Original Research Article

A comparative community based cross-sectional study of lipid profile among healthy urban and rural local ethnic Mising population in a district of upper Assam

Kailash Gairola[1], Javin Bishnu Gogoi[2*], RohiniKanta Goswami[3], Kingshuk Lahon[4]

[1]Assistant Professor, [2]Professor, Department of Biochemistry, Veer Chandra Singh Garhwali Government Institute of Medical Sciences and Research, Srinagar Garhwal, Uttarakhand-246174, INDIA.
[3]RetiredProfessor, Department of Biochemistry, Assam Medical College and Hospital, Dibrugarh, Assam- 786002, INDIA and Professor& Head, Department of Biochemistry, Agartala Government Medical College, Tripura, INDIA.
[4]Professor, Department of Pharmacology, Veer Chandra Singh Garhwali Government Institute of Medical Sciences and Research, Srinagar Garhwal, Uttarakhand-246174, INDIA.
Email: drjkkvcsg@gmail.com

Abstract

Background: Abnormalities in lipid profile are important risk factors for cardiovascular disease. Ethnicity, cultural and socioeconomic characteristics influence the lipid profile in different populations. Mising ethnic population of Assam traditionally consume boiled pork, dried fish and rice beer with low use of cooking oil. Many of them have migrated from rural to urban areas of Assam with corresponding changes in their diet and lifestyle. **Aims and objectives:** To assess and compare the lipid profile of healthy rural and urban Mising population of Dibrugarh district, Assam, India. **Materials and Methods:** After Institutional ethics committee (IEC) clearance and written informed consent, we estimated lipid profile of 100 healthy subjects between 18-65 years from both genders of urban and rural Mising population in Dibrugarh district of upper Assam from 1stOctober 2009 to 30thSeptember 2010. Subjects with hereditary familial hypercholesterolemia, chronic diseases like diabetes mellitus or pre-existing cardiovascular disease, pregnant women, subject with medication for any other diseases or usage of oral contraceptives were excluded. After interview and clinical examination of the subjects, fasting blood samples were collected for estimation of total cholesterol, triglycerides and HDL, LDL, VLDL cholesterol (mg/dl). Data were recorded in a proforma and serum lipid values were expressed as Mean ± SD. Statistical analysis for significance of differences in means and age and gender variations was performed in GraphPadQuickCalcs statistical software, using unpaired Student's t test, where $P < 0.05$ was considered statistically significant at 95% Confidence interval. **Observations and Results:** We observed statistically significant higher levels of mean serum total cholesterol and LDL and significantly lower HDL cholesterol in urban compared to rural Mising population, but no significant difference was found in the triglyceride and VLDL values. **Conclusion:** Urban population has adverse lipid profile compared to the rural population among Mising ethnic group of Assam.

Key Words: Cross-sectional, Lipid profile, Mising, Rural, Urban.

[*]**Address for Correspondence:**
Dr.Javin Bishnu Gogoi, Department of Biochemistry, Veer Chandra Singh Garhwali Government Institute of Medical Sciences & Research, Srinagar Garhwal, Uttarakhand-246174, INDIA.
Email: drjkkvcsg@gmail.com

Received Date: 02/07/2018 Revised Date: 23/07/2018 Accepted Date: 12/08/2018
DOI: https://doi.org/10.26611/1002726

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 15 August 2018

INTRODUCTION

Lipid profile, also known as coronary risk panelor lipid panel, is the collective term given to the estimation of, typically, total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), very low-density lipoprotein cholesterol (VLDL) and non-HDL-C, used to assess risk of coronary heart disease[1]. Cardiovascular diseases are a major cause of death in our society. The ability to prevent the development of atherosclerosis or, alternatively, to decrease established atherosclerotic plaques, often

How to cite this article: Kailash Gairola, JavinBishnu Gogoi, RohiniKanta Goswami, Kingshuk Lahon. A comparative community based cross-sectional study of lipid profile among healthy urban and rural local ethnic Mising population in a district of upper Assam. *MedPulse International Journal of Biochemistry.* August 2018; 7(2): 34-41. https://www.medpulse.in/Biochemistry/

referred to as regression, has major implications for public health. The historical distribution of risk and communicable versus non-communicable forms of cardiovascular disease, reflects the influence of cultural and ethnic factors[2].Whereas the incidences of coronary artery disease (CAD) were halved in the West in the past 30 years, the rates doubled in India with no signs of downturn. It appears that the CAD epidemic could explode in parallel with affluence and urbanization in rural villages unless the gravity and magnitude of the problem is recognized and immediate action is taken[3].Thus, a rapid epidemiological transition with increasing life expectancy and sociological changes of acculturation could be the main reasons for the accelerating CAD epidemic in India[4]. Epidemiological transition determines the socioeconomic gradient associated with the prevalence of CAD[2,5].Social and economic inequalities have been shown to be associated with health problems in general and non-communicable diseases such as diabetes, hypertension, dyslipidaemia and CAD in particular[2,6].The validity of the lipid hypothesis has been debated for more than 40 years. The relation between TC and LDL-C levels and the incidence of CAD and peripheral vascular disease (PVD) is now well established[7]. Although LDL-C has been the primary lipoprotein of concern, total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), and triglycerides also play roles in heart disease risk, with TC, LDL-C, and triglycerides positively associated with risk and HDL-C possibly playing a protective role[8].Lowering LDL-C concentrations can reduce cardiovascular morbidity and mortality, but hyperlipidemia is under diagnosed and undertreated[9]. A 10% increase in the prevalence of treatment for hyperlipidemia could prevent an estimated 8000 deaths per year[10].Even modest steps, such as those proposed by the National Cholesterol Education Program Adult Treatment Panel 3 primary prevention guidelines, could prevent approximately 20, 000 heart attacks and 10, 000 deaths due to coronary heart disease and save almost $3 billion in heart disease-related medical costs per year[11].Epidemiological studies have shown parallel, age-related trends of atherosclerotic lesions in the abdominal aorta, carotid, and coronary arteries[12].There is a great variation of plasma lipid levels in different populations and usually these are affected by age, sex, food habits, life style, socio-economic status, races, heredity, etc. Different methodology adopted for the determination of lipids and lipoproteins also may have some role in variation which cannot be ignored. Though in clinical chemistry, reference values are commonly based on reference of the Western population[13], these usually do not match with the Indian population especially in case of lipid profile. Higher HDL cholesterol and lower triglycerides are seen in blacks compared with whites[14].In a study conducted by Sliwa K, *et al*, differences in cardiovascular risk factors, especially lipid profiles, were apparent in the ethnically diverse enclave of Soweto in South Africa. While there are inherent limitations in the interpretation of racial and ethnic comparisons, irrespective of the healthcare setting, rational approaches to secondary prevention of heart disease may require a diversity of strategies because of these ethnic differences[15,16].The Misingor Mishingtribe, an Indo-Mongoloid group of people, live in the eastern region of the Brahmaputra valley in Assam, India. They migrated from the eastern Himalayan regions in Tibet in the hoary past and finally settled in the fertile Brahmaputra valley in Assam after having lived for long centuries in the Siang region of present-day Arunachal, India. One of the most unique features about their culture is their traditional diet, consisting of extensive consumption of boiled pork, dried fish and rice beer, although the use of oil in cooking is low. Thus, we see that the Misings traditionally consumed a high fat diet but with reduced consumption of cooking oil. Due to the impact of globalisation, many of them have migrated from their primarily rural roots to diverse urban areas of Assam with corresponding changes in their diet and other changes[17].The influence of diet on lipid levels has been reported by Yokohama Y, *et al* in their meta-analysis on association of vegetarian diets and plasma lipid levels. They concluded that plant-based diets are associated with decreased TC, LDL-C and HDL-C, but not with decreased triglycerides[18].Hence, a comparative cross sectional study was designed to observe the trends of lipid profile among rural and urban apparently healthy Mising population with regard to their changing lifestyle and food habits.

MATERIALS AND METHODS

The study was performed after due ethical clearance from the Institutional ethics committee (IEC).

The estimation of serum lipid profile was performed in 100 subjects belonging tourban and rural Mising population of Dibrugarh district of upper Assam during a one year periodfrom1stOctober 2009 to30thSeptember 2010. The rural population was taken from 'PaniMisingGaon' in Dibrugarh district. The urban population was taken from areas in Dibrugarh town where the Mising community was preponderant. Subjects were included in the study only after taking written informed consent while fully explaining the purpose of the study to them. Convenience sampling was done.

Inclusion criteria

All healthy adults, both male and female, belonging to Mising tribe between 18-65 years of age willing to participate in the study were included.

Exclusion criteria

Subjects with hereditary familial hypercholesterolemia, chronic diseases like diabetes mellitus or pre-existing coronary artery disease or other cardiovascular diseases, pregnant women, subject with medication for any other diseases or usage of oral contraceptives were excluded from the study.

Study procedure

After obtaining informed consent, a detailed clinical interview followed by clinical examination was performed; then collection of blood samples was done. Subjects were informed prior to the visit so that samples after 12 hours fasting could be collected. A standard proforma was used to note the demographic details (age, gender, occupation, socioeconomic status) and thedetails of clinical interview, including thorough history of any medical illness whether present or past, personal history including food habits, family history, drug history and menstrual history for females. This was followed by clinical examination and relevant findings were noted. Thereafter, the fasting blood samples for lipid profile were collected from the subjects. The blood samples were analysed for the following parameters -fasting blood sugar, Urea, Creatinine, Total cholesterol, Triglycerides, HDL cholesterol, LDL cholesterol and VLDL cholesterol in Dade Behring Dimension Rxl Max fully automatic analyser (SIEMENS Healthcare Pvt. Ltd., India). Clinical interview and examination as well as estimation of blood sugar, urea and creatinine helped in screening the population for eligibility to be included in the study as healthy subjects.

Statistical analysis

The values of the different parameters measured were entered as Mean ± SD in MS Excel sheet and GraphPadQuickCalcs was used for the statistical analysis. Other descriptive statistics like proportion and percentages were also used. The statistical analysis of differences in means between the groups (urban and rural)as well as association of age and gender with lipid levels were done using unpaired Student's t-test, where $P < 0.05$ was considered statistically significant at 95% Confidence interval.

OBSERVATIONS AND RESULTS

The results and observations of the study are enumerated below along with tables and figures. A total of 100 apparently normal healthy subjects were included in our study, 50 each from urban and rural areas. The urban subjects had occupations not involving hard physical labour, as compared to their rural counterparts who were mostly farmers and daily wage workers having different life styles and food habits than the urban dwellers. The age of the subjects varied from 30 to 60 years. Mean age among males was 40.89 ± 10.05 years in urban areas and 48.33 ± 10.84 years in rural areas. Mean age among females was 41.90 ± 9.38 years in urban and 45.30 ± 9.41 years in rural areas. The sex distribution of the total cases are 28 (56%) male and 22 (44%) female in urban, whereas 31 (62%) male and 19 (38%) were female in the rural subjects.

Table 1: Lipid profile in urban and rural subjects irrespective of their sex distribution

Parameters (mg/dl)	Urban (Mean±SD)	Rural (Mean±SD)	*P*value
Total cholesterol	164.86 ± 40.20	146.90 ± 26.92	<0.0101(a)
Triglycerides	150.53 ± 40.26	145.15 ± 34.13	< 0.4728(c)
HDL cholesterol	38.66±11	51.93 ± 12.42	< 0.0001 (b)
LDL cholesterol	97.16 ± 43.42	65.93 ± 30.13	< 0.0001(b)
VLDL	30.10 ± 8.05	29.03 ± 6.82	< 0.4750 (c)

Values are expressed as Mean ± SD; Unpaired't' test a = $P< 0.05$ (significant), b = $P< 0.0001$ (highly significant), c= $P>0.05$ (not significant)

There is significant difference in serum cholesterol level ($p<0.05$), and highly significant difference in HDL cholesterol level ($p <0.0001$) and LDL cholesterol level ($p< 0.0001$) between urban and rural subjects irrespective of their sex distribution. However, there is insignificant difference ($p>0.05$) in serum triglyceride and VLDL levels between groups.

Table2: Lipid profiles of urban and rural male population

Parameters (mg/dl)	Urban (Mean±SD) (n=28)	Rural (Mean±SD) (n=30)	*P* value
Total cholesterol	170.61 ± 45.52	153.11 ± 26.24	< 0.0758(c)
Triglyceride	161.92 ± 29.51	142 ± 37.02	< 0.0280(a)
HDL-cholesterol	37.86 ±9.87	50.96± 12.64	< 0.0001(b)
LDL-cholesterol	101.34 ±49.45	73.74 ± 30.44	< 0.0126(a)
VLDL	32.38 ± 5.90	28.40 ± 7.40	< 0.0281(a)

Values are expressed as Mean ± SD; Unpaired 't' test a = $P< 0.05$ (significant), b = $P< 0.0001$ (highly significant), c = $P> 0.05$ (not significant)

The total cholesterol level is statistically non-significant (p> 0.05) between urban and rural male subjects, but serum triglyceride, LDL cholesterol, VLDL are statistically significant (p< 0.05) and HDL cholesterol is statistically highly significant (p<0.0001) in the compared groups.

Table 3: Lipid profiles of urban and rural female population

Parameters (mg/dl)	Urban (Mean±SD) (n=28)	Rural (Mean±SD) (n=20)	*P* value
Total cholesterol	157.82 ± 32.14	137.6 ± 25.82	< 0.0312(a)
Triglyceride	136.03 ± 47.64	149.9 ± 29.55	< 0.2693(c)
HDL-cholesterol	39.68 ± 12.45	53.40 ± 12.25	< 0.0009(b)
LDL-cholesterol	91.83 ± 34.67	54.21 ± 26.19	< 0.0003(b)
VLDL	27.20 ± 9.52	29.97 ± 5.91	< 0.2697(c)

Values are expressed as Mean ± SD; Unpaired't' test a = P< 0.05 (significant), b = P< 0.0001 (highly significant), c = P> 0.05 (not significant)

The total cholesterol is significantly different (p<0.05), whereas HDL cholesterol (p<0.0001) and LDL cholesterol (p<0.0001) levels are highly significantly different between the two study groups. Although mean serum triglyceride and VLDL levels are more in rural subjects as compared to their urban counterparts, it is non significant(p>0.05).

Table 4: Lipid profiles of urban male versus female population and of rural male versus female population

Parameters (mg/dl)	Urban male (n=28) Mean±SD	Urban female (n=22) Mean±SD	*P* value	Rural male (n=30) Mean±SD	Rural female (n=20) Mean±SD	*P* value
Total cholesterol	170.61 ± 45.52	157.82 ± 32.14	<0.2699(c)	153.11 ± 26.24	137.6 ± 25.82	<0.0448 (a)
Triglyceride	161.92 ± 29.51	136.03 ± 47.64	<0.0224(a)	142 ± 37.02	149.90 ± 29.55	<0.4283 (c)
HDL-cholesterol	37.86 ±9.87	39.68 ± 12.45	<0.5667(c)	50.96± 12.64	53.40 ± 12.25	<0.5017(c)
LDL-cholesterol	101.34 ±49.45	91.83 ± 34.67	<0.4477(c)	73.74 ± 30.44	54.21 ± 26.19	<0.0231(a)
VLDL	32.38 ± 5.90	27.20 ± 9.52	<0.0223(a)	28.40 ± 7.40	29.97 ± 5.91	<0.4311(c)

Values are expressed as Mean ± SD; Unpaired 't' test a = P< 0.05 (significant), b = P< 0.0001 (highly significant), c = P> 0.05 (not significant)

Table 4 shows the differences in lipid profile according to gender within urban and rural population.The total cholesterol and LDL-cholesterol levels are significantly more (p<0.05) in rural male than in rural female but not in urban group(p>0.05).Mean serum triglyceride and VLDL levels are significantly more in urban male than female subjects (p<0.05). These values among males and females in the rural population do not show any statistically significant differences (p>0.05). HDL cholesterol is not significantly different between males and females of both groups(p>0.05).

Table 5: Lipid profiles in different age groups of urban and rural populations

Age range (years)	Parameters (mg/dl)	Urban Mean±SD	Rural Mean±SD	*P* value
18 - 39	Total cholesterol	145.70 ± 32.30	140.58 ± 28.30	< 0.06421(c)
	Triglyceride	149.04 ± 32.96	135.36 ± 29.78	< 0.2316(c)
	HDL-cholesterol	44.83 ± 10.04	51.43 ± 11.98	< 0.0874(c)
	LDL-cholesterol	71.86 ± 34.06	62.07 ± 27.84	< 0.393(c)
	VLDL	29.80 ± 6.59	27.07 ±5.95	< 0.2323(c)
40 - 65	Total cholesterol	185.37 ± 37.61	148.9 ± 26.55	<0.0001(b)
	Triglyceride	152.01 ± 47.1	148.24 ± 35.19	< 0.7176(c)
	HDL-cholesterol	32.5 ± 8.19	52.09 ± 12.7	< 0.0001(b)
	LDL-cholesterol	122.47 ± 36.82	67.15 ± 31.07	< 0.0001(b)
	VLDL	30.4 ± 9.42	29.65 ± 7.03	< 0.7189(c)

Values are expressed as Mean ± SD; Unpaired't' testa = P< 0.05 (significant), b = P< 0.0001 (highly significant), c = P> 0.05 (not significant)

Table 5 shows the age related differences in lipid profile between urban and rural populations.For age related differences, we categorised the participants as 18-39 years (young adult to older adult) and 40-65 years (middle age – old age) in both the groups.In the young to older adult group, minimum age observed was 30 years (range 30-37y in rural and 30-38y in urban) and maximum age in the middle-old age group was 60 years (range 40-60y in both urban and rural).From Table 5, it has been observed that the there is no statistically significant difference in any of the lipid profile values between urban and rural populations in the 18-39 y age group (young adult-older adult). However, in the 40-65 y age group (middle age–old age), there is a statistically highly significant (p<0.0001) difference in serum values of total cholesterol, HDL cholesterol and LDL cholesterol between the two study groups. Urban population had higher levels of serum total cholesterol and LDL-cholesterol and lower levels of HDL-cholesterol compared to rural. Although mean serum triglyceride and VLDL levels are more in urban subjects as compared to their rural counterparts, on statistical analysis it was found to be non-significant (p>0.05).

DISCUSSION

The study was undertakenwith the aim to understand the pattern of lipid profile in a defined ethnic population in a defined geographical location and to study the variation of lipid profile in that ethnic group among the healthy urban and rural populations. Our objective was to assess the lipid profile of healthy rural and urban Mising population of Dibrugarh district, Assam and to compare the differences, if any, among them. In the present study, the levels of mean total cholesterol in urban and rural Mising population were found to be164.86 ± 40.20 mg/dl and 146.90 ± 26.92 mg/dl respectively. This difference among urban and rural populations was found to be statistically significant.The urban population had a higher total cholesterol value as compared to their rural counterparts.This finding correlates with a previous study conducted in Thailand where it was found that the total cholesterol is higher in urban than their rural counterparts[19].In another study on serum lipid levels and prevalence of dyslipidemia among urban and rural Thai adults, it was found that rural residents had lower mean levels of total cholesterol than the urban residents[20].In a study in China, it was observedthat the adjusted mean total cholesterol in participants from the urban districts is more than the participants from the rural districts[21].An almost similar finding with the present study was also observed by Gupta R, *et al*where they found higher mean levels of total cholesterol in urban than the rural population[22]. We observed that the level of mean triglyceride in urban and rural Mising population was found to be 150.53 ± 40.26 mg/dl and 145.15 ± 34.13 mg/dl respectively. The rural population has lower triglyceride level than their urban counterparts but this difference was not statistically significant (p>0.05). In a previous study,it was observed that the mean levels of triglyceride in urban population is more than in the rural population but it is statistically non-significant[22].In another study done by Zhao WH, *et al*,it was found that the mean triglyceride level from urban districts was higher than that in participants from rural areas[21].Another study conducted in 2008 found a similar result with the urban and rural communities in Papua New Guinea[23]. In our study, the level of mean HDL cholesterol level in urban and rural Mising population was found to be 38.66 ± 11 mg/dl and 51.93 ± 12.42 mg/dl respectively.Thus, the rural population has higher mean HDL cholesterol levels than their urban counterparts. In 1983 and 1984, surveys were conducted in four Chinese population samples, urban and rural for both Beijing and Guangzhou, as part of PRC-USA collaborative research in cardiovascular and cardiopulmonary epidemiology and found that group mean values of HDL-C varied from 48 to 59 mg/dl, higher in Beijing than Guangzhou and it is higher in the rural population than the urban population24.A similar finding was observed by Gupta, *et al*inthe study conducted in Rajasthan, India where the mean levels of HDL cholesterol in rural vs. urban population was 44 ± 13 vs. 43 ± 12 mg/dl[22].Another study done in Haryana found low HDL cholesterol in the urban areas compared to the rural areas[25].However, in a study by Lim S, *et al*,conducted in a Korean population, low HDL cholesterolemia in the urban segment was reported[26].The level of mean LDL cholesterol level in urban and rural Mising population was found to be 97.16 ± 43.42 mg/dl and 65.93 ± 30.13 mg/dlin our study. This higher level of LDL cholesterol in urban population was statistically highly significant (p<0.0001).In studies conducted previously, it was found that the LDL cholesterol was significantly higher in the urban subjects than the rural subjects (p<0.001)[19,20].Patel,*et al* have also reported that LDL cholesterol level in both men and women were lower in the rural subjects than the urban subjects[20].In the present study, the mean VLDL cholesterol level in the urban and rural subjects was found to be 30.10 ± 8.05 mg/dl and 29.03 ± 6.82 mg/dl respectively. Although mean VLDL was higher in urban subjects, on statistical analysis, it was found to be insignificant(p>0.05).This finding could not be compared with the previous studies as they have not mentioned about the VLDL status in

urban and rural population. Joshi SR, *et al*[27] in their cross sectional study of prevalence of dyslipidemia in urban and rural India found that mean cholesterol levels in urban subjects were higher than in their rural counterparts, but no differences were observed in triglyceride and HDL-C levels. Similar observations were reported by Misra K, *et al* in their study of dyslipidemia on Asian Indians, with higher mean cholesterol in urban compared to rural subjects and a low mean HDL-C[28].We observed that the total cholesterol and LDL cholesterol were higher in the urban subjects compared to rural subjects in both male and females.The level of triglyceride although higher in the rural females, was not significant. Similar observations were reported in a study by Pongchaiyakul, *et al*[19]. HDL cholesterol in both males and females were higher in the rural subjects than the urban subjects in our study. But in thestudy by Pongchaiyakul, *et al*, it was seen that the HDL cholesterol in both males and females were lower in the rural subjects than the urban subjects; in case of males it was not significant whereas in females it was significant[19].This variation could be due to different ethnic population with different life style and food habits in a different geographic area. However our findings were corroborated byobservations of another study in Saudi Arabia where HDL cholesterol was low in females and lower in the urban subjects[29].These differences among urban and rural populations of the same ethnic group could be due to the changes in lifestyle and diet consistent with urbanisation.We also did a comparison of gender differences within the populations. Then, it was observed that the total cholesterol and LDL-cholesterol levels were significantly more (p<0.05) in rural male than in rural female but not in urban group (p>0.05). Mean serum triglyceride and VLDL levels were significantly more in urban male than female subjects (p<0.05), but triglyceride and VLDL values among males and females in the rural population do not show any statistically significant differences (p>0.05). HDL cholesterol is not significantly different between males and females of both groups (p>0.05). On comparing for age related differences, we found that in the young to older adult group, minimum age observed was 30 years (range 30-37y in rural and 30-38y in urban) and maximum age in the middle-old age group was 60 years (range 40-60y in both urban and rural). We did not observe statistically significant difference in any of the lipid profile values between urban and rural populations in the 18-39 y age group (young adult-older adult).However, in the 40-65 y age group (middle age – old age), urban population had highly significant (p<0.0001) higher levels of serum total cholesterol and LDL-cholesterol and lower levels of HDL-cholesterol compared to rural. Although mean serum triglyceride and VLDL levels are more in urban subjects as compared to their rural counterparts, it was statistically non-significant (p>0.05). There is a linear association between extent of dyslipidemia and advancing age, as observed by Pongchaiyakul C, *et al*[19] andNongkynrih B, *et al*[25].Das SK, *et al* found that in the 40-59 years age group, lower serum HDL and higher levels of serum total cholesterol, triglycerides andLDL cholesterol were seen in urban compared to rural subjects in a study conducted in a Bangladeshi population[30]. However, there was no such difference observed between urban and rural populations in the age group of 60 years and above.

Implications of the study

Baseline data on lipid profile of Mising ethnic group of Assam will help in framing guidelines for prevention and treatment of cardiovascular diseases in this population. Specific reference and recommendation on primary and secondary prevention guidelines in relation to ethnic groups is extremely limited as reported by Lip, GYH, *et al*, whoprovided an overview of ethnicity and cardiovascular disease (CVD) in the United Kingdom, with management recommendations based on a roundtable discussion of a multidisciplinary ethnicity and CVD consensus group[32]. Similar recommendations can only be possible if we have the baseline lipid profile data of healthy populations in the ethnic communities in our own country, like the Misings.

Strengths of the study

This study was done in Mising tribe, an ethnic group of Assam with a unique sociocultural identity, including food habits and lifestyle, which could influence their lipid levels. Such a study has not been reported in scientific literature in this population.

Limitations of the study

This was only a cross-sectional study owing to time and resource constraints; follow up of the observed persons for lipid profile over a longer period including observation for development of cardiovascular morbidity would have provided more valuable information.

CONCLUSIONS

The present study has made an attempt to understand the pattern of lipid profile in the Mising population in both urban and rural dwellers. We observed a statistically significant difference in the mean serum total cholesterol, HDL cholesterol and LDL cholesterol values between urban and rural Mising population of Dibrugarh district of upper Assam, but no significant difference was found in the triglyceride and VLDL

values. Thus it can be concluded that urban population has unfavourable lipid profile compared to the rural population among Mising ethnic group of Assam. It could probably be due to the impact of urbanisation on lifestyle leading to unfavourable changes in lipid profile in urban Mising population.Baseline data on lipid profile of Mising ethnic group can be used for framing guidelines for primary and secondary prevention and treatment of cardiovascular diseases in this population.Alongitudinal study with longer duration and a larger sample size is required to observe for changes in lipid profile and its association with development of cardiovascular morbidity in this population over a period of time.

ACKNOWLEDGEMENT

The authors would like to acknowledge the help of the postgraduate junior residents of clinical departments who helped us in the screening of healthy Mising population in urban and rural areas of Dibrugarhand the laboratory staff of the department of Biochemistry, Assam Medical College, Dibrugarh for their contribution. We are also thankfulto Dibrugarh University for postgraduate dissertation research grant (as per norms).

REFERENCES

1. Available from https://www.webmd.comAccessed March 6, 2018.
2. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases: Part II: variations in cardiovascular disease by specific ethnic groups and geographic regions and prevention strategies. Circulation2001; 104 (23):2855–64.
3. Enas, EA. Coronary artery disease epidemic in Indians: A cause for alarm and call for action. J. Ind. Med. Assoc. 2000; 98: 694-702.
4. Gupta R. Prevention of coronary heart disease among Indians. Focus on primary prevention. J Indian Med Assoc 2000; 98:703–9.
5. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases. Part I: General considerations, the epidemiologic transition, risk factors and impact of urbanization. Circulation 2001; 104: 2746–53.
6. Hazuda HP, Haffner SM, Stern MP, Eifler CW. Effects of acculturation andsocioeconomic status on obesity and diabetes in Mexican Americans: The San Antonio Heart Study. Am J Epidemiol 1988;128:1289–301.
7. Bergstrand L, Olsson AG, Erikson U, Holme I, Johansson J, Kaijser L, et al. The relation of coronaryand peripheral arterial disease to theseverity of femoral atherosclerosis inhypercholesterolemia. J. Intern. Med. 1994;236:367-75.
8. Lemieux I, Lamarche B, Couillard C, Pascot A, Cantin B, Bergeron J, et al. Total cholesterol/HDL cholesterol ratio vs LDL cholesterol/HDL cholesterol ratio as indices of ischemic heart disease risk in men: the Quebec Cardiovascular Study. Arch Intern Med. 2001;161(22):2685–92.
9. Kuklina EV, Yoon PW, Keenan NL. Trends in high levels of low-density lipoprotein cholesterol in the United States, 1999–2006. JAMA 2009;302:2104–10.
10. Farley TA, Dalal MA, Mostashari F, Frieden TR. Deaths preventable in the U.S. by improvements in use of clinical preventive services. Am J Prev Med. 2010;38:600–9.
11. Pletcher MJ, Lazar L, Bibbins-Domingo K, Moran A, Rodondi N, Coxson P, et al. Comparing impact and cost effectiveness of primary prevention strategies for lipid-lowering. Ann Intern Med. 2009;150:243–54.
12. Berenson GS, Wattigney WA, Tracy RE, Newman WP 3rd, Srinivasan SR, Webber LS,et al. Atherosclerosis of the aorta and coronary arteries and cardiovascular risk factors in persons aged 6 to 30 years studied at necropsy (The Bogalusa Heart Study). Am. J. Cardiol. 1992;70:851 – 8.
13. Solberg HE. Establishment and use of Reference Values. In: Burtis CA, Ashwood ER, Bruns De, (eds).Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 4thEdition, Philadelphia U.S.A;W.B.Saunders Company: 2006, pp. 425
14. Zoratti R. A review on ethnic differences in plasma triglycerides and high-density lipoprotein cholesterol: Is the lipid pattern the key factor for the low coronary heart disease rate in people of African origin? Eur J Epidemiol 1998;14:9-21
15. Sliwa K, Wilkinson D, Hansen C, Ntyintyane L, Tibazarwa K, Becker A, et al. Spectrum of heart disease and risk factors in a black urban population in South Africa (the Heart of Soweto Study): a cohort study. Lancet 2008; 371(9616): 915–22.
16. Sliwa K, Lyons JG, Carrington MJ, Lecour S, Marais DA, Raal FJ, et al. Different lipid profiles according to ethnicity in the Heart of Soweto study cohort of de novo presentations of heart disease. Cardiovasc J. Afr. 2012;23(7): 389-95
17. Kumari P, Dutta SK. Changing eating pattern of Mising food culture. International Journal of Humanities and Social Sciences 2012;2(2):211-9)
18. Yokohama Y, Levin S, Barnard N. Association between plant-based diets and plasma lipids: a systematic review and meta-analysis. Nutr. Rev. 2017; 0(0):1-16
19. Pongchaiyakul C, Hongsprabhas P, Pisprasert.V, Pongchaiyakul C. Rural-urban Difference in Lipid Levels and Prevalence of Dyslipidemia: a population-Based Study in KhonKaen Province, Thailand. J MedAssoc Thai 2006;89(11):1835-44
20. Patel A, Woodward .M, Stolk. R, Suriyawongpaisal P, Neal B.Serum Lipid Levels and the Prevalence of Dyslipidaemia among Rural and Urban Thai Adults - are the NCEP III Guidelines Appropriate?J Med Assoc Thai 2005; 88(9):1242-50
21. Zhao WH, Zhang J, Zhai Y, You Y, Man QQ, Wang CR, et al. Blood Lipid Profile and Prevalence of Dyslipidemia in Chinese Adults. Biomed Environ. Sci. 2007;20:329-35

22. Gupta R, Prakash H, Kaul V. Cholesterol lipoproteins, triglycerides, rural-urban differences and prevalence of dyslipidaemia among males in Rajasthan. J Assoc. Physicians India1997;45(4):275-9
23. Wyatt G. B, GriewA. R, Martin FI, Campbell DG. Plasma Cholesterol, Triglyceride and Uric Acid in Urban and Rural Communities in Papua New Guinea. Aust NZ J Med 1980;10(5):491-5
24. Tao S, Li Y, Xiao Z, Cen R, Zhang H, Zhuo Y, et al. Serum lipids and their correlates in Chinese urban and rural populations of Beijing and Guangzhou. PRC-USA Cardiovascular and Cardiopulmonary Epidemiology Research Group. Int J Epidemiol. 1992;21(5):893-903.
25. Nongkynrih B, Acharya A, Ramakrishnan L, Ritvik, Anand K, Shah B. Profile of biochemical risk factors for noncommunicable diseases in urban, rural and periurban Haryana, India.JAssoc Physicians India. 2008;56:165-70.
26. Lim S, Jang HC, Lee HK, Kimm KC, Park C, Cho NH,et al. A rural-urban comparison of the characteristics of the metabolic syndrome by gender in Korea: the Korean Health and Genome Study (KHGS).J Endocrinol Invest. 2006;29(4):313-9.
27. Joshi SR, Anjana RM, Deepa M, Pradeepa R, Bhansali A, Dhandhania VK, et al. Prevalence of dyslipidemia in urban and rural India: The ICMR-INDIAB Study. PloS One 2014;9(5):e96808
28. Misra A, Luthra K, Vikram NK. Dyslipidemia in Asian Indians: determinants and significance. J Assoc Physicians India 2004;52:137-42
29. Al-NuaimAR. Serum total and fractionated cholesterol distribution and prevalence of hypercholesterolemia in urban and rural communities in Saudi Arabia. Int J Cardiol 1997;58(2):141-9
30. Das SK, FaruqueASG, Ahmed S, Chowdhury AK, Hossain A, Chisti MJ, et al. serum lipid profile among urban and rural Bangladeshi population. J Obes. Wt Loss Ther. 2012;2:148
31. Lip GYH, Barnett AH, Bradbury A, Cappuccio FP, Gill PS, Hughes E, et al. Ethnicity and cardiovascular disease prevention in the United Kingdom: A practical approach to management. J Hum Hypertens. 2007;21:183-211.

Source of Support: None Declared
Conflict of Interest: None Declared