Original Article

Study on cholesterol and triglyceride level in normal people of Kathmandu valley

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The normal range of cholesterol and triglyceride for normal people of Nepal is being compared with the standard reference value of WHO. The project work was carried out to establish the normal range of cholesterol and triglycerides in the Nepali citizens of Kathmandu valley in the pathology department of Patan Hospital from 2061-2-21 to 2061-6-18 by using the standard methodology. During the study, 150 samples were taken. The average range of cholesterol for age group 20-30 was found to be 114-164 mg/dL. Similarly, the same for the age group 30-40 was 122-182 mg/dl ,for age group 40-50 was 135-223 mg/dl, for age group 50-60 was 112-195 mg/dL and for age group 60 and above was found to be 110-207 mg/dL respectively. Likewise, the average range of triglyceride level for the age group 20-30 was found to be 60-195 mg/dL and the same for the age group 30-40 was 78-193 mg/dL, for the age group 40-50 was 99-316 mg/dL, for the age group 50-60 was 54-304 mg/dL and lastly, for the age group 60 and above was 60-292 mg/dL. The cholesterol level of the females was found to be higher than the males but the triglyceride level of males was found to be higher than females. The non- vegetarians were seemed to have high cholesterol and triglyceride level than vegetarians.

Introduction

Cholesterol is a major sterol in the body and a main constitution of the plasma membrane and plasma lipoproteins. Two sources contribute to the amount of the cholesterol in the body, liver manufactures about 80 percent of it and the remaining part is contributed by diet while consuming meat, eggs and dairy products. Cholesterol is used by the body in order to manufacture hormones or vitamin D, to break down carbohydrates and proteins, to build cell walls and to produce bile and also to form a protective coating around nerves. It is carried through the bloodstream by lipoproteins namely HDL cholesterol and LDL cholesterol. Its level rises with age, sex and diet[4,7,8,9]
Triglycerides are the esters of the alcohol glycerol and fatty acids which serve as the major energy reserve of the body. It constitutes about 98% of the total dietary lipids. Triglycerides in plasma are derived from fats eaten in foods or made in the body from other energy sources like carbohydrates. The major site of accumulation is the cytoplasm of adipose tissue. Its level rises with age, sex and diet[4].
It becomes important to measure cholesterol and triglyceride level of the normal individual to know the intensity of risk of heart diseases and other different conditions related to high level of cholesterol and triglyceride. Not only the increased level but decreased level of cholesterol and triglyceride are the indicators of different kinds of diseases. Unfortunately, so far nobody has established the level of cholesterol and triglyceride level in our Nepalese community and is comparing the same with the standard reference value of WHO. But it is necessary to have our own standard as the range differ with the lifestyle, economic status, diet, geographic condition and education. Therefore, to interpret the results of cholesterol and triglyceride in the context of our country, the study on these variables on normal people of Kathmandu valley has been projected.

Methodology

Sampling

The total of 150 normal individuals of Kathmandu valley visiting Patan hospital of variable age, sex and diet were taken as study samples.

Blood collection

1. The arm was extended and the tourniquet was tied above the elbow.
2. The skin over the vein was cleaned by rubbing with cotton soaked with spirit.
3. The bevel of the syringe was made upward and punctured in the vein with the help of right hand and held steady by the thumb of the other hand.
4. The plunger was withdrawn slightly and 2ml of blood was collected.
5. Then the tourniquet was released.
6. A cotton swab soaked with spirit was placed on the arm where the needle was inserted and the needle was

withdrawn.
7. The pad was held on firmly for a few minutes until the bleeding stops.
8. The needle was removed from the syringe and the blood was transferred to a container with an anticoagulant using minimum amount of pressure.
9. The blood was allowed to clot by placing in hot water bath.
10. Then it was centrifuged at 4000rpm for 2 minutes.
11. The supernatant(serum) was then used for the analysis

Sample processing

Cholesterol was determined by assay method:-

- The test tubes were used as described below:

Description	Blank	Standard	Test
Reagent	1.0 ml	1.0 ml	1.0 ml
Standard	-	0.01 ml	-
Test	-	-	0.01 ml

- All the contents in the tubes were mixed and incubated for 10 minutes at 37°C.
- The absorbance of the sample and standard against reagent blank was measured at 510nm in a semi-automated analyzer.(10)

Triglyceride was determined by assay method:-

- The test tubes were used as described below:

Description	Blank	Standard	Test
Reagent	1.0 ml	1.0 ml	1.0 ml
Standard	-	0.01 ml	-
Test	-	-	0.01 ml

- All the contents in the tubes were mixed and incubated for 10 minutes at 37°C.
- The absorbance of the sample and standard against reagent blank was measured at 510nm in a semi-automated analyzer.(10)

Result and Discussion

In the study, 48(32%) individuals were in the age group 20-30. Similarly, 30 (20%) were in the age group 30-40, 34(23%) were in the age group 40-50, 23(15%) were in the age group 50-60 and 15(10%) were in the age group 60 and above.

Table 1 Agewise distribution of the total subjects.

Age group	Frequency	Percent
20-29	48	32
30-39	30	20
40-49	34	23
50-59	23	15
60 and above	15	10
Total	150	100

In the study, regarding different age groups, the age group 40-50 was found to have high cholesterol and triglyceride level. Similarly, considering the gender, the female were found to have high cholesterol level whereas the male were found to have high triglyceride level. Lastly, on the basis of the diet, the non vegetarians were found to have high cholesterol and triglyceride level.

During the study, cholesterol level of the age group 60 and above was found to be highly varied. Similarly, the triglyceride level of the age group 50-60 was found to be highly varied .Regarding the gender, the cholesterol and triglyceride level of male were found to be highly varied. Lastly, the non vegetarians were found to have highly varied cholesterol and triglyceride level *(Table 2, 3 and 4)*.

The age group 40-50 is taken as a group with a high risk of heart disease. The lipid concentrations continue to increase throughout adult life, with total and LDL cholesterol[1,8].

Table 2 Cross tabulation of mean cholesterol, mean triglycerides (mg/dL), standard deviation and coefficient of variation.

Age groups	Freq.	Mean Cholesterol	Standard Deviation	C.V. (%)	Mean Triglycerides	Standard Deviation	C.V. (%)
20—30	48	138.67	25.194	18.17	127.42	67.376	52.87
30—40	30	151.63	30.161	19.89	135.53	57.745	38.91
40—50	34	178.50	43.795	24.53	207.56	108.666	52.35
50—60	23	153.74	41.315	26.87	179.04	125.108	69.87
60 and Above	15	158.40	48.188	30.42	175.67	116.029	66.04

After puberty, there is an increase in triglycerides, LDL and apo B-100 in both sexes but a decrease in HDL cholesterol in men. Women are particularly at risk after menopause, when their HDL cholesterol levels drop and their LDL cholesterol levels increase[1,6, 8].

Table 3 Cross tabulation of gender with mean cholesterol, mean triglycerides (mg/dL), standard deviation and coefficient of variation.

Gender	Freq.	Mean Cholesterol	Standard Deviation	C.V. (%)	Mean Triglycerides	Standard Deviation	C.V. (%)
Male	68	151.79	38.737	25.52	168.41	113.489	67.38
Female	82	156.88	38.518	24.55	152.93	80.011	52.32

The individuals can have high triglyceride level if they have more saturated fats in their diet, since fats tend to remain in the stomach longer and are digested slowly. Most fats and oils, upon hydrolysis, yield several fatty acids as well as glycerol. The cholesterol and triglyceride of the individual may differ as they depend on different factors as age, sex, diet, stress, physical inactivity, cigarette, blood pressure, diabetes mellitus, obesity and genetic conditions. The diets like egg yolk, brain, flesh, liver, lung and spleen of different animals as buffalo, chicken and shellfish are rich in

cholesterol and saturated fats which tend to elevate the cholesterol level as well as the triglyceride level which are seemed to be less in the vegetarians diet. High carbohydrate diet intakes tend to count a temporary increase in serum triglyceride. People with high triglycerides often have high cholesterol, high LDL cholesterol and a low HDL cholesterol level. People with diabetes or obesity are also likely to have high triglycerides and in some cases this persists[2, 3, 4, 5].
The cholesterol in the human body rises to abnormally high levels when someone eats a diet high in saturated fats or trans fats especially when that person is obese or rarely exercises . Particularly, trans fats (common ingredients in potato chips, snack foods, many Types of margarine and shortening, deep fried and fast foods) not only increase levels of LDL cholesterol, but also decrease HDL levels[6].

Table 4 Cross tabulation of diet with mean cholesterol, mean triglycerides (mg/dL), standard deviation and coefficient of variation.

Diet	Freq.	Mean Cholesterol	Standard Deviation	C.V. (%)	Mean Triglycerides	Standard Deviation	C.V. (%)
Non Vegetarian	126	157.17	39.54	25.15	167.23	100.124	59.87
Vegetarian	24	140.96	30.190	21.41	121.71	64.440	52.94

The most widespread inherited cholesterol disorder is familial hypercholesterolemia(FH) in which the cholesterol level of people may reach as high as 550 mg/dL almost four times the level considered desirable for the average person. People having high cholesterol with FH are at a high risk for an early heart attack, regardless of the presence of other risk factors. Another genetic condition associated with high cholesterol level is familial dysbetalipoproteinemia (or familial combined hyperlipoproteinemia) in which both cholesterol and triglyceride levels are elevated. The hypercholesterolemia (cholesterol level over 240) is a major contributor to the development of atherosclerosis and can also lead to a certain Type of chest pain called angina, or even a heart attack. Research studies have concluded that for every 1 percent reduction in blood cholesterol level, the risk of coronary heart disease decreases by as much as 3 percent[6].
Regarding heredity, high cholesterol often runs in families. Although specific genetic causes have been identified in only a minority of cases, genes still play a role in influencing blood cholesterol levels. Excess weight tends to increase blood cholesterol levels[8]. The standard reference range is normally made giving emphasis to the Europeans and their lifestyle which may not reflect the similarity in the normal range of Nepali citizens. Therefore the authors would like to emphasis to determine the own normal range of different biochemical parameters.

Recommendation

The cholesterol and triglycerides value was estimated in 150 normal people of Kathmandu valley. Since sampling was done randomly, all the places of Kathmandu valley couldn't be included due to time factor. In addition, other parameters like weight, height, cast, religion, class, community were also not included. Even though, I would like to recommend the following suggestions**:-**

- Sample should cover most of the places of Kathmandu valley.
- For the better statistical evaluation, the number of sample should be increased.
- Cholesterol and triglyceride level should also have been related with other parameters like weight, height, blood pressure of the individual.
- The study could also be done on the particular community.
- Similarly, cholesterol and triglycerides level should also be studied among different ethnical groups.
- Likewise, the cholesterol and triglyceride level of the normal people and the diseased person can be compared.
- By performing this Type of study, we can have our own reference value.

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