Awareness and Trends of Blood Cholesterol and Susceptibility to Develop Heart Disease

Hari OS1*, Sonali G2 and Sumitra N3

1Department of Molecular Virology, National AIDS Research Institute, Pune-411026, India
2Department of Biochemistry, Central Drug Research Institute, Lucknow-226014, India
3Department of Pharmacy, Banasthali University, Jaipur-302001, India

*Corresponding author: Hari Om Singh, Department of Molecular Virology, National AIDS Research Institute, Pune-411026, India, Tel: +91-020-27331200; E-mail: hariomsgpgims@gmail.com

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Abstract

Objectives: Cholesterol is the essential steroids for life which created and used by our bodies to keep us healthy. Approximately 75% blood cholesterol produced from liver and ~25% produced from the food we eat. Hypercholesterolemia is a condition of abnormal cholesterol levels. Abnormal cholesterol levels are strongly associated with coronary heart disease. Therefore, we aimed to evaluate the awareness and frequency of trends of blood cholesterol levels (total cholesterol, LDL, HDL, triglycerides) and its associated complications.

Methods: This is a cross-sectional pilot study. The total no. of participant consisted of 200. We enrolled 100 unrelated healthy individuals by door to door visit to check awareness status of blood cholesterol and 100 referral individuals of lab undergone for lipid profile were enrolled in this study. Blood cholesterol awareness was calculated using Microsoft excel version 7.0. Frequency of LDL, HDL and triglycerides were calculated using chi square by SPSS version 15.0 version.

Results: Frequency of awareness of blood cholesterol was found to be 29% among all survey participants while as frequency of awareness of blood cholesterol were found to be 54% and 4% among educated and non-educated participants. Frequency of Desirable Cholesterol Level was found to be higher (81.0%) as compared to Borderline High (19.0%) in between lab survey participants. Frequency of Above Optimal Low density lipoprotein (LDL) level was found to be higher (64.0%) as compared to above borderline high (27.0%) and high (9.0%) among lab survey participant. Frequency of Optimal HDL density lipoprotein (HDL) Level was found to be to be higher (94.0%) as compare to borderline low (5.0%) and high 1.0%) among lab survey participant. Frequency of Optimal Serum Triglyceride Level was found to be higher (53.0%) in optimal as compare to borderline high (33.0%) and High (4.0%) among lab survey participant.

Conclusion: The survey data of door to door visit strongly suggest the lack of awareness of blood cholesterol level and its associated complications among educated and non-educated people. Individuals with borderline high Serum triglyceride level may have the risk for heart disease and they may require for therapeutic intervention in Indian setting.

Keywords: High blood cholesterol; Heart disease; Triglyceride; Trends of cholesterol

Introduction

Cholesterol is steroid, essential for life. It is structural component of plasma membrane [1] and in the insulating layer of myelin wound around neurons, precursor of the synthesis of steroid hormone and vitamin D [2]. Cholesterol is synthesizes from small molecules by enzyme HMG-CoA reductase [3]. Cholesterol is the structural component of the membranes [4], functioning of nerve conduction, cell signaling and in intracellular transport [5]. Cholesterol is precursor of synthesis of bile acids, steroids and vitamin D [2]. Hypercholesterolemia is a condition of abnormal cholesterol levels. High cholesterol level in blood has greater chance of getting Coronary heart disease which is strongly associated with cardiovascular disease [6]. Cholesterol levels among US adults today are generally higher than in all other industrial nations. During the 1990s there was some concern about cholesterol levels in American children [7]. According to Centers for Disease Control and Prevention, nearly 1 in every 10 children/adolescents in the USA has elevated total cholesterol levels [8]. India is known as tenth largest economy country in the world and spends approximately 5% of its GDP on healthcare. The private sector plays a significant role in healthcare delivery and expenditures, while public health expenditures account for an estimated 1% of GDP. With a current population of 1.2 billion, India is expected to overtake China as the world’s most populous country by 2030 [9].

The transition from infectious to chronic diseases is increased as the population grows older, richer and more urbanized in India. Hyperlipidemia is complex and multifactorial disease. Environmental factor (life style, diet, tobacco use, and heavy alcohol use), medicine, overweight, lack of exercise, certain diseases (Diabetes, High blood pressure, metabolic syndrome, Kidney disease, pregnancy and levels of female hormones) and genetic factors play important role in abnormal...
cholesterol levels. Diet is an important factor in India, as low dietary intake is associated with iron-deficiency or anemia, while a diet high in certain spices like curcumin may help to prevent colon cancer. In 2011, anemia [10] was the most prevalent disease in India, followed by hypercholesterolemia (high cholesterol). It is estimated that there are almost 224 million people with high cholesterol in India [11].

There have been only a few studies that have examined trends in cardiovascular risk factors in middle and low income countries [12]. A multiple cross sectional surveys were conducted among men aged 40-59 years in Yugoslavia, Italy, Greece, Holland, Finland, Japan and USA countries [13]. These studies reported that while major coronary risk factors initially stabilized and later declined in many of these countries, in middle income countries such as Yugoslavia the risk factors increased. The WHO-MONICA study reported that population risk factors increased in the Chinese while they declined in North American and Western European cohorts [14,15]. Increasing trends in coronary risk factors has also been reported from many middle income Latin American countries [16]. In Asia, increasing trends in lipids and in prevalence of dyslipidemias (high LDL cholesterol and low HDL cholesterol) has been reported in urban populations of Beijing [17], rural China [18] and South Korea [19].

To our knowledge no single study that systematically evaluated trends in major cardiovascular risk factors in India exists although reviews have reported increasing prevalence of hypertension [20], diabetes [21], and hypercholesterolemia [22], and declining smoking rates among the educated Indians [23]. All these evaluations suffer from multiple biases inherent in compiling studies from different sources and different methodologies [24]. Few studies have been done on epidemiological aspect like multiple coronary heart disease risk factor in urban populations in western Indian state of Rajasthan to determine their lifestyle and other determinants [25-28]. Here we report population awareness and frequency of trends in levels of various lipoproteins (total cholesterol, LDL, HDL and triglycerides).

Methods

This is cross sectional pilot study

Subjects: A total of 200 participants consist in this study. One hundred unrelated healthy individuals were enrolled in this study for viva voice to check awareness status of blood cholesterol. One hundred referral individuals from different hospitals of Lucknow for lipid profile were enrolled in this study who undergone for examination of Lipid profile from October 2013 to February 2014 from the Lal Pathology, Gomti Nagar, Lucknow, Uttar Pradesh, India and Indira diagnostic, Indira Nagar, Lucknow, Uttar Pradesh, India. We were collected the lipid profile data to evaluate the trend of blood cholesterol.

I have visited door to door in the Jankipuram sector 9 and 10 and Bithauli of Lucknow area to know the awareness status of hypercholesterolemia. Personally, we interviewed about awareness of blood cholesterol to the individuals having age range from 20-78 year in the Lucknow area.

Fasting blood sample were collected for test. All individuals were tested for serum total cholesterol, High density lipoprotein, Low density lipoprotein, Triglyceride, Very-low-density lipoprotein using Roche Cobas Integra 400 plus kit and Olympus AU 400 chemistry Analyzer. Data were collected from Lab record.

Table 1: Characteristics of patients.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Participant (%)</th>
</tr>
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<tbody>
<tr>
<td>Survey participant</td>
<td>100</td>
</tr>
<tr>
<td>Mean Age</td>
<td>47.66</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>13.19</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>62 (62)</td>
</tr>
<tr>
<td>F</td>
<td>38 (38)</td>
</tr>
</tbody>
</table>

Blood cholesterol level and awareness status in Lucknow population

We conducted the survey to know the status of blood cholesterol awareness among the educated and uneducated population of Lucknow, I have visited door to door and personally interviewed about the status of blood cholesterol found to be 29% awareness of blood cholesterol among all participants. We stratified the survey participants in educated and non-educated groups and found be 54% awareness of blood cholesterol among educated while 4% awareness among Non-educated. Again we wanted to know how many people undergone for examination of blood cholesterol level and found to be 34% people undergone for examination of blood cholesterol level among non-educated. In total, 63% individual found to positive among undergone for lipid profile while as 58.82% and 100% individual were found to be positive for High blood cholesterol level among educated and non-educated. Others remaining participant neither undergone for examination of blood cholesterol level nor have awareness about complications associated with high blood cholesterol level (Table 2 and Figures 1-3).

Table: Statistical Analysis

Descriptive statistics of survey participants were presented as mean and SDs for continuous measures while frequencies and percentages were used for categorical measures. All statistical analysis was performed using SPSS software version 15 (SPSS, Chicago, IL, USA) and tests of statistical significance were two-sided.

Results

The survey participant consisted of 200 individuals among them 100 participants were consisted of door to door visit and 100 participants consisted of referral lab based. The mean age of participant 47.66 and standard deviation ±13.19. Characteristics of lab based participant are shown in Table 1.
The frequency distributions of Serum Cholesterol level are shown in Table 3. Frequency of Desirable Cholesterol level was found to be higher (81.0%) as compared to Borderline High (19.0%) in between survey participant. However Desirable Cholesterol level showed a trend to maximum range limit (190-200 mg/dL).

The frequency distributions of Low density lipoprotein are shown in Table 4. Frequencies of Above Optimal Low density lipoprotein Level were found to be higher (64.0%) as compared to above borderline high (27.0%) and high (9.0%) among survey participant. However, Optimal Serum triglyceride level showed a trend to range limit (130-150 mg/dL) and borderline high (160-180).

The frequency distributions of High density lipoprotein are shown in Table 5. Frequency of Optimal High density lipoprotein level was found to be higher (94.0%) as compare to borderline low (5.0%) and high 1.0% among survey participant. However Optimal High density lipoprotein level showed a trend to range limit (40-50 mg/dL).

The frequency distributions of Serum Triglyceride level are shown in Table 6. Frequency of Optimal Serum triglyceride level was found to be higher (53.0%) in optimal as compare to borderline high (33.0%) and High (4.0%) among survey participant. However, Optimal Serum triglyceride level showed a trend to range limit (130-150 mg/dL) and borderline high (160-180).

### Table 2: Individual participants.

<table>
<thead>
<tr>
<th>Cholesterol Level and Lab survey participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>The frequency distributions of Serum Cholesterol level are shown in Table 3. Frequency of Desirable Cholesterol level was found to be higher (81.0%) as compared to Borderline High (19.0%) in between survey participant. However Desirable Cholesterol level showed a trend to maximum range limit (190-200 mg/dL).</td>
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</tr>
</tbody>
</table>
cholesterol helps keep cholesterol from building up in the arteries and is considered a major risk factor because it increases your risk for heart disease. HDL levels of 60 mg/dL or more help to lower your risk for heart disease.

Earlier survey study was a prospective population survey. Cardiovascular risk factors were examined; including fasting serum lipid estimation. This was a community based study within a defined survey area in Trinidad. All men aged between 35 and 69 years within the survey area were identified and followed between 1977 and 1986. Analysis was confined to those of African, Asian Indian, and mixed descent who were free of coronary heart disease at entry (n = 960, 69% of age eligible men in the survey population. 64 men developed coronary heart disease during the study period. A strong inverse curvilinear relation was found between high density lipoprotein cholesterol and coronary heart disease incidence (p less than 0.005), independent of age or other relevant characteristics including low density lipoprotein cholesterol. A low serum concentration of high density lipoprotein cholesterol is a risk factor for coronary heart disease in non-whites as well as in whites [29].

In the present survey, the frequencies of Optimal High density lipoprotein level was found higher (94.0%) among survey participant. Therefore, it appears that risk of heart disease due to HDL is not associated among our survey participant. However, this survey has limit due to less sample size. While as survey conducted at National AIDS Research Institute, Pune during 2012 among western region population, reported that High density lipoprotein level was low (below 40 mg/dL) in 50 healthy individuals they showed low level of HDL is associated with risk of heart disease.

In the present survey, frequency of Optimal Serum triglyceride level was higher in among survey participant while as our survey showed 33.0% participant have borderline high levels of triglycerides and 4% showed high level of triglycerides. Triglycerides can raise risk of heart disease. Individuals with borderline high levels of triglycerides (150-199 mg/dL) or high (200 mg/dL or more) may require therapy in Indian setting while as in USA population, there is no need for therapeutic intervention

In summary, the survey data of door to door visit suggest that lack of awareness of blood cholesterol and its associated complication among educated and non-educated people

Lab survey participant data suggest that Individuals with borderline high Serum triglyceride level may have risk for heart disease and they may have requirement of treatment. However, this survey was conducted in a very small number of participants. Therefore, this survey warrant that further studies need to be done in larger sample size for better assessment of trends of abnormal blood cholesterol and its associated complications.

**References**

1. Cholesterol at the US National Library of Medicine Medical Subject Headings (MeSH)


