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**RACIAL VARIATIONS IN SERUM LIPID AND LIPOPROTEIN LEVELS IN BANGALEE AND CHAKMA POPULATIONS OF BANGLADESH**

Dwaipayan Sikdar, Mohammad Abul Hashem, Ramendu Parial

Department of Biochemistry and Molecular Biology, University of Chittagong  
Chittagong, Bangladesh

E-mail of Corresponding Author: sikdardw@yahoo.com

**ABSTRACT**

**Background:** Racial differences in serum lipid and lipoprotein levels exist and assumed to be important determinants of cardiovascular disease. The purpose of this study is to investigate if there are any differences in serum lipid and lipoprotein level in the population of two different races of Bangladesh.

**Materials and Methods:** Ninety one Chakma subjects (43 male and 48 female) and equal number of Bangalee subjects (39 male and 52 female) were randomly selected. Serum Total Cholesterol (TC), Triglyceride (TG), High Density Lipoprotein Cholesterol (HDL-C) of the study subjects were measured using commercial kits and Low Density Lipoprotein Cholesterol (LDL-C) was calculated.

**Result:** The Bangalee subjects had higher levels of TC, TG, LDL-C and lower level of HDL-C than the Chakma population. The Bangalee males had higher TC, TG and LDL-C than the Chakma male. No significant difference was observed for HDL-C. Bangalee female had higher TC and TG and lower HDL-C than the Chakma female. No significant difference was found for LDL-C.

**Conclusion:** This study clearly showed that racial variations exist in serum lipid and lipoproteins levels between the Bangalee and Chakma population of Bangladesh.

**Keywords:** Racial variation, Lipid, Lipoprotein, Bangalee, Chakma.

**INTRODUCTION**

Cardiovascular disease (CVD) is a major cause of death in the world today. The rates of CVD in many developed countries, such as the United States of America and parts of Western Europe, have reached a plateau and, in many instances, have begun to decline. However, in most developed countries, which are experiencing economic growth and rapid urbanization, the rates of CVD are only beginning to rise. The rise of CVD in developing countries is particularly important because the populations of these countries encompass two-thirds of the world's population. In fact, despite lower rates of CVD, more CVD deaths occur in developing than in developed countries (1). Increased serum lipid and lipoprotein concentrations are recognized

risk factors for coronary heart disease and atherosclerosis (2-4).

Racial differences have been regarded as an important risk factor of coronary heart disease (CHD). Black adults have been reported to suffer more hypertension and black women appear to more obese than their white counterparts (5-10). There is also evidence of racial differences in lipid and lipoprotein levels, as black subjects have been found to have lower levels of triglycerides and higher levels of high-density lipoprotein (HDL) cholesterol (11-21). It is important to know the normal level of blood lipid profile of ethnic group to ascertain their risk for CHD.

In Bangladesh, people of different races e.g. Bangalee, Chakma, Marma, Tripura etc. are living. No significant study has been conducted

to examine if there are any differences in lipid and lipoprotein levels of these different races. The aim of this investigation was to determine whether there is any variation in the lipid and lipoprotein levels in the population of two different races namely Bangalee (Proto-Austriod or Veddas in origin and the mainstream population) and Chakma (Tibeto-Mongoloids in origin and tribal population) of Bangladesh.

## SUBJECTS AND METHODS

### Study subjects

The *Chakma* subjects (43 male and 48 female) were selected from the hilly area of Rangamati, Khagrachari in Bangladesh and ninety one Bangalee people (39 male and 52 female) were selected from the plane land area of Chandanaish, Chittagong. Age and body mass index (BMI) were matched in the two races. Subjects suffering from familial hyperlipidemia and those on hypolipidemic drugs were excluded from the study.

### Laboratory methods

5 ml venous blood was collected from each subject after an overnight fast of 12-14 hours. Fasting total serum cholesterol, serum triglycerides and HDL-C were determined enzymatically using the kits of Randox Laboratory Ltd. UK. The LDL-C value was calculated using the Friedewald equation (22) when the triglyceride level was less than 400 mg/dl.

### Statistical analysis

Statistical analysis was performed with a SPSS/PC statistical software package. Data were expressed as mean $\pm$ SD. Unpaired t-test was used for comparison between two groups. Differences with a P value less than 0.05 were considered to be statistically significant.

## RESULTS

### Characteristics of the study subjects

Age, BMI and WHR showed no significant difference in Bangalee and Chakma subjects.

Both systolic and diastolic pressure were significantly higher ( $p=0.001$ ) in Bangalee than the Chakma subjects (**Table 1**).

### Characteristics of the study subjects depending on sex

Bangalee male subjects showed higher systolic and diastolic pressure compared to the Chakma male subjects. The same pattern was observed in the female subjects of the two races. Age, BMI and WHR showed no significant difference between Bangalee and Chakma subjects of both sex (**Table 2**).

### Lipid and lipoprotein level in Bangalee and Chakma subjects

Serum total cholesterol (TC), TG, LDL-C were significantly higher ( $p=0.001$ ) and HDL-C was significantly lower ( $p=0.001$ ) in the Bangalee subjects compared to the Chakma subjects (**Table 3**). The Bangalee male had significantly higher TC, TG and LDL-C ( $p=0.001$ , 0.002, 0.001 respectively) than the Chakma male. No significant difference was observed for HDL-C. Bangalee female had significantly higher TC, TG ( $p=0.000$  and 0.007 respectively) and significantly lower level of HDL-C ( $p=0.000$ ) than the Chakma female. LDL level was slightly lower in Bangalee female than in Chakma female (**Table 4**).

## DISCUSSION

Our study confirms the racial variations in serum lipid and lipoprotein levels between the Chakma and Bangalee population of Bangladesh and this is the first report with this observation. This study shows the Chakma population had favorable lipid profile than Bangalee population. The Chakma population had significantly lower TC, TG and LDL-C and higher HDL-C than Bangalee population. Both the systolic and diastolic blood pressure were significantly ( $p<0.001$ ) higher in Bangalee subjects which may be due to their higher lipid and lipoprotein level. Age, obesity and anthropometric data did not contribute to these differences. Similar racial

variations in serum lipid and lipoprotein level were also found in the children, adult and pregnant women of African and Caucasians (4, 15, 16, 23-24). There are also reports of variation in serum lipid and lipoprotein level in different ethnic groups of China (between the Bai Ku Yao and Han populations) (25) and Singapore (Chinese, Malays and Asian Indians) (26) and different nationalities of China (Kazaks and Hans) (27). When considered by sex, Bangalee male had higher TG, TC and LDL-C than Chakma male although there was no significant difference for HDL-C. On the other hand, Bangalee female had significantly higher TC and TG and lower HDL-C than Chakma female although no significant variation was found for LDL-C. Although a previous study which included only 20 subjects of both races of Bangladesh showed no significant racial variation in serum lipid and lipoprotein content, but in that study also the Bangalee subjects showed higher TG, TC and LDL-C than Chakma population (28).

Different factors have been considered for racial and ethnic variation in lipid profile. The differences in the lipid profiles between the Guangxi Bai Ku Yao and Han populations were associated with different dietary habits, lifestyle choices, and levels of physical activities (25). In this study we didn't consider the effect of dietary habits, lifestyle choices and levels of physical exercise on the lipid profile variation between the subjects of two races. The food habit of Bangalee and Chakma is different. The Banglaee population takes more animal protein and less vegetable than Chakma. The Chakma people are more industrious and poor than Bangalee. They are to work hard for their living. Genetic factors also influence the lipid profile. Genetic Variants of Y chromosome were found to be associated with a protective lipid profile in Black men (29). Ethnicity may have an influence on the association between *APOE* genotypes and HDL-C (27). Association of

DNA polymorphism at the apolipoprotein B-100 gene locus with plasma lipid concentration and coronary artery disease were also found among North Indians (30). DNA polymorphism at *APOB* and *APOE*-100 gene could be examined between the Bangalee and Chakma population of Bangladesh. Our findings conclude that race should be considered as a vital factor in determining risk of Bangladeshi population to CHD.

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**Table 1: Characteristics of the Study Subjects**

Variable	Bangalee (n=89)	Chakma (n=91)
Age	25.93±4.6	26.50±4.72
BMI (Kg/m <sup>2</sup> )	21.35 ± 2.62	21.1 ± 2.92
WHR	0.81 ± 0.03	0.80 ± 0.04
Systolic BP	118.77 ± 8.78	110.57 ± 11.59*
Diastolic BP	81.38 ± 8.74	74.65 ± 8.38*

Results expressed as mean± SD, Unpaired t-test was used for comparison between two groups. \*p<0.001, n= number of subjects. BP-blood pressure, WHR-waist hip ratio, BMI-body mass index

**Table 2: Characteristics of the Subjects Depending on Sex**

Variable	Bangalee male (n=39)	Chakma male (n=43)	Bangalee female (n=48)	Chakma female (n=52)
Age	25.52 ±4.60	26.30 ±5.05	26.35 ±4.60	26.70 ±4.38
BMI (Kg/m <sup>2</sup> )	20.72 ± 2.26	21.32 ± 2.63	22.01 ± 2.82	22.65 ± 3.07
WHR	0.82 ± 0.02	0.81 ± 0.04	0.81 ± 0.03	0.80 ± 0.05
Systolic BP	119.06 ± 8.91	110.69 ± 12.12*	118.47 ± 8.74	110.45 ± 11.19*
Diastolic BP	81.66 ± 8.14	75.58 ± 9.14*	81.08 ± 9.42	73.75± 7.55*

Results expressed as mean± SD, Unpaired t-test was used for comparison between two groups. \*p<0.001, n= number of subjects. BP-blood pressure, WHR-waist hip ratio, BMI-body mass index

**Table 3: Comparison of serum lipid and lipoprotein concentration between Bangalee subjects and Chakma subjects**

Variable	Bangalee subjects (n=89)	Chakma subjects (n=89)
<b>Total cholesterol (mg/dl)</b>	152.94 ± 25.67	132.1 ± 21.72**
<b>Triglycerides (mg/dl)</b>	103.94 ± 26.96	89.93 ± 14.61**
<b>HDL- Cholesterol (mg/dl)</b>	37.64 ± 5.07	41.12 ± 8.64*
<b>LDL- Cholesterol (mg/dl)</b>	94.51 ± 19.09	85.76 ± 19.47*

Results expressed as mean± SD, Unpaired t-test was used for comparison between two groups. \*P<0.003, \*\*P<0.001, n= number of subjects.

**Table 4: Comparison of serum lipid and lipoprotein concentration between subjects depending on sex**

Variable	Bangalee male subjects (n=39)	Chakma male subjects (n=43)	Bangalee female subjects (n=48)	Chakma female subjects (n=52)
<b>Total cholesterol (mg/dl)</b>	159.43 ± 27.13	137.30±20.96**	146.15 ± 22.39	127.09±21.49**
<b>Triglycerides (mg/dl)</b>	108.14 ± 31.93	90.9 ± 13.45**	99.54 ± 19.95	88.95 ± 15.79*
<b>HDL- Cholesterol (mg/dl)</b>	37.83 ± 4.62	38.40 ± 7.2	37.43 ± 5.54	43.84 ± 9.15**
<b>LDL- Cholesterol (mg/dl)</b>	99.97 ± 19.30	80.81 ±19.62**	88.80 ± 17.30	90.70 ± 18.23

Results expressed as mean± SD, Unpaired t-test was used for comparison between two groups. \*P<0.007, \*\*P<0.001, n= number of subjects.