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RESEARCH ARTICLE

The Relationship Between Total Cholesterol Levels and LDL Cholesterol in Hypertensive Patients

Octavia So Hanggrainy[1], Hadyanto Lim[2], Surjit Singh[3]

1. Medical Education Study Program, Faculty of Medicine, Methodist University of Indonesia
2. Department of Pharmacology and Pharmacy, Faculty of Medicine, Methodist University of Indonesia
3. Department of Medicolegal Forensics Faculty of Medicine, Methodist Indonesia University

Correspondence:
fkmethoditsmedan@yahoo.co.id

ABSTRACT

Background: *Cholesterol is an essential structural component that forms the cell membrane and the external layer of plasma lipoproteins. The increase of total cholesterol is always accompanied by the increase in LDL cholesterol especially in hypertensive patients. The present study was conducted to find the correlation between total cholesterol and LDL cholesterol of the patients with hypertension*

Method: *It is an observational analytic using cross sectional study in which the data were collected by clinical laboratory examination of Prodia Jl. S.Parman no. 17/223G Medan, North Sumatra Indonesia. The population included all patients with hypertension in which the samples were taken by consecutive sampling method so the total were 19 samples.*

Results: *Majority of samples had normal total cholesterol of 8 persons (42.1%) and the majority of the study samples had high LDL cholesterol of 8 persons (42.1%).*

Conclusion: *There is a significant correlation between total cholesterol and LDL cholesterol. It is indicated by the sig-p value = 0.004 (p <0.05). There is a significant correlation between total cholesterol and LDL cholesterol of the patients with hypertension. It is indicated by the correlation coefficient value r-count = 0.635 which is between 0.6 - 0.79*

Keywords : Total cholesterol, LDL cholesterol, patients with hypertension

INTRODUCTION

According to the World Health Organization (WHO), hypertension is a condition in which blood vessels experience persistently high blood pressure (systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg). Blood pressure is the force of blood against the pressure of artery walls as it is pumped throughout the body by the heart. The higher the blood pressure, the harder the heart has to work (WHO, 2013).

In 2005, research revealed that lower blood pressure leads to lower cholesterol levels. The following year, doctors examined data from thousands of women and found that the higher a middle-aged woman's cholesterol levels, the greater her risk of developing hypertension. In 2006, the Physicians' Health Study compared cholesterol levels in men with hypertension with those in men with normal blood pressure. The risk of developing hypertension in men with the highest cholesterol levels was 23% greater than

in men with the lowest cholesterol levels (Kowalski, 2010).

Low-density lipoprotein (LDL) transports most of the blood cholesterol from the liver, which has LDL receptors, to the tissues. Target LDL levels for individuals at high risk for cardiovascular events are set lower than those for individuals at low risk. For example, current US guidelines state that LDL should be less than 160 mg/dL (4.1 mmol/L) for individuals in the low-risk category, while for high-risk patients, LDL levels should be less than 100 mg/dL (2.6 mmol/L), with consideration given to a target of less than 70 mg/dL (1.8 mmol/L) (Aaronson, 2007). Strong evidence suggests that reducing total and LDL cholesterol can prevent cardiovascular disease (Lindarto, 2014). With this background, researchers conducted a study on "The Relationship Between Total Cholesterol and LDL Cholesterol in Hypertensive Patients."

METHOD

The approach used is analytical research with a cross-sectional study approach to determine the relationship between total cholesterol levels and LDL cholesterol in hypertensive patients (Sastroasmoro, 2011). The location of total cholesterol and LDL cholesterol examinations is at the Prodia Clinical Laboratory, Jl. S. Parman No. 17 Medan, the research period is June 8-13, 2017 with the target population of the entire community experiencing hypertension. Using the Consecutive Sampling method, 19 samples of hypertensive patients were obtained who met the inclusion criteria and did not meet the exclusion criteria as research subjects. The operating variables are age, gender, total cholesterol levels, LDL cholesterol levels, and hypertension.

RESULTS

Tabel 1. Subject Characteristics Based on Age

No	Age Group	Jumlah (n)	Persentase (%)
1	21-30 year	1	5.3
2	31-40 year	1	5.3
3	41-50 year	2	10.5
4	51-60 year	8	42.1
5	61-70 year	6	31.6
6	71-80 year	1	5.3
	Total	19	100.0

Table 1 shows that of the 19 subjects, one (5.3%) was between 21-30 years old, one (5.3%) was between 31-40 years old, two (10.5%) were between 41-50 years old, eight (42.1%) were between 51-60 years old, six (31.6%) were between 61-70 years old, and one (5.3%) was between 71-80 years old. Thus, the majority of subjects were between 51-60 years old, namely eight(42.1%).

Table 2. Subject Characteristics by Gender Type

No	Jenis kelamin	Jumlah (n)	Persentase (%)
1	Laki-laki	4	21.1
2	Perempuan	15	78.9
	Total	19	100.0

Table 2 shows that of the 19 subjects,
4 (21.1%) were male and 15 (78.9%) were female. Thus, the majority of subjects were female, at 15 (78.9%).

Tabel 3. Kolesterol Total

No	Kolesterol Total	Jumlah (n)	Persentase (%)
1	Normal (<200 mg/dL)	8	42.1
2	Ambang batas (200-239 mg/dL)	7	36.8
3	Tinggi (≥ 240 mg/dL)	4	21.1
	Total	19	100.0

Table 3 shows that of the 19 subjects, 8 (42.1%) had normal total cholesterol (<200 mg/dL), 7 (36.8%) had borderline total cholesterol (200-239 mg/dL), and 4 (21.1%) had high total cholesterol (≥240 mg/dL). Thus, the majority of study subjects, namely 8 (42.1%), had normal total cholesterol.

Tabel 4. Kolesterol *LDL*

No	Kolesterol *LDL*	Jumlah (n)	Persentase (%)
1	Normal (<110 mg/dL)	6	31.6
2	Ambang batas (110-129 mg/dL)	5	26.3
3	Tinggi (≥ 130 mg/dL)	8	42.1
	Total	19	100.0

Table 4 shows that of the 19 subjects, 6 (31.6%) had normal LDL cholesterol (<110 mg/dL), 5 (26.3%) had borderline LDL cholesterol (110-129 mg/dL) and 8 (42.1%) had high LDL cholesterol (130 mg/dL). Thus, the majority of the study subjects had high LDL cholesterol, namely 8 (42.1%).

Tabel 5. Tekanan Darah Sistolik

No	Tekanan Darah Sistolik	Jumlah (n)	Persentase (%)
1	Grade 2	3	15.8
2	Grade 1	16	84.2
	Total	19	100.0

The systolic blood pressure table shows that of the 19 subjects, 3 people (15.8%) had grade 2 blood pressure and 16 people (84.2%) had grade 1 blood pressure. Thus, the majority of the sample had grade 1 blood pressure, namely 16 people (84.2%).

Tabel 6. Tekanan Darah Diastolik

No	Tekanan Darah Diastolik	Jumlah (n)	Persentase (%)
1	Grade 2	4	21.1
2	Grade 1	15	78.9
	Total	19	100.0

The diastolic blood pressure table shows that of the 19 subjects, 4 people (21.1%) had grade 2 blood pressure and 15 people (78.9%) had grade 1 blood pressure. Thus, the majority of subjects had grade 1 blood pressure, namely 15 people (78.9%).

Tabel 7. Nilai Rata-rata Kolesterol Total dan Kolesterol *LDL* Berdasarkan Umur

Umur (tahun)	Kolesterol Total (mg/dL)	Kolesterol *LDL* (mg/dL)
21-30 tahun	172	114
31-40 tahun	205	146
41-50 tahun	210.5 ± 9.19	142.5 ± 12.02
51-60 tahun	213.75 ± 47.56	136.50 ± 43.45
61-70 tahun	204.83 ± 51.35	119.33 ± 20.92
71-80 tahun	204	109

Table 7 shows that there was only one study subject aged 21-30 years, so there was no mean value and standard deviation. The total cholesterol value was 172 and the LDL cholesterol value was 114. Furthermore, there was only one study subject aged 31-40 years, so there was no mean value and standard deviation. The total cholesterol value was 205 and the LDL cholesterol value was 146. The study subjects aged 41-50 years had total cholesterol of 210.50; 9.19 and LDL cholesterol of 142.5;
12.02. The study subjects aged 61-70 years and over had total cholesterol of 204.83; 51.35 and LDL cholesterol of 119.33; 22.92 and the research subject aged 71-80 years was only 1 person so it did not have a mean and standard deviation value where the total cholesterol value was 204 mg/dL and LDL cholesterol 109 mg/dL.

Tabel 8. Hasil Pengukuran Kolesterol Total dan Kadar Kolesterol *LDL*

Sampel	Kelamin	Umur	Kolesterol Total	Kolesterol LDL	Tek.darah	Sistolik	Diastolik
1	Laki-Laki	37	205	146	140/90	Grade 1	Grade 1
2	Perempuan	53	170	107	140/90	Grade 1	Grade 1
3	Perempuan	30	172	114	150/90	Grade 1	Grade 1
4	Perempuan	42	217	151	140/90	Grade 1	Grade 1
5	Perempuan	51	270	190	140/90	Grade 1	Grade 1
6	Laki-Laki	55	132	65	150/100	Grade 1	Grade 2
7	Laki-Laki	52	235	154	140/90	Grade 1	Grade 1
8	Laki-Laki	53	186	115	150/100	Grade 1	Grade 2
9	Perempuan	47	204	134	150/90	Grade 1	Grade 1
10	Perempuan	53	250	163	140/90	Grade 1	Grade 1
11	Perempuan	67	178	128	150/90	Grade 1	Grade 1
12	Perempuan	64	213	158	150/90	Grade 1	Grade 1
13	Perempuan	61	187	106	150/90	Grade 1	Grade 1
14	Perempuan	61	170	114	150/90	Grade 1	Grade 1
15	Perempuan	63	305	106	140/90	Grade 1	Grade 1
16	Perempuan	63	176	104	140/100	Grade 1	Grade 2
17	Perempuan	72	204	109	160/90	Grade 2	Grade 1
18	Perempuan	56	214	113	180/100	Grade 2	Grade 2
19	Perempuan	55	253	185	160/90	Grade 2	Grade 1

Total Cholesterol

Regarding age, there was only one study subject aged 21-30 years, so there was no mean and standard deviation, with a total cholesterol level of 172 mg/dL. Furthermore, there was also only one study subject aged 31-40 years, so there was no mean and standard deviation, with a total cholesterol level of 205 mg/dL. Subjects aged 41-50 years had a total cholesterol level of 210.50 ± 9.19 mg/dL. Subjects aged 61-70 years and older had a total cholesterol level of 204.83 ± 51.35 mg/dL. There was only one study subject aged 71-80 years, so there was no mean and standard deviation, with a total cholesterol level of 204 mg/dL. LDL Cholesterol

Regarding age, there was only one study subject aged 21-30 years, so there was no mean value and standard deviation, with an LDL cholesterol value of 114. Furthermore, there was only one study subject aged 31-40 years, so there was no mean value and standard deviation, with an LDL cholesterol value of 146. Subjects aged 41-50 years had an LDL cholesterol of 142.5 ± 12.02. Subjects aged 61-70 years and older had an LDL cholesterol of 119.33 ± 22.92. There was only one study subject aged 71-80 years, so there was no mean value and standard deviation, with an LDL cholesterol value of 109 mg/dL.

Relationship between Total Cholesterol and LDL Cholesterol

The higher the total cholesterol, the higher the LDL cholesterol. This is consistent with research by Idemudia, who conducted a study on the relationship between total cholesterol and LDL in hypertensive patients and found a positive correlation (r=0.609). LDL cholesterol is referred to as "bad" cholesterol because it carries total cholesterol to many tissues in the body. This increases the risk of cholesterol buildup in various tissues, including blood vessels. LDL testing is generally performed as part of a total cholesterol measurement, as LDL is the lipoprotein with the highest cholesterol content. 2

CONCLUSION

The majority of study subjects had normal total cholesterol (8 people (42.1%), and the majority of study subjects had high LDL cholesterol (8 people (42.1%). There was a significant correlation between total cholesterol and LDL cholesterol, indicated by a p-value of 0.004 ($p<0.05$). There was a very strong correlation between total cholesterol and LDL cholesterol in hypertensive patients, indicated by a correlation coefficient of r-count = 0.635, which ranges from 0.6 to 0.79.

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2