

Physical Activities, Nutritional Status, HDL-LDL Cholesterol Content and Physical Fitness of the Aerobic Calisthenics Exercising Women in Lubuk Pakam

Novriani Tarigan¹, Tiar Lince Bakara¹

Health Polytechnics, Nutrition Section, Indonesian Health Department Medan

Abstract: *Consistent calisthenics exercises are able to improve physical fitness. The excellent physical fitness of Indonesian women were very low. There are several factors contributing the level of men physical fitness such as age, sex, heredity or genetics, food, cigarette addiction, exercises, physical activities and body fat. This research is revealing the relation of physical activities, nutritional status, HDL and LDL cholesterol content with physical fitness of women that regularly participating the aerobic calisthenics exercises. This research performed in Lubuk Pakam on January 2016. This research is an observational cross sectional design on 54 women between 41 and 59 years of age. HDL and LDL cholesterol content were obtained in Lubuk Pakam Public Hospital. The physical fitness were measured by five minutes of Harvard Step Test. Data were studied by correlation test. The result shows a significant relation between physical activities and physical fitness, that is, more physical activities will give fitter physique. There is also a significant negative relation between HDL cholesterol content with physical fitness, that is, a normal HDL cholesterol content tends to reduce the physical fitness.*

Keywords: Physical activities, BMI, Body fat percentage, HDL cholesterol, Physical fitness

1. Introduction

Indonesians today have a life time of 69 years age, but in 2025 there will be 273.65 million people that might have longer live to reach 73.7 years. People could improve their health by managing their body fat, that is, by managing food intake, and exercising, with its true knowledge¹.

More than two million world people are dying each year due to lack of physical activities. Sixty percent to 85% of people of most countries have no adequate physical activities². Those countries are facing difficulties to manage their people's physical fitness. Human activities are supported by its fitness³. A consistent exercise or physical activities could improve physical fitness.

Aerobic calisthenics is a kind of exercises. It employs most large muscles continuously and rhythmically. Music in aerobic calisthenics helps to increase motivation and sustains the speed. A right aerobic calisthenics will give benefit, that is, by gradual and consistent exercises³.

In Indonesia, people's participation on sports were indicated in Sport Development Index (SDI). In the year 2005, the participation was 0.345, and 0.422 in 2006⁴. By the year 2014 it became 0.56 that was still a low level compare to normal participation represents by one⁵. Based on the year 2006 SDI report, 1.08% of Indonesian have an excellence fitness, 4.07% categorized to good, 13.55% fair, 43.90% unfit, and 37.40% bad. These facts were frightening⁴. Factors that contributing physical fitness are age, sex, genetics or hereditary, food intakes, cigarette addiction, exercises, physical activities and body fat⁶.

According to data from basic medical research in 2013, revealed that proportion of physical activities was 26.1% that

was categorized to be generally not-active. Meanwhile in North Sumatera the figure was 23.5%⁷. Physical activities is any movement of part of the body that need power or energy. The demand of energy were varied as intensity and duration of the physical activities. Heavier and longer the activities, bigger energy needed⁸.

Nutritional status represented by body mass index (BMI) and body fat percentage. BMI have been widely used as a general weight indicator of child, teen and adult. Nowadays, BMI is rather used as a proportion criterion of body shape instead of the table that directly compares the body height with body weight⁹. Fat roles as energy and fat-base vitamins storage. Physically it protects organs against mechanical hits. Male or female needs fat as much as 3% of its body weight. Fat are situated under the skin, stomach shield, around kidney tissue, and outlying the hearth surface¹⁰.

Amelia (2013) revealed a weak negative correlation between physical activities and body fat percentage, and a significant relation between physical activities and body fat percentage. This negative correlation refers to a condition that a higher intensity of physical activities will reduce the body fat percentage of aerobic calisthenics exercising women⁸.

Lipid profile is a condition of blood fat that referred to its total cholesterol content in blood, LDL, HDL and Triglyceride. Concentration of blood lipid profile in an obese child is same as lipid profile in cardiovascular disorders. That child is also exposed to a higher risk of blood hypertension. The accumulation of atherosclerosis related to the lipid in blood¹¹. Elmukhsinur (2013) revealed that aerobic calisthenics contributes to increase HDL cholesterol content¹².

Sports is any physical activities performed as planned for various goals, such as physical healthy, recreational, fitness, education, and individual achievement. Sports related with capacity of hearth system (hearth and vessels), neural and muscle system³. The WHO studies on risk factors, states that lack of physical activities, for instance too much sitting during working, is a cause of human deaths or disabilities in the world.

The government of LubukPakam City performs an aerobic calisthenics in an open public court called LapanganSegitiga. Until now, they performed it weekly, joined by 200s people of various ages. The researchers wished to perform a study called Physical activities, Nutritional status, HDL-LDLCholesterol Content with Physical Fitnessof Aerobic Calisthenics Participantsin LubukPakam.

2. Method

This research was performed in LapanganSegitigaLubukPakam. Data were collected on January 2016. This is an *observation research* with *cross sectional research design* to reveal the relation of physical activities, nutritional status, and HDL-LDL cholesterol content with physical fitness of 186 aerobic calisthenics participants in the city of LubukPakam. Subjects were choose base on inclusion criteria, between 41 and 59 years of age. There were 54 samples that fulfilled these criteria: have joined the exercise continuously not less than three months, willing to be a sample, in good health, able to communicate.

Data were taken by interview by the researcher which assisted by some enumerators and analysts of the Public Hospital of Deli Serdang. The data included name, date of born, education, occupation, race, membership duration, address. Physical activities data were collected by interviews using quiz once every 24 hours within two days intermittently.

Nutritional status data were collected by measuring of the body fat percentage, using *bioelectrical impedance analysis* (BIA) tool. BMI data were obtained measuring of the weight and length of subjects. HDL-LDL cholesterol content data were obtained by taking the blood sample with GOD-PAP method using German LOT D393 Biocon tool. The blood were taken by some analysts of the Public Hospital of Deli Serdang and measured in the same hospital. Physical fitness were measured by a five minutes *Harvard Step Test* continuously.

Recall of physical activities data than were converted to *Physical Activity Ratio* (PAR). Total calories used by subject during the 2 days intermittent physical activities were calculated based on the PAR table to obtain the *Physical Activity Level* (PAL) of each subject within 2 days. The formula to get the PAL is this: Sum of duration of each activity times PAR divide by 24 hours. The total of PAL within 2 days than divided by 2 to get its average. The categories are these: very light: 1.20 – 1.39 PAL; light: 1.40 – 1.69 PAL; fair: 1.70 – 1.99 PAL; heavy: 2.00 – 2.40 PAL. The categories of BMI are these: low: <18.5 kg/m²; normal:

18.5 – 25.0 kg/m²; over: > 25.0 kg/m². The categories of body fat percentage are these: high: > 30%; normal: 20 – 30%; low: < 20%. The categories of HDL cholesterol content are these. Low: <40 mg/dl, good: 40 – 60 mg/dl; high: >60 mg/dl. Categories of LDL cholesterol content are these. Good: <100 mg/dl; normal: 100 – 150 mg/dl; high: >150 mg/dl. Categories of fitness are these. Very good: > 90; good: 80 – 89; sufficient: 65 – 79; lack: 50 – 64; very lack: <50.

The correlation test was used by univariate to describe each variable and the bivariate to test the hypothesis. The result shows that if $p < 0.05$ then H_0 is rejected to erect a relation of physical activities, nutritional status, HDL-LDL cholesterol content with physical fitness of the aerobic calisthenics participants in LubukPakam.

3. Result

Subject Characteristics

Subjects of this research were 51 women of 41-59 years age. Table 1 showing the data of subject characteristics.

Table 1: Characteristics of the aerobic calisthenics participants in LubukPakam city

Variable		Frequency	
		N	%
Age	41-50 years	34	66.7
	51-59 years	17	33.3
	Sum	51	100
Education	Low School	12	23.5
	Junior School	9	17.6
	High School	19	37.3
	University	11	21.6
	Sum	51	100
Occupation	House host	27	52.9
	Particular Businesses	6	11.8
	Trader	6	11.8
	Civil Servants	6	11.8
	Others	6	11.8
	Sum.	51	100
Duration of aerobic exercise	3 months to 1 year	15	29.4
	More than 1 year	36	70.6
	Sum.	51	100

Table 1 shows, by age, the larger members are from the age of 41-50 years, and by education, the larger members are high school. Half of aerobic calisthenics participants are house host, 70.6% were active as member for more than 1 year.

Physical fitness

Table 2 shows that all calisthenics participants were not fit.

Table 2: Characteristics of physical fitness of subjects

Variable	Frequency	Percentage
Very low	51	100

Physical activities, BMI, Body fat percentage, HDL-LDL cholesterol content

Table 3: Frequency distribution of subject base on physical activities, BMI, Body fat percentage, HDL-LDL cholesterol content

Variable		Frequency	
		N	%
Physical activities	Very light	2	3.9
	Light	36	70.6
	Fair	13	25.5
	Sum	51	100
BMI	Normal	11	21.6
	Fatty	7	13.7
	Obese	33	64.7
	Sum	51	100
Body fat percentage	Normal	9	17.6
	Over	42	82.4
	Sum	51	100
HDL cholesterol content	Low	11	21.6
	Normal	35	68.6
	High	5	9.8
LDL cholesterol content	Optimum	8	15.7
	Border of High	9	17.6
	High	34	66.7
	Sum	51	100

Most subjects (70.6%) could be categorized to *light*. The nutritional status, based on BMI, 64.7% were categorized to *obese*, and base on body fat percentage 82.4% were categorized to *over*. More than half subjects (68.6%) have *normal* HDL cholesterol content, and 9.8% only have a *high* HDL cholesterol content. The *high* LDL cholesterol content was belong to 66.7% subjects.

Table 4: The minimum, maximum, average, and deviation standard physical activities variable, BMI, Body fat percentage, HDL-LDL cholesterol content

Variable	Minimum	Maximum	Average ± SD
Physical activities	1.37	2.01	1.63 ± 0.14
BMI	21.17	39.95	28.12 ± 3.74
Body fat percentage	28.9	48.20	36.5 ± 5.05
HDL cholesterol content	31	68	47.47 ± 9.18
LDL cholesterol content	55	238	145.75 ± 40.33

Table 4 shows the light category of physical activities, BMI categorized to be over, body fat percentage to be high. HDL cholesterol content categorized to normal, and LDL cholesterol content categorized to be normal.

Table 5: Relation of physical activities, BMI, Body fat percentage, HDL-LDL cholesterol content, with Physical fitness

Variable	Physical fitness	
	r	P
Physical activities	0.29	0.039 *
BMI	-0.119	0.405 **
Body fat percentage	-0.139	0.330 **
HDL cholesterol content	-0.328	0.0019 *
LDL cholesterol content	-0.110	0.444 **

*Correlation by Pearson test

** Correlation by Spearman rank test

The result of correlation test reveals that there is a significant relation between physical activities and physical fitness ($p < 0.05$), and the positive correlation meaning that the higher the physical activities the better the physical fitness, with fair correlation. HDL cholesterol content have a significant relation with physical fitness ($p < 0.05$). The

negative correlation meaning that the higher the HDL cholesterol content the lower the fitness. There is no significant relation between BMI, body fat percentage, LDL cholesterol content and triglyceride content with physical fitness ($p > 0.05$), the negative correlation meaning that the higher the BMI the lower the fitness, and the higher body fat percentage the lower the fitness.

4. Analysis

Fitness

The fitness is related with daily activity performance, with power and the effort to minimize the risk of degenerative disorders. This research reveals that the fitness of all (100%) subjects were categorized in very low level. Even though more than 70.6% subjects have been exercising more than 1 years, their fitness were not automatically in good shape. Several earlier researches have come to similar result that the group have been dominated by the unfit subjects. Nurwidyastuti, in 2012 revealed that 88.7% of Architecture undergraduate students were categorized to unfit¹³. Cendani in 2011 shew that 80% of teens that studied in State High School-2 were categorized to unfit¹⁴. Hermantoin 2012 revealed that 69.76% vegetarian women in Semarang were categorized to be very unfit¹⁵.

Relation of Physical activities with Physical fitness

Physical activities refer to any body movement done by frame muscle that need an amount of kilo-calorie of energy. Such activity could be categorized to light, fair, or heavy that could improve health in long and consistence run. Lack of physical activities would enlarge the risks to several chronic diseases, and generally could put a person to death.

Pearson statistical test shows a significant relation between physical activities and fitness, with fair relation level. This meaning that the higher physical activities the more the fitness. Hermantoin 2012 revealed a significant relation on vegetarian women¹⁵. Nurwidyastuti in 2012 shew a significant relation between physical activities and fitness by the OR of 4.62, that is, the dependences of non-active sports were tended to be 4.62 times unfit compare to the active¹³.

Relation of Nutritional status (BMI and Body fat percentage) with Physical fitness

An adult's (above 18 years of age) energy sufficiency is represented by body his weight that represented by a body mass index (BMI). Theoretically, the higher the fitness, the higher the ability to do the physical activities, and the lower the BMI.

This research showing (table 2) that 100% subjects were very unfit, meanwhile the BMI and body fat percentage were categorized to be 64.7% obese and 82.4% were categorized to be over. This research supports Hermantoin 2012 that revealed no significant relation between BMI ($r = -0.119$; $p = 0.405$) and body fat percentage ($r = -0.139$; $p = 0.330$)¹⁵. A person with a good nutritional status could sustain his fitness and his health. Nurwidyastuti in 2012 said there was no significant relation between BMI and body fat percentage with physical fitness¹³. Lubisin 2015 revealed a significant

negative correlation between BMI with fitness on medical students of Universitas Andalas¹⁶.

Relation of nutritional status with fitness could be explained as this. Fitness is an ability of the body to bear the load of works. A good fitness could be achieved if the body have a sufficient energy. Energy is coming from oxidizing the carbohydrates, fat, and protein. The level of nutritional status represented by the nutritional status. Sukmajati in 2015 stated that there is a significant relation between body fat with fitness on the students of UKM. Its negative relation revealed that the lower the body fat percentage the higher the fitness¹⁷.

Relation of HDL-LDL cholesterol content with physical fitness

This research showing that 100% subjects were very unfit, with average HDL cholesterol content categorized to be normal (47.47), and LDL cholesterol content categorized to be normal (145.75). HDL cholesterol content with a negative significant correlation, showing that the higher the HDL the lower the fitness. Meanwhile the LDL cholesterol content have no relation with fitness.

Except sports, there are factors contribute to level of HDL-LDL cholesterol content. Low fat diet, fibered food, and antioxidant could control LDL cholesterol content. HDL cholesterol content could be increased by sustaining the ideal body weight, balance menus, aerobic exercises, not smoking and not consuming alcohols¹⁸.

This research supports Mamitoh in 2016 revealed that there was no significant contributions to total cholesterol on the elder members of calisthenics that perform 24 exercises within 8 weeks¹⁹. Contradicting with other researches, Innashin 2013 studied the relation of blood total cholesterol content with aerobic calisthenics among the medical students of UNISSULA. There was a significant relation between blood total cholesterol content with aerobic calisthenics by a correlation coefficient of -0.281²⁰. Elmukhsinur in 2013 showing no differences of aerobic calisthenic of the participant group and the control group. Meanwhile the HDL cholesterol content were increased significantly by $p < 0.012$ ($P < 0.05$) on the aerobic calisthenics participant that perform 18 exercises within 6 weeks. That research also revealed that aerobic calisthenics were contributing to increase aerobic calisthenics⁵. Leon and Sanchez in Mann (2014) have performed a 12 weeks intervention aerobic exercises, revealed that HDL cholesterol content was increased by 4.6%, and LDL cholesterol content decreased by 5%. Dunn in Mann (2014) studied the effects of 6 month program of aerobic exercises sports, reported that there was a significant decline of total cholesterol by $p < 0.001$. Lemurain Mann (2014) reported an increasing HDL cholesterol content ($p < 0.05$) following a 3 weeks exercises. Those data shows that a short run intervention could be effective if there is a sufficiently high quantity or intensity of exercises. There is an expected additional benefit if the frequency of exercises is increased to be four times a week. Body fat percentage were decreased to be 13% ($p < 0.05$)²¹.

Physical activities and sports could rectify the cholesterol content. A regular and consistent activity have proved to increase the HDL cholesterol content, and maintained LDL cholesterol content. There was also a proof that increasing calories emission due to aerobic exercises by increasing intensity or duration have contributed the activity of lipase lipoprotein, HDL and cholesterol content. This information could help people to control or to prevent dyslipidemia, and to minimize the risks of heart stroke, and coronary disorders²¹.

5. Results

There are significant relation between physical activities with physical fitness, and a significant negative relation between HDL cholesterol content with physical fitness. There is no relation between BMI and body fat percentage with physical fitness. No significant relation between LDL cholesterol content with physical fitness.

References

- [1] Budiyo, Kodrad. 2015. Aplikasi Calisthenics Aerobic High Impact and Low Impact Terhadap
- [2] Penurunan Presentase Body Fat Pada Kepala Sekolah Dasar Sekecamatan Banjarsari Surakarta. Education Kepe exercises Sports, FKIP, UNS, Surakarta.
- [3] Sientia, Fathirina. 2012. Pengaruh Exercises Aerobic calisthenics Terhadap Perubahan Body weight Pada Peserta Klub Fitness. Fakultas Kedokteran Universitas Diponegoro.
- [4] Purwanto, 2011. Dampak Aerobic calisthenics Terhadap Endurance Tubuh and Penyakit. Jurnal Media Ilmu Kesporsan Indonesia, Universitas Negeri Semarang, Semarang.
- [5] Kementerian Pemuda and Sports, 2010. Rencana Strategis Kementerian Pemuda and Sports years 2010-2014.
- [6] Kementerian Pemuda and Sports, 2014. Laporan Kinerja Instansi Pemerintah.
- [7] Afiwardi, 2010. Ilmu kedokteran Sports. Jakarta, EGC.
- [8] Kemenkes RI, 2013. Laporan Riset Kesehatan Dasar. Litbangkes. Jakarta
- [9] Amelia, Irma Nur, 2014. Relation of between asupan energy and physical activities with body fat percentage pada women pesertaaerobic calisthenics. Journal of nutrition college vol 3 no 1: 200-205.
- [10] Rahmawati, Annis. 2009. Relation of Between Body mass index with Usia Awal Andropause. Skripsi. Fakultas Kedokteran, Universitas Sebelas Maret, Surakarta
- [11] Almatier, Sunita. 2010. Prinsip Dasar Ilmu Gizi. PT. Gramedia Pustaka Utama, Jakarta.
- [12] Iksan, Astrid Novieradkk. 2015. Gambaran lipid profile pada siswa obese di SMP Negeri 1 Manado. Skripsi. Fakultas Kedokteran Universitas Sam Ratulangi Manado.
- [13] Elmukhsinur, 2013. Pengaruh aerobic calisthenic terhadap tingkat fitness and kadar high density lipoprotein cholesterol. Thesis. Universitas Andalas.

- [14] Nurwidyastuti, Dinda. 2012. Relation of Konsumsi Zat Gizi, Nutritional status, and Faktor-Faktor Lain with Status Fitness Mahasiswa Departemen Arsitektur Fakultas Teknik Universitas Indonesia. Skripsi. Program Studi Sarjana Gizi, Fakultas Kesehatan Masyarakat, Universitas Indonesia, Depok.
- [15] Cendani, C. Etisa AM. 2011. Asupan mikronutrien, kadar hemoglobin and fitness remaja putri. Media Medika Indonesia. Volume 45. issue I.
- [16] Hermanto, RS. Hesti M.R. 2012. Faktor-faktor contribute to fitness pada vegetarian women. Journal of nutrition college. Volume I No. 1: 38-45.
- [17] Lubis, H.M. Delmi S. Afriwardi. 2015. Relation of body mass index with ketahanan kardiorespirasi, kekuatan and ketahanan otot and fleksibilitas pada mahasiswa laki-laki jurusan pendidikan dokter Universitas Andalas angkatan 2013. Jurnal kesehatan andalas 4(1):142-150.
- [18] Sukmajati, Refina Putri. 2015. Relation of Asupan Zat Gizi Mikro and Komposisi Body fat with Tingkat Fitness Mahasiswa di UKM Sepakbola UNY. Skripsi. Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta, Surakarta.
- [19] Linder, Maria C. 2010. Biokimia Nutrisi and Metabolisme. Jakarta, Universitas Indonesia.
- [20] Mamitoho, 2016. Pengaruh calisthenics lansia terhadap total cholesterol content pada lansia di BPLU Senja Cerah Manado. Jurnal e-biomedik PAAI. Volume 4 no 1.
- [21] Innash, Rahmaan and Ika Rosdiana, 2013. Relation of between blood total cholesterol content with VO₂-max melalui uji jalan 6 menit. Sains Medika, vol 5. No.1. Januari-Juni 2013:1-3
- [22] Mann S, Christopher B, Alfonso J. 2014. Differential effects of aerobic exercise, resistance training and combined exercise modalities on cholesterol and the lipid profile: review, synthesis and recommendations. Sports medicine, 44(2): 211-221.