

Diet and lifestyle: its association with cholesterol levels among Nomad tribal populations of Rajasthan

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ABSTRACT

Background: Dietary pattern and lifestyle may enhance the risk factors associated with cardiovascular and metabolic diseases. **Aim:** This study examine the dietary pattern and other lifestyle known to be associated with threatening features related to metabolic disorders. **Material and Method:** 1440 subjects made up of 633 males and 807 females with age group ≥ 18 years were studied from a cluster of three districts. All subjects lived in different locations of these districts. Dietary patterns, physical activities related with work, habit of consuming liquor were noted while cholesterol level, blood glucose levels, blood pressure, height, weight, waist girth, and hip circumference were measured. **Results:** The prevalence of borderline high cholesterol level (200-239) and high cholesterol (>240) was 21.1 % and 9.4 % among select tribal populations. It was found that 71.7% were non-vegetarian and 28.3% were vegetarian out which 82.6% were males and 63.2% were females. It was observed that males (10.7%) had high cholesterol level as compared to females (8.4%). Females were slightly more at borderline high cholesterol level as compared to males. Working group (9.8%) had high level of cholesterol level as compared to non-working group (6.7%). **Conclusion:** Specifically meat eaters were significantly associated with high cholesterol level and liquor consumers might be prone to risk factors like high cholesterol levels as they were not significantly associated but positively correlated with high cholesterol levels. Overall consumption of mustard oil was 100% among these populations. This might be the reason for having less prevalence rate of high cholesterol level as compared to rural and urban populations.

Key words. Diet, mustard oil, lifestyle cholesterol

INTRODUCTION

Diet low in cholesterol is one of the essential ways to improve the cardiovascular status. This ensures a slash by as much as 10% to 20% of the bad cholesterol. Cholesterol is a soft waxy substance that can either be blood or dietary cholesterol.

Blood cholesterol is synthesized by the liver and accounts for about 80% of the body cholesterol.

Dietary cholesterol accounts for the remaining 20%.^[1] Cholesterol is a type of lipid that is found in the body and in some foods. Although, it is an essential substance found in the blood and all body cells and also one of the building blocks of the cell

membrane, it is associated with cardiovascular diseases and stroke. It also plays a role in the synthesis of other substances like vitamin D and hormones. High level of blood cholesterol increases the risk of cardiovascular diseases and stroke by the buildup of plaque on arterial walls. These plaques narrow the arteries causing atherosclerosis and thus reduce blood flow. When the arterial supply to the heart is blocked following clots formation, a heart attack ensues. If this occurs in the brain, it leads to a stroke. The lifestyle and dietary pattern results in higher levels of risk factors, such as high cholesterol level, obesity, hypertension, and type 2 diabetes. The risk factors are undiagnosed often or managed inadequately in health facilities. Mustard,^[2] an annual in the cabbage family, produces tiny black seeds with a pungent quality. The black mustard plant is native to southern Europe, while the brown mustard plant originated in Asia. Mustard seed oil is used for cooking in some cuisines, notably Indian, and offers a variety of health benefits, including potential cholesterol-lowering effects. Keeping in mind the above facts the present work was done to find out the dietary pattern, lifestyle and its association with one of known independent risk factors for CVD, stroke and type 2 diabetes among selected nomad tribal populations.

METHODS AND MATERIALS

A total of one thousand four hundred and forty nomad tribals including males and females residing in various locations of three select districts of Jhunjhunu, Sikar and Churu were included in the study. Participants were interviewed and examined to get required information. Semi-structured schedule was used to gather information regarding background characteristics and lifestyle related information including quantity and quality of liquor consumed by males. Socio-economic status was classified using Modified Kuppaswamy Socio-economic status scale.^[3] Physical activity was assessed using the participants' occupation and thus classified as sedentary and non-sedentary accordingly. Standard methods were employed in the assessment of anthropometric parameters such as weight, height, and waist circumference. Body Mass Index (BMI) was classified according to Indian standard norms. The standards have been set in the Ministry's consensus guidelines for the Prevention and Management of Obesity and Metabolic Syndrome for the country as released in October 2008. The guidelines were released jointly by the Health Ministry, the Diabetes Foundation of India (DFI), the All-India Institute of Medical Science

(AIIMS), Indian Council of Medical Research (ICMR), the National Institute of Nutrition (NIN) and 20 other health organizations.

Blood pressure measurements were done as per JNC VII guidelines.^[4] Required biochemical parameters such as total cholesterol levels and random blood sugar (RBS) levels were estimated in participants using easy touch glucose and cholesterol meter.

The study was approved by the institutional human ethics committee at Birla Institute of Technology and Science (BITS), Pilani and performed according to the Declaration of Helsinki. All members included in the study received detailed explanation of the study in their native language and then informed consent was given.

RESULTS

Overall percentage distributions of various parameters were given below in table 1. It was found that 82.6% of the males were meat eaters and 63.2% of the females were meat eaters. Approximately 50% of the males were consuming liquor. Almost 100% of the nomad's populations were using mustard oil for cooking. Females were more prone to adiposities as measured by general obesity (BMI) body mass index and central obesity waist circumference (WC) as compared to males.

Figure 1 and 2 shows the percentage distribution of cholesterol levels and vegetarian vs. non-vegetarian among select nomad population. Overall percentage distribution high cholesterol levels among these populations were found to be 9.4% whereas 21.1% of them were at the risk zone for high cholesterol level (Figure 1). Approximately 72% of these populations were non-vegetarian (Figure 2).

Majority of the populace (87.6%) were working (Figure 3) and almost 100% of these populations were using mustard for cooking (Figure 4).

Linear regression analysis was done to find out the correlation between meat eaters and cholesterol levels. It was found to be statistically significant ($r=0.05$) based on t-value (2.209) as shown in figure 5

Frequency distribution of cholesterol levels among select Nomads

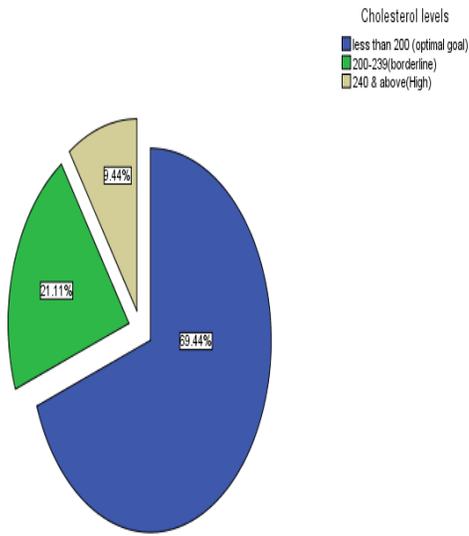


Figure 1: Shows the frequency distribution of cholesterol levels among selected Nomad tribal

Pie chart diagram to show the prevalence of physical activity

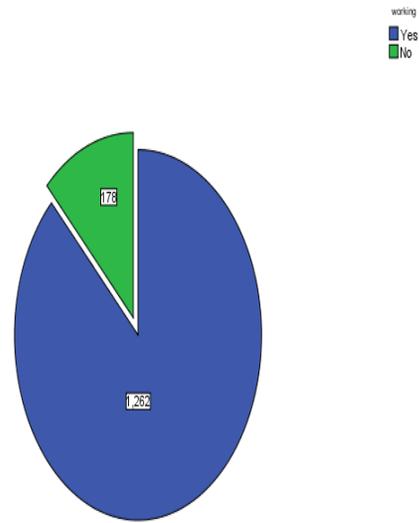


Figure 3: Pie chart shows the prevalence of physical activities among the populations

Percentage distribution of vegetarians and non-vegetarians among Nomads

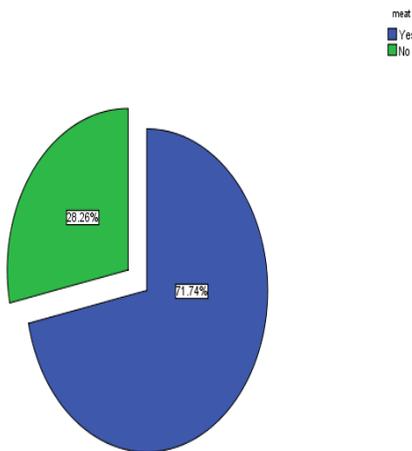


Figure 2: Pie chart shows the percentage distribution of vegetarians and non-vegetarians among Nomad tribal populations

Consumption of Mustard oil

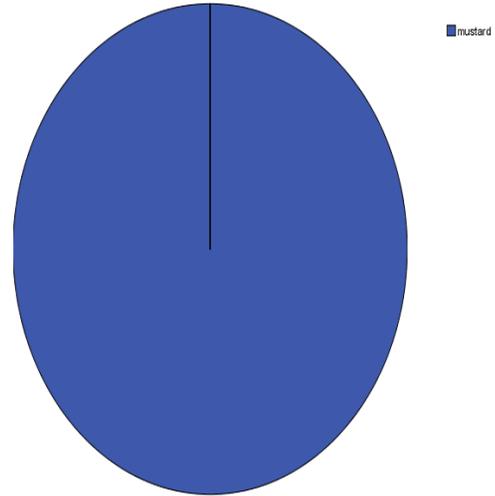


Figure 4: Pie chart shows the prevalence of mustard oil consumption among the populations

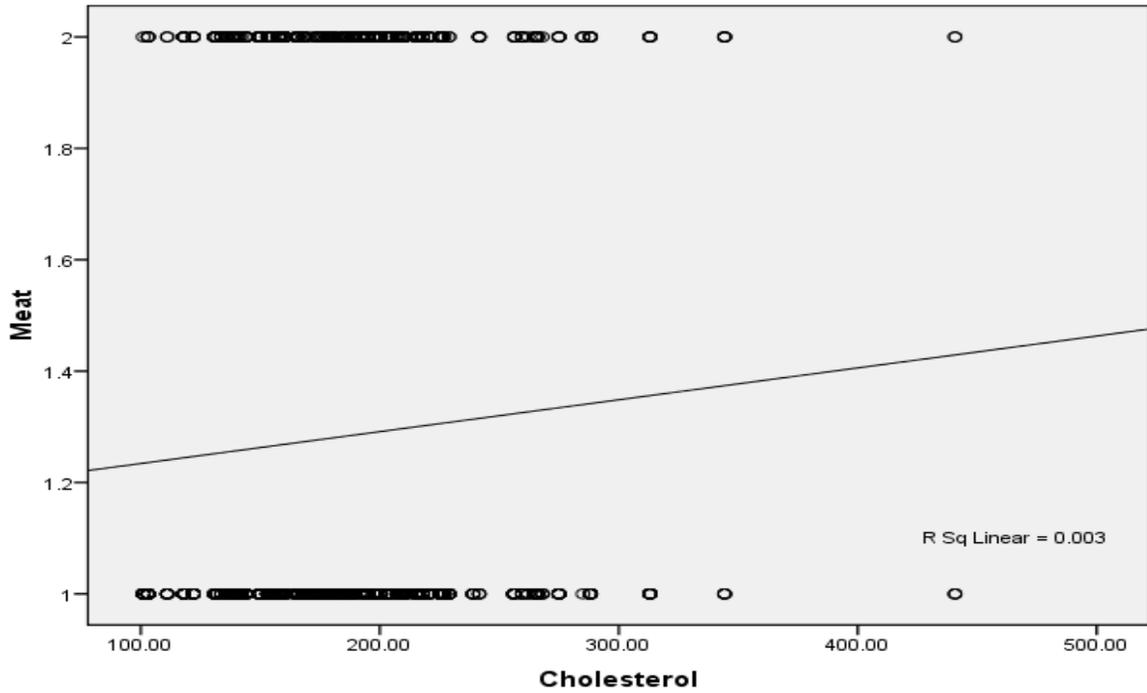


Figure 5: Scatter plot diagram to show the relationship between meat eaters and cholesterol level

Table 1: Characteristics of the study population

Parameters	Males (N=633)	Females(N=807)	Total (1440)
Gender	44.0 %	56.0%	1440 (100%)
BMI			
Overweight (23-25)	10.6%	11.2%	10.9%
Obese= >25	14.4%	16.9%	15.8%
Waist circumferences	14.4%	28.9%	22.5%
Meat eaters	82.6%	63.2%	71.7%
Consumption of liquor	49.3%	0 %	49.3%
Blood Cholesterol			
Borderline(200-239)	20.4%	21.7%	21.1%
High = >200	10.7%	8.4%	9.4%
Activity			
Working	90.8%	85.1%	87.6%
Non-working	9.2%	14.9%	
Type 2 DM			
Positive=>200	5.2%	3.0 %	4.0%
At risk zone(140-199)	5.5%	7.4%	6.6%
Hypertension	25.0%	21.8%	23.2%
Mustard oil	100%	100%	100%

Table 2: The percentage distribution of cholesterol levels between working and non-working groups

		Cholesterol levels			Total
		less than 200 (optimal goal)	200-239 (Borderline)	240 & above(High)	
Working	Yes	872(69.1%)	266(21.1%)	124(9.8%)	1262(100%)
	No	128(71.9%)	38(21.3%)	12(6.7%)	178(100%)
Total		1000(69.4%)	304(21.1%)	136(9.4%)	1440(100.0%)

$\chi^2 = 1.754, P = 0.416$

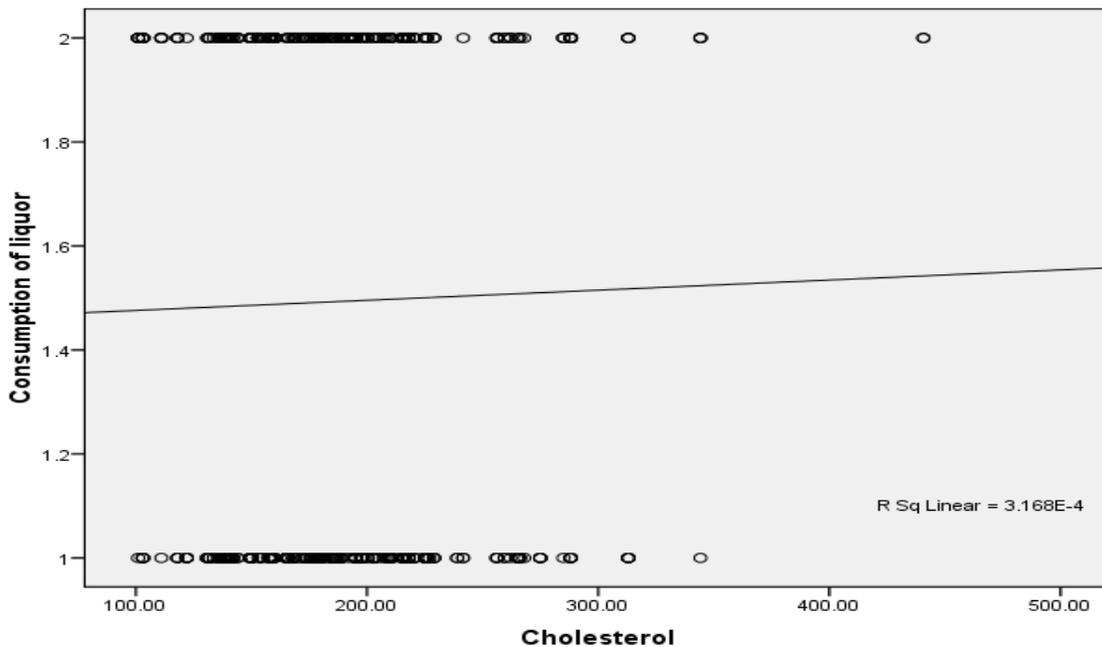


Figure 6: Correlation ship between cholesterol levels and liquor consumers among Nomad tribal populations (only for males)

Correlation analysis was done to find out the relationship between liquor consumers and cholesterol level. It was found to be positively

correlated ($r=0.02$) based on t-value (0.638) but insignificant as shown in figure 6.

As shown in table 2, those who were working were having higher cholesterol levels as compared to non-working group but it was difficult to calculate the physical activity on the basis of working because most of these populations were not working on the regular basis.

DISCUSSION

Millions of people in developing countries are faced by a double health burden representing an unsettling modern-day irony; the burden of poverty-related diseases (associated with infections and nutrition) is being exacerbated by the increasing incidence of chronic non-communicable diseases.^[5,6] In India, epidemiological studies of cholesterol measurement are hampered by lack of conformity in assay technique. This has led to large variation in the levels of parameters assessed. However, it has been observed in urban and rural populations that the cholesterol levels measured by enzyme-based assays have been on the increase.^[7] Dyslipidaemia was classified among men in Rajasthan by Gupta *et al.*^[7] using the US National Cholesterol Education Program guidelines (rural=202, urban=199).^[9] High-risk and borderline-high cholesterol ≥ 200 mg/dl was in 24.2% and low HDL cholesterol (< 35 mg/dl), which was the most prevalent dyslipidemia, in 30%.^[7] Reddy *et al.* documented the prevalence of hypercholesterolemia (≥ 200 mg/dl) in industrial, urban and rural populations in Delhi.^[10] In men, the prevalence was 30.9%, 36.8%, and 16.3% and in women it was 21.7%, 39.7% and 16.3% respectively.^[10]

The results of the present study reveal the fact that the overall prevalence of elevated cholesterol level was 9.4% and borderline high cholesterol level was 21.1% among nomad tribal populations. The one of the reasons for having cholesterol level less as compared to above studies in other populations might be the consumption of mustard oil for cooking purpose as many studies have shown the positive effect of mustard oil. Mustard oil decreases cholesterol and improves red blood cell membrane structure according to a previous study.^[11] Another study by Sengupta *et al.*^[12] has also shown the benefit of mustard oil in reducing high cholesterol level. Cardiovascular risk factors have been evaluated among urban middle-class in a cross-sectional study over a 20-year period by the Jaipur Heart Watch studies in India.^[13] It was found out that the prevalence of smoking declined, hypertension did not significantly change following increased awareness and treatment, while all other

risk factors such as obesity, hypercholesterolemia, diabetes and metabolic syndrome increased significantly. Cholesterol levels have also declined in high- and middle-income countries but have increased in low-income countries. The India specific data are similar to the overall trends in low-income countries.^[13]

From the results of the present study it was observed that the incidence rate of cholesterol among these nomads tribal populations were on the increase. One of the reasons could be their non-vegetarian diet. The present study revealed that meat eating has significant association with the high cholesterol level. A recent study by Gul *et al.* have shown that serum cholesterol levels were also seen higher among non-vegetarians as compared to vegetarians.^[14] Further the results of present study have shown positive association of liquor consumers and high cholesterol level. Studies have associated the consumption of alcohol with a rise in HDL-cholesterol levels. This rise was in a dose-dependent pattern. Subjects who received moderate amounts of alcohol had the greatest increase in HDL-cholesterol while those who received the equivalent of a heavy drinker had a reduced protective effect.^[15] Similar results were found in a previous study.^[16] Our study have also supported the fact that these populations were hard liquor consumers and heavy drinkers based on the quantity and quality of liquor consumed by them that might have reduced the protective effect. It was found that among these population maximum of them were working (87.6%) as compared to non-working (12.4%). However, they were not working on regular basis. Some gets work for fifteen days and others for a week per month. Very few of them worked for whole the month. The working pattern depends on the availability of work.

CONCLUSION

This paper summarizes the current information on diet, lifestyle, obesity and cholesterol levels known as risk factors for various lifestyle oriented diseases like type 2 diabetes and CVD mortality in India. Significant correlation between non-vegetarians and high cholesterol level was observed. Positive correlation between liquor consumers and high cholesterol level was also observed. The present prevalence rate of high cholesterol level among these populations was less than the rural and urban populations as shown by various above discussed studies. It might be due to the positive affect of mustard oil being used by them for cooking purpose

offers a variety of health benefits, including potential cholesterol-lowering effects. Regarding physical activity calculated on the basis of working pattern .It is not possible to find out any association with cholesterol levels because of variations in the working pattern. More such studies are required to reach to the final conclusion.

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