

# The Correlation Between *Pegringsingan* Weavers Physical Activity with Body Mass Index, Triglycerides, and Cholesterol Levels in Tenganan Village Karangasem Regency

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## ABSTRACT

The *Pegringsingan* weaving work position is by sitting on the floor with a simple mat and legs straight to the front and done for 6 to 8 hours per day. Low physical activity or sedentary lifestyle can increase the prevalence of obesity which is a risk factor for non-communicable diseases. Body Mass Index is one of the makers of nutritional status related to obesity that can lead to an increase of triglyceride and cholesterol levels that can cause cardiovascular disease. The Objective of this study to determine the correlation between physical activity with Body Mass Index, Triglycerides levels and Cholesterol Levels of *Pegringsingan* Weavers in Tenganan Village Karangasem Regency. Method of this is a correlation study with cross-sectional design. The study was done to 26 respondents that were chosen by the saturated sampling method. Physical activity is categorized according to the IPAQ category, BMI is measured by anthropometry and triglyceride and cholesterol levels are measured by dialysis autolyzes. The correlation between physical activity with BMI, Triglycerides dan cholesterol levels are analyzed with Spearman Rho. The Results are there is a significant correlation between physical activity with BMI ( $p = 0,021$ ;  $r = -0,451$ ), there is a significant correlation between physical activity with triglyceride levels ( $p = 0,002$ ;  $r = -0,578$ ), there is a significant correlation between physical activity with cholesterol levels ( $p = 0,034$ ;  $r = -0,417$ ). The conclusion there is a negative correlation between physical activity with BMI, triglyceride levels and cholesterol levels.

**Keywords:** *physical activity, body mass index, Triglycerides levels, cholesterol levels*

## 1. INTRODUCTION

*Pegringsingan* weavings is a heritage home industry that combines art and simple technology fully produced by hand. This *Pegringsingan* woven fabric is a characteristic of Tenganan village which is not owned by other regions. To make *Pegringsingan* weavings is the job of some of the women in Tenganan village, in Manggis sub-district, Karangasem regency [1]. Based on a preliminary survey, the weaving process is done by women workers by themselves, starting from making the threads, coloring, and weaving [2]. Weaving is a manual job using muscle power, the body locomotive organs, by sitting on the floor, with simple mat, and legs straight to the front. A work position by a long sitting position on the flour makes the weaver have low physical activity [2, 3]. Physical activity is related to body mass index. Low physical activity can increase body mass index [4, 5]. Body mass index is one of the markers of nutritional status related to obesity. Prior epidemiologic studies have shown that increasing body mass index (BMI) is associated with higher total cholesterol, low-density lipoprotein cholesterol (LDL) and Triglycerides (6).

## 2. METHOD

This research is a correlation study with cross-sectional design. The study was done to 26 respondents that were chosen by the saturated sampling method. Physical activity is categorized according to the International Physical Activity Questionnaire (IPAQ) category. The IPAQ is an international questionnaire designed to measure adult physical activity in the previous seven days [7]. BMI is measured by anthropometry and triglyceride and cholesterol levels are measured by dialysis autolyzes. The correlation between physical activity with BMI, Triglycerides dan cholesterol levels are analyzed with Spearman Rho

## 3. RESULTS AND DISCUSSION

The subjects in this study were 26 weavers of *Pegringsingan* woven in Tenganan village, Karangasem, all of whom were women with active weaving criteria for at least the last two years. The measurement results of the weaver's physical activity were obtained by the majority of weavers, namely,

54% had low physical activity and 46% had moderate physical activity. Most respondents did physical activity less than 600 METs-min / week.

Measurement of the respondent's Body Mass Index obtained results as much as 54% normal, 19% overweight and 27% obese. From the measurement of body mass index obtained the highest BMI is 40.5 and the lowest is 19.3, with a mean value of 25. Measurement of triglyceride levels found 46% had normal triglyceride levels, 31% triglyceride levels were at borderline and 23% had high triglyceride levels. the highest triglyceride level is 378 mg/ dl, while the lowest level is 68 mg/ dl, with a mean value of 153 mg /dl. Measurement of cholesterol levels obtained 23% of cholesterol levels are good, 27% borderline and 50% high cholesterol levels. The highest cholesterol level is 291 mg/dl with the mean value 214 mg/dl.

Most respondents with low physical activity have an overweight and obese Body Mass Index. 38% of respondents who have a normal Body Mass Index are respondents with moderate physical activity.

Distribution of Body Mass Index based on Physical Activity can be seen in Figure 1.

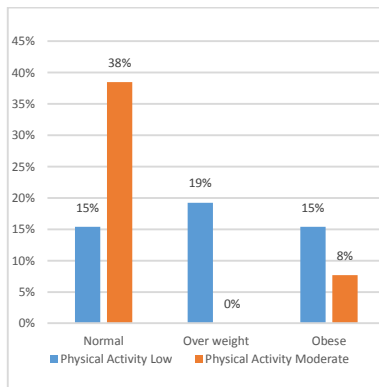


Figure 1. Distribution of Body Mass Index based on Physical Activity

The distribution of triglyceride levels, 38% of respondents with normal triglyceride levels were respondents with moderate physical activity, while respondents with high triglyceride levels all had low physical activity. The distribution of triglyceride levels, based on physical activity can be seen in Figure 2.

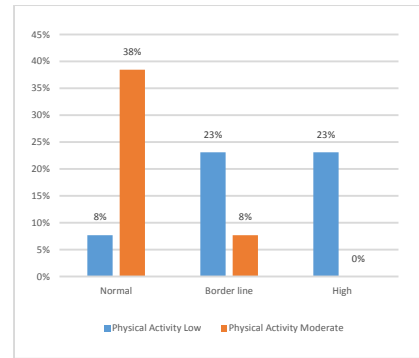


Figure 2. Distribution Of Triglyceride Levels Based On Physical Activity

Most respondents who have cholesterol levels at the threshold and high, have low physical activity. The distribution of cholesterol levels based on physical activity can be seen in Figure 3.

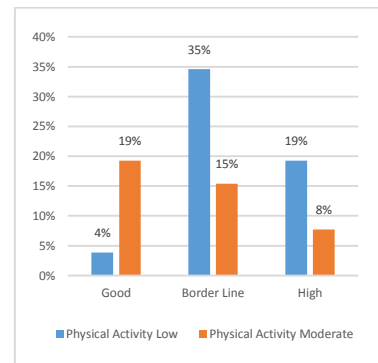


Figure 3. The Distribution of Cholesterol Levels Based On Physical Activity

The results of the Shapiro Wilk analysis data are not normally distributed. Correlation analysis was performed with the Spearman Rho analysis [8]. There is a significant correlation between physical activity with BMI ( $p = 0,021$ ;  $r = -0,451$ ), there is a significant correlation between physical activity with triglyceride levels ( $p = 0,002$ ;  $r = -0,578$ ), there is a significant correlation between physical activity with cholesterol levels ( $p = 0,034$ ;  $r = -0,417$ ). The weaver's physical activity is a mostly low activity because weaving work requires sitting time of 6 to 8 hours per day so that the physical activity carried out by the weaver is less than 600 METs-min / week [9]. Physical activity associated with Body Mass Index, if physical activity is low then the Body Mass Index increases. As many as 46% of the body mass index of the weaver is more than 25 kg / m<sup>2</sup> or above normal. The excessive fat accumulation that occurs in obese people results in an increase in the amount of free fatty acids (Free Fatty Acid / FFA) that are hydrolyzed by endothelial lipoprotein lipase (LPL). This increase triggers the production of oxidants which have a negative effect on the endoplasmic and

mitochondrial reticulum. FFA released due to excessive accumulation of fat also inhibits the occurrence of lipogenesis thereby inhibiting serum triacylglycerol clearance resulting in an increase in blood triglyceride levels [10]. Obesity in adulthood is associated with an increased risk of coronary heart disease, hypertension, hypercholesterolemia, diabetes mellitus, and metabolic disorders. Atherosclerosis formation is related to lipid profile in the blood. Lipid profile is a state of blood fat in terms of total cholesterol in the blood, LDL, HDL, and triglycerides [11]. Pegringsingan weavers have a risk of increasing body mass index [12]. Low physical activity is a risk of CVD because of increased cholesterol levels and triglyceride levels [13]. Because weaving is an activity that is classified as low physical activity, the weavers need to increase their physical activity by doing regular exercise.

#### 4. CONCLUSION

There is a negative correlation between physical activity with BMI, triglyceride levels and cholesterol levels in Pegringsingan weaver at Tenganan Village. Low physical activity increases body mass index, triglyceride levels and blood cholesterol levels in Pegringsingan weavers.

#### REFERENCES

- [1] Utami S. GRINGSING WOVEN CLOTH: THE MOTIF CORRELATION, FUNCTION, AND SYMBOLIC MEANINGS. *Imaji* [Internet]. 2014;vol 12 no. Available from: <https://journal.uny.ac.id/index.php/imaji/article/view/3632/3106>
- [2] Merta IW, Sudarmanto IG, Sri Dhyana Putri IGA, Arjani IAMS, Mallongi A. Working position improvement by adding supporting tool reduced subjective complains and increase productivity of weavers in tenganan village karangasem regency. *Indian J Public Heal Res Dev* [Internet]. 2018;9(8):1500–5. Available from: [www.ijphrd.com](http://www.ijphrd.com)
- [3] Singer RH, Stoutenberg M, Gellman MD, Archer E, Davis SM, Gotman N, et al. Occupational physical activity and body mass index: Results from the hispanic community health study / study of Latinos. *PLoS One* [Internet]. 2016;11(3):1–15. Available from: <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0152339&type=printable>
- [4] Hu G, Barengo NC, Tuomilehto J, Lakka TA, Nissinen A, Jousilahti P. Relationship of Physical Activity and Body Mass Index to the Risk of Hypertension: A Prospective Study in Finland. *Hypertension* [Internet]. 2004;43(1):25–30. Available from: <https://www.ahajournals.org/doi/full/10.1161/01.hyp.000107400.72456.19>
- [5] Hashimoto Y, Matsudaira K, Sawada SS, Gando Y, Kawakami R, Sloan RA, et al. Association between objectively measured physical activity and body mass index with low back pain: A large-scale cross-sectional study of Japanese men. *BMC Public Health* [Internet]. 2018;18(1):1–8. Available from: <https://bmcpublihealth.biomedcentral.com/track/pdf/10.1186/s12889-018-5253-8>
- [6] Lior Shamaieinar LurixMichael ShenGian M. NovaroSamuel SzomsteinRaul Rosenthal. Association of Body Mass Index and Lipid Profiles: Evaluation of a Broad Spectrum of Body Mass Index Patients Including the Morbidly Obese. *Obes Surg* [Internet]. 2011;vol 21(1):42–7. Available from: <https://link.springer.com/article/10.1007%2Fs11695-010-0170-7>
- [7] Hallal PC, Victora CG. Reliability and validity of the International Physical Activity Questionnaire (IPAQ) [2]. *Med Sci Sports Exerc* [Internet]. 2004;36(3):556. Available from: [https://dev-journals2013.lww.com/acsm-msse/Fulltext/2004/03000/RELIABILITY\\_AND\\_VALIDITY\\_OF\\_THE\\_INTERNATIONAL.00027.aspx](https://dev-journals2013.lww.com/acsm-msse/Fulltext/2004/03000/RELIABILITY_AND_VALIDITY_OF_THE_INTERNATIONAL.00027.aspx)
- [8] McDonald JH. *Handbook of Biological Statistics*. 2014.
- [9] Forde C. Scoring the International Physical Activity Questionnaire (IPAQ) Exercise Prescription for the Prevention and Treatment of Disease. 2005;(2005). Available from: [https://ugc.futurelearn.com/uploads/files/bc/c5/bcc53b14-ec1e-4d90-88e3-1568682f32ae/IPAQ\\_PDF.pdf](https://ugc.futurelearn.com/uploads/files/bc/c5/bcc53b14-ec1e-4d90-88e3-1568682f32ae/IPAQ_PDF.pdf)
- [10] Hong Hanh NT, Tuyet LT, Anh Dao DT, Tao Y, Chu DT. Childhood obesity is a High-risk factor for hypertriglyceridemia: A case-control study in Vietnam. *Osong Public Heal Res Perspect* [Internet]. 2017;8(2):138–46. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5441441/pdf/phrp-08-138.pdf>
- [11] Klop B, Elte JWF, Cabezas MC. Dyslipidemia in Obesity: Mechanisms and Potential Targets. *Nutrients* [Internet]. 2013;5(4):1218–40. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3705344/pdf/nutrients-05-01218.pdf>
- [12] Hu G, Barengo NC, Tuomilehto J, Lakka TA, Nissinen A, Jousilahti P. Relationship of Physical Activity and Body Mass Index to the Risk of Hypertension: A Prospective Study in Finland. *Hypertension* [Internet]. 2004;43(1):25–30. Available from: <https://www.ahajournals.org/doi/pdf/10.1161/01.HYP.000107400.72456.19>
- [13] Hu SS, Kong LZ, Gao RL, Zhu ML, Wang W, Wang YJ, et al. Outline of the Report on Cardiovascular Disease in China, 2010. *Biomed Environ Sci* [Internet]. 2012;25(3):251–6. Available from: <http://dx.doi.org/10.3967/0895-3988.2012.03.001>