending on the type of work (Suardi, 2005), including those caused by the work environment. Working environment conditions that can cause risk of hazards are work environment conditions that do not meet occupational health and safety (K3) requirements, unsafe work processes, and increasingly complex and modern work systems can be a threat to workers. safety and health (Tarwaka, 2008).

Work health and safety can be optimally achieved if the three components of work capacity, workload and work environment can interact well and harmoniously (Suma.mur: 2009). Workers are not only expected to be healthy and productive during their working period but also afterwards, so they can live their old days without being disturbed by various diseases and other health problems caused by work or the work environment when they are still actively working (Sahab, 2007).

Lighting / lighting is one of the physical work environment factors in the workplace. Good lighting is lighting that workers do work requires sufficient lighting so it does not require other efforts to see the object being worked on. For that we need to provide the right and efficient lights. According to the research results Faridha.M

(2016) the most efficient lamp is the LDE lamp. LDE lamps that are available on the market are very many forms in the form of TL LEDs, LED bulbs, LED PAR (compact), and LED Bulb (halogen). Different forms of lighting will have different lighting that will be issued, because the area of the field that will emit light is also different, so the possibility of the resulting illumination is also different. Therefore this research

wants to find out what type of LDE lamp is the most effective form so that it gets lighting that suits the needs and the worker is able to see the object well without more effort.

Research methods

This quasi-experimental study uses the design of one group pretest posttest aimed to determine the effect of various types of lights on the ability to see objects. Respondents used were 36 people with umursama criteria, no eye pain, no glasses, same sex, willing to be respondents. Data collection was done by examining the ability to see using snellen E cards before and after the use of various types of lights, to underline the hypothesis there are differences the ability to see objects before and after using the LDE TL lamp, existsLighting / lighting is one of the physical work environment factors that exist in the workplace. Good lighting is lighting that allows workers to see objects that are worked clearly, quickly and without unnecessary efforts (Suma.mur, 2014).

Poor lighting can result in eye fatigue, reduced work efficiency, mental fatigue, aching complaints in the eye area and headaches around the eyes, damage to vision equipment and increased accidents (Suma.mur, 2009). Therefore lighting in the workplace must be adjusted to the needs so that it does not have an impact, workers can work comfortably and finally productivity is achieved as high as possible.

The ILO (1998) research results, entitled "Improving Working Conditions and Productivity in the Garment Industry", show that improving lighting in the workplace can increase productivity (10%) and reduce work errors (30%). The availability of appropriate lighting will maximize the ability to see, so avoid accidents and / or work-related diseases.

The lighting that is needed where the work must be matched with the work done, the more detailed the work that will be done will require higher lighting. The lighting is in place of the natural and material lighting. Lighting is made from natural light from various types of lights. According to Forster in the International Encyclopedia of Occupational Health and Safety ILO Fourth Edition types of lamps are made of incandescent lamps, tungsten halogen, HT low voltage, fluorescent tube fluorescent lamps, compact fluorescent lamps, mercury lamps, metal halides. The lights on the market are various kinds of which are incandescent lamps, LED lamps, TL lamps and LHE lamps.

differences in the ability to see objects before and after using an LDE lamp Bohlamp, there are differences in the ability to see objects before and after using an LDE PAR lamp, there are differences in the ability to see objects before and after using an LDE Bulp lamp, and there is an Effect of the type of lamp on the ability to see objects between LDE lights TL, Bohlamp, PAR, and Bulb. The data obtained were analyzed with Wilcoxon to determine differences in the ability to see objects before and after each lamp installed and continued with the Kruskal wallis test to see the lights that most influence the ability to see objects.

Research and Discussion Results

This research has been carried out with the object of Poltekkes Kemenkes Jambi as many as 24 people, aged 18-24 years, willing to be sampled and given contact money as a substitute for tired and lost time. The research object is selected according to the criteria and steps that have been determined. Furthermore, materials, equipment and the room where the research will be prepared are prepared. All samples were first checked for eye health, then collected and collected data in accordance with established procedures.

A. Differences in the ability to see objects before and after using TL LED lights

The results of research on differences in the ability to see objects before and after using TL LED lights as follows:

Table 4.1. The Difference in the Ability to See After Using TL LED Lights

No	Difference in the Ability to See Objects						% Different
	1	2	3	4	5	6	
1.	0	1	0	1	1	1	67%
2.	0	1	1	1	1	1	83%
3.	1	1	1	1	1	0	83%
4.	-1	0	1	1	1	1	83%
5.	0	1	1	1	1	1	83%
6.	0	1	1	0	1	0	50%

Based on the results of the study in table 4.1, it appears that there is a difference in the ability to see objects after using TL LED lights. The difference in the ability to see the highest as much as 83% and the lowest 50%. So it means there is a difference in the ability to see after using TL lights. To test the truth, a different Wilcoxon signed Rank Test was performed. Different test means comparing 2 paired data. The two data are said to be in pairs because they come from the same subject but are measured twice, namely pretest and posttest. While it is said to be non-parametric because the data used are not interval or ratio data, but in this case ordinal or ranking data. Because there are 4 types of lamps, they are tested one by one, as follows:

The test results above show the average value (MEAN) and standard deviation (standard deviation) the ability to see objects between before and after the type of TL LIGHTS. There is an average difference between the two where the average after is higher than before using the lamp. Wilcoxon signed rank test results can be:

Wilcoxon Signed Ranks Test

Ranks

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Before	42	2.10	.297	2	3
After	42	2.79	.415	2	3

	N	Mean Rank	Sum of Ranks
After - Negative Ranks	1 ^a	16.00	16.00
Before Positive Ranks	30 ^b	16.00	480.00
Ties	11 ^c		
Total	42		

- a. After < Before
- b. After > Before
- c. After = Before

Test Statistics^a

	After - Before
Z	-5.209 ^b
Asymp. Sig. (2-tailed)	.000

- a. Wilcoxon Signed Ranks Test
- b. Based on negative ranks.

The test results show the value of Z -5.209 with a p value of 0,000 <0.05 means that H1 is accepted or which means there is a significant or significant difference between the ability to see before and after using TL LED lights. So that means TL lights can improve the ability to see objects properly, because it can increase the ability to see up to 83%. Vision problems can not be separated from the role of light, because humans will not be able to see an object if there is no light on the object which is then reflected to the eye. close, so the ability to see is better.

The light comes from TL LED lights installed so that there are differences in the ability to see before and after using these lights. According to Iridiastadi (2014) someone.s ability to see is caused by the presence of light. The light serves as a differentiator so that objects can be seen.

- B. There is a difference in the ability to see objects before and after using a Bohlamp LED light.

The results of research on differences in the ability to see objects after using a LED Bohlamp obtained the ability to see as follows:

Table 4.2

The Difference in the Ability to See After Using a Bulb

No	Difference in the Ability to See Objects						% Different
	1	2	3	4	5	6	
1.	1	0	0	0	0	0	16%
2.	0	0	0	0	0	0	0
3.	0	0	-1	-1	0	0	0,33%
4.	0	0	0	0	0	0	0
5.	0	-1	0	0	0	0	0
6.	0	0	0	0	0	0	16%

Based on the results of the study in table 4.1, there is a difference in the ability to see objects after using a Bohlamp lamp, but the difference is very low. The highest difference is only 16 %%. The Wilcoxon signed Rank Test results are as follows:

Ranks

	N	Mean Rank	Sum of Ranks
After- Negative Ranks	3 ^a	3.50	10.50
Before Positive Ranks	3 ^b	3.50	10.50
Ties	36 ^c		
Total	42		

- a. After < Before
- b. After > Before
- c. After = Before

Test Statistics^a

	After - Before
Z	.000 ^b
Asymp. Sig. (2-tailed)	1.000

- a. Wilcoxon Signed Ranks Test
- b. The sum of negative ranks equals c.the sum of positive ranks.

The test results show the value of Z 0,000 with p value $1 > 0.05$ then accept H_0 or which means there is no significant difference between the ability to see before and after using a Bohlamp LED lamp, so that the hypothesis answer is no difference in the ability to see between before and after using an LED lamp bulb.

There is no difference in the ability to see objects before and after using a Bohlamp LED lamp caused by light produced by the bulb is not much different from the previous light. This means that there is almost no difference in lighting before and after the lights are installed. According to Sumakmur (2014) good lighting is lighting that allows workers to see objects that are done clearly, quickly and without unnecessary efforts. According to Fletcher.C. (2013) that the ability to see will be reduced if the lighting is less, so there is no difference in the ability to see before and after the installation of LE Bohlamp lamps.

- C. There is a difference in the ability to see objects before and after using PAR LED lights.

The results of research on differences in the ability to see objects after using PAR LED lights obtained the ability to see as follows:

Table 4.3

Differences in Viewing Ability after Using PAR LED Lights

No	Difference in the Ability to See Objects						% Different
	1	2	3	4	5	6	
1.	1	1	1	1	1	1	100%
2.	1	0	1	0	1	1	66%
3.	-1	0	1	1	1	1	50%
4.	0	1	0	1	0	1	50%
5.	0	1	0	1	0	1	50%
6.	0	0	0	1	1	1	50%

Based on the results of the study in table 4.3, it appears that there is a difference in the ability to see objects after using PAR LED lights. The highest difference is 100%. To test the truth is that a Wilcoxon signed Rank Test is performed. To ensure there is a difference in the ability to see between before and after using PAR LED lights as follows:

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Min	Max
Before	42	2.05	.216	2	3
After	42	2.71	.457	2	3

Descriptive data above shows the average value (MEAN) and standard deviation (standard deviation) the ability to see objects between before and after the use of LED PAR lamps looks different. So there is a difference after it is greater than before using the lamp. To find out the significance, a Wilcoxon signed rank test test is performed below.

Wilcoxon Signed Ranks Test

Ranks

	N	Mean Rank	Sum of Ranks
After - Negative Ranks	1 ^a	15.50	15.50
Before Positive Ranks	29 ^b	15.50	449.50
Ties	12 ^c		
Total	42		

- a. After < Before
- b. After > Before
- a. After = Before

Test Statistics^a

	Sesudah Sebelum	-
Z		-5.112 ^b
Asymp. Sig. (2-tailed)		.000

- a. Wilcoxon Signed Ranks Test
- b. Based on negative ranks.

The test results show the value of Z-5,112 w / p value 0,000 <0.05 then accept, which means there is a very significant difference between the ability to see before and after using PAR LED lights.

This happens because the LED PAR lamp that is used emits higher light after using the lamp, because according to Iridiastadi (2014) someone.s ability to see is caused by the presence of light. The greater the difference in the light produced before and after the installation of PAR lamps the more clearly the object being seen. Fletcher.C. (2013) said that the ability to see will decrease if the lighting is less, and will increase if the lighting increases.

D. Difference in the ability to see objects before and after using an LED Bulb lamp

The results of research on differences in the ability to see objects before and after using the LED Bulb lights as follows:

Table 4.4

The Difference in the Ability to See After Using a Bulb Lamp

No	Difference in the Ability to See Objects						% Different
	1	2	3	4	5	6	
1.	0	1	1	1	1	1	83%
2.	0	1	1	0	0	0	33%
3.	0	1	1	0	1	1	67%
4.	0	1	1	1	1	1	83%
5.	0	0	1	1	1	1	67%
6.	0	1	0	1	1	1	67%

Based on the results of the study in table 4.4 there is a difference in the ability to see objects after using a bulb. The difference is quite high at 83%, the lowest at 33%. However, to ensure the truth, a Wilcoxon signed Rank Test was performed. To ensure there are differences in the ability to see between before and after using LED Bulb lights as follows:

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Min	Max
Before	42	2.10	.297	2	3
After	42	2.81	.397	2	3

Above are the average value (MEAN) and standard deviation (standard deviation) the ability to see objects between before and after the type of LED Bulb LIGHTS. There is an average difference between the two where the average after is higher than before using the lamp. To find out that the difference is significantly significant, it is seen the results of the Wilcoxon signed rank test test below.

Wilcoxon Signed Ranks Test

Ranks

	N	Mean Rank	Sum of Ranks
After - Negative Ranks	0 ^a	.00	.00
Before - Positive Ranks	30 ^b	15.50	465.00
Ties	12 ^c		
Total	42		

- a. After < Before
- b. After > Before
- c. After = Before

Test Statistics^a

	After - Before
Z	-5.477 ^b
Asymp. Sig. (2-tailed)	.000

- a. Wilcoxon Signed Ranks Test
- b. Based on negative ranks.

Visible test results with a value of Z-5,112 w / p value 0,000 <0.05 then accept H1 or which means there is a significant difference between the ability to see before and after using the LED Bulb. The ability to see after using this lamp is getting better,

this is caused by the intensity of the light produced so that it can distinguish objects more clearly. Lighting or lighting determine the range of accommodation. Good lighting is adequate and adequate lighting so as to prevent eye strain. Bulb lamps with a round shape emit light in each direction with a uniform beam, so as to improve the ability to see compared to not using lights.

E. Effect of Lamp Type on the Ability to See Objects between TL LEDs, LED Bulbs, LED Par and LED Bulb.

Table 4.4

The Difference in the Ability to See After Using Lights of Different Types of Lights

No	Type Of Lamp	133						On average
1	TL	67%	83%	83%	83%	83%	50%	67%
2	Bohlamp	16%	0%	33%	0%	-16%	0%	33%
3	PAR	100%	66%	50%	50%	50%	50%	61%
4	Bulb	83%	33%	67%	83%	67%	67%	67%

Table 4.4 looks descriptively seen the difference in the ability to see objects of each type of lamp is almost the same, there is only 1 type of lamp the ability to see is quite small at only 33%. To ensure there is an influence of each type of lamp on the ability to see the Kruskal-Wallis test is performed with the following results:

NPar Tests

Kruskal-Wallis Test

Ranks

	Lamp	N	Mean Rank
After	LED Bulb	42	100.00
	LED TL	42	42.00
	LED PAR	42	94.00
	LED Bohlam	42	102.00
	Total	168	

Test Statistics^{a,b}

	Sesudah
Chi-Square	60.290
Df	3
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Lampu

The test results show the calculated chi square value of 60.290 dg p value 0.000 <0.05 then accept H1 or which means there is a significant difference in the ability to see after using lights between types of lights, so it can be concluded that "There is a significant effect of the type of lamp on the ability to see objects between lights LED Bulb, LED Bulb, TL LED, LED PAR after using the lamp. "But the ability to see between types of lights is not so different, except for the bulb. Means the shape of the lamp does not really affect the object. Factors that must be considered are the light intensity, the distance of the lamp and the object, the cleanliness of the lamp, and the lamp stand. But avoid using bohlamp lamps, because the intensity produced is small, because some of it emits heat.

Conclusion

1. There is a difference in the ability to see objects before and after using the LDE TL lamp
2. There is no difference in the ability to see objects before and after using an LDE Bohlamp lamp
3. There is a difference in the ability to see objects before and after using the LDE PAR lamp
4. There is a difference in the ability to see objects before and after using the LDE Bulb lamp.
5. There is an effect of the type of lamp on the ability to see objects between LDE TL and LDE Bohlamp, LDE PAR, and LDE Bulb.

Recommendation

1. Use Types According to the level of difficulty of the job
2. Bohlamps are not good for use as light sources.

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