

Research Article

Diabetes and hypercholesterolemia among a tribal population in Tamilnadu, India

Nikkin T.^{1*}, Meriton Stanly²

¹Postgraduate, Department of Community Medicine, Sri Ramachandra Medical College & Research Institute, Sri Ramachandra University, Porur, Chennai-116, India

²Professor, Department of Community Medicine, Sri Ramachandra Medical College & Research Institute, Sri Ramachandra University, Porur, Chennai-116, India

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*Correspondence:

Dr. Nikkin T,

E-mail: nikkint@gmail.com

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ABSTRACT

Background: It is predicted that diabetes will become the 7th leading cause of death in the world by the year 2030. The global prevalence of diabetes in 2014 was estimated to be 9% in adults aged 18+ years. Raised total cholesterol is a major cause of disease burden in both the developed and developing world as a risk factor for ischemic heart disease and stroke. The present study was done to determine the blood glucose and cholesterol levels among a tribal population in Tamil Nadu. The objective of the study was to estimate the proportion of population having diabetes and hypercholesterolemia attending primary health centre in a tribal area.

Methods: The present study was carried out among tribal population in Athanavoor Primary Health Centre in Yelagiri hill station of Vellore District, Tamilnadu. The study was done for a period of two weeks from 25th December, 2014 to 08th January, 2015. Individuals aged 25 to 65 years were selected for the study. Blood samples were collected to estimate Fasting Blood Sugar and Serum Cholesterol levels. The data entry and statistical analysis were done by SPSS software version 16.0

Results: Out of 104 participants, 29(27.9%) are males and 75(72.1%) are females. The proportion of participants who had diabetes mellitus is 3.8% with a 95% confidence interval of 1.1% to 9.6%. About 6% of the participants had borderline hypercholesterolemia with a 95% confidence interval of 2.1% to 12.1%. The difference in mean total cholesterol levels of men and women is statistically significant with a p value of 0.009.

Conclusions: The proportion of participants with impaired fasting glucose levels and borderline hypercholesterolemia from this study suggests that these risk factors should be taken care of in Tribal population at the earliest to prevent these people from developing CHD in the later years.

Keywords: Tribal population, Primary health centre, Diabetes, Hypercholesterolemia, Cross sectional

INTRODUCTION

Diabetes mellitus is a chronic, metabolic disease, characterized by raised blood glucose levels. There is an emerging global epidemic of diabetes. About 347 million worldwide have diabetes mellitus. It is predicted that diabetes will become the 7th leading cause of death in the world by the year 2030. There are two types of diabetes

namely, Type I and Type II. Type II diabetes accounts for almost 90% of all the diabetes cases in the world. Diabetes was the direct cause of 1.5 million deaths in the year 2012.¹ The global prevalence of diabetes in 2014 was estimated to be 9% in adults aged 18+ years.² According to a study by Mohan et al, the overall prevalence of diabetes in India is found to be 12%.³ Raised cholesterol levels increase the risks of heart

disease and stroke. Globally, a third of ischemic heart disease is attributable to high cholesterol. Overall, raised cholesterol is estimated to cause 2.6 million deaths (4.5% of total) and 29.7 million DALYs, or 2.0% of total DALYs. Raised total cholesterol is a major cause of disease burden in both the developed and developing world as a risk factor for ischemic heart disease and stroke.⁴ In 2008, the global prevalence of raised total cholesterol among adults was 39% (37% for males and 40% for females).⁵ Shashank et al reported the prevalence of dyslipidaemia in India as 13.9% and this study reported that the prevalence of dyslipidaemia is 19.2% in urban areas and 11.7% in rural areas. The prevalence of dyslipidaemia was reported in Tamilnadu (18.2%) with prevalence higher in the urban areas than in the rural areas of Tamilnadu.⁶ The present study was done to determine the blood glucose and cholesterol levels among a tribal population in Tamil Nadu.

The objective of the study was to estimate the proportion of population having diabetes and hypercholesterolemia attending primary health centre in a tribal area.

METHODS

A cross sectional study was carried out among patients attending the PHC, Athanavoor. Athanavoor is a Tribal village in Yelagiri, a hill station in Vellore District of Tamilnadu. The study was done for a period of two weeks from 25th December, 2014 to 08th January, 2015. The study was started after obtaining ethical clearance from IEC, SRMC and prior permission from Director of Public Health (DPH) was obtained to carry out the study. Informed consents were obtained from all the study participants. Inclusion Criteria: Individuals aged 25 to 65 years were only taken for the study; patients residing in the area at least for a period of 1 year only were included. Exclusion Criteria: Pregnant women were not included; Patients with severe illness were not included. A total of 104 participants were included in the study. The age, sex and address of the participants were obtained and they were asked to be in fasting on the following day morning. Next day, participants were met at their home and their blood samples were collected for Fasting Blood Sugar and Total Cholesterol measurements. The blood samples were taken to a certified laboratory and the values were estimated. The statistical analysis was made using the SPSS software version 16.0. Proportion of patients having diabetes and hypercholesterolemia was estimated. Mean and Standard deviation of the blood sugar and total cholesterol values were found out. Chi square tests and p value were calculated to find out significance of differences.

RESULTS

Out of 104 participants, 29 (27.9%) are males and 75 (72.1%) are females. Among different age groups, there was equal number of participants of about 28 (26.9%) participants from 35 to 44 years and 45 to 54 years age

groups. 24% of participants were from 25 to 34 years age group and about 22% of participants were from 55 to 64 years. The details are given in Table 1 and Figure 1.

Table 1: Age group and sex of participants.

Age group	Men N	Men %	Women N	Women %	Total N	Total %
25 to 34	3	2.9	22	21.2	25	24.0
35 to 44	10	9.6	18	17.3	28	26.9
45 to 54	8	7.7	20	19.2	28	26.9
55 to 64	8	7.7	15	14.4	23	22.1
Total	29	27.9	75	72.1	104	100

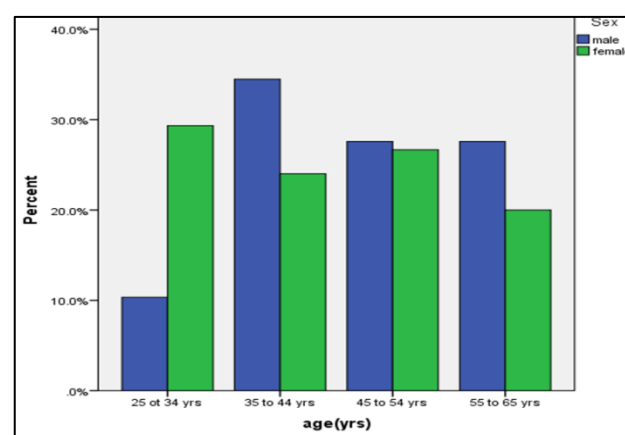


Figure 1: Percentage of respondents in different age groups.

Overall, out of 104 participants, 79.3% of participants had normal blood glucose values; 13 participants had impaired fasting glucose values. The proportion of participants with impaired fasting glucose is 12.5% with a 95% confidence interval of 6.8% to 20.4%. Among men, the proportion of patients who had impaired fasting glucose values is 17.2% and among women 10.7% had impaired fasting blood glucose values. Similarly 3.8% of the participants overall had diabetes mellitus with a 95% confidence interval of 1.1% to 9.6%. Between men and women there is no much difference with around 4% proportion of participants in both men and women having diabetes. Among the diabetics, 2 (50%) cases are from 55 to 65 years age group and 1 case (25%) each from 25 to 34 years and 45 to 54 years age groups. No diabetes case from 35 to 44 years age group. The details are given in Table 2.

Out of 104 participants, 86.2% of participants had optimal cholesterol values. None of the participants had hypercholesterolemia but about 6% of the participants had borderline hypercholesterolemia with a 95% confidence interval of 2.1% to 12.1%. Among men, the proportion of participants having hypercholesterolemia is 13.8% and among women it is only 2.7%. This difference is found to be statistically significant with a p value of 0.03. The details are given in Table 3.

The mean fasting blood sugar level among participants overall is 96.9 mg/dl with a standard deviation (S.D) of 16.7mg/dl. The mean fasting blood glucose level among males is 98.8 mg/dl and that of females is 96.2 mg/dl. The mean total cholesterol level of both men and women combined is 160mg/dl with a S.D of 21.6 mg/dl while the

mean total cholesterol level among men is 168.8 mg/dl and that of women is 156.6 mg/dl. The difference in mean total cholesterol levels of men and women is statistically significant with a p value of 0.009. The details are in Table 4.

Table 2: Distribution of participants by blood glucose levels.

Age group	FBS < 110 mg/dl			FBS 110 to 126 mg/dl			FBS > 126 mg/dl		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
25 to 34	2	20	22	1	1	2	0	1	1
35 to 44	8	17	25	2	1	3	0	0	0
45 to 54	7	17	24	0	3	3	1	0	1
55 to 65	6	10	16	2	3	5	0	2	2
Total	23	64	87	5	8	13	1	3	4

Table 3: Distribution of participants by cholesterol levels.

Age group	TC < 200 mg/dl (Optimal)			TC 201 to 239 mg/dl (Borderline)		
	Male	Female	Total	Male	Female	Total
25 to 34	2	22	24	1	0	1
35 to 44	10	17	27	0	1	1
45 to 54	6	20	26	2	0	2
55 to 65	7	14	21	1	1	2
Total	25	73	98	4	2	6

Table 4: Total cholesterol and fasting blood sugar mean levels of participants.

Sex	Mean	S.D.	p value
Mean Total Cholesterol values			
Men	168.8	26.3	0.481
Women	156.6	18.6	
Overall	160.0	21.6	
Mean Fasting blood sugar values			
Men	98.8	19.1	0.009
Women	96.2	15.7	
Overall	96.9	16.7	

DISCUSSION

The limitation of this study is that it is a hospital based study and so only patients with some symptom or the other were study participants. The study had 22% males and 78% females. This could be due to most of the men were working people and the women who stay at home attend PHC to get treatment. The participants were equally distributed in the different age groups except for the 25 to 34 years age group. The overall prevalence of Diabetes in India is around 15% and the prevalence of diabetes according to this study is 3.8% but the prevalence of impaired fasting glucose in India is 10%

which is comparable to the results of this study where the prevalence of impaired fasting glucose is 12.6%.⁷ Though the results of this study cannot be applied to the general population the prevalence of impaired fasting glucose levels is almost the same as that of national average. The participants of this study are from a Tribal area hence, the 12.6% of impaired fasting glucose levels in this population has to be taken seriously to bring out some effective measures of prevention of full blown diabetes in this population. None of the participants had hypercholesterolemia in this study. The prevalence of borderline hypercholesterolemia in this study is found to be 5.8% which is much lower than the prevalence found in the study done by Bandana in a select Tribal population in India.⁸ In the study done by Bandana, the prevalence of borderline hypercholesterolemia was found to be 21.4%. The mean cholesterol levels between men and women were significantly different. Men had about 8 mg/dl higher total cholesterol levels than that of women. The possible reason could be the physical activity of the Tribal people. Tribal men at Yelagiri are involved in high levels of physical activity in their day to day life. The difference in mean fasting blood sugar levels between men and women is not so high and it is not statistically significant too.

CONCLUSION

Hypercholesterolemia and Diabetes are major risk factors for coronary heart diseases (CHD). The proportion of participants with impaired fasting glucose levels and proportion of men with borderline hypercholesterolemia from this study suggests that these risk factors should be taken care of in Tribal population at the earliest to prevent these people from developing CHD in the later years.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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