

SHORT ARTICLE

Prevalence of Dyslipidemia in Geriatric rural Population Residing in a Hilly District of Uttarakhand State, India

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Abstract

Background: Dyslipidemia is a major contributing determinant in the development of ischemic heart diseases, stroke, and other vascular diseases. It increases the risk of mortality amongst the geriatric population. **Aims & Objectives:** To assess the prevalence of dyslipidemia in geriatric rural population residing in a hilly district of Uttarakhand state, India. **Material & Methods:** A community based cross-sectional study was conducted during 2015 - 2016 in District Nainital, Uttarakhand. A list of all villages with their population in the district was developed. From this list, thirty villages were identified using population proportionate to size sampling method. From each village 30 geriatric subjects were selected. A total of 1003 geriatric subjects aged 60 years and above were included in the study. The data was collected on socio demographic profile and lipid profile from all the enrolled subjects. The prevalence of dyslipidemia was assessed using National Cholesterol Education Programme (NCEP) criteria. **Result:** The overall prevalence of dyslipidemia was 50.6%. A total of 26.3% participants had hypercholesterolemia, 34.2% had hypertriglyceridemia and 23.5% had high LDL levels. The prevalence of dyslipidemia was higher in women compared to men. **Conclusion:** High prevalence of dyslipidemia was found amongst geriatric rural population.

Keywords

Dyslipidemia; Hypercholesterolemia; Hypertriglyceridemia; Geriatric, Elderly

Introduction

Dyslipidemia is a major contributing determinant in the development of ischemic heart diseases, stroke, and other vascular diseases. National Cholesterol Education Programme (NCEP) guidelines were followed for defining Dyslipidemia. (1) Hypercholesterolemia was defined as Serum cholesterol ≥ 200 mg/dl. Hypertriglyceridemia was

defined as Serum triglyceride ≥ 150 mg/dl and high LDL cholesterol was defined as LDL cholesterol ≥ 130 mg/dl. An earlier study conducted by ICMR documented that 79% of the people had abnormalities in one of the lipid parameters. (2) Earlier studies have documented that dyslipidemia account for 47 % of ischemic heart diseases and 26% of strokes. (3,4) In developing countries the problem of IHD has increased dramatically. Studies have

documented that by 2020, India will bear 60% of the world's cardiovascular disease burden. (5) Increase of 10 mg/dL in total cholesterol has also been associated with increase of 5% and 9% in cardiovascular mortality. (6) Geriatric population is particularly vulnerable to development of dyslipidemia due to age related changes. (2,7)

High prevalence of dyslipidemia amongst geriatric population in India has been reported from the plain regions of the country (7-11). There is a lack of scientific evidence on the prevalence of dyslipidemia among geriatric population living in rural area at high altitude regions in India.

Aims & Objectives

To assess the prevalence of dyslipidemia in geriatric rural population residing in a hilly district Uttarakhand, India.

Material & Methods

A community based cross-sectional study was conducted during 2015-2016 in District Uttarakhand state, India. The district is situated at an altitude of 2084 meters: Assuming the prevalence of dyslipidemia to be 50% (10), the desired sample size

$$N = \frac{z^2_{crit} p(1-p)}{D^2}$$

using the formula [where z is standard normal variate corresponding to 5% level with 50% prevalence rate], 95% confidence level, 5% relative precision, design effect of 2 and 15% non-response was 883 and rounded up equivalent to 900 after considering losses to follow up. However, we included 1003 geriatric populations in the study. A total of 1003 geriatric population were enrolled from 30 clusters (villages) identified by using population proportionate to size (PPS) sampling methodology. After reaching the village, the village president member was contacted. From the selected village, one lane was selected randomly. From the selected lane, one household was selected randomly. The survey was initiated from the selected first household and contiguously covered all the required number subjects from that cluster. Thirty geriatric subjects in the age group of 60 and above were selected from each cluster by house to house visit. The geriatric subjects were identified with the help of village level health and nutrition functionaries such as anganwadi workers. However, they did not participate in data collection. The objectives and procedure of data collection was explained to each

subject. An informed written consent was obtained from each subject prior to data collection.

An oral questionnaire was administered to obtain information on socio demographic profile like age, gender, caste, religion, financial dependency, educational qualification, occupation, family monthly income, type of house, type of family, marital status and living arrangement. The estimation of blood lipid profile was undertaken using standard procedure.

Estimation of Total Serum Cholesterol levels and triglyceride levels

The estimation of total serum cholesterol and triglyceride were done using Dried Blood Spot (DBS) methodology. (12-14) Total cholesterol (TC) was estimated by cholesterol oxidase method and triglyceride (TG) was estimated by glycerophosphate oxidase-peroxidase method using enzymatic kits from Randox Laboratories, Ltd., United Kingdom.

LDL was calculated using the following equation:

Low density lipoprotein (LDL) = (0.9x Total cholesterol) – (0.9x Triglyceride/5) – 28). (15)

The research was approved by the ethical committee of All India Institute of Medical Sciences, New Delhi.

Statistical analysis used: Data were entered in Excel sheet, cleaned, validated and statistical analysis was performed with the same. The results were analysed and presented as numbers and percentages.

Results

A total of 1003 geriatric subjects were enrolled in the study. Eighteen subjects were excluded due to insufficient blood sample for the biochemical analysis. Therefore, 985 subjects were included in data analysis. The socio demographic characteristics of geriatric subjects are depicted in [Table 1](#). The mean age of subjects was 69.5 ± 7.4 years (males) and 67.7 ± 7.2 years (females).

The distribution of geriatric population according to total cholesterol, triglyceride and low density lipoprotein has been depicted in [Table 2](#). A total 50.6% of geriatric subjects had dyslipidemia as per cut off of any of the three parameters (TC, TG and LDL). The maximum derangement of lipid profile was noted for triglyceride (34.2%) followed by total cholesterol (26.3%) and low density lipoprotein (23.5%).

[Table 3](#) represents the distribution of subjects with elevated lipoprotein components based on age and gender. The prevalence of hypercholesterolemia and low density lipoprotein were highest in the subjects

aged 80 years and above whereas hypertriglyceridemia was highest in the age group of 60-70 years. The prevalence of dyslipidemia was higher in women compared to men

Discussion

In this present study, we found lower prevalence of dyslipidemia (50.6%) as compared to earlier study conducted by Indian Council of Medical Research (ICMR) which documented 79% abnormalities in one of the lipid abnormalities (2). An earlier study conducted in South India showed a higher prevalence of dyslipidemia amongst elderly (81.3%) rural population (5). Previous study conducted in urban geriatric women residing in Rajasthan also reported a higher prevalence of dyslipidemia (88.2%) (6).

We found 26.5% prevalence of hypercholesterolemia in the present study. An earlier study conducted in rural area of Kerala, India reported higher prevalence of 60.7% of hypercholesterolemia amongst geriatric subjects (7). High prevalence of hypercholesterolemia (57.5%), hypertriglyceridemia (45.5%) and high LDL (66.7%) was reported by a study conducted in Delhi among elderly population (8). This is concordance to the present study.

Another study conducted in Gujarat documented a higher prevalence of hypercholesterolemia (58%) but lower prevalence in high LDL cholesterol (20%) and hypertriglyceridemia (18%) among elderly persons Gujarat, India (9). These findings are similar to our study

Conclusion

The present study revealed that the prevalence of dyslipidemia among geriatric population residing in hilly region of Uttarakhand was high. The prevalence of TG, TC and LDL were 34.2%, 26.3% and 23.5%, respectively. Dyslipidemia is an important cardiovascular risk factor therefore there is a need to develop healthy lifestyle and nutrition education programme in the community for the management of dyslipidemia.

Recommendation

Preventive education regarding health diet, lifestyle behaviours, importance of physical activity along with regular screening of the geriatric population on periodic basis should be incorporated in the primary health care level to prevent and manage the dyslipidemia amongst them. There is a need to

develop intervention strategies to increase the awareness among geriatric population regarding the ill effects of dyslipidemia.

Limitation of the study

It was a cross sectional study and we would not follow up the subjects for health consequences of dyslipidemia. Cohort study will be required to study illeffects of dyslipidemia

Relevance of the study

The present study revealed the higher prevalence of dyslipidemia among geriatric subjects living in rural area. There is a need for educating the geriatric population about the health consequences of dyslipidemia. Geriatric subjects attending routine outpatient department should be investigate for dyslipidemia irrespective whether they have any sign and symptom of dyslipidemia

Authors Contribution

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References

1. Expert Panel on Detection E. Executive summary of the Third Report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). *Jama*. 2001;285(19):2486. <https://www.ncbi.nlm.nih.gov/pubmed/11368702> accessed on 15/06/2018
2. Joshi SR, Anjana RM, Deepa M, Pradeepa R, Bhansali A, Dhandania VK, Joshi PP, Unnikrishnan R, Nirmal E, Subashini R, Madhu SV, Rao PV, Das AK, Kaur T, Shukla DK, Mohan V; ICMR-INDIAB Collaborative Study Group.. Prevalence of dyslipidemia in urban and rural India: the ICMR-INDIAB study. *PLoS One*. 2014 May 9;9(5):e96808. doi: 10.1371/journal.pone.0096808. eCollection 2014. PubMed PMID: 24817067; PubMed Central PMCID: PMC4016101.[PubMed].
3. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet*. 2006 May 27;367(9524):1747-57. PubMed PMID: 16731270.[PubMed].
4. World Health Organization. The world health report 2002: reducing risks, promoting healthy life. World Health Organization; 2002. <http://www.who.int/whr/2002/en/> accessed on 15/06/2018
5. Mendagudali RR, Akka AD, Manjula R, Swati IA, Dayalaxmi TS and Ghattargi VC. Prevalence of coronary heart disease in rural population of Bagalkot, Karnataka, India. *Int J Community Med Public Health*. 2015 Nov;2(4):581-586.

6. Lee MH, Kim HC, Ahn SV, Hur NW, Choi DP, Park CG, et al. Prevalence of dyslipidemia among Korean adults: Korea National Health and Nutrition Survey 1998-2005. *Diabetes Metab J.* 2012;36(1):43-55.

7. Raj SA, Sivakumar K, Sujatha K. Prevalence of dyslipidemia in South Indian adults: an urban-rural comparison. *Int J Community Med Public Health.* 2016;3:2201-10.

8. Agrawal A, Varma K, Gupta R. Lipid profile and prevalence of dyslipidemia in urban women of Jaipur district, Rajasthan, India. *Nutrition & Food Science.* 2015;45(3):412-22.

9. Aslesh OP, Jayasree AK, Karunakaran U, Venugopalan AK, Divakaran B, Mayamol TR, et al. Prevalence of hypercholesterolaemia among adults aged over 30 years in a rural area of north Kerala, India: a cross-sectional study. *WHO South-East Asia J Public Health* 2016; 5(1): 70–75.

10. Sharma U, Kishore J, Garg A, Anand T, Chakraborty M, Lali P. Dyslipidemia and associated risk factors in a resettlement colony of Delhi. *J Clin Lipidol.* 2013 Nov-Dec;7(6):653-60. doi: 10.1016/j.jacl.2013.06.003. Epub 2013 Jun 19. PubMed PMID: 24314364. [PubMed].

11. Modi G, Patel DS. Prevalence and Pattern of Dyslipidemia in a Rural Community of Anand District of Gujarat. *National Journal Of Laboratory Medicine* 2016;5(4):1-4.

12. Lakshmy R, Gupta R, Prabhakaran D, Snehi U, Reddy KS. Utility of dried blood spots for measurement of cholesterol and triglycerides in a surveillance study. *J Diabetes Sci Technol.* 2010 Mar 1;4(2):258-62. PubMed PMID: 20307386; PubMed Central PMCID: PMC2864161. [PubMed].

13. Quraishi R, Lakshmy R, Prabhakaran D, Mukhopadhyay AK, Jaikhani B. Use of filter paper stored dried blood for measurement of triglycerides. *Lipids Health Dis.* 2006 Jul 14;5:20. PubMed PMID: 16839425; PubMed Central PMCID: PMC1540415. [PubMed].

14. Quraishi R, Lakshmy R, Prabhakaran D, Irshad M, Mukhopadhyay AK, Jaikhani BL. Effect of storage temperature on cholesterol measurement from dried blood. *Indian J Med Res.* 2007 Sep;126(3):228-9. PubMed PMID: 18037719. [PubMed].

15. Anandaraja S, Narang R, Godeswar R, Lakshmy R, Talwar KK. Low-density lipoprotein cholesterol estimation by a new formula in Indian population. *International journal of cardiology.* 2005;102(1):117-20

Tables

TABLE 1 DEMOGRAPHIC CHARACTERISTICS OF THE STUDY SUBJECTS

Socio-Demographic Profile	Male (n=363) (%)	Female (n=640) (%)	Total (n=1003) (%)
Age			
60- <70	197 (54.3)	397 (62.0)	594 (59.2)
70- <80	120 (33.0)	177 (27.7)	297 (29.6)
≥80	46 (12.7)	66 (10.3)	112 (11.2)
Socio Economic Status			
Upper	17 (4.7)	Nil	17 (1.7)
Upper Middle	79 (21.8)	13 (2.0)	92 (9.2)
Middle/Lower Middle	77 (21.2)	87 (13.6)	164 (16.4)
Lower/ Upper Lower	157 (43.2)	262 (40.9)	419 (41.7)
Lower	33 (9.1)	278 (43.4)	311 (31.0)
Education			
Illiterate	81(22.3)	446 (68.7)	527(52.5)
Primary School Certificate	120 (33.1)	124 (19.4)	244(24.3)
Middle school Certificate	62 (17.1)	36 (5.6)	98(9.8)
High School Certificate	49 (13.5)	22 (3.4)	71(7.1)
Intermediate or Post High School Diploma	28 (7.7)	6 (0.9)	34(3.4)
Graduate and Postgraduate	11 (3.0)	1 (0.2)	12(1.2)
Profession and honors	12 (3.3)	5 (0.8)	17(1.7)
Occupation			
Unemployed	54 (14.9)	481 (75.1)	535 (53.3)
Unskilled Worker	133 (36.6)	104 (16.2)	237 (23.6)
Clerical, Shop owner, Farmer	13 (3.6)	2 (0.3)	15 (1.5)
Professional	163 (44.9)	53 (8.3)	216 (21.6)

Family income per month (in Rs.)			
≤1865	93 (25.6)	138 (21.6)	231 (23.0)
1866-5546	125 (34.4)	286 (44.7)	411 (41.0)
5547-9248	46 (12.7)	103 (16.1)	149 (14.8)
9,249-13,873	39 (10.7)	41 (6.4)	80 (8.0)
13,874-18,497	30 (8.3)	30 (4.7)	60 (6.0)
18,498-36,996	23 (6.3)	33 (5.1)	56 (5.6)
≥36,997	7 (1.9)	9 (1.4)	16 (1.6)
Type of Family			
Nuclear	124 (34.1)	164 (25.6)	288(28.7)
Joint	223 (61.4)	445 (69.5)	668(66.6)
Extended	16 (4.4)	31 (4.8)	47(4.7)

TABLE 2 DISTRIBUTION OF TOTAL CHOLESTEROL, TRIGLYCERIDE AND HIGH LOW DENSITY LIPOPROTEIN AMONG GERIATRIC RURAL POPULATION

Lipids Parameters	Normal	High
Total Cholesterol	726 (73.7%)	259 (26.3%)
Triglyceride	648 (65.3%)	337 (34.2%)
Low Density Lipoprotein	754 (76.5%)	231 (23.5%)

Figures in parenthesis denote percentages.

TABLE 3 THE PREVALENCE OF HIGH CHOLESTEROL, HIGH TRIGLYCERIDE AND HIGH LDL BASED ON SEX AND AGE GROUP

Variables	Total Cholesterol (≥200)	Triglyceride (≥150)	Low Density Lipoprotein (≥130)
Age			
60-<70 (n = 585)	160 (27.4)	222 (37.9)	143 (24.4)
70-<80 (n = 291)	66 (22.7)	81 (27.8)	60 (20.6)
≥80 (n = 109)	33 (30.3)	34 (31.2)	28 (25.6)
Gender			
Male (n = 357)	92 (25.8)	118 (33.05)	83 (23.2)
Female (n=628)	167 (26.6)	219 (34.87)	148 (23.5)

Figures in parenthesis denote percentages.

Figures

FIGURE 1 FLOW DIAGRAM OF THE STUDY

