



THE ASSOCIATION OF DYSLIPIDEMIA IN VARIOUS NON-COMMUNICABLE DISEASES ALONG WITH THEIR CLINICAL PROFILE

Dr Jayant Mayavanshi	Assistant Professor, Department of Medicine, SBKS Medical Institute & Research centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India.
Dr Sanjaykumar Rathwa*	Assistant Professor, Department of Medicine, SBKS Medical Institute & Research centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India. *Corresponding Author
Dr Manisha Panchal	Associate Professor, Department of Medicine, PDU Government Medical College and Hospital, Rajkot, Gujarat, India.
Dr Nilay Machhar	Assistant Professor, Department of Medicine, SBKS Medical Institute & Research centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India.
Dr Vaibhav Mehta	Resident Doctor, Department of Medicine, SBKS Medical Institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India.

ABSTRACT

Background: Several clinical and epidemiological studies have shown that dyslipidemia, a component of metabolic syndrome, can double the risk of cardiovascular events among subjects with diabetes mellitus (DM) despite aggressive blood pressure, LDL cholesterol, and blood glucose control. **Objectives:** To study the association of Dyslipidemia with various non-communicable diseases. **Method:** This study was conducted to explore the prevalence and various patterns of dyslipidemia, along with their clinical profile, in Rajkot and Saurashtra region of Gujarat, India; in 100 patients of CVDs presenting to P.D.U. Government College and Hospital, Rajkot. The pattern of Dyslipidemia in different age and sex groups along with its association with various Non-communicable Diseases was studied. **Results:** The study included 100 patients first time diagnosed with non-communicable diseases for the first time such as Myocardial Infarction, Cerebrovascular Stroke, Diabetes Mellitus, and Hypertension. In the present study, out of 100 cases, 72 (72%) were males and 28 (28%) were females. So, non-communicable diseases were found more commonly in males. In the present study, out of a total of 100 recruited cases, 83% had at least one abnormal lipid parameter, while 17% had a normal lipid profile. Considering the prevalence of dyslipidemia in both sexes, though minor, female preference was noticed. In the present study, 81.94% of males had dyslipidemia and 85.71% of females were dyslipidemic. **Conclusion:** Patients with low HDL had a family history positive in 72%. Hence, from the present study, it can be concluded that dyslipidemia is more commonly found in middle-aged obese urban females with a positive family history.

KEYWORDS : Clinical Profile, Diabetes, Dyslipidemia, Hypertension, Non-communicable Diseases

INTRODUCTION

All around the world, dyslipidemia is becoming more common. The Multi-Ethnic Study of Atherosclerosis, or MESA, was conducted by Goff and Psaty and found that the overall prevalence of dyslipidemia in the United States was 29.3%, with a range of 21% in Chinese women and 39.6% in non-Hispanic white males [1]. The primary source of this issue was thought to be the rise in morbidities associated with cardiovascular disorders, such as diabetes, hypertension, and dyslipidemia.

Several clinical and epidemiological studies have shown that dyslipidemia, a component of metabolic syndrome, can double the risk of cardiovascular events among subjects with diabetes mellitus (DM) despite aggressive blood pressure, LDL cholesterol, and blood glucose control [2-4].

Diabetes type 2 is characterized by dyslipidemia and adults with the disease have been shown to have greater levels of very low-density lipoprotein cholesterol (VLDL-C) and lower levels of HDL-C. On the other hand, there is no discernible difference in LDL-C levels between individuals with and without diabetes [5]. Patients with diabetes typically have a larger percentage of denser and smaller LDL particles, which are more oxidatively vulnerable and may thereby raise the risk of cardiovascular events [5]. Highly atherogenic sd-LDL was shown to be closely correlated with aberrant glycometabolism, according to Ban and colleagues [6]. The

objective of the study was to assess the association of Dyslipidemia with various non-communicable diseases.

Method

A group of 100 patients were included in the study who presented in Medicine Department P.D.U. Medical College and Hospital, Rajkot with Non-communicable Diseases in the period of September 2018 to September 2019.

Inclusion Criteria

The Patients with Non-communicable diseases above the age of 13 years, patients with first-time diagnosed Hypertension and/or Diabetes and those presenting first-time with MI and/or CV stroke.

Exclusion Criteria

Patients who are already on hypolipidemic medications. The patients with other co-morbid conditions viz. Liver diseases, Kidney disease, Tumours. [Nephrotic Syndrome, Autoimmune Liver Disease, Tumours causing alterations in lipid profile].

For CV Stroke, only Ischemic CV Stroke with evidence of acute infarct on MRI Brain were considered in this study. A pretested semi-structured questionnaire was prepared to collect data. Each subject was asked about socio-demographic profile, past and family history of disease and associated morbidity. Each subject underwent general, systemic examination and different diagnostic tests like Hb, TC, DC, RBS, FBS, PP2BS,

Fasting Lipid Profile, Serum Na⁺ and K⁺ level, Urine routine/micro, Urine sugar, Urine albumin, Urine acetone and Chest X-ray, ECG, MRI (if indicated) etc. Then patients were informed about the study and consent was taken before enrollment.

From the History, Clinical examination, Anthropometry and Proforma, Data concerning clinical features and laboratory parameters are obtained. The pattern of Dyslipidemia in different age and sex groups along with its association with various Non-communicable Diseases was studied.

RESULTS

The present study was conducted at P.D.U. Government Medical College and Hospital, Rajkot during the period of September 2018 to September 2019. The study included 100 patients first time diagnosed with non-communicable diseases such as Myocardial Infarction, Cerebrovascular Stroke, Diabetes Mellitus, and Hypertension.

In the present study, out of 100 cases, 72 (72%) were males and 28 (28%) were females. So, non-communicable diseases were found more commonly in males. The most common age to be affected was 51-60 years in both males and females. Concluding that non-communicable diseases were more common in elderly males followed by elderly females than younger age group (Table 1).

Table 1: Age And Sex Distribution Of Non-communicable Diseases

Age Group (Years)	Males (N=72)	Females (N=28)	Total (N=100)
31-40	9	5	14
41-50	14	3	17
51-60	24	11	35
61-70	20	3	23
71-80	3	3	6
81-90	2	3	5

In the present study, out of total 100 recruited cases 83% had at least one abnormal lipid parameter, while 17% had normal lipid profile (Figure 1).

Prevalence of dyslipidemia

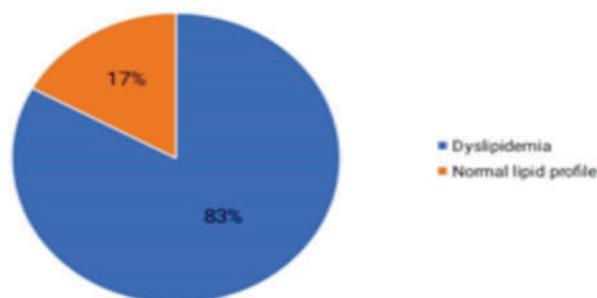


Figure 1: Prevalence Of Dyslipidemia In All 100 Recruited Cases

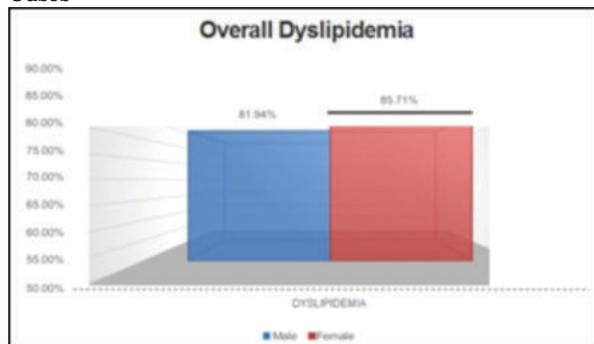


Figure 2: Prevalence of Dyslipidemia in Males and Females

Considering the prevalence of dyslipidemia in both sexes, though minor, female preference was noticed. In the present study, 81.94% of males had dyslipidemia and 85.71% of females were dyslipidemic (Figure 2).

In this study, out of a total of 100 cases, the most common lipid profile abnormality came up as LDL with 58% prevalence, followed by HDL and Triglyceride, as the second and third most common, with 55% and 32% respectively. Whereas total cholesterol and VLDL were least common, affecting 26% of patients each.

LDL was discovered as being the most common individual lipid abnormality in males and females, 56.92% and 60.72% respectively. The least common was found to be VLDL in males having 18.05% and Cholesterol in females at 35.70%.

Females were being affected by all forms of individual lipid abnormalities slightly more than males. The rest of the lipid profile abnormalities in males and females are given in (Figure 3).

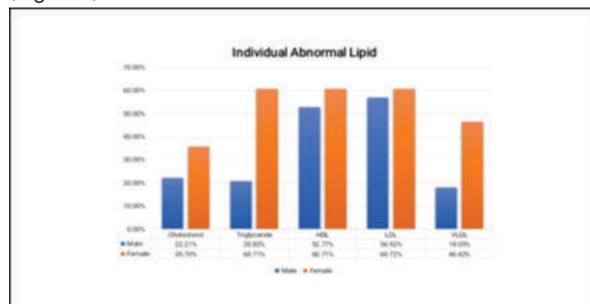


Figure 3: Individual Lipid Abnormality In Males And Females

From the present study, all patients, when classified as per their age group and looked for dyslipidemia, were reflecting the following pattern. The most dyslipidemic age group was 41-50 years with the affection of all 97% of patients and the second most common was 31-40 years with 92.85% prevalence. The least dyslipidemic group discovered was of >70 years of age with only 63.63%. Dyslipidemia is more prevalent in younger age groups with sedentary lifestyles and unhealthy diets as compared to the elderly age group (Table 2).

Table 2: Dyslipidemia In Different Age Groups

Age Group	Dyslipidemia
31-40(N=14)	92.85%
41-50(N=17)	97%
51-60(N=35)	82.85%
61-70(N=23)	73.91%
>70(N=11)	63.63%

In present study, cholesterol was documented to be abnormal most commonly in age group of 41-50 years and least in >70years old. Triglyceride and HDL were commonly altered in 31-40 years (42.86%) and 81-90 years (80%) respectively. With 70.59% presence, LDL abnormality was mostly found in 41- 50 years. VLDL showed a younger age group preference with 42.85% in ages 31-40 years.

The study showed that 55 (55%) patients were from Urban communities, while 45(45%) belonged to Rural. Displaying almost equal distribution of non-communicable diseases, both in the Urban and Rural populations of Rajkot and the Saurashtra region of Gujrat (Table 3).

Table 3: Geographical Distribution Of Non-Communicable Diseases And Dyslipidemia

Geographical Area	Total No of Patients	% of Dyslipidemic Patients
Rural	45	80%
Urban	55	85.45%

Dyslipidemia was also found to be prevalent in both the populations neck to neck, with slightly more common being in urban population. 80% of patients in rural areas were dyslipidemic, while 85.45% of urban patients were dyslipidemic.

In this study, the most common lipid abnormalities detected in rural patients were HDL and LDL with an equal distribution of 55.55%, whereas in Urban patients LDL abnormality was most common followed by HDL at 54.54% (Table 4).

Table 4: Individual Lipid Profile Abnormality In Rural And Urban Patients

Abnormal Lipid Profile	Rural	Urban
Cholesterol	20%	30.90%
TG	26.66%	36.36%
HDL	55.55%	54.54%
LDL	55.55%	60%
VLDL	17.77%	32.72%

Hence, LDL and HDL were discovered as the most common lipid abnormalities in both geographical areas' patients. While in Rural patients VLDL was least commonly affected as having 17.77% of patients and with 30.90% cholesterol, was least affected in Urban patients. In this study, out of a total of 100 patients, 46% had MI and 54% had CV stroke, as potential life-threatening cardiovascular diseases, with high risk of mortality and morbidity. Diabetes Mellitus was prevalent in 37% of patients. Whereas Hypertension was commonest showing 77% of affected patients. General examination revealed that 8% had xanthomas. Fatty Liver was evident in 24% of patients in ultrasound scanning and 4% of patients had GB stones.

The study discovered that for single non-communicable diseases, dyslipidemic patients were 19%. A noticeably large number of patients with two diseases diagnosed together was 58%. While 23% of patients had more than two diseases at the presentation (Table 5).

Table 5: Total Number Of Diseases And Patients With Dyslipidemia

No of Disease	Disease	% of Patients with Dyslipidemia
Single Disease	Mi or CVA	19%
2 Disease	MI or CVA plus DM or HTN	58%
>2 Disease	DM and HTN plus MI or CVA	23%

In this study, out of total MI patients, dyslipidemic patients with no other co-morbidities, were counted as 11. Patients with MI and one co-morbidity as HTN and DM II were noted as dyslipidemic, as 12 and 9 respectively. 11 patients had MI and HTN plus DM II (Table 6).

Table 6: Number Of Dyslipidemias With Their Respective Diseases

Disease	No. of Patients with Dyspidemia
MI	11
MI+HTN	12
MI+ DMII	9
MI + HTN + DM II	11
CVA	6
CVA+HTN	31
CVA+DMII	5
CVA + HTN + DM II	12

From CV stroke patients, 6 were found to be dyslipidemic who had no co-morbidity. 31 dyslipidemic patients had HTN as co-morbidity with CV stroke, whereas 5 had DM II along with CV stroke. Both HTN and DM II as co-morbidities in CVA were

noted in 12 dyslipidemic patients.

Of the total patients with DM II, 83.78% had dyslipidemia. The highest dyslipidemia prevalence was noticed in patients with CV Stroke at 85.18%. Hypertensives had an 82.08% prevalence, while patients with MI had an 80.43% prevalence. Although, almost equal, diabetics had overall dyslipidemia more than HTN. CV stroke patients were more dyslipidemic than patients with MI (Figure 4).

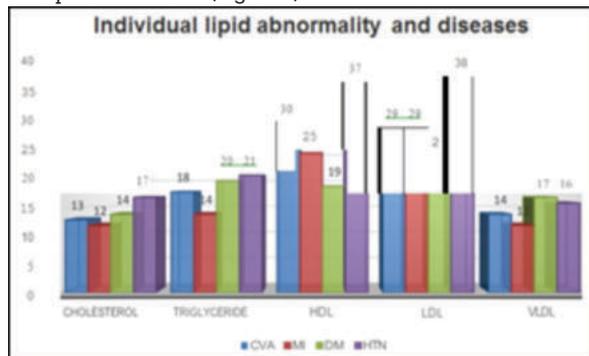


Figure 4: Individual Lipid Abnormality Prevalence In Different Diseases

From all patients with altered cholesterol, 17 had Hypertension, 14 had DM II, 13 had CVA and 12 had MI. Triglyceride abnormality was most seen in Hypertension, followed by DM II, with 21 and 20 patients, respectively 18 had CVA, while 14 had MI. HDL abnormality was most prevalent in hypertensives, being present in 37 hypertensives. The second most common was CVA which was noted in 30 patients. MI and DM patients were 25 and 19, respectively. HTN was present in 38 patients with LDL abnormality. Followed by CVA and MI, both equally documented in 29. 24 LDL dyslipidemic had DM. VLDL abnormality was associated mostly with DM II in 17 patients. Followed by 16, 14 and 13 in HTN, CVA and MI, respectively.

DISCUSSION

Isolated studies for dyslipidemias and other risk factors for CVD (Cerebrovascular Diseases) are available in plenty and are quite enlightening. We have tried to highlight the combined clinical study of coronary and cerebrovascular atherosclerosis and its risk factors, dyslipidemia, obesity, and sedentary lifestyle. The present study shows that the age group of 41-50 years has the highest prevalence of dyslipidemia, among the patients suffering from non-communicable diseases. So, the 4th decade is the most vulnerable age for dyslipidemia leading to CVD.

AM Sawant et al study had a maximum incidence of dyslipidemia in the third decade as compared to the fourth decade in this study [7]. Hetal Pandya et al study also demonstrated the maximum incidence of dyslipidemia in the third decade [8]. In the present study, females had more prevalence of dyslipidemia as compared to males. Yadav D et al study showed a similar distribution of dyslipidemia in females as compared to males [9]. The present study's results are also comparable to the R.M. Parikh et al study displayed more dyslipidemic females than males [10]. Hetal Pandya et al study found dyslipidemia more prevalent in males as compared to females [8].

The present study noticed the prevalence of dyslipidemia in urban patients of noncommunicable disease more than in rural patients. Findings are comparable to Chatlert Pongchaiyakul MD et al study, having urban patients more dyslipidemic than rural. Thus, dyslipidemia is more prevalent in urban patients, who have sedentary lifestyles unhealthy dietary habits and obesity [11]. The present study discovered prevalence of dyslipidemia is more common in obese patients

than in non-obese. Results are comparable to the previous study of A Misra et al, having dyslipidemic obese patients more as compared to non-obese [8,12].

Obesity and dyslipidemia together are major risk factors for CVDs. At the same time, being modifiable by lifestyle changes and medications, we can reduce morbidity and mortality by preventing them or early diagnosing and treating them. Dyslipidemia prevalence among hypertensives in the present study was 82.08%. That is comparable to the previous study by G. Cocci F et al, having 82.6% dyslipidemia among hypertensive patients [13]. Although Chobanian AV et al study displayed a lesser number (31%) of hypertensives with dyslipidemia [14]. Chobanian AV et al and Eberly L. E. et al showed 30% and 41.9% patients with dyslipidemia among diabetics. While the present study documented a much higher proportion of dyslipidemia in diabetics at 83.78% [14,15]. The prevalence of dyslipidemia in patients with MI, in the present study was 80.53%. It is comparable to the previous study of Hector Gonzalez-Pacheco et al [16]. J. S. et al have 85.1% and 83% of dyslipidemic in patients with MI, respectively [17]. Dyslipidemia prevalence in patients with ischemic stroke was 85.18% in the present study. Findings are comparable to the other studies with 94% and 92.5% prevalence in Lee J. S. et al and Siddeswari R. studies, respectively [17,18]. Ashraf H. et al study had 68.80% of CV stroke patients with ischemic ECGs. Whereas the present study demonstrated 57.40% of the CV stroke patients with ischemic ECG changes [19]. Heralding dyslipidemia causes atherosclerotic processes in multiple vessels at various sites including CVS and CNS.

CONCLUSION

Among all 100 cases of NCDs, 77% had hypertension; 54% had ischemic CV stroke; 46% had MI; and diabetics were 37%. Among them, increased cholesterol was found in 26%, increased TG was found in 32%, low HDL was noted in 55%, high LDL in 58% and high VLDL in 26%. Geographically, an almost equal distribution of dyslipidemia was found to exist, with slight urban predominance; being 85.45% dyslipidemic in urban and 80% of dyslipidemic in rural patients. Though non-communicable diseases are documented more in males; dyslipidemia was found to affect females more than males, with 85.71% and 81.94% respectively. Dyslipidemia was more prevalent in the age group of 41-50 years. Obesity and a sedentary lifestyle also came out to be important modifiable risk factors. Dyslipidemia in patients with overweight and obesity was remarkably high as compared to patients with normal BMI; 56.20% of dyslipidemics with normal BMI, 67.5% of dyslipidemics were overweight, whereas 100% of obese patients were dyslipidemics. Out of all patients, 19% dyslipidemics had a single NCD, while 58% dyslipidemics had 2 NCDs and 23% dyslipidemics had more than 2 NCDs. Dyslipidemia discovered in patients with DM II and HTN was 83.78% and 82.08%, whereas in patients with MI and CVA was 80.43% and 85.18%. While the findings like xanthoma were noted in 8% of patients, fatty liver in 24% and GB stone in 4%, chronic pancreatitis in 1% of patients. Positive family history with dyslipidemia in all patients was 87%, which was more in patients with elevated triglycerides at 82%, whereas patients with elevated LDL and Total Cholesterol had a family history of 68% and 50%, respectively. Patients with low HDL had a family history positive in 72%. Hence, from the present study, it can be concluded that dyslipidemia is more commonly found in middle-aged obese urban females with a positive family history.

Limitations:

The data was collected only from the patients consulting P.D.U. Civil Hospital. Despite the use of standardized data collection, not all the information was collected from all the patients. Further, such large community-based studies are required to analyse the actual profile of the disease.

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Conflict Of Interest: None declared.

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

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