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Prevalence of Type-II-Diabetes Mellitus and Dyslipidemia in Rural and Urban Participants from Faridabad, India

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Abstract:

Type-II Diabetes mellitus (T2DM) is a chronic endocrine disease linked to elevated blood sugar levels and dyslipidemia. Its prevalence is continuously increasing in India. This study focused on the prevalence of T2DM and dyslipidemia in the urban-rural location of Faridabad. A retrospective cross-sectional study was carried out at Metro Heart Institute, Faridabad, Haryana, India. Participant data included their demography (urban-rural), gender, blood analysis (fasting glucose level, HBA1c) lipid profile-triglycerides (TG), high-density lipoprotein (HDL-c), low-density lipoprotein (LDL-c) cholesterol and total cholesterol (TC). This study included 590 urban and 357 rural individuals having >60% males. Prevalence of T2DM (urban: 36.3%; rural: 6.2%) and dyslipidemia (urban: 90.8%; rural: 80.96%) was more in urban than rural participants. Prevalence of HBA1c (urban: 19.4%; rural: 50.1%), TC (urban: 9.8%; rural: 6.2%), and TG (urban: 27.1%; rural: 14.6%) was also high in urban participants. Gender differences were not observed in HBA1c, TC, and fasting blood sugar levels. In urban (34.1%) mixed dyslipidemia was more widespread than rural (23.3%). Dyslipidemia was common in T2DM participants with the most common ones included hypercholesterolemia and hypertriglyceridemia. The prevalence of T2DM and dyslipidemia was higher in urban than rural participants and required more frequent monitoring.

Key-words: Type-II-Diabetes mellitus, total cholesterol, low-density lipoprotein cholestrol (LDL-c), triglycerides, high-density lipoprotein cholestrol (HDL-c)

1. Introduction

Diabetes mellitus is a non-communicable, chronic, epidemic disease (Saedi et al., 2016). Individuals with Type-II Diabetes Mellitus (T2DM) experience an increase in insulin resistance and a decrease in normal insulin production from the pancreas (Hills et al., 2018; Saedi et al., 2016; Tangvarasittichai, 2015). T2DM is the primary etiology of 95% of diabetes individuals (Bommer et al., 2018; Lin et al., 2020). The most risk factors for T2DM are hyperglycemia, dyslipidemia, stroke, and cardiovascular illnesses among many additional risks (Pitso et al., 2021; Udawat et al., 2001). An imbalance between insulin secretion and action leads to hyperglycemia. In low- and middle-income countries such as India, reports of T2DM and dyslipidemia occurrences and prevalence are most common (Bommer et al., 2018; Lin et al., 2020). T2DM is the seventh most common cause of mortality worldwide, with comparable rates for men and women (Bommer et al., 2018; Lin et al., 2020).

Dyslipidemia, an aberrant lipid profile, is common in individuals diagnosed with T2DM (Pitso et al., 2021; Shahwan et al., 2019). Insulin resistance is associated with dyslipidemia through elevated fatty acid flux. Insulin resistance and metabolic syndrome cause the liver to create an excessive amount of free fatty acids. These fatty acids induce the overproduction of lipoproteins high in triglycerides to be produced, which raises LDL-c levels while lowering HDL-c (Pitso et al., 2021; Shahwan et al., 2019). Lipid imbalances, including high triglycerides (TG), decreased HDL-c, elevated TC, and elevated LDL-c are associated with the prevalence of dyslipidemia in individuals with T2DM. Several investigations have demonstrated that insulin resistance plays a significant role in the onset of type II diabetes (Warraich et al., 2017).

Pre-diabetic symptoms, such as impaired fasting glucose and/or impaired glucose tolerance are present in the majority of individuals. These symptoms appear before the full-blown diabetic symptoms. Pre-diabetes can be prevented from progressing further by altering one's lifestyle and controlling insulin levels (Carris et al., 2019). The primary lifestyle factors associated with T2DM are obesity, inactivity, diet, stress, and urbanization (Chehade et al., 2013; Deepa et al., 2014; Kenny et al., 2019). Sugar-filled beverages are also believed to play a central role in the prevalence of T2DM. Moreover, monounsaturated and polyunsaturated lipids reduce the incidence of type II diabetes, while trans and saturated fats increase it (Pitso et al., 2021; Shahwan et al., 2019).

Diabetes mellitus is diagnosed with a test for the glucose levels in the blood. The World Health Organization offers two standard tests for T2DM (American Diabetes Association, 2010) The first is the glycated hemoglobin level, which should be at least 6.5, and the second is the fasting plasma glucose level. People with impaired glucose tolerance had plasma levels between 140 and 200 mg/dL. Individuals with impaired fasting glucose are those whose blood glucose levels fall between 110 and 125 mg/dL. Compared to fasting glucose, the estimate of glycated hemoglobin is a more accurate way to predict the risk of cardiovascular disease associated with T2DM (American Diabetes Association, 2010).

Furthermore, as India becomes more urbanized, people's lifestyles change, which alters the country's disease prevalence (Anjana et al. 2023; Ranasinghe et al. 2021). This study aimed to assess the prevalence of dyslipidemia and type-II diabetes mellitus from Faridabad, Haryana, India, both in urban and rural participants. Furthermore, the study aims to ascertain the prevalence of T2DM and dyslipidemia amongst genders in Faridabad, India.

2. Material and Methods

Research design: The Department of Laboratory Services, Metro Heart Institute with multispecialty, Faridabad, Haryana was the site of this descriptive study. Data from participants visiting the diabetes clinic were collected over a period of two months from August and September 2023. Ethical approval was taken from the local Institutional Ethical Committee of Metro Heart Institute with multispecialty Faridabad, Haryana, India dated 10 July 2023.

Data collection: Participants after obtaining consent forms were included in the study. The content form includes questionnaires in both Hindi and English languages. The study incorporated participant’s socio-demographic information such as name, age, gender, height, Body Mass Index (BMI), and demographic data (urban versus rural).

A total of 947 individuals from urban and rural areas of Faridabad, Haryana, India were included in the investigation to determine the prevalence of type-II Diabetes mellitus (T2DM) and dyslipidemia in individuals. Out of 947 individuals 590 were from urban areas and 357 from rural areas. The study comprised both males and females.

Inclusion criteria for the study: (i) participants aged 30-70 years; (ii) participants diagnosed with T2DM for more than 3 months; (iii) on regular follow-up at Metro Heart Institute with multispecialty; (iv) Participants residing in urban or rural areas >5 years willing to participate in the study.

Exclusion criteria: (i) participants diagnosed with T2DM for less than three months (ii) Type-I-DM, gestational diabetes, or secondary causes of diabetes (iii) Hypertension (iv) on lipid-lowering drugs (v) Hypothyroidism, renal disease, or hepatic disorders (vi) Patients records with incomplete information.

Materials: The following measurements were included: The levels of fasting blood sugar (mg/dl), (TC) total cholesterol (mg/dl), (TG) triglycerides (mg/dl), (HDL-c) high-density lipoprotein cholesterol (mg/dl), (LDL-c) low-density lipoprotein cholesterol (mg/dl), and glycosylated hemoglobin-HBA1c (%). All the measurements were taken using standardized equipment and procedures as described in the World Health Organization (WHO) manual and dyslipidemia using the National Cholesterol Education Program—Adult Treatment Panel III guidelines (https://apps.who.int/iris/handle/10665/43376)

All individuals were instructed to fast for at least 12 hours overnight, and 5ml of venous blood was drawn before breakfast to assess fasting blood glucose, HBA1c, and serum lipid profile. The screening was done as per the criteria recommended by WHO (https://apps.who.int/iris/handle/10665/43376). If the fasting blood sugar was >126 mg/dL, they were diagnosed with type-II diabetes mellitus (T2DM); if it was < 100 mg/dL, they were classified as non-diabetic. If the value were between 100-125 mg/dL condition is pre-diabetic for T2DM if the patient had HBA1c > 6.5% they were classified as diabetic, and HBA1c between 5.7-6.4 % was considered pre-diabetic. While HBA1c < 5.7% was indicative of controlled type-II diabetes.

Dyslipidemia: Dyslipidemia was defined as the existence of one or more of the following lipid abnormalities: total cholesterol level >200 mg/dl, triglyceride level > 150 mg/dl, low-density lipoprotein >100 mg/dl, or high-density lipoprotein <40 mg/dl in males or < 50 mg/dl in and females (Anjana et al., 2023). Individuals whose HDL-c was >60 mg/dL were considered normal. Total cholesterol <200mg/dL was regarded as normal, 200-239 mg/dL as borderline, and >240 mg/dL as high. Similarly, triglycerides <150mg/dL were regarded as normal, those between 150-199 mg/dL as borderline, and those >200 mg/dL as high. Low-density lipoprotein >160-190 mg/dL was considered extremely high. Individuals diagnosed with dyslipidemia were further divided into three categories: isolated single-parameter dyslipidemia, combined-parameter dyslipidemia (two abnormal lipid parameters), and mixed-parameter dyslipidemia (three abnormal lipid parameters).

Statistics: Data was entered in Microsoft Excel 2016 and analyzed in the statistical package for social sciences (SPSS version 14; IBM SPSS, Inc., Chicago, IL, USA). Descriptive analysis such as mean and standard deviations was performed on participant's data. The prevalence of variables was reported as a proportion (N, %) with a 95% confidence interval. A P-value of <0.05 was considered statistically significant.

3. Results

The socio-demographic characteristics of the studied participants are shown in Table 1. A total of 957 participants were included in the study. Out of 947 studied participants, 590 belonged to urban and 357 to rural. The number of females from both rural and urban areas was lesser than males. There were 231 (39.2%) and 122 (34.2%) females from urban and rural areas, respectively. Mean age was higher for females than males but it did not differ between the urban and the rural participants. BMI was slightly higher for urban than rural participants (Table 1).

Gender comparison: The gender-specific profiles are shown in Figure 1. There was a lack of difference amongst genders for fasting blood sugar levels of both urban (females: 125.8 mg/dL; males: 123.2 mg/dL; P-value: 0.40 ns) and rural (females: 99.3 mg/dL; males: 98.2 mg/dL; P-value=0.35 ns). There was a lack of gender-specific differences in total cholesterol (mg/dL) between rural and urban individuals. Males' triglyceride levels were significantly higher (P-value <0.001) than females in both rural (males: 146.1 mg/dL, females: 127.2 mg/dL) and urban individuals (males: 183.4 mg/dL, females: 148.4 mg/dL). HDL-c was higher in females than males in both rural (Males: 43.3mg/dL Females: 51.5mg/dL) and urban individuals (Males: 41.9mg/dL Females: 49.8mg/dL). LDL-c was non-significant in males and females as well as urban and rural individuals (Figure 1).

Risk Profile: Table 2 depicts the prevalence of T2DM and dyslipidemia amongst rural and urban participants. Fasting blood sugar was higher in urban (36.3%; 95% CI:30.3-42.1) compared to rural (6.2%; 95% CI:4.1-8.3). Non-diabetic individuals were higher in rural (68.3%; 95% CI: 59.3-77.3) compared to urban areas (39.3%; 95% CI: 33.1-45.5). Lesser participants who gave blood for HBA1c from rural (19.4%; 95% CI:14.2-24.6) than urban (50.1%; 95% CI:42.6-57.3) had T2DM. The prevalence of higher cholesterol levels was also higher in urban: 9.8% than in rural areas at 6.2%. The prevalence of hyper-triglyceridemia (>200mg/dL) was two times higher in urban (27.1%; CI:19.1-31.1) than in rural (14.5%; CI:11.6-17.6) individuals. The percentage of patients with low HDL-c (<40mg/dL in males and <50mg/dL in females) was almost equal in rural (45.1%) and urban (49.5%) individuals. Urban participants (6.8%) had a slightly higher percentage of high-LDL-c (>160mg/dL) than rural (5.1%) participants (Table 2).

Statistically significant differences were observed amongst diabetic and non-diabetic individuals from urban and rural populations (P-value <0.001; Table 2; Figure 2). Hypercholesterolemia was more prevalent in urban (males: 34.3%; females: 32.1%) than in rural (males: 25.1%; females: 25.4%). Hypertriglyceridemia was also more prevalent in urban (males 54.3%; females 40.7%) than rural (males 39.6%; Females 26.2%) participants. Males had more hypertriglyceridemia than females in both urban and rural areas. A high number of individuals from both rural and urban (>75%) had low HDL-c values. Individuals with

>100mg/dL LDL-c were more likely in males of urban (males 61.01%; females 48.5%) than in rural (males 53.6%; females 52.5%) individuals (Figure 2).

Prevalence of dyslipidemia: There were 19.1% in rural and 9.2% in urban areas without dyslipidemia. The prevalence of dyslipidemia (defined as having at least one abnormal lipid fraction) was 80.9% in rural individuals and 90.8% in urban participants (Table 3). In 12.6% of rural and 5.1% of urban participants; high LDL-c dyslipidemia was the most prevalent form of isolated dyslipidemia. The percentage of individuals with isolated dyslipidemia (high TG, low HDL-c, and high LDL-c) was 29.1% in urban areas and 34.4% in rural. Individuals with combined dyslipidemia (two abnormal lipid fractions) are more common in urban areas (26.7%) than in rural areas (23.2%). Participants with mixed dyslipidemia (three abnormal lipid fractions) were also more prevalent in the urban (18.5%) than in the rural (16.5%) population (Table 3).

4. Discussion

Urbanization influences the lifestyle and socio-economic status of people compared to rural populations. Urbanization has several detrimental impacts, including enhanced consumption of sugar and fats, obesity, cardiovascular disease, and T2DM (Anjana et al., 2023; Deepa et al., 2014; Ranasinghe et al., 2021; Velmurugan et al., 2021). Studies indicated that persons who relocate from rural to urban regions are typically less active than those who remain in rural areas (Deepa et al., 2014; Ranasinghe et al., 2021). India's fast urbanization in recent years has led to a rise in the prevalence of many diseases in urban people (Anjana et al., 2023). Understanding the incidence of T2DM and dyslipidemia in India's rural and urban individuals is therefore important. The current study examined the prevalence of pre-diabetes, diabetes, and dyslipidemia in urban and rural persons of Faridabad, Haryana, India. The majority of persons included in this study came from urban areas (n = 590) than rural (n = 357). Males from both urban and rural made up the majority of participants compared to women (Table 1). T2DM was significantly more common in urban (36.3%; 95%CI: 30.3-42.1) than in rural (6.2%; 95% CI:4.1-8.3) participants (Table 2). These results are comparable to a study from Ambala, Haryana where a 4.7% prevalence of T2DM was observed in rural participants (Gupta et al., 2020). Similarly, a study that included 27 studies from different rural tribes in India revealed a 4.94% prevalence of T2DM (Vashitha et al., 2012). These results are similar to our results from rural areas. Likewise, studies based on the urban population from Delhi revealed 18.8% and 24% prevalence of diabetes which is higher than the prevalence of the rural population and consistent with the current study with a higher prevalence of T2DM in urban participants (Goswami et al., 2016; Singh et al., 2012). The disparities in T2DM and dyslipidemia between individuals in urban and rural locations can be attributed to a variety of factors, including cholesterol, LDL-c, triglycerides levels, and lifestyle factors (Anjana et al., 2023; Gupta et al., 2020; Kautzky-Willer et al., 2024).

Some studies indicated that men were diagnosed with T2DM at a higher rate than women (Anjana et al., 2023, Kautzky-Willer et al., 2024). Therefore, understanding gender differences in T2DM, pre-diabetes, and dyslipidemia prevalence could be essential. In this study, fewer than 40% of females from urban and rural received a diagnosis, compared to more than 60% of male participants (Figure 1). This could be the result of gender discrimination or a lack of knowledge about women's health and well-being. Interestingly, changes in parameters-total cholesterol, LDL-c, or fasting blood sugar levels were not influenced by gender in either urban or rural participants. However, in both rural and urban participants men's TG levels were significantly greater than women's (Figure 1). A study based on the Delhi-NCR region also revealed higher triglycerides and total cholesterol in males than in females (Kumar et al., 2023). These differences can be explained by varying hormone effects and higher levels of physical exercise in females (Anjana et al., 2023; Goryakin et al., 2017; Ranasinghe et al., 2021).

Furthermore, urban adults were more likely to have dyslipidemia than those in rural (Anjana et al., 2023; Deepa et al., 2023, Ranasinghe et al., 2021; Velmurugan et al., 2021). In the current study compared to their rural counterparts, urban individuals had greater TC, LDL-c, and triglycerides (Figure 2). Table 2 shows a greater prevalence of triglyceride (urban: 27.1%; rural: 14.6 %) and total cholesterol (Urban: 9.8%; Rural: 6.2%) in urban participants than in rural. HDL-c and LDL-c were slightly higher in urban participants (Figure 2). Thus, urban participants have more hypercholesterolemia and hypertriglyceridemia than rural which is consistent with the study involving a large number of participants depicting a higher prevalence of dyslipidemia in urban than rural individuals (Anjana et al., 2023).

Dyslipidemia affected 90.8% of urban participants and 80.9% of rural participants (Table 3). In both males and females, the most prevalent patterns of dyslipidemia were (high LDL-c and low HDL-c) and (High TG and Low HDL-c). Isolated dyslipidemia, such as elevated LDL-c, was more common in rural participants (Rural: 12.6%; Urban: 5.1%). Conversely, mixed dyslipidemia- defined as having three or more aberrant lipid fractions)was more prevalent in urban (Jialal and Singh, 2019; Sharma et al., 2024). 18.5% of urban participants had three abnormal lipid fractions, whereas 15.6% had four abnormal lipid fractions. Table 3 shows that 16.5% of the rural participants had three abnormal lipid fractions and 6.7% had four abnormal lipid fractions. Dyslipidemia and other T2DM risk factors are produced when hypertriglyceridemia is paired with either high LDL-c or low HDL-c (Al Ghadeer et al., 2021; Jialal and Singh, 2019; Sharma et al., 2024; Udawat et al., 2001). Numerous earlier studies reported the prevalence of dyslipidemia concurred with these findings. These differences in T2DM and dyslipidemia prevalence and patterns may be due to lifestyle, genetics, and socioeconomic development (Al Ghadeer et al., 2021; Jialal and Singh, 2019; Sharma et al., 2024; Udawat et al., 2001).

The study had several limitations, including not measuring variables like sleep period, depression, and dyslipidemia caused due to secondary drugs. There were limited female and rural participants in the study due to a lack of awareness about disease progression. Furthermore, this study did not consider the proportion of diabetic individuals as migrants, potentially causing bias in rural-urban diabetes prevalence.

5. Conclusions

This study showed the prevalence of dyslipidemia and T2DM in adult Indians varied significantly between urban and rural participants. According to these results, urban participants may have greater levels of total cholesterol, total triglycerides, HBA1c, and fasting blood glucose. The percentage of non-diabetic individuals was higher in rural compared to urban. The finding of this study suggested that the large urban population of northern India may be at risk of progression of pre-diabetes to diabetes and dyslipidemia due to lifestyle changes. In India, there is an urgent need to increase understanding of the diagnosis and prevention of type-II diabetes and dyslipidemia among rural populations and women.

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Table 1: Socio-demographic characteristics of studied subjects.

	Rural		**Urban**	
	Females	**Males**	**Females**	**Males**
Count (N)	122	235	231	359
(%)	34.2%	65.8%	39.2%	60.8%
Age (Mean±SD)	53.8±13.5	51.4±13.3	53.6±13.5	51.9±13.8
Socio-economic status				
Lower	9 (7.4%)	18 (7.6%)	10 (4.3%)	15 (4.2%)
Middle	70(57.4%)	139(59.2%)	134(58.1%)	218(60.7%)

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Upper	43(35.2%)	78 (33.2%)	87 (37.6%)	126(35.1%)
Smokers	2 (1.6%)	38 (16.2%)	5 (2.2%)	65 (18.1%)
Height (cm; Mean±SD)	153.4±7.2	170.2±6.8	154.2±6.2	168.1±7.1
BMI (Kg/m^2; Mean±SD)	22.5±3.5	21.9±3.2	25.9±3.7	24.3±3.8

BMI: Body Mass Index; SD: Standard deviation

Table 2: Prevalence of T2DM and dyslipidemia among participants

Variables		**Rural**		**Urban**	
		Mean ±SD	**Prevalence (95% CI)**	**Mean ± SD**	**Prevalence (95% CI)**
Fasting blood sugar (mg/dL)	Normal(<100 mg/dL)	88.9 ±8.1	68.3 (59.3-77.3)	88.7±6.4	39.3 (33.1-45.5)
	Pre-diabetic (100-125 mg/dL)	107.2 ±7.3	25.4 (21.4-29.4)	111.1±7.9	24.4 (20.1-28.3)
	Diabetes (>126 mg/dL)	171.8 ±55.9	6.2 (4.1-8.3)	171.6±49.6	36.3 (30.3-42.1)
HBA1c	Normal (<5.7 %)	5.4 ±0.3	52.8 (45.5-60.1)	5.4±0.3	18.8 (14.6-23.1)
	Pre-diabetic (5.7 - 6.4 %)	5.9±0.3	27.8 (23.6-32.1)	6.1±0.2	31.2 (26.7-35.7)
	Diabetes (>6.5%)	8.0±1.6	19.4 (14.2-24.6)	8.4±1.8	50.1 (42.6-57.3)
Total cholesterol (mg/dL)	Normal (< 200 mg/dL)	157.1±29.1	74.8 (66.7-82.8)	155.6±27.8	66.6 (60.6-72.6)
	Borderline (200 -239 mg/dL)	216.5±11.2	19.1 (14.9-23.3)	217.4±11.6	23.6 (19.6-27.6)
	Hypercholesterolemia(>240mg/dL)	256.4±62.1	6.2 (4.2-8.2)	261.7±22.6	9.8 (7.3-12.3)
Triglyceride (mg/dL)	Normal (<150 mg/dL)	103.1±25.1	64.9 (59.5-69.5)	107.1±26.1	50.3 (44.3-56.3)
	Borderline (150-199 mg/dL)	171.7±15.1	20.4 (17.4-23.4)	170.8±14.5	21.9 (18.9-24.9)
	Hypertriglyceridemia (>200 mg/dL)	255.6±60.5	14.6 (11.6-17.6)	285.1±90.5	27.1 (19.1-31.1)

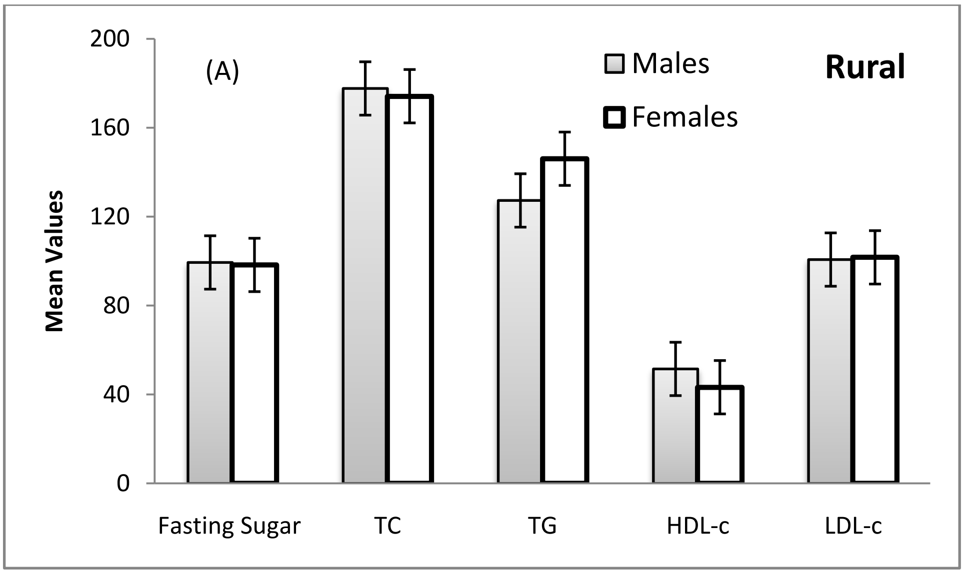
HDL-c (mg/dL)	Normal (>60 mg/dL)	67.8±7.9	14.6 (11.6-17.5)	68.9 ±8.3	12.7 (9.7-15.7)
	Low (<40 mg/dL/<50mg/dL)	36.4±6.6	45.1 (41.1-49.1)	36.2±6.9	49.5 (44.5-54.5)
LDL-c (mg/dL)	Normal(<100 mg/dL)	72.6±19.1	47.3 (43.3-51.3)	70.8±19.8	48.3 (43.3-53.3)
	Borderline high(100 to160 mg/dL)	121.5±16.1	47.6 (43.6-51.6)	123.9±16.5	44.9 (41.9-47.9)
	High(>160-190 mg/dL)	180.7±33.8	5.1 (3.1-7.1)	184.3±68.9	6.8 (4.8-8.8)

*Females <50(mg/dL); Males <40(mg/dL); High-density Lipoprotein cholesterol (HDL-c); Low-density lipoprotein cholesterol (LDL-c)

Table 3: Demographic distribution of dyslipidemia amongst the studied individuals

	Rural (N;%)			**Urban(N; %)**		
	Females	**Males**	**Total**	**Females**	**Males**	**Total**
No dyslipidemia	23 (18.9%)	45 (19.1%)	68 (19.0%)	4 (1.7%)	50 (13.9%)	54 (9.2%)
Dyslipidemia	99(81.1%)	190 (80.8%)	289 (80.9%)	227 (98.3%)	309 (86.1%)	536 (90.8%)
Isolated dyslipidaemia						
High TG (mg/dL)	1 (0.8%)	18 (7.7%)	19 (5.3%)	0	21 (5.8%)	21 (3.6%)
Low HDL-c (mg/dL)	24 (19.7%)	35 (14.9%)	59 (16.5%)	80 (34.6%)	41 (11.4%)	121(20.5%)
High LDL-c (mg/dL)	16 (13.1%)	29 (12.4%)	45 (12.6%)	2 (0.9%)	28 (7.8%)	30 (5.1%)
Combined dyslipidemia						
High LDL-c+ Low HDL-c	13(10.6%)	10 (4.3%)	23 (6.4%)	29 (12.6%)	19 (5.3%)	48 (8.1%)
High TG + Low HDL-c	6 (4.9%)	12 (5.1%)	18 (5.1%)	32 (13.9%)	52 (14.5%)	84 (14.2%)
High TG+ High LDL-c	0	9 (3.8%)	9 (2.5%)	0	10 (2.8%)	10 (1.7%)
High TC+ High LDL-c	12 (9.8%)	19 (8.1%)	31 (8.7%)	0	14 (3.9%)	14 (2.4%)
High TC+ High TG	0	2 (0.9%)	2 (0.6%)	0	0	0
High TC+ Low HDL-c	0	0	0	3 (1.3%)	4 (1.1%)	7 (1.2%)
Mixed dyslipidaemia						
High TG+ Low HDL-c+ High LDL-c	12 (9.8%)	18 (7.6%)	30 (8.4%)	15 (6.5%)	20 (5.6%)	35 (5.9%)
High TG +High TC+ High LDL-c	6 (4.9%)	18 (7.7%)	24 (6.7%)	1 (0.4%)	38 (10.6%)	39 (6.6%)
High TC+ High LDL-c+Low HDL-c	1 (0.8%)	1 (0.4%)	2 (0.6%)	19 (8.2%)	6 (1.7%)	25 (4.2%)
High TC+ High TG+Low HDL-c	0	3 (1.3%)	3 (0.9%)	1 (0.4%)	9 (2.6%)	10 (1.7%)
High TG + Low HDL-c +High LDL-c+ High TC	8 (6.6%)	16 (6.8%)	24 (6.7%)	45 (19.5%)	47 (13.1%)	92 (15.6%)

TC: Total cholesterol, TG: Triglycerides, HDL-c: High-density lipoprotein cholesterol, LDL-c: low-density lipoprotein cholesterol.


200
160
120
80
40
0
Mean Values
(A)
Males
Females
Rural
Fasting Sugar
TC
TG
HDL-c
LDL-c

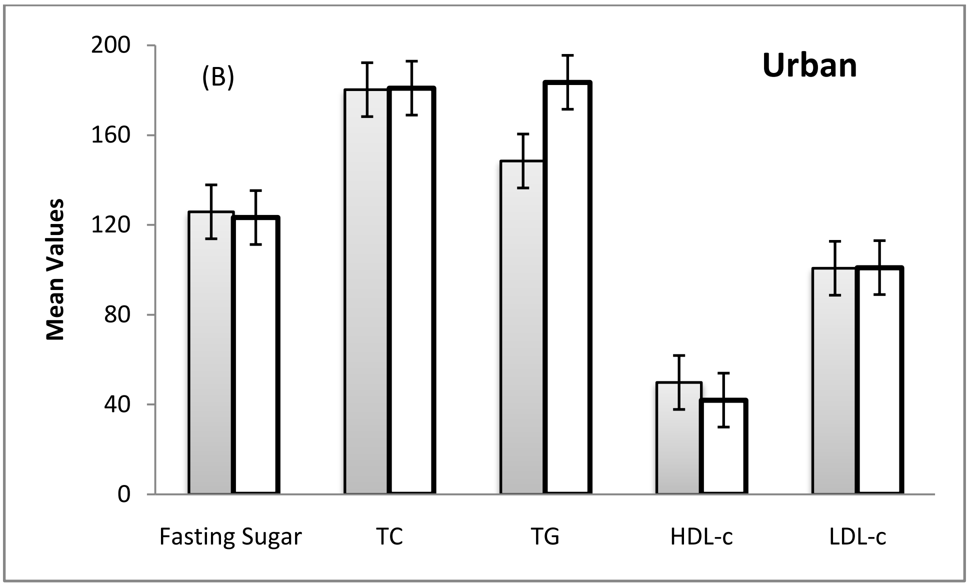


Figure 1: Comparison of fasting blood sugar and lipid profile amongst gender in rural versus urban individuals. TC: Total cholesterol, TG: Triglycerides, HDL-c: High-density lipoprotein cholesterol, LDL-c: Low-density lipoprotein cholesterol.

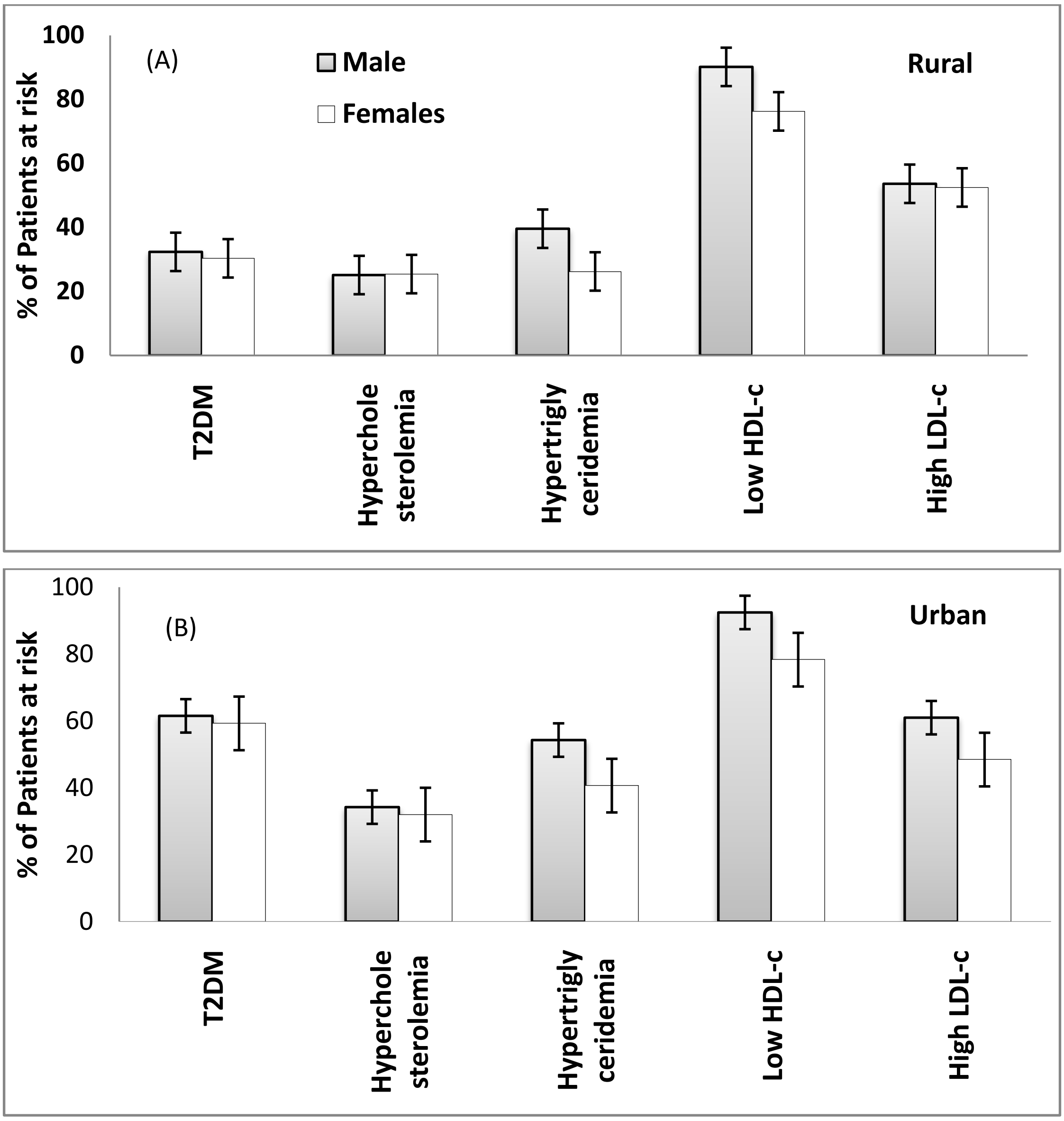
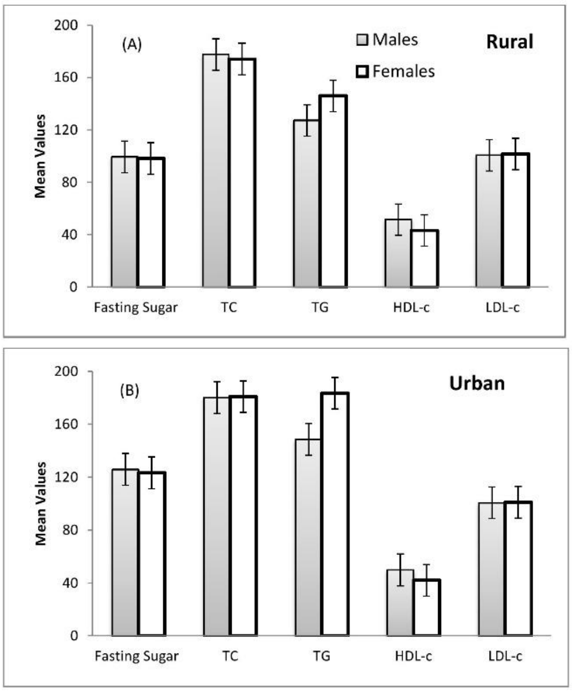


Figure 2: Comparison of genders based on risk profile (%) for fasting blood sugar, glycosylated hemoglobin levels and lipid profile in rural versus urban patients. T2DM: type-II Diabetic mellitus, HDL-c high-density lipoprotein cholesterol, LDL-c low-density lipoprotein cholesterol

JPEG Format


(A)
Rural
Males
Females
Mean Values
200
160
120
80
40
0
Fasting Sugar
TC
TG
HDL-c
LDL-c
(B)
Urban
Mean Values
200
160
120
80
40
0
Fasting Sugar
TC
TG
HDL-c
LDL-c

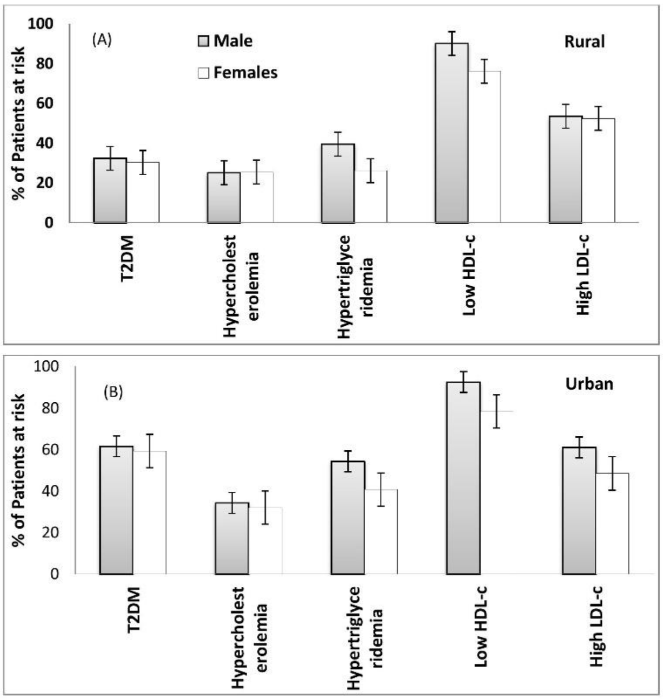


Figure 2: Comparison of genders based on risk profile (%) for fasting blood sugar, glycosylated hemoglobin levels and lipid profile in rural versus urban patients. T2DM: type-II Diabetic mellitus, HDL-c high-density lipoprotein cholesterol, LDL-c low-density lipoprotein cholesterol