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The Relationship between Body Mass Index and Grasping Strength in Students of the Medical Education Study Program, Faculty of Medicine, University of Papua

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ABSTRACT

Psychological changes in pregnant women are divided into several trimester phases according to fetal development. During the Coronavirus Disease 2019 (covid-19) pandemic, the anxiety level of pregnant women is increasing. The research objective was to know the effect of health education on pregnant women's anxiety during the COVID-19 pandemic. This type of research was pre-experimental with a one-group pretest and posttest design. The population is all pregnant women who are at the Public Health Center of Segalamider, Bandar Lampung City with totalling 36 people, the sampling technique used was total sampling. Univariate analysis used range values and bivariate analysis used the Wilcoxon test. The results of the research show the average level of anxiety of pregnant women before health education was 10.5, the average level of anxiety of pregnant women after health education was 6.6 and there was an effect of providing health education on the anxiety of pregnant women during the COVID-19 pandemic with p-value = 0.000. Suggestions for mothers are expected to be able to consult with midwives regarding physical and psychological health conditions while still implementing health protocols so that they can prevent anxiety during pregnancy during the covid-19 pandemic.

INTRODUCTION

A person's health status is one of the factors that determine their level of health. A person with good health will be affected by good nutritional intake, so that he can maintain the stability of his body functions during activities (Ery Pratiknyo Dwikusworo, 2010). Everyone needs good physical fitness to support their work activities, especially for medical students with busy lectures and clinical skills and more homework. Intensive academic activities will cause students to rarely exercise, so that their physical fitness is in the category of not good (Nugroho K. et.al, 2016).

In developed countries, the population at the highest risk of obesity has shifted to the group of young people aged 18-29 years, especially those who are studying at universities. The selection of less or unhealthy foods without parental supervision, such as consuming snacks such as excessive fast food, especially late at night, eating unhealthy foods, busy schedules reducing time for physical activity, and the provision of unhealthy foods on campus and lack of motivation can lead to weight gain in students (Eka, Shane H. R. Ticoalu, Djon Wongkar, 2012). The result of this large academic activity makes students spend a lot with campus academic activities compared to off-campus activities such as physical activity or sports aimed at maintaining their body fitness. This can put the student at risk of having a poor diet and lack of physical activity can increase weight and risk obesity.

Based on basic health research data in 2018, the prevalence of obesity in Indonesia at the age of over 18 years is around 21.8% which has increased compared to previous years (Riskesdas, 2018). Research Eka, et al 2012, the prevalence of obesity in students of the faculty of medicine, Sam Ratulangi university, found that from 307 respomden there were 28% percent or 86 people categorized as body weight more seen based on body mass index (Kementrian Kesehatan RI. 2018). Obesity is described by an increase in the BMI value of Sam Ratulangi university. a person, this affects the health-related components of fitness, one of which is muscle strength (Ayu Indriyani Utami. Et.al, 2020 & Dewa Ayu Sri Agung Suandewi, 2017). Muscle strength (dynamic) is defined as the maximum force that a muscle or muscle group

can produce at a certain speed. Based on the explanation above, this study was conducted to determine the relationship between body mass index and grasping strength in students of the Medical Education Study Program, Faculty of Medicine, University of Papua (PSPD FK UNIPA).

METHOD

This research uses analytical methods with a cross-sectional research design. The purpose of this study was to see whether there was a connection between body mass health and grasping force in PSPD FK UNIPA students and data collection was carried out at the same time without follow-up. The location of the study was conducted on the campus of the UNIPA faculty of medicine in June.The population in this study was all PSPD students of FK UNIPA. To obtain a large sample in this study using the Slovin formula.From the calculation of the sample, the results of the total number of samples of at least 107 respondents were obtained, the sum of which was taken in each batch in a simple random manner until it reached a total sample of 107 respondents who met the inclusion criteria.

RESULT AND DISCUSSION

This research was conducted at the Faculty of Medicine, University of Papua, located in Mariat District. Mariat District is the center of government or the capital of Sorong Regency which has an area of 130.13 km^2. Unipa Faculty of Medicine is located in Mariat district, Aimas district, Sorong Regency, West Papua which is the only medical faculty in West Papua Province.The faculty of medicine is a campus with C accreditation with a total of 146 students. In this study, the population used was all students who met the criteria of inclusion and exclusion. The total sample taken amounted to 107 samples.

Table 1. Gender Characteristics of Respondents

Age	Frequency	Percentage
18 Tahun	11	10.4 %
19 Years	29	27.1 %
20 Years	32	29.9 %
21 Years	18	16.1 %
22 Years	14	13.1 %
23 Years	1	0.9 %
24 Years	1	0.9 %
28 Years	1	0.9 %
Total	**107**	**100.0 %**

Based on Table 1, it shows that respondents who are 20 years old are the most aged as many as 32 people with a percentage of 29.9%, respondents aged 19 years as many as 29 with a percentage of 27.1%, respondents who are 21 years old as many as 18 people with a percentage of 16.8%, as many as 14 respondents aged 22 years with a percentage of 13.1%, respondents aged 18 years there are 10 people with a percentage of 9.3% and respondents who are 1 person, namely 23 years old, 24 years and 28 years with a percentage of 1%.

Table 2. Gender Characteristics of Respondents

Gender	Frequency	Percentage
Male	29	26.2 %
Female	78	73.8 %
Total	**107**	**100.0 %**

Based on Table 2, it shows that respondents are dominated by women with 78 women with a percentage of 73.8% and men as many as 29 people with a percentage of 26.2%.

Univariate analysis results

There are two variables studied in this study, here is a univariate analysis table of varied body mass index and grasping strength.

Table 3. Frequency distribution and percentage of BMI and Grasping Power

Variable	Frequency	Percentage
Body Mass Index		
Overweight	34	31.8 %
Normal	51	47.7 %
Under Weight	22	20.6 %
Total	**107**	**100 %**
Grasping Stranght		
Strong	39	36.44 %
Normal	53	49.54%
Weak	15	14.02%
Total	**107**	**100 %**

From the distribution of research in Table 3, it is divided into two variables that are studied, namely body mass index and grasping strength. In the table above, it is explained that the average student with overweight is 34 people with a percentage of 31%, normal is 51 people with a percentage of 47.7% while underweight is 22 people with a percentage of 20.6%. The average grasping strength, in respondents with strong grasping strength amounted to 39 people with a percentage of 36.44%, for the normal there were 53 people with a percentage of 49.54% while weak amounted to 15 people with a percentage of 14.02%.

Bivariate analysis results

The bivariate analysis in this study is the relationship between body mass index and grasping strength in PSPD FK UNIPA students. These two variables are variables studied by researchers using the Chi Square test. The following are the results of the analysis of the relationship of BMI with grasping strength from 107 research samples taken

Table 4. The Relationship Between Body Mass Index and Grasping Strength

Body Mass Index	Grasping Stranght			Total	*P-Value*
	Strong	Normal	Weak		
Overweght	12 (11,2 %)	17 (15,9 %)	5 (4.7 %)	34 (31,8 %)	0,108
Normal	15 (14,0 %)	29 (27,1 %)	7 (6,5 %)	73 (47,7 %)	
Underweight	13 (12,1)	9 (8,4)	12 (20,6%)	22 (20,6 %)	
Total	40 (37,4 %)	55 (51,4 %)	12 (11,2 %)	107 (100 %)	

From table 4, it can be concluded that respondents with an overweight BMI and have strong grasping strength totaled 12 people with a percentage of 11.2%, respondents who had an overweight BMI and normal grasping strength were 17 people with a presentation of 15.9%, respondents who had an overweight BMI with weak grasping strength amounted to 5 people with a percentage of 4.7%. The total number of respondents who had a more BMI was 34 people with a percentage of 31.8%. The number of respondents who had a normal BMI and strong grasping strength was 15 people with a presentation of 14.0%, the number of respondents who had a normal BMI with normal grasping strength was 29 people with a percentage of 27.1%, while the number of respondents who had a normal BMI with weak grasping strength was 7 people with a percentage of 6.5%. The total number of respondents who had a normal BMI was 51 people with a percentage of 47.7%. Respondents with a low BMI with strong grasping strength amounted to 13 people with a percentage of 12.1%, respondents with a low BMI with normal grasping strength amounted to 9 people with a percentage of 8.4%, while there were no respondents with a low BMI and had weak grasping strength or with a percentage of 0.0%. The total number of respondents who had a low BMI was 22 people with a percentage of 20.6%.

When viewed from the results of the Chi Square test, the results of this study are not qualified because there are 2 cells (22.2%) with an expected value of less than 5 cells so that the Chi Square test is continued by combining cells by making a table twice three by combining the normal BMI and low BMI variables as in the table 5.

Table 5
Cross Tabulation Test Combines Two Categories of Relationship Between Body Mass Index and Grasping Strength

Body Mass Index	Grasping Stranght			Total	*P*
	Strong	Normal	Weak		
Overweght	12 (11,2 %)	17 (15,9 %)	5 (4.7 %)	34 (31,8 %)	0,734
Normal + Underweight	28 (26,2 %)	38 (35,5 %)	7 (6,5 %)	73 (68,2 %)	
Total	40 (37,4 %)	55 (51,4 %)	12 (11,2 %)	107 (100 %)	

From table 5, it can be concluded that the significant value of 2 taileds is 0.734 > 0.05 so it is concluded that there is no relationship between body mass index and grasping strength in PSPD FK UNIPA students. In the chi square table, it is found that there is no expected calculation column (16.7%) or no more than 20% meaning that this chi square test has met the requirements and can be read.

DISCUSSION

Body mass index is a description of a person's nutritional status obtained by measuring body weight divided by the height that is squared. The increase in BMI will generally continue to increase according to age. In this study, it was found that the study sample was dominated by a normal BMI and was followed by a high BMI or excessive weight. Based on the results of the study, it showed that there was no relationship between the BMI variable and the grasping force. This is not in accordance with the initial hypothesis which states that there is a relationship between BMI and grasping power in PSPD FK UNIPA students. In this study, it was found that the body mass index in unipa medical school students was on average in men classified as overweight while in women the average was in the normal category. The gripping power in men is obtained on average strong and in women it is obtained in the normal category. As for the grasping strength of FK Unipa students, the average is in the normal category. When compared with women, men have stronger grasping power.

The results of the univariate analysis in this study illustrate that the average BMI of the most PSPD FK UNIPA students is in the normal category with a total of 51 people with a percentage of 47.7%. As for the gripping force, it is the most in the normal category with a total of 49 people with a percentage of 49.54%.

The results of the bivariate analysis in this study using the Chi Square test obtained a significant value of two taileds of 0.108 greater than 0.05 which means that there is no relationship between body mass index and grasping strength in PSPD FK UNIPA students. However, this result cannot be read because it does not understand the requirements of the Chi Square test so that two categories are combined with independent variables, namely normal BMI and low BMI to meet the requirements of the Chi Square test.After the merger test, the P value was obtained to be 0.734, which means that there is no relationship between BMI and grasping strength. Furthermore, if viewed based on the requirements of the Chi Square test, this result can be read because the expected calculation value is less than five squares or less than 20%. So that the P value in this result can be used as the final result of a valid Chi Square test. Furthermore, if you still do not meet the requirements for the Chi Square test, it can be done with the Kolmogorov-Smirnov Two-Sample Test so that readable results are obtained.

The results of this study are in line with the research of Dewi Ayu, et al. on 61 respondents at the central general hospital sanglah Bali who found that there was no relationship between BMI and grasping strength (Dewa Ayu Sri Agung Suandewi, 2017). The meaninglessness of the results of this study was in line with research conducted by Dhara et al., in 2011 on 286 elderly samples, and Ryoto in 2012 in 100 elderly who stated that there was no meaningful relationship between BMI and handheld muscle strength. The same results were also obtained in a study conducted by Setiawan and Setiowati in 15 elderly people at the Wredha Rindang Asih III Orphanage, Boja District in the Journal of Sport and Sciences related to the relationship between BMI and the strength of grasping (Ryoto, V,2012). As for the meaninglessness of the relationship between BMI and grasping strength, it cannot be fully explained because there are only a few samples with a low BMI and no samples with strong grasping strength, this is in accordance with the research of Massy-Westropp et al., in 2011, in 435 samples in Autralia aged 18 years and over (Setiawan, D.A. and Setiowati, A, 2014)

When entering adulthood, women's muscle strength decreases compared to men's. This means that men have significantly higher hand grip strength than women. According to Primana (1998), this situation is because the size of the male muscle fibers is larger than that of women. In addition, the condition is caused also by the influence of the hormone testosterone on men. As the hormone testosterone

in men helps in increasing muscle size, so men tend to be stronger than women (Pribis P, et al, 2010). Cotton (1998) also added that the body composition of adult women who have a greater amount of body fat than men also has an influence on their muscle strength (Suandewi DASA, Purnawati S, Saraswati MR, 2017). Research by Lava Shrestha, et al explained that the presence of genetic factors and the equipment used can affect the difference in grasping power between men and women (Al-Asadi, J.N, 2018). Overall, the average hand grip strength is 55.00 ±14,023 kg. According to the corbin and colleagues criteria, the strength of the hand grip in the sample of this study was weak. (Dewi HS, Susetyowati, Danarti SRD, 2018). In this study, if it is connected between each category of each variable, the relationship between each category of each variable still has a weak sample. This can be due to muscle quality, energy deficiency, fat infiltration in muscles, decreased red muscle fiber, slow oxidative and increased white muscle fiber, as well as easy fatigue in samples that are obes due to muscle quality (Pasumbung E, Purba MM , 2015 & Dhara, Prakash C, Piyali S, Sujaya D, 2011). Dengan hasil penelitian ini dan penelitian sebelumnya maka dapat disimpulkan bahwa tidak terdapatnya hubungan antara IMT dan kekuatan menggenggam dapat dipengaruhi oleh banyak faktor misalanya kurang adanya latihan fisik terkait melatih kekuatan otot, selain itu banyaknya komorbid (Diabetes, malnutrisi), masalah gaya hidup, jenis kelamin, etnis, akumulasi lemak pada penuaan cenderung mempengaruhi interpretasi data IMT. (Arikatus Shofia, Dandi Putra. Et.al, 2021 & Frank Q. Nuttall, 2015). Diet is strongly influenced by the surrounding environment. Teenagers prefer foods with a high content of sodium and fat but low in vitamins and minerals, such as snacks and fast food previously described. These snack foods are usually energy dense, high in sodium and fat, and low in vitamins and minerals (Nugroho K. dkk, 2016).

CONCLUSION

From the explanation above, we can conclude that the absence of a relationship between body mass index and grasping strength can be caused by many things that have been explained before. Therefore, it is necessary to conduct research on other samples to find out whether there is a relationship between BMI and grasping strength.

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Conflict of Interest statement

Penulis yang namanya tercantum tepat di bawah ini menyatakan bahwa tidak memiliki afiliasi atau keterlibatan dengan pihak luar manapun dan tulisan ini murni dari sumber yang dicantumkan di daftar pustaka serta tidak mengandung plagarisme dari jurnal artikel manapun. Sumber tulisan telah dicantumkan seluruhnya di daftar pustaka.

REFERENCES

Ery Pratiknyo Dwikusworo (2010). Tes Pengukuran Dan Evaluasi Olahraga. Semarang: Widya Karya

Nugroho K. dkk (2016). Hubungan Aktivitas Fisik dan Pola Makan Dengan Perubahan Indeks Massa Tubuh Pada Mahasiswa Semester 2 Program studi Ilmu Keperawatan Fakultas Kedokteran. e-journal Keperawatan(e-Kp). Volume Nomor 2, https://doi.org/10.29303/jku.v9i1.403

Eka, Shane H. R. Ticoalu, Djon Wongkar (2012). Prevelensi Obesitas Pada Mahasiswa Fakultas Kedokteran Universitas Samratulangi Angkatan 2011. Jurnal Biomedik, Volume 4, Nomor 3, Suplemen, hlmS83-92. https://ejournal.unsrat.ac.id/index.php/biomedik/issue/view/328/showToc

Riset Kesehatan Dasar (Riskesdas) (2018). Badan Penelitian dan Pengembangan Kesehatan Kementerian RI tahun 2018.

Kementrian Kesehatan RI. (2020). Profil Kesehatan Indonesia 2017. Jakarta: Kemenkes RI.

Ayu Indriyani Utami, I Made Krisna Dinata, I Dewa Ayu Inten Dwi Primayanti, Luh Made Indah Sri Handari Adiputra (2016) Hubungan IMT Dengan Kekuatan dan Ketahanan Otot Tungkai Pada Mahasiswa PSSKPD UNUD Angkatan 2016. Jurnal Medika Udayana, Vol. 9 No. 11 Available.at: https://ojs.unud.ac.id/index.php/eum/article/view/67026

Dewa Ayu Sri Agung Suandewi, Susy Purnawati, Made Ratna Saraswati (2017) . Hubungan Indeks Massa Tubuh (IMT) dan Aktivitas Fisik Dengan Kekuatan Otot Genggam Pada Pasien Diabetes Melitus Tipe 2 di Rumah Sakit Umum Pusat Sanglah Denpasar. e-journal Medika, Vol 6 No12: 157-163. Available at: https://ojs.unud.ac.id/index.php/eum/article/view/36440

Ryoto, V (2012). "Hubungan Antara Kekuatan Otot Genggam dengan Umur, Tingkat Kemandirian, dan Aktivitas Fisik pada Lansia Wanita Klub Geriatri Terpilih Jakarta Utara Tahun 2012". [Undergraduate]. Jakarta: Universitas Indonesia;

Setiawan, D.A. and Setiowati, A. (2014) Hubungan Indeks Massa Tubuh (IMT) terhadap Kekuatan Otot pada Lansia di Panti Wredha Rindang Asih III Kecamatan Boja. Journal of Sport Sciences and Fitness.;3(33):30-34.

Pribis P, et al. (2010) Trends in body fat, body mass index, and physical fitness among male and female college students. *Nutrients.*;2:1075-1085.

Suandewi Dasa, Purnawati S, Saraswati MR (2017). Hubungan indeks massa tubuh (IMT) dan aktivitas fisik dengan kekuatan otot genggam pada pasien diabetes melitus tipe 2 di rumah sakit umum pusat Sanglah Denpasar. *E- journal Medika,* ;6(12):157-163.

Al-Asadi, J.N. (2014) Handgrip strength in medical students: correlation with body mass index and hand dimensions. Iraq: Asian Journal of Medical Sciences, Vol. 9, pp. 21-24.: https://www.researchgate.net/journal/Journal-of-Institute-of-Medicine-Nepal

Dewi HS, Susetyowati, Danarti SRD (2018). Hubungan status gizi (IMT dan LLA) terhadap kekuatan genggaman tangan pada pasien kanker payudara dengan radioterapi di RSUP Dr. Sardjito Yogyakarta. *Skripsi,* Universitas Gadjah Mada.; http://etd.repository.ugm.ac.id/penelitia n/detal/129547

Pasumbung E, Purba MM (2015). faktor risiko obesitas berdasarkan indeks massa tubuh dan lingkar pinggang di SMA Katolik Palangkaraya. *Jurnal Vokasi Kesehatan*;1(1):1-8.

Dhara, Prakash C, Piyali S, Sujaya D (2011) Hand grip strength of older persons in relation to body dimensions and nutritional status. Journal of The Indian Academy of Geriatrics ;7:143-149.

Arikatus Shofia, Dandi Putra Setiawan, Nur Amin, Ika Nilawati, Saeful Fadly (2021) . Hubungan Status Gizi Dengan Kekuatan Otot Lengan Atlet Bola Basket. Nutrition Research and Development Journal. Volume 01 Nomor 01, Juli (1-5). https://journal.unnes.ac.id/sju/index.php/nutrizione/.

Frank Q. Nuttall (2015). Body Mass Index. Obesity, BMI, and Health: A Critical Review. Nutr Today. (3): 117–128. https://www.ncbi.nlm.nih.gov/pmc/artic les/PMC4890841/terhadap Kekuatan Otot pada Lansia di Panti Wredha Rindang Asih III Kecamatan Boja. Journal of Sport Sciences and Fitness. 2014;3(33):30-34.

Pribis P, et al. Trends in body fat, body mass index, and physical fitness among male and female college students. *Nutrients.* 2010;2:1075-1085.

Suandewi DASA, Purnawati S, Saraswati MR. Hubungan indeks massa tubuh (IMT) dan aktivitas fisik dengan kekuatan otot genggam pada pasien diabetes melitus tipe 2 di rumah sakit umum pusat Sanglah Denpasar. *E- journal Medika.* 2017;6(12):157-163.

Al-Asadi, J.N (2018) Handgrip strength in medical students: correlation with body mass index and hand dimensions. Iraq: Asian Journal of Medical Sciences, Vol. 9, pp. 21-24. Availableat: https://www.researchgate.net/journal/Jo urnal-of-Institute-of-Medicine-Nepal

Dewi HS, Susetyowati, Danarti SRD (2018). Hubungan status gizi (IMT dan LLA) terhadap kekuatan genggaman tangan pada pasien kanker payudara dengan radioterapi di RSUP Dr. Sardjito Yogyakarta. *Skripsi,* Universitas Gadjah Mada http://etd.repository.ugm.ac.id/penelitia n/detal/129547

Pasumbung E, Purba MM. faktor risiko obesitas berdasarkan indeks massa tubuh dan lingkar pinggang di SMA Katolik Palangkaraya. *Jurnal Vokasi Kesehatan.* 2015;1(1):1-8.

Dhara, Prakash C, Piyali S, Sujaya D. Hand grip strength of older persons in relation to body dimensions and nutritional status. Journal of The Indian Academy of Geriatrics. 2011;7:143-149.

Arikatus Shofia, Dandi Putra Setiawan, Nur Amin, Ika Nilawati, Saeful Fadly. Hubungan Status Gizi Dengan Kekuatan Otot Lengan Atlet Bola Basket. Nutrition Research and Development Journal. Volume 01 Nomor 01, Juli 2021 (1-5). Avalaible at: https://journal.unnes.ac.id/sju/index.php /nutrizione/.

Frank Q. Nuttall. Body Mass Index. Obesity, BMI, and Health: A Critical Review. Nutr Today. [Internet]. 2015 May; 50(3): 117–128. Available: https://www.ncbi.nlm.nih.gov/pmc/artic les/PMC4890841/