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ELEVATED BLOOD TRIGLYCERIDES AND ITS PREDICTORS IN RURAL ADULT POPULATION: FINDINGS FROM CENTRAL INDIA

Community Medicine

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ABSTRACT

Background: Cardiovascular diseases (CVDs) are the leading cause of death worldwide. Dyslipidemia has been closely linked to pathophysiology of CVDs.

Objectives: To assess extent of elevated blood triglycerides in rural adult population and to pin point its predictors.

Methodology: This cross-sectional study was undertaken on a representative adult population of rural Varanasi, India. After obtaining consent from the participants their socio-demographic characteristics were assessed by interviewing them using predesigned and pretested proforma. Weight, height, hip and waist circumference of each participant was measured following standard techniques. Blood for triglycerides (TG) was analyzed by CHOD-PAP Enzymatic End Point Assay method. Hemoglobin estimation was done by Sahli's method.

Results: Prevalence of elevated blood triglycerides was 35.4%. Adjusted Odd's Ratio was significantly (P<0.01) higher for subjects in the age group 50-59 years (AOR 7.00; 95%CI: 3.43-14.28) and with family history of diseases (AOR3.04; 95%CI: 1.66-5.57).

Conclusion: Seven out of 20 subjects had elevated blood TG. Age and family history of diseases were significant predictors of raised TG.

KEYWORDS

Blood triglycerides, cardiovascular diseases, predictors of raised triglycerides, rural area

INTRODUCTION

The world is in the phase of epidemiological transition where it is being observed that death due to non-communicable diseases (NCDs) exceeds death due to communicable diseases. NCDs which were once considered as rich man's disease has now reached even the poor and becoming threat to economy of nation by being a burden to health system. NCDs are diseases of long duration and slow progression thereby reducing the working efficiency and increasing the out of pocket expenditure. Globally NCDs kill 40 million people each year .They are the leading cause of death and account for 70% of all deaths. Cardiovascular diseases are responsible for 17.7 million deaths annually. In India NCDs accounted for 37.9% of total death in 1990 which increased to 61.1% in 2016.[1-2] Cardiovascular diseases (CVDs) are the leading cause of death worldwide. Dyslipidemia has been closely linked to pathophysiology of CVDs and is a key independent modifiable risk factor for CVDs. The most common dyslipidemia in India are borderline high LDL cholesterol, low HDL cholesterol and high triglycerides. An elevation in triglycerides (TG) is associated with an increased risk of cardiovascular disease (CVD), even after controlling for low-density lipoprotein cholesterol (LDL-C).[3] There are ample of studies regarding elevated triglycerides and their predictors in urban India but in rural areas there are few. With this background this study was conducted on representative adult population of rural Varanasi, India, with the following objectives:

[a.] To assess the extent of elevated blood triglycerides in rural adult population.

[b.] To pin point predictors of elevated blood triglycerides in participants of the study.

MATERIAL AND METHODS

This community based cross-sectional study was conducted in one of the 8 Community Development Blocks of Varanasi district, India. It was observed in the pilot study that 30% subjects had elevated blood triglycerides in non-study villages. Taking this as prevalence and permissible error of 7.5% (absolute) the required sample size was worked out to be 143.4, which after adjusting for design effect of 1.5 became 216. Further, giving due allowance to non-response of 10% the final sample size was fixed at 240. Multistage sampling was adopted for the selection of study subjects:

Stage-1: Out of 8 Community Development Blocks of Varanasi District, *Chiraigaon* Community Development Block was selected by simple random sampling.

Stage-2: Villages were selected by stratified sampling; stratification was done on the basis of distance from block headquarter (>10km and <10km).Two villages i.e. *Narainpur* and *Chhitauna* were selected by simple random sampling from the two strata.

Stage-3: Selection of family was done by adopting systematic random sampling.

Stage-4: Finally one adult from the selected family was picked up by lottery method.

If a particular individual was not present at the time of survey, the house was revisited. Individuals who were not available in spite of two visits then one adult from the next household was taken. Adults of age group 30-59 years, consenting for the study, were considered as subjects of the study.Subjects with terminal illness, serious mental abnormality, pregnant women, and having duration of stay in the study area less than six months were excluded from the study.

Ethical approval was obtained from Institutional Ethical Committee and consent was obtained from participants using bilingual consent form.

Socio-demographic characteristics of the study subjects were obtained by interviewing them using predesigned and pretested proforma. Feedback from the pilot process was used to sharpen tools for eliciting information. Each subject was subjected to anthropometric measurements (viz. weight, height, hip and waist circumference) following standard techniques.[4] Body Mass Index (BMI) was calculated and categorized as chronic energy deficiency (CED), normal, overweight and obese accordingly adopting global and Asian cutoffs.[5-6]

Fasting blood sample was collected by taking aseptic precaution and transferred to Department of Biochemistry, Institute of Medical sciences, Banaras Hindu University, Varanasi, on the same day. Triglycerides were analyzed by CHOD-PAP Enzymatic End Point Assay methods.[7] Participants having blood triglycerides (TG) level 150mg/dl or more were classified as elevated triglycerides.[8] Hemoglobin estimation was done by Sahli's Method. Subjects were

categorized anemic as per cut off values for age and gender given by WHO.[9]

Data, thus, generated, was entered in personal computer and analyzed using IBM-SPSS version 23.0. In order to pinpoint significant predictors associated with elevated TG chi-square test was applied and logistic regression was used for computation of Adjusted Odd's Ratio (AOR) and 95% Confidence Interval.

RESULTS:

Prevalence of elevated blood TG was 35.4%. In male participants it was 33.6% whereas this was 37.3% in females. As much as 19.0%, 32.8% and 60.0% subjects belonging to age group 30-39, 40-49, 50-59 years, respectively, had elevated TG levels (P<0.05).Association of triglycerides and socio-demographic characteristics of study subjects is given in Table1.

Table1: Association of triglycerides (TG) and socio-demographic characteristics of study subjects

Variables	Elevated TG N (%)	Normal TG N (%)	Total N (%)	Tests of significance
Age group(Years)				
30-39	19(19.0)	81(81.0)	100(100)	$\chi2$=31.70, df=2,p<0.01
40-49	22(32.8)	45(67.2)	67(100)	
50-59	44(60.3)	29(39.7)	73(100)	
Addiction				
Present	55(43.3)	72(56.7)	127(100)	$\chi2$=7.34 df=1,p<0.05
Absent	30(26.5)	83(73.5)	113(100)	
Marital status				
Married	71(33.5)	141(66.5)	212(100)	Fisher's Exact=9.57 df=3,p<0.05
Unmarried	02(20.0)	08(80.0)	10(100)	
Widowed	09(75.0)	03(25.0)	12(100)	
Widower	03(50.0)	03(50.0)	06(100)	
BMI(Asian Criteria)				
CED	08(36.4)	14(63.6)	22(100)	$\chi2$=11.06 df=3,p<0.05
Normal	16(21.3)	59(78.7)	75(100)	
Overweight	22(37.3)	37(62.7)	59(100)	
Obese	39(46.4)	45(53.6)	84(100)	
BMI (Global criteria)				
CED	08(36.4)	14(63.6)	22(100)	$\chi2$=8.21 df=3, p<0.05
Normal	38(28.4)	96(71.6)	134(100)	
Overweight	29(43.9)	37(56.1)	66(100)	
Obesity	10(55.6)	08(44.4)	18(100)	
Family history of diseases				
Present	42(50.6)	41(49.4)	83(100)	$\chi2$=12.79 df=1,p<0.05
Absent	43(27.4)	114(72.6)	175(100)	
Anemia				
Anemic	60(40.3)	89(59.7)	149(100)	$\chi2$=4.04 df=1,p<0.05
Normal	25(27.5)	66(72.5)	91(100)	
Waist circumference				
Elevated	54(45.8)	64(54.2)	118(100)	$\chi2$=10.86 df=1,p<0.01
Normal	31(25.4)	91(74.6)	122(100)	
Waist hip ratio				
High risk	73(39.2)	113(60.8)	186(100)	$\chi2$=5.30 df=1, p<0.05
Low risk	12(22.2)	42(77.8)	54(100)	

Triglycerides levels were more than cutoff in 43.3% subjects having some addiction, 50.6% with family history of disease, 75.0% widowed, and 46.4% obese by Asian and 55.6% obese by global criteria taking BMI as parameter. Least values in respective categories were in subjects without addiction (26.5%), family history disease (27.4%), unmarried (20.0%) and normal nutritional status both by Asian (21.3%) and global (28.4%) classifications. Elevation of TG was significantly (P<0.05) more in anemic (40.3%) than non-anemic subjects. There existed no significant difference (P>0.05) between elevated TG and gender, Socioeconomic status, educational status, highest education in the family, types of family and caste of the study subjects.

Logistic regression analysis for triglycerides is given in Table2.

Table2: Logistic regression for triglyceride (TG)

Variables	B	SE of B	P Value	AOR	95% CI
Age group(Years)					
50-59	1.96	0.36	0.000	7.00	3.43-14.28
40-49	0.71	0.37	0.057	2.04	0.98-4.26
30-39*	--	--	--	--	--
Family history of disease					
Present	1.11	0.31	0.000	3.04	1.66-5.57
Absent*	--	--	--	--	--

*Reference category

Logistic regression analysis identified age, and family history of disease as significant (p<0.01) predictors of raised TG. When 30-39 age group was taken as reference AOR for elevated TG was 7.00(95%CI: 3.43-14.28) for 50-59 years and 2.04(95% CI: 0.98-4.26) for 40-49 years age group. Subjects with family history of disease(s) had higher AOR (3.04; 95%CI: 1.66-5.57) for elevated TG

DISCUSSION

Nearly, 7 out of 20 subjects in the present study had raised TG; similar prevalence prevailed for male and female subjects. In India Heart Watch study multisite study (urban) 4 out of 10 male subjects had raised TG and nearly 3 out of 10 females had elevated TG.[10] Extent of elevated TG in the present study has been similar for female subjects observed in a study conducted in Tamil Nadu.[11] According to Joshi et al., (2014) 3 out of 10 subjects had raised triglycerides level.[12] Contrary to the finding of the present study lower prevalence of elevated TG was reported in Indian women health study.[13]

Logistic model has identified age as a significant predictor of raised TG in rural adult population. Similar finding have been reported by several workers.[14-16]

As observed in this study addiction significantly influences elevated TG. Widowhood has been associated with elevated TG. Although causes of such phenomena were not explored in this study, it may be mediated via stress mechanism. Raised TG has been maximum in obese subjects based on global as well as Asian criteria using BMI as parameter. Similar observations have been reported in other studies.[12,16] At risk subjects on the basis of waist circumference and waist hip ratio had elevated TG; similar findings have been reported by Joshi et al., (2014).[11] Family history of disease has been significant predictors of raised TG which may be due to genetic predisposition and family environmental factors. In consonance with Verma et al.,(2010) anemia has been identified as significant associates of raised TG.[17] Contrary to this Ohiray et al., (1980) reported no significant association between anemia and TG.[18]

Significant association of addiction, marital status, and nutritional indices in univariate analysis got eliminated in the logistic model and higher age (50-59 years) and presence of disease in the family have been significant predictors of raised TG.

CONCLUSION:

Raised blood triglyceride is an emerging potential threat. There is need and scope for focused attention giving due consideration to significant predictors

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