

ISSN-0976-0245 (Print) • ISSN-0976-5506 (Electronic)

Volume 11 / Number 01 / January 2020



# Indian Journal of Public Health Research & Development

An International Journal

## SCOPUS IJPHRD CITATION SCORE

Indian Journal of Public Health Research and Development  
Scopus coverage years: from 2010 to till date. Publisher:  
R.K. Sharma, Institute of Medico-Legal Publications  
ISSN:0976-0245E-ISSN: 0976-5506 Subject area: Medicine:  
Public Health, Environmental and Occupational Health  
CiteScore 2017-0.03  
SJR 2017 - 0.108  
SNIP 2017- 0.047



Website:

[www.ijphrd.com](http://www.ijphrd.com)

# The Relationship between Obesity and Dyslipidemia in Adolescents

Ria Qadariah Arief<sup>1</sup>, Ridwan Amiruddin<sup>2</sup>, Syamsiah Russeng<sup>2</sup>,  
Citra Kesumasari<sup>2</sup>, Nurhaedar Jafar<sup>2</sup>, Ummu Salamah<sup>2</sup>, Nugrahaeni<sup>3</sup>

*<sup>1</sup>Faculty of Psychology and Medical Science, Universitas Islam Negeri Sunan Ampel, Surabaya,  
<sup>2</sup>Faculty of Public Health, Hasanuddin University, Makassar, <sup>3</sup>Faculty of Public Health,  
Diponegoro University, Semarang, Indonesia*

## Abstract

**Background:** Obesity is a condition of chronic accumulation of body fat and a factor for the onset of serious diseases such as dyslipidemia. Obesity and dyslipidemia are emerging as significant public health challenges in South Asian countries

**Aim:** This study aimed to assess the association of obesity with dyslipidemia by measuring LDL and HDL in adolescents

**Method:** This study is an observational analytic study with a cross-sectional design. Sixty-two adolescents aged 17-19 years were randomly using systematic random sampling. LDL and HDL, anthropometric (weight, height, and BMI). Analysis data was performed using an independent t-test, chi-square test, and Fisher test

**Results:** The results showed that the samples with a high risk for the measurement of LDL and HDL.

**Conclusions:** It was concluded that obese adolescents have close links with dyslipidemia and have low HDL level. Obesity in adolescents is essential as early as possible so that it does become a significant health problem.

**Keywords:** *Obesity, Dyslipidemia, LDL, and HDL.*

## Introductions

Obesity is a chronic disease that can cause various other degenerative diseases. The development of the problem of obesity has been widespread throughout the country, and its occurrence has increased every year for the past 40 years. The increase in the incidence of obesity also increases the increase in the incidence of degenerative diseases. Such as dyslipidemia which even increased in adolescence.

The Problem of Body Weight Proportion has experienced a very remarkable development, from 1975 to 2014, with changes in the average value of BMI of the world's population, ranging from 21.7 kg/m<sup>2</sup> in 1975 to 24.2 kg/m<sup>2</sup> in 2014, where in males from 22.1 kg/m<sup>2</sup> in 1975 to 24.4 kg/m<sup>2</sup> in 2014. These data indicate that an increase in BMI of the world population supports a positive shift towards obesity BMI. And finally in 2014 the face of the world changes increasingly concentrated due to obesity problems with the prevalence of morbidity due to obesity globally of 0, 64% of male sex and 1.4% of women<sup>1</sup>. Thus, the change in BMI of the world's population for four decades supports the spread of obesity to high mortality rates.

Likewise, the development of the problem of obesity in Indonesia is clearly illustrated in the 2007 Riskesdas data with the national prevalence of obesity in people

---

### Corresponding Author:

**Ria Qadariah Arief**

Faculty of Psychology and Medical Science,  
Universitas Islam Negeri Sunan Ampel, Surabaya,  
Indonesia.

e-mail: ria.qadariah@gmail.com

Contact No.: 085255381987

aged > 18 years by 13.9% and becoming 19.7% in 2013<sup>2</sup>. The picture of the population above the age of 18 shows that for the Indonesian population the coverage of adults and the elderly has a problem of obesity which is quite alarming and requires special attention in their snacks.

The incidence of obesity for South Sulawesi has experienced a very large increase. The prevalence of obesity in the Selayar Archipelago District is 32.49% greater than the prevalence of obesity at the provincial level in South Sulawesi which amounted to 23.67% in 2016.

Where in adolescence, obesity, drugs cannot be done because they are still in growth period. While on the other hand the condition of obesity experienced by adolescents raises new problems namely dyslipidemia.

LDL and HDL changes that occur in adolescents can cause dyslipidemia problems more quickly at a younger age. This change is a very big dynamic from very high LDL and very low HDL in adolescents. Or a standard LDL level but a very low HDL level.

This study aimed to assess the association of obesity with dyslipidemia by measuring LDL and HDL in adolescents. The purpose of this study is to prove that there are changes in LDL and HDL in adolescents due to their obesity. This is important to be the reason for the importance of promoting obesity treatment in adolescents. To prevent dyslipidemia.

### Method

In our respondents we measured LDL, HDL, and anthropometric measurements including abdominal circumference using measuring tape, body weight with weight scales, height with microtoa, and BMI (Body Mass Index).

BMI measurement by calculating body weight in Kg divided by height in meters squared. Like the following formula:

$$BMI = \frac{weight(Kg)}{(height(m))^2}$$

Measurements of LDL and HDL were carried out as a result of venous blood tests taken from adolescents and measured in Lab. Prodia Makassar, Indonesia.

The data of this study were analyzed by independent t-test, chi-square test, and Fisher test to see the relationship of several measured variables.

## Results

### The results of this study

**Table 1. Characteristics of Adolescent Respondents**

Variabel	N	%
<b>Gender</b>		
Men	27	43.5
Women	35	56.5
<b>Age</b>		
17	5	8.1
18	45	72.6
19	12	19.4
<b>Central Obesity</b>		
Normal	21	33.8
Obesity	41	66.2
<b>BMI</b>		
Normal	22	35.5
Obesity	40	64.5

Based on table 1 above shows the majority of respondents are female adolescents with a percentage of 56.5%. and dominated by 18 years old with 72.6%. Respondents who had central obesity based on measurements of abdominal circumference were 66.2%, and for respondents who were obese based on the results of BMI measurements were 64.5%.

**Table 2. Lipid Profile and Obesity According to Central Obesity of Adolescent**

Central Obesity			
Variable	Normal Mean ± SD (n=21)	Obesity Mean ± SD (n=41)	P
HDL	51.9 ± 10	43.9 ± 7	0.001
LDL	98 ± 18	115 ± 33	0.01
LDL/HDL	2.2 ± 0.58	2.6 ± 1	0.063

From table 2 above shows that HDL levels in adolescents with central obesity conditions are much lower than in adolescents with normal abdominal circumference which is a mean of 43.9 ± 7 with a value of P < 0.005.

**Table 3. Lipid Profile and Obesity According to Body Mass Index of Adolescent**

Body Mass Indeks			
Variable	Normal Mean ± SD (n=22)	Obesity Mean ± SD (n=40)	P
HDL	51.4 ± 10.4	44 ± 7.6	0.002
LDL	98.2 ± 17	116.3 ± 32.8	0.007
LDL/HDL	2.2 ± 0.6	2.6 ± 1.05	0.057

In table 3 above shows that adolescents with obese conditions have very low HDL levels compared to normal adolescents. This obesity measurement was

based on the Adolescent Body Mass Index adjusted for BMI chart percentile tables for children and adolescents based on CDC 2000.

**Table 4. Obesity Based by Waist Circumferences According to Lipid Profile of Adolescent**

Variabel		LDL				P	HDL				P	LDL/HDL				P
		Hight Risk		Low Risk			Low Risk		Hight Risk			Low Risk		Hight Risk		
		N	%	N	%		N	%	N	%		N	%	N	%	
Central Obesity	Obesity	29	70.7	12	29.3	0.153 *	14	34.1	27	65.9	0.036*	11	26.8	30	73.2	0.046**
	Normal	11	52.4	10	47.6		2	9.5	19	90.5		1	4.8	20	95.2	

\*Chi-square test, \*\*Fisher test

Based on table 4 above shows that central obesity has a close relationship with HDL levels and LDL/HDL ratio which shows a close relationship with the risk of

heart disease. This is seen as a significant value from the Chi-squer and Fisher test analysis results as attached in table 4 above.

**Table 5. Obesity Based by Body Mass Index According to Lipid Profile of Adolescent**

Variabel		LDL				P	HDL				P	LDL/HDL				P
		Hight Risk		Low Risk			Low Risk		Hight Risk			Low Risk		Hight Risk		
		N	%	N	%		n	%	N	%		N	%	N	%	
Obesity by BMI	Obesity	29	72.5	11	27.5	0.076*	13	32.5	27	67.5	0.104*	11	27.5	29	72.5	0.042**
	Normal	11	50	11	50		3	13.6	19	86.4		1	4.5	21	95.5	

\*Chi-square test, \*\*Fisher test

Based on table 5, the relationship of obesity based on BMI in adolescents shows a very close relationship with the LDL/HDL ratio for those who are at high risk of heart disease.

in children is higher in the community of children with obesity so that the examination of lipid profiles in children with obesity is needed for prevention<sup>3</sup>. Conditions like this have a bad impact on their health status in adulthood<sup>4</sup>.

**Discussion**

This study provides an overview of the relationship of Obesity in adolescents both based on BMI and Abdominal Circumference have very low HDL levels and this poses a severe risk for heart disease in the future. This research provides evidence of the obesity conditions experienced by adolescents putting the burden of other health problems. And giving the weight of obesity management treatments is important given to adolescents to prevent the occurrence of diseases due to weight gain.

One important determinant that can cause early atherosclerosis problems at a younger age is adiponectin<sup>5</sup>. Low adiponectin is associated with atherogenic lipid profiles<sup>6</sup>. Likewise, the problem of cardio vascular disease in adulthood is suspected of having begun since childhood<sup>7</sup>. This is the main key to the importance of examining the lipid profile in the condition of observation both in children and adolescents.

Because further research is still needed to answer and provide a big picture of this in younger age groups and the involvement of more respondents.

The high prevalence of dyslipidemia problems

### Conclusion

Based on the results of this study it can be concluded that obesity experienced by adolescents can reduce HDL levels in lipid metabolism in adolescents' bodies and has a high risk of the appearance of heart disease.

**Conflict of Interest:** None.

**Source of Funding:** Source of personal funding

**Ethical Clearance:** From Faculty of Public Health, Hasanuddin University.

### References

1. Di Cesare M, Bentham J, Stevens GA, Zhou B, Danaei G, Lu Y, et al. Trends in adult body-mass index in 200 countries from 1975 to 2014: A pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *Lancet* [Internet]. 2016;387(10026):1377–96. Available from: [http://dx.doi.org/10.1016/S0140-6736\(16\)30054-X](http://dx.doi.org/10.1016/S0140-6736(16)30054-X)
2. Balitbangkes. Riset KESEHATAN DASAR TAHUN 2013. 2013.
3. Boyd GS, Koenigsberg J, Falkner B, Gidding S, Hassink S. Effect of Obesity and High Blood Pressure on Plasma Lipid Levels in Children and Adolescents. 2019;116(2).
4. Mijailović V, Micić D, Mijailović M. Effects of childhood and adolescent obesity on morbidity in adult life. *J Pediatr Endocrinol Metab* [Internet]. 2001;14 Suppl 5:1339–44; discussion 1365. Available from: <http://europepmc.org/abstract/MED/11964032>
5. Zech F, Tran H, Mong T, Clapuyt P, Maes M, Brichard SM. Determinants of Early Atherosclerosis in Obese Children. 2007;92(8):3025–32.
6. Marso SP, Mehta SK, Frutkin A, House JA, McCrary JR, Kulkarni KR. Low Adiponectin Levels Are Associated With Atherogenic Dyslipidemia and Lipid-Rich Plaque in Nondiabetic Coronary Arteries. *Diabetes Care* [Internet]. 2008;31(5):989–94. Available from: <https://care.diabetesjournals.org/content/31/5/989>
7. Cook S, Kavey REW. Dyslipidemia and Pediatric Obesity. *Pediatr Clin* [Internet]. 2011 Dec 1;58(6):1363–73. Available from: <https://doi.org/10.1016/j.pcl.2011.09.003>