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Research Article

# A SURVEY ON DIABETIC SUBJECTS TO STUDY THE PREVALENCE AND PATTERN OF DYSLIPIDAEMIA

**Bhardwaj Priyanka[1]*, Chaudhary Vijay[2], Chaudhary Minakshi[3]**

*[1]Assistant Professor, Department of Kayachikitsa, Dayanand Ayurvedic College, Jalandhar, Punjab.
[2]Principal cum Dean, [3]Reader, Department of Kaumarbhritya, Rajiv Gandhi Government Post Graduate Ayuvedic College and Hospital, Paprola, Himachal Pradesh, India.

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## ABSTRACT

Diabetes has become a major concern for medical feternity being one of the most common disorders and associated with a high mortality and morbidity because of the complications associated, dyslipidemia being one of them. Need of the hour is to study the prevalence, patterns and risk factors associated with the condition of dyslipidemia in diabetes. **Materials and methods:** A survey study was carried out on 220 subjects visiting the O.P/I.P, Department of Kayachikitsa, Rajiv Gandhi Government Post Graduate Ayurvedic Hospital, Paprola (HP) on a pre-designed questionnaire. **Observations and results:** Prevalence of dyslipidemia was found to be 92.72% which was on higher side in females (96.92%) as compared to males (86.67%). Mixed diet and lack of physical exercise were also found to be one of the major risk factors. Anthropometric parameters studied in the survey were on higher side as compared to suggested cut off values. Glycemic status of the patients was found to be significantly correlated with S. Cholesterol, S.Triglycerides and VLDL. **Conclusions:** Present study revealed high prevalence of Dyslipidemia among Diabetic subjects. Thus, awareness should be made in healthcare providers as well as in patients of Diabetes regarding changing the lifestyle, dietary modifications and regular follow ups to offer a better management of the disease.

## INTRODUCTION

Rising incidence of Type II Diabetes is an immense concern globally with India being most affected and has been regarded as Diabetes capital of the world. It is major concern for the developing countries being a medical, social as well as economic burden. Its incidence is increasing as per facts. It is predicted that between 2010 and 2030, developed and developing countries will see a 20% and 69% increase, respectively, in the number of adults with diabetes.[1] The prevalence of diabetes among those aged 20–79 years may increase to 7.7%, constituting 439 million by 2030.[2]

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Type II Diabetes is associated with a number of complications, huge mortality as well as morbidity. It is one of the major risk factor for atherosclerotic cardiovascular disease and the risk is aggravated due to presence of comorbidities like hypertension, high body fat percentage, dyslipidemia etc. Patients with Diabetes are predicted to have two to three times higher rate of coronary artery disease, four times higher rate of death during an acute myocardial infarction, and two times higher rate of post myocardial infarction morbidity when compared to the general population.[3] This increased risk in Diabetic patients is attributable to impaired glucose tolerance and insulin resistance that further leads to lipid abnormalities and thus directly linked to atherogenesis. Dyslipidemia in diabetes is common and is characterized by hypertriglyceridemia with decreased levels of high-density lipoprotein (HDL)-cholesterol. Whilst low-density lipoprotein (LDL) cholesterol levels are usually not elevated there is a preponderance of small dense LDL particles which

appear to be more atherogenic. [4,5] Asian Indians are at increased risk as it is opined that Indian population because of its phenotype is more prone even at lower BMI (as compared to suggested cut offs for other populations) for metabolic as well as cardiovascular disorders. A study conducted on anthropometric variables in Asian Indian adults suggested that healthy BMI for an Urban Indian is <23kg/$m^2$, and cut-off values for Waist Circumference were 85 cm for men and 80 cm for women, and for Waist Hip Ratio they were 0.89 for men and 0.81 for women.[6] In the present scenario, people due to lack of proper knowledge about the disease pay much less attention to their glycaemic control and a major part of population remain undiagnosed for years and this chronic hyperglycaemic levels in the blood leads to serious complications like ASVCD, peripheral artery disease, stroke, foot amputations due to food ulcers etc. that further adds to the morbidity and mortality caused by the disease.

Diagnosis at early years, patient education, prevention and management of the disease as well as risk factors can work better in halting further progression to complications and thus can improve the quality of life, economic burden and can regress the morbidity as well as mortality. There are very few studies in India regarding nature of dyslipidemia and its risk factors that's why present study have been carried out in view of studying the lifestyle and habits of diabetic subjects so as to evaluate the prevalence, pattern and risk factors associated with the disease.

## MATERIALS AND METHODS

A population of 220 patients who were known case of Type 2 Diabetes Mellitus visiting the O.P/I.P, Department of Kayachikitsa, Rajiv Gandhi Government Post Graduate Ayurvedic Hospital, Paprola (Himachal Pradesh) were studied to assess the prevalence and pattern of dyslipidemia, risk factors associated and their lifestyle.

Information regarding duration of diabetes, individual characteristics, habits, diet, and physical activity was recorded. To obtain the necessary information, an individual interview was performed with each patient on a pre-designed questionnaire after taking an informed consent. Anthropometric parameters like BMI, Waist circumference and WHR were recorded. Biochemical parameters FBS and S. Lipid Profile were analysed. Lipid parameters were categorized as uncontrolled or out of target if,

- S. Cholesterol- >200mg/dl
- S. Triglycerides- > 130 mg/dl
- LDL - >100mg/dl
- VLDL- > 30mg/dl
- HDL- <40 mg/dl for males
  - <50 mg/dl for females

The data was analysed using SPSS version 20.0. The mean, standard deviation, and correlation (Pearson's) test were used to interpret the results. All the study patients were counselled about the benefits and risk factors pertaining to lifestyle modifications.

**Table 1: Demographic Distribution of Study Subjects (n=220)**

| Observation | Attribute | Number of Subjects | Percentage |
|---|---|---|---|
| Age (in years) | 31-50 | 58 | 26.36% |
| | 51-70 | 158 | 71.81% |
| | >70 | 4 | 1.81% |
| Gender | Male | 90 | 40.9% |
| | Female | 130 | 59.1% |
| Marital Status | Married | 216 | 98.2% |
| | Unmarried | 4 | 1.8% |
| Educational Status | No Schooling | 48 | 21.8% |
| | Primary School | 60 | 27.3% |
| | Matriculation | 70 | 31.8% |
| | Graduate | 28 | 12.7% |
| | Post Graduate | 14 | 6.4% |
| Work Status | Govt. Employee | 32 | 14.5% |
| | Non Govt. Employee | 36 | 16.4% |
| | Self Employed | 10 | 4.5% |
| | Home maker | 118 | 53.6% |
| | Retired | 24 | 10.9% |

**Table 2: Medical Profile of Study Subjects (n=220)**

| Observation | Attribute | Number of Subjects | Percentage |
|---|---|---|---|
| History of hospitalisation for complications of Diabetes Mellitus | Hyperglycemia | 8 | 3.64% |
| | Hypoglycemia | 4 | 1.82% |
| | Diabetic Ketoacidosis | 4 | 1.82% |
| | No History of hospitalisation | 204 | 92.73% |
| Presence of other co-morbidities | Hypertension | 55 | 25% |
| | Hypertension + CAD | 5 | 2.27% |
| | Hypothyroidism | 6 | 2.72% |
| | Hypertension+ Hypothyroidism | 7 | 3.18% |
| | No other health issues | 147 | 66.82% |
| Use of medication for Diabetes | Allopathic | 166 | 75.5% |
| | Ayurvedic | 4 | 1.8% |
| | Allopathic+Ayurvedic | 32 | 14.5% |
| | Life Style Modifications | 18 | 8.2% |
| Use of Insulin | Insulin Glargine | 4 | 1.8% |
| | Isophane | 6 | 2.7% |
| | Isophane + Glargine | 2 | 0.9% |
| | No Use | 208 | 94.6% |

**Table 3: Dietary Habits of Study Subjects (n=220)**

| Observation | Attribute | Number of Subjects | Percentage |
|---|---|---|---|
| Vegetable Habit | Seven days a week | 114 | 51.8% |
| | 4-5 days a week | 94 | 42.7% |
| | <4 days a week | 12 | 5.5% |
| Fruit Habit | 6-7 days a week | 14 | 6.4% |
| | 3-5 days a week | 88 | 40.0% |
| | <3 days a week | 118 | 53.6% |
| Dietary Habit | Vegetarian | 82 | 37.3% |
| | Mixed | 138 | 62.7% |
| Type of oil used in cooking | Sunflower/ Mustard oil | 144 | 65.5% |
| | Butter/Ghee | 12 | 5.5% |
| | Rice bran/ Falx seed oil | 14 | 6.4% |
| | None in particular | 50 | 22.7% |
| Habit of taking extra ghee | Yes | 106 | 48.2% |
| | No | 114 | 51.8% |

**Table 4: Physical Activity of Study Subjects (n=220)**

| Observation | Attribute | Number of Subjects | Percentage |
|---|---|---|---|
| Habit of making regular journeys | No | 84 | 38.2% |
| | Walking | 136 | 61.8% |
| Walking Speed | Slow (<4km/hr) | 64 | 29.1% |
| | Moderate (4-5.6km/hr) | 128 | 58.2% |
| | Fast (>5.6km/hr) | 28 | 12.7% |
| Physical Activity Compared to individual of same age | More Active | 22 | 10.0% |
| | Similar | 100 | 45.5% |
| | Less Active | 82 | 37.3% |
| | Muchless Active | 16 | 7.3% |

| | | | |
|---|---|---|---|
| Active Sporting | No | 140 | 63.6% |
| | Occasionally | 72 | 32.7% |
| | Frequently | 8 | 3.6% |
| Exercise | Yes | 24 | 10.9% |
| | No | 196 | 89.1% |

**Table 5: BMI of Study Subjects**

| Status | No. of Subjects | Percentage |
|---|---|---|
| Underweight (<18.59kg/m$^2$) | 6 | 2.72% |
| Normal (18.5-24.9 kg/m$^2$) | 84 | 38.18% |
| Overweight (25-29.9 kg/m$^2$) | 82 | 37.27% |
| Obese (30-39.9 kg/m$^2$) | 48 | 21.81% |
| **Total** | **220** | **100.0%** |

**Table 6: Biochemical parameters in Study Subjects (n=220)**

| Parameter | Males (n=90) | | Females (n=130) | | Total (n=220) | |
|---|---|---|---|---|---|---|
| | Mean | SD± | Mean | SD± | Mean | SD± |
| FBS (mg/dl) | 142.49 | 39.35 | 153.90 | 41.92 | 149.23 | 41.18 |
| S. Cholesterol (mg/dl) | 202.40 | 50.15 | 211.92 | 50.56 | 208.03 | 50.50 |
| S. Triglycerides (mg/dl) | 202.93 | 119.74 | 239.63 | 100.89 | 224.61 | 110.23 |
| HDL (mg/dl) | 48.76 | 12.81 | 52.21 | 11.12 | 50.80 | 11.93 |
| LDL (mg/dl) | 117.57 | 38.96 | 112.27 | 39.84 | 114.44 | 39.48 |
| VLDL (mg/dl) | 40.16 | 23.595 | 50.43 | 24.70 | 46.23 | 24.72 |

**Table 7: Dyslipidemic Profile of Study Subjects**

| Status | No. of Subjects | | Total | Percentage |
|---|---|---|---|---|
| | Males | Females | | |
| Non Dyslipidemic | 12 | 4 | 16 | 7.28% |
| Dyslipidemic Profile | 78 | 126 | 204 | 92.72% |
| **Total** | **90** | **130** | **220** | **100.0%** |

**Table 8: Prevalence of deranged lipid profile in study subjects with dyslipidemic profile (n=204)**

| Parameter | Males (n=78) | | Females (n=126) | | Total (n=204) | |
|---|---|---|---|---|---|---|
| | No. of Subjects | % age | No. of Subjects | % age | No. of Subjects | %age |
| S. Cholesterol (>200mg/dl) | 46 | 58.97% | 72 | 52.14% | 118 | 57.84% |
| S. Triglycerides (>150 mg/dl) | 56 | 71.79% | 98 | 77.78% | 154 | 75.49% |
| LDL (>100mg/dl) | 58 | 74.36% | 84 | 66.67% | 142 | 69.60% |
| HDL (<40mg/dl in males) (<50mg/dl in females) | 20 | 25.64% | 54 | 42.86% | 74 | 36.27% |
| VLDL (>30 mg/ dl) | 54 | 69.23% | 102 | 80.95% | 156 | 76.47% |

**Table 9: Correlation study between FBS and S. Lipid Profile in 204 dyslipidemic subjects**

| Correlation with | | S. Cholesterol | S. Triglycerides | HDL | LDL | VLDL |
|---|---|---|---|---|---|---|
| **FBS** | Pearson Correlation | 0.177* | 0.502** | -0.001 | -0.014 | 0.441** |
| | p-value | 0.008 | <0.001 | 0.988 | 0.840 | <0.001 |
| **S. Cholesterol** | Pearson Correlation | | 0.459** | 0.403** | 0.799** | 0.393** |
| | p-value | | <0.001 | <0.001 | <0.001 | <0.001 |
| **S. Triglyceride** | Pearson Correlation | | | 0.012 | 0.031 | 0.880** |
| | p-value | | | 0.859 | 0.647 | <0.001 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **HDL** | Pearson Correlation | | | | 0.250** | 0.016 |
| | p-value | | | | <0.001 | 0.813 |
| **LDL** | Pearson Correlation | | | | | 0.013 |
| | p-value | | | | | 0.845 |

**Table 10: Correlation study between Anthropometric parameters and FBS, S.Lipid Profile in 204 subjects**

| Correlation with | | FBS | S.Chol | S.Tgl | HDL | LDL | VLDL |
|---|---|---|---|---|---|---|---|
| **BMI** | Pearson Correlation | 0.138* | 0.089 | 0.030 | 0.026 | 0.037 | -0.006 |
| | p-value | 0.041 | 0.189 | 0.663 | 0.704 | 0.585 | 0.926 |
| **Waist Circumference** | Pearson Correlation | 0.058 | -0.037 | -0.025 | 0.068 | -0.096 | -0.081 |
| | p-value | 0.393 | 0.580 | 0.711 | 0.317 | 0.157 | 0.234 |
| **WHR** | Pearson Correlation | 0.063 | -0.030 | -0.018 | -0.073 | 0.075 | -0.086 |
| | p-value | 0.352 | 0.657 | 0.789 | 0.283 | 0.267 | 0.203 |

**Table 11: Correlation study between Age and FBS, S. Lipid Profile in 204 dyslipidemic subjects**

| | | FBS | S.Chol | S.Tgl | HDL | LDL | VLDL |
|---|---|---|---|---|---|---|---|
| **Age** | Pearson Correlation | -0.106 | -0.001 | -0.042 | -0.007 | -0.016 | -0.069 |
| | Sig. (2-tailed) | 0.118 | 0.984 | 0.531 | 0.916 | 0.817 | 0.310 |

**Fig. 1: Correlation study between FBS and S. Cholesterol**

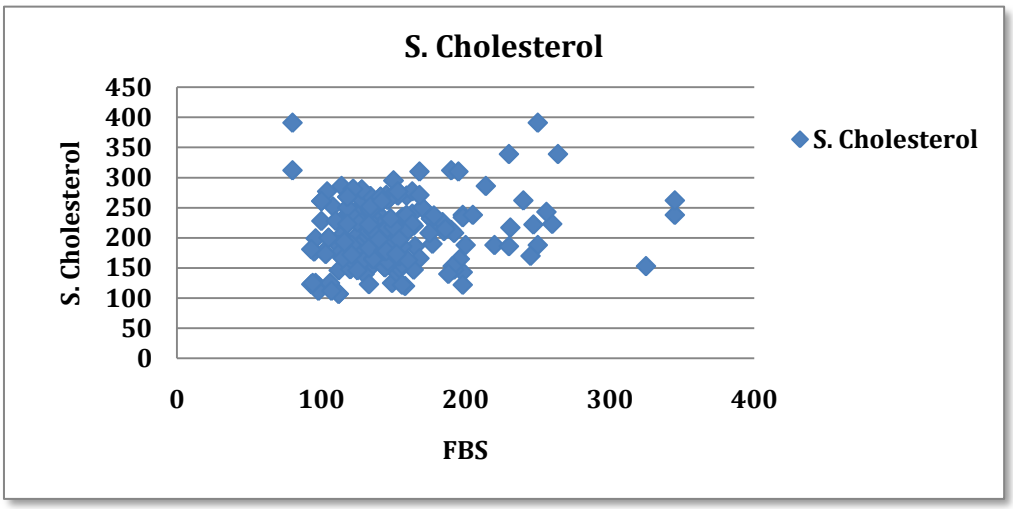



**Fig. 2: Correlation study between FBS and S. Triglycerides**

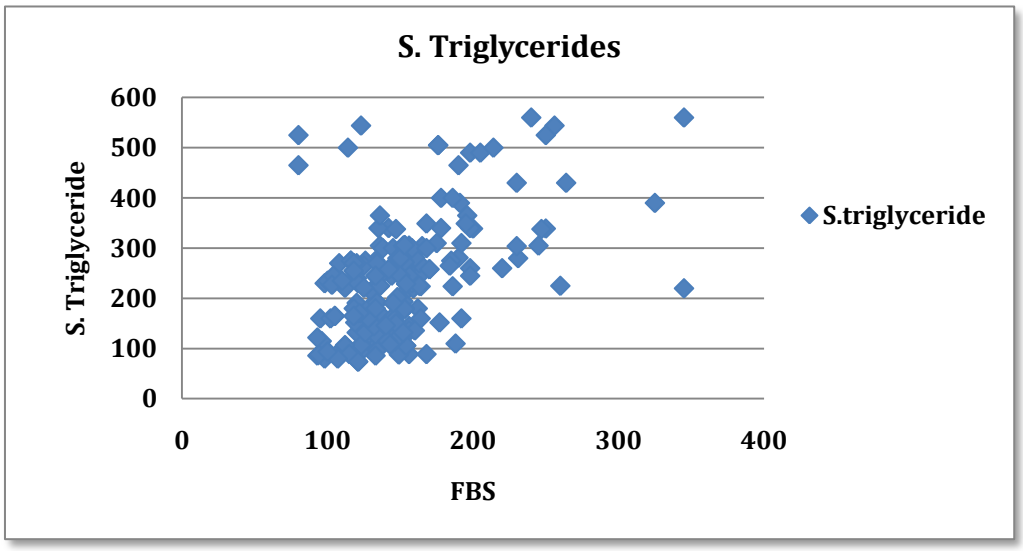


**Fig. 3: Correlation study between FBS and HDL**

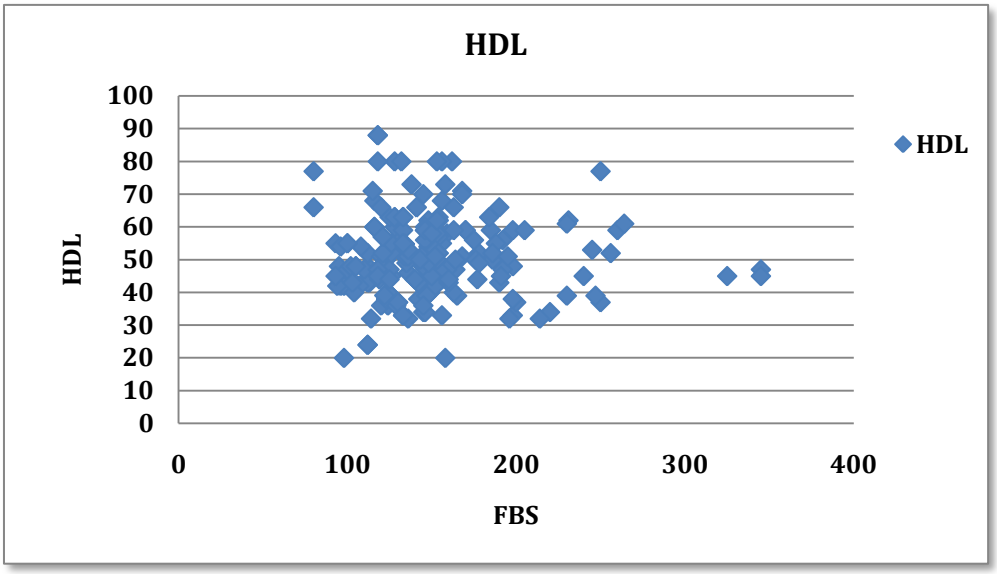



**Fig. 4: Correlation study between FBS and LDL**

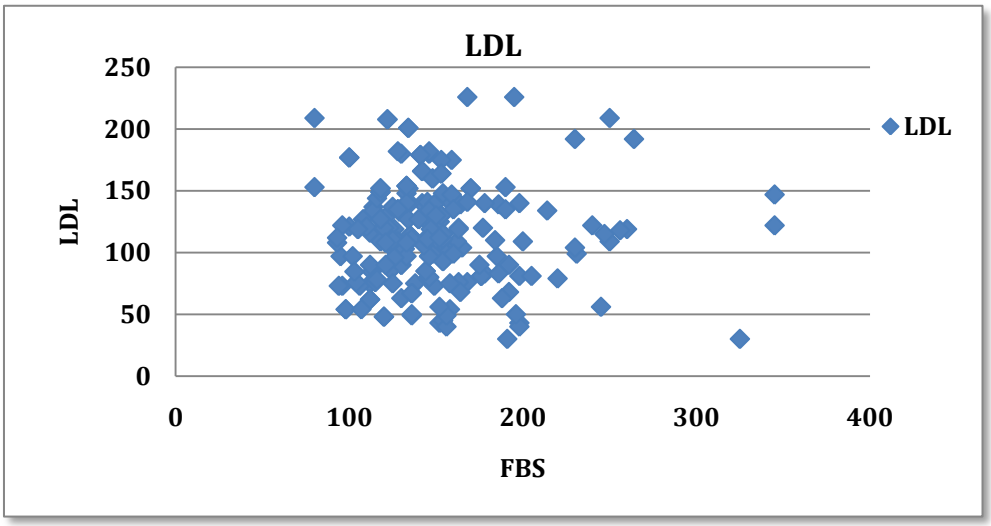
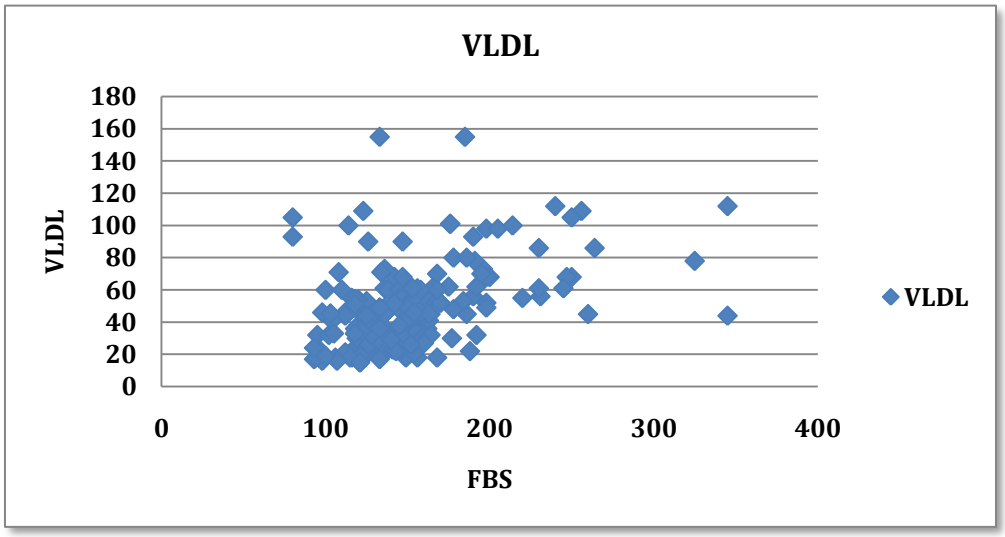



**Fig. No. 5: Correlation study between FBS and VLDL**




## RESULTS AND DISCUSSION

**Demographic Distribution** (Table 1)

Incidence of metabolic disorders including Type II Diabetes Mellitus and cardiovascular diseases is closely related with the ageing process. Age wise distribution in the present study showed that most of the subjects i.e. 158 (71.81%) belonged to the age

group 51-70 years and majority were females i.e. 130 (59.1%) out of 220 study subjects and thus majority of the subjects (118, 53.6%) were housewives. Maximum subjects (70, 31.8%) had educational qualification up to matric level and 48 (21.8%) were illiterate. Housewives and persons with lower educational qualification were found to be in a majority being unaware of the disease and often ignorant because of the lack of knowledge and awareness regarding the disease and associated risk factors. So, it is an area of major intervention to create awareness in general public and counsel the patients regarding the complications and comorbidities associated with the disease.

**Medical Profile** (Table 2)

Chronic hyperglycemia is an independent factor responsible for the development of macro and microvascular complications. In the present survey, majority of the subjects i.e., 134 (60.9%) were having diabetes for 1-10 years, 38 (17.27%) were having diabetes for 11-20 years while, 10 (4.54%) were having diabetes more than 20 years. Majority of the subjects 204 (92.73%) had no history of hospitalization for complications of diabetes. Comorbidities like hypertension, hyperuricemia, thyroid disorders are associated with deranged metabolism and offer as major risk factors for further complications. Maximum patients in the present study i.e., 147 (66.82%) had no other co-morbidities while 55 (25%) had associated hypertension, 5 (2.27%) suffered from coronary artery disease, 6 (2.72%) were having hypothyroidism, 7 (3.18%) were having hypertension along with hypothyroidism. In the present study majority of the subjects were dependent on modern medications and very few were getting insulin therapy (12, 5.4%) along with medications.

**Behavioural Measurements**

Majority of subjects i.e., 170 (77.3%) subjects in the present study were non-smokers and 186 (84.5%) were non-alcoholic.

**Dietary Habits** (Table 3)

Different patterns of food intake have recently been positively associated with risk of T2DM. Higher intake of saturated and trans-fats adversely affects glucose metabolism and insulin resistance while higher intake of polyunsaturated fats and long chain omega-3 fatty acids is known to be beneficial. The ADA suggests an increase in either carbohydrate or monounsaturated fat to compensate for the reduction in saturated fat. Some studies suggest that a high–monounsaturated fat diet may have better metabolic effects than a high-carbohydrate diet, although other experts have suggested that such a dietary modification may make weight loss more difficult in obese patients with diabetes. Dietary habits in the 220 diabetic subjects were studied regarding type of diet, use of vegetables, fruits, extra ghee/butter and type of oil used for cooking purposes. It was observed that maximum number of patients were enjoying mixed diet i.e. 138 (62.7%). 114 (51.8%) used to eat vegetables seven days a week, 94 (42.7%) took for 4-5 days a week, rest 12 (5.5%) were taking vegetables less than 4 days a week. 118 (53.6%) used to take fruits for less than three days a week. 88 (40.0%) were having fruits for 3-5 days. 114 (51.8%) were not taking extra ghee, while 106 (48.2%) were used to take extra ghee with meals. 144 (65.5%) used mustard/ sunflower oil for cooking purposes while, 14 (6.4%) used oils like rice bran or flax seed oil for cooking purposes and 12 (5.5%) used ghee/butter. Vegetarian diets may reduce blood cholesterol concentrations through several mechanisms. Vegetarian diets are low in cholesterol, total fat, and saturated fatty acids, leading to less absorption and conversion to blood cholesterol.[7] Regarding the effects of vegetarian diets on blood lipid concentrations, several cross-sectional studies showed that vegetarians have significantly lower concentrations of TC, LDL-C, and TG compared with omnivores.[8]

**Physical Activity** (Table 4)

Physical activity plays an important role in delaying or preventing development of T2DM, directly by improving insulin sensitivity and reducing insulin resistance and indirectly by beneficial changes in body mass and body composition. The American College of Sports Medicine and the American Diabetes Association have recommended at least 150 min/week of moderate (50%-70% of an individual's maximum heart rate) to vigorous (> 70% of an individual's maximum heart rate) physical activity for patients with type 2 diabetes (T2D).[9] In the survey of 220 subjects, majority of patients i.e., 136 (61.8%) were making regular journey via walking, rest 84 (38.2%) were not having any physical activity. Walking speed of majority of subjects i.e. 128 (58.2%) was moderate (4-5.6km/hour). Majority of the patients i.e. 100 (45.5%) were equally active compared to healthy individuals of their own age, 82 (37.3%) were less active while 16 (7.3%) were much less active. 140 (63.6%) patients were not involved in active sports, 72 (32.7%) used to have sports activities occasionally and 8 (3.6%) were frequently involved in active sports. Out of 220 subjects, 196 (89.1%) were not doing any physical exercise on routine basis, rest 24 (10.9%) had physical exercise as a part of their routine.

**Athropometric Parameters** (Table 5)

Anthropometric parameters taken in the study were BMI, waist circumference and WHR. BMI is a

frequently used tool to identify the overweight and obese patients. Many longitudinal studies have reported that increased BMI is a strong risk factor for diabetes. Various cross sectional studies have also shown that higher BMI is also associated with altered lipid profile. Mean values of BMI, waist circumference and WHR were found to be on higher side as compared to suggested cut-off values. In 220 Diabetic patients taken for the study, 84 (38.18%) had normal BMI, 82 (37.27%) were overweight, 48 (21.81%) were obese. Mean BMI of study subjects was found to be 26.45kg/$m^2$. Mean BMI in males was found to be 26.510kg/$m^2$ and in females was 26.408kg/$m^2$. Mean waist circumference in 220 study subjects was found 95.44cm. In males it was 96.89cm while in females it was 94.43cm. Mean WHR observed in study subjects was 0.986. In males it was 1.002 and in females it was 0.975.

**Biochemical Parameters** (Table 6)

Mean value of FBS was 149.23 mg/dl. Mean FBS was 142.49 mg/dl in males and 153.90 mg/dl in females. Results of serum lipid profile showed that the mean values for S.Cholesterol, S.Triglycerides, HDL-C, LDL-C and VLDL-C were 208.03 mg/dl, 224.61mg/dl, 50.80 mg/dl, 114.44mg/dl, and 46.23mg/dl respectively. In male patients, mean values of S.Cholesterol, S. triglycerides, HDL-C, LDL-C and VLDL-C were 202.40mg/dl, 202.93mg/dl, 48.76mg/dl, 117.57 mg/dl and 40.16mg/dl respectively. The mean values for S.Cholesterol, S. triglycerides, HDL-C, LDL-C and VLDL-C in female patients were 211.92mg/dl, 239.63 mg/dl, 52.21mg/dl, 112.27mg/dl and 50.43mg/dl respectively.

**Prevalence and Correlations** (Table 7, 8)

In the present survey study of 220 diabetic subjects 204 (92.72%) were found to be dyslipidemic. Out of which 78 (86.67%) were males and 126 (96.92%) were females. According to the CDC, 97% of adults with diabetes have one or more lipid abnormalities.[10] Results were also comparable to the study done by R.M. Parikh et.al. They carried a study on a total of 788 patients, in which 85.5% males had dyslipidemia, while the prevalence was even higher among females (97.8%).[11] The finding was also comparable with a study done in Ethopia that indicated the prevalence of dyslipidemia was 91.1% (Wube et al) [12] and also with the prevalence reported by Abdel-Aal et al. (2008), in which prevalence was 90%.[13]

Analysis further revealed that hypercholesterolemia was present in 118 (57.84%) patients, hypertriglyceridemia was present in 154 (75.49%), LDL was raised in 142 (69.60%) VLDL was raised in 156 (76.47%), and HDL was on lower side in 74 (36.27%) patients. A study on prevalence and pattern of dyslipidemia among T2DM patients at a rural-based hospital in Gujarat, India reported by Pandya et al,[14] revealed that mean serum cholesterol level was 188.9±43.70, mean serum TG was 174.6±69.44, mean serum HDL was 46.2±17.08, mean serum LDL was 105.9±34.06, and mean serum VLDL level was 33.4±11.08mg/dL. Out of 171 DM patients, 36.3% patients had high serum cholesterol level, 35.7% had low serum HDL level, 56.1% had high serum TG level, 57.3% had serum LDL level above normal range; and 49.7% showed high serum VLDL level.

Correlation study was done using Pearson's correlation coefficient between FBS, S. Lipid Profile, Age and Anthropometric Parameters. (Table No. 9, 10, 11) (Figure No. 1-5) Statistically insignificant correlation was observed between Age and FBS, S. Lipid profile. BMI showed a positive correlation (r=0.138) with FBS that was statistically significant (p-value=0.041). In correlation studies, FBS showed statistically significant positive correlation (r=0.177) with S. Cholesterol ($p< 0.01$); statistically highly significant positive correlation with S.Triglycerides ($p< 0.001$) and VLDL ($p< 0.001$). S. Cholesterol showed statistically highly significant positive correlation with S. Triglyceride, HDL, LDL, and VLDL. S.Triglycerides showed statistically highly significant positive correlation with VLDL. HDL showed significant positive correlation with LDL. A number of studies also discovered positive correlation between FBS and S.Lipid Profile. Khadke et al. also reported significant positive correlations between Fasting Plasma Glucose and S.Lipid Profile.[15] Wube et al. observed that FBS correlated positively with TC and LDL.[16] Jayesh et al. conducted a prospective study on western Indian population that comprised of 430 T2DM patients and 501 non diabetic control subjects. They found significant correlation of HbA1c with TC and LDL.[17]

## CONCLUSIONS

In the present survey of 220 Diabetic subjects, prevalence of dyslipidemia was found to be 92.72% which was on higher side in females (96.92%) as compared to males (86.67%). Majority of subjects were in their middle age. Mixed diet and lack of physical exercise were also found to be one of the major risk factors. Anthropometric parameters studied in the survey were on higher side as compared to suggested cut off values yet, no correlation was observed between anthropometric values and serum lipid profiles as well as with FBS of the subjects. Glycemic status of the patients was found to be significantly correlated with S. Cholesterol, S.Triglycerides and VLDL. Thus, the present study signifies that awareness should be made in healthcare

providers regarding the need to offer better management of dyslipidemia in diabetic patients. Regular follow ups, patient education, lifestyle modification, healthy diet and regular physical activity would be a positive step towards reducing the prevalence of dyslipidemia in diabetic subjects.

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***Address for correspondence**
**Dr. Bhardwaj Priyanka**
Assistant Professor
Department of Kayachikitsa,
Dayanand Ayurvedic College,
Jalandhar, Punjab.
Email:
drpriyankab93@gmail.com
Contac: 8219823693