

The Effect of Alcohol on Low Density Lipoprotein Level

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Abstract

Original Research Article

Cardiovascular disease according to *World Health Organization* (WHO, 2012) is a major cause of death worldwide (31%). The prevalence of coronary heart disease on age > 15 year old in Indonesia in 2013 is 0.5% and the prevalence in North Sulawesi based on diagnosis is 0.7% and based on symptoms 1.7%. In 2018 based on doctor diagnosis the prevalence increased to 1.8% and became a tenth rank in Indonesia. The main Lipoproteins circulated in blood are chylomicrons, *Very Low Density Lipoprotein* (VLDL), *Low Density Lipoprotein* (LDL) and *High Density Lipoprotein* (HDL). Intermediate Density Lipoprotein is derived from VLDL in the formation of LDL. High level of LDL will form a plaque that builds up in arteries, a condition called atherosclerosis. LDL level can be affected by several factors such as genetics, diet, weight, physical activity, smoking and alcohol consumption. **Objective:** The objective of this study is to determine the effect of alcohol consumption on blood LDL level. **Methods:** This is an observational study with a cross-sectional design on 60 male university students (Faculty of Economy and Business, University of Sam Ratulangi) aged 20 - 24 year old who consumed alcohol drink regularly. Primary and secondary data were collected using questionnaire and interview. Blood samples were analyzed in clinical laboratory with reference value of normal LDL levels <100 mg/dL. **Result:** Using Chi square there is significant correlation between the duration of alcohol intake and LDL levels ($p < 0.05$), between the amount of alcohol intake and LDL levels ($p < 0.05$) and between daily amount of alcohol intake with LDL levels. **Conclusion:** Alcohol consumption can influence blood LDL levels.

Keywords: *Alcohol, Lipoprotein, LDL.*

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INTRODUCTION

Excessive alcohol consumption (alcoholics) has become a common problem throughout the world in recent years. In America there are around 85% who consume alcohol and 51% of them are users to date. In the UK, alcohol consumption is around 87% [1]. Based on Riskesdas data that the proportion of alcoholic beverage consumption in population aged > 10 years there are around 3.0% increased to 3.3% in 2018, North Sulawesi Province was the first or highest in Indonesia, which was 15% in 2007 and increased to 16% in 2018. Proportion of excessive consumption of alcoholic beverages in people aged > 10 years, Sulawesi Province North ranks third highest at 2.95% in 2018 [2]. Research on the Unsrat Faculty of engineering students in 2018 found a significant relationship between the frequency and duration of alcohol consumption and cholesterol levels [3].

Alcohol has an effect on the metabolism of cholesterol of high density lipoprotein (HDL-C), low density lipoprotein (LDL-C) and triglycerides. Cholesterol is an amphipathic lipid that forms essential

structural components found in the external layer of cell membranes and is a plasma lipoprotein. Free in the blood circulation, these four elements immediately balance the cholesterol element in other lipoproteins and cell membranes. Four main groups have been identified: Triglycerides, Very Low Density Lipoprotein (VLDL), Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL). Triglycerides are the main forms of lipids in adipose tissue, this form of lipids will be released through the process of hydrolysis (HDL) by the enzyme Lipase into free fatty acids and glycerol. These free fatty acids will bind to serum albumin to be transported to tissues which will be stored as an important source of energy for the body [4].

Cardiovascular disease according to data from the World Health Organization (WHO), in 2012 around 17.5 million, equivalent to 31% of deaths worldwide. Of the estimated mortality rate of 7.4 million caused by CHD and 6.7 million due to stroke. In the United States 550,000 people die from heart problems every year. In Europe according to data taken in 2012, CHD is the

leading cause of death of around 4 million deaths each year. In recent years nearly half of the deaths (around 47%) of all deaths were caused by CHD (52% in women and 42% in men). Based on doctor's diagnosis, the prevalence of coronary heart disease in Indonesia in 2013 with usia 15 years of age was 0.5% or estimated to be around 883,447 people, while based on diagnosis of symptoms 1.5% or estimated around 2,650,340 people. Based on the doctor's diagnosis, the highest estimated number of coronary heart disease sufferers is in West Java Province as many as 160,812 people (0.5%). In North Sulawesi Province, based on doctor's diagnosis, there were 11,892 people (0.7%) and based on symptoms as many as 28,880 people (1.7%) [5].

Research on the relationship of alcohol consumption with triglyceride levels has been conducted by Cora D, Engka JNA, 2018 on students of the Faculty of Social and Political Sciences (FISIP) Unsrat [6]. Also the relationship of alcohol consumption with cholesterol levels in students of the Faculty of Engineering [3]. In research this obtained a significant relationship between the frequency and duration of alcohol consumption with blood triglyceride levels in FISIP students and with blood cholesterol levels in Fatek students [6].

Based on this background, the researchers are interested in knowing the effect of alcoholic beverage consumption on blood LDL levels in students at other faculties in the Sam Ratulangi University Manado

MATERIALS AND METHODS

This study was an analytic observational study with a cross-sectional design. This research was conducted for 10 months. The subjects of the study were male students from 2015 - 2017 Faculty of Economics and Business Unsrat, amounting to 60 people with ages 20-24 years.

Data collection techniques are

- Request a research permit as well as an Ethical Clearance request to the Research Ethics Committee Faculty of Medicine, Sam Ratulangi University, and Manado.
- Request permission from the Faculty of Economics and Business
- Dissemination to students regarding the purpose of this research.
- Interview with prospective subjects to get a willingness to be a subject in this study by reading and signing an informed consent.
- Take a blood sample and analyze it in the laboratory.

RESULTS AND DISCUSSION

Taking blood samples from 60 male students of the Faculty of Economics and Business Unsrat aged 20-24 years who have signed an informed consent. The reference value for normal LDL levels in this study was 100 mg / dL. [7].

Table-1: Distribution of research subjects based on the length of alcohol consumption with LDL levels

Duration of alcohol consumption	LDL levels				p
	Normal		Hypercholesterolemia		
	n	%	n	%	
< 3 years	35	58.3	8	13.3	0,006
≥ 3 years	12	20	5	8.3	
Total	47	100	13	100	

In table 1 above there is a relationship between the length of time the subject has consumed alcohol with LDL levels, the results of the Chi Square test

results obtained a value of Continuity Correction of 0.006 ($p < 0.05$)

Table-2: Distribution of research subjects based on the average amount of daily alcohol consumption by levels Cholesterol

average amount of daily alcohol consumption	LDL levels				p
	Normal		Hypercholesterolemia		
	n	%	n	%	
< 3 Shots/ day	23	38.3	1	17	0,009
≥ 3 Shots/ day	24	40	12	20	
Total	47	100	13	100	

In table 2 above there is a relationship between the average amount of alcohol consumption with LDL levels, the results of the Chi Square test analysis

obtained a value of Continuity Correction of 0.009 ($p < 0.05$)

Table-3: Relationship between Daily Alcohol Consumption Volume and LDL Levels

	LDL levels	
	Correlation coefficient (R)	p
Alcohol Consumption Volume	0.582**	0.000

Significant correlation at 0.01 levels (Pearson correlation test)

In table 3, The Pearson correlation test results there is a very significant relationship between the volume of alcohol consumption with LDL levels in the blood that is p 0,000 in the correlation coefficient (R) at the level of 0.01

In this study conducted on students aged 20-24 years including the final adolescent category [8]. At this age peer environmental factors in campus influence alcohol consumption behavior. Research conducted by Saputro FAM on 96 young men in the village of Jatibarang Kidul Kab. Brebes shows the influence of peers on alcohol consumption behavior ($p = 0.001$). This is the same as a study conducted by Wijaya IPA on young men in Bali. There is a significant relationship between peers on alcohol consumption in young men in Keramas Village, Blahbatuh District, Gianyar Regency and the result is OR = 9.64, meaning that the teenager has a chance of 9.64 times to become an alcoholic consumer in a peer environment [10] The results of this study are also in line with those conducted by Adiputra, *et al.* in the Village of Sampalan Kelod, Dawan District, Klungkung Regency [10]. High LDL levels can be caused by alcohol consumption this is the same as research conducted by Sandi Ch *et al.* on unskilled workers in Majasari Village, Buka Teja Kab rbalingga [11].

The same study was also carried out by Ardanan Y et al in 2013, at the Faculty of Medicine students of the 2011 batch of Elemental Medicine LDL levels in the blood which experienced an increase (≥ 100 mg / dL) were 20 respondents from 26 respondents with a percentage of 76.9% in BMI > 23 kg / m² [12].

CONCLUSION

Alcohol consumption can affect blood LDL

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