



## TO STUDY LIPID PROFILE LEVELS IN DIABETES MELLITUS PATIENTS WITH AND WITHOUT DIABETIC RETINOPATHY

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### ABSTRACT

Diabetes mellitus results in considerable morbidity and mortality, affecting about 180 million people worldwide. Diabetes is a multisystem disease, having many manifestations in the eye, of which cataracts and Diabetic Retinopathy (DR) are the most significant cause of visual impairment and blindness, and people with diabetes are 25 times more likely than the general population to become blind. Sample size was 140 in each group keeping level of significance as  $p < 0.5$ . The data was analysed using SPSS software 11.5 version. Higher Total cholesterol, Triglyceride and LDL levels are associated with more severe retinopathy and increased duration is associated with increased prevalence and more severe diabetic retinopathy. This effective monitoring of lipid profile and glycemic control would be beneficial in these patients. Our study shows that alteration in Lipid profile has a role as a risk factor in causation and pathogenesis of Diabetic Retinopathy.

**Key Words:-** Diabetic Retinopathy, Diabetes mellitus, blindness, chronic hyperglycaemia, Lipid profile.

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Received:05.07.2010    Revised:12.08.2010    Accepted:25.08.2010

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### INTRODUCTION

Diabetes mellitus (DM) was first recognized as a disease around 3000 years ago by the ancient Egyptians and Indians, illustrating some clinical features very similar to what we now know as diabetes.[1] DM can result in many complications such as nephropathy, cardiovascular, neurologic and ocular complications,[2-4] with diabetic retinopathy (DR) being the most common microvascular ocular complication of DM.[5] DR is defined as a disorder of the retinal circulation that compromises the delivery of oxygen and nutrients to the retina, thus being unable to meet the requirements of its high metabolic demands.[5-6] Therefore, defects in retinal circulation may affect normal vision, which is considered a leading cause of

vision impairment and blindness worldwide.[1,4,7] Many risk factors for DR have been reported among patients with diabetes; these include uncontrolled DM, longer periods of DM and the presence of other systemic diseases such as hypertension.[8,9]

Increasing the level of awareness of DR as an ocular complication of DM among patients with diabetes is considered an important factor for early diagnosis and management of DR, in addition to the prevention of possible visual impairment due to the disease.[9] Variable levels of awareness of DR among patients with diabetes have been reported from different countries around the world.

To date, there is a lack of studies that assess the awareness levels regarding DR in DM sufferers in South India. This study was conducted to assess the awareness levels of DR, compliance with DM control and routine eye check-up among Jordanian type 2 DM patients. The morbidity and mortality related to DM is mainly attributed to its microvascular complications including retinopathy, nephropathy and neuropathy. Chronic hyperglycaemia, increased reactive oxygen species, decreased nitric oxides and increased fatty acids are responsible for these chronic vascular complications by altering the vascular response.[10] The major ocular complication of DM is diabetic retinopathy (DR) which is the leading cause of irreversible blindness worldwide with prevalence of DR in newly diagnosed type II diabetics up to 40%.[11-12] Known risk factors for development and progression of

DR include type and duration, age, gender, bodymass index (BMI), glycaemic control, hypertension, nephropathy, smoking, pregnancy and serum lipid levels.[13-15].

Hyperlipidaemia causes endothelial dysfunction due to reduced bioavailability of nitric oxide and breakdown of blood retinal barrier leading to exudation of serum lipids and lipoproteins which results in DR changes and diabetic macular odema (DME) formation. [13-15]. This study was conducted to explore this intriguing relationship between serum lipids and DR in our population.

## MATERIAL AND METHOD:

This study was conducted at the department of Ophthalmology, Narayana Medical College, Nellore. After approval by Institutional Ethical Committee, informed written consent was taken from the patients prior to inclusion in the study. Patients from both genders, aged between 35-65years, with recent or earlier diagnosis of type 2 DM were included through non-probability convenience sampling. Patients with hypertension, heart disease, renal disease, use of anti-hyperlipidaemia drugs, and history of ophthalmic diseases or surgery were excluded. Sample size was 140 in each group keeping level of significance as  $p < 0.5$ . The data was analysed using SPSS software 11.5 version.

**Table-I: Clinical and biochemical profile of study population.**

Variable	Group 1 No DR (n=140)	Group 1 With DR (n=140)	P Value
Age (Years)	48.01 ± 4.92	49.23 ± 6.04	0.018
BMI (kg/m <sup>2</sup> )	26.29 ± 2.75	26.12 ± 3.09	0.412
Plasma Glucose (F) mg/dl	117.30 ± 7.86	131.08 ± 14.06	< 0.01
HbA1C	5.73 ± 0.53	7.68 ± 1.02	< 0.01

**Table – II: Lipid Sub Fraction Values Among Subgroups.**

Lipid Profile	No DR (n=140)	NPDR (n=96)	PDR (n=44)	P Value
Serum Cholesterol (md/dl)	183.13 ± 17.80	215.32 ± 7.32	234.03 ± 10.28	< 0.01
Serum LDL-C (mg/dl)	92.32 ± 11.21	122.38 ± 20.55	138.21 ± 4.58	< 0.01
Serum HDL-C (mg/dl)	45.60 ± 4.38	43.23 ± 2.68	42.71 ± 3.29	< 0.01
Serum TG (mg/dl)	168.31 ± 9.61	220.58 ± 34.01	240.91 ± 17.06	< 0.01

## DISCUSSION:

DR is a leading complication of diabetes mellitus (DM), affecting over 130 million people worldwide [16]. Therefore, how to prevent the progression of DR and treat this devastating complication remains a challenge for ophthalmologists [16]. DR is considered as an indicator of systemic diabetic microvascular complications, and also a crucial indicator of the impact of diabetes on patients [17]. Chronic complications of Diabetes Mellitus (DM) affect many organ systems and are responsible for majority of morbidity and mortality. Chronic complications of Diabetes mellitus include Macrovascular complications like coronary artery disease, cerebrovascular disease, peripheral vascular disease. Microvascular complications include Retinopathy, Nephropathy, Neuropathy, Diabetic Retinopathy (DR) is highly specific complication of both Type I and Type II DM.

In our study, analysis of serum lipid sub fractions among subgroups of patients with no DR, with NPDR and PDR showed statistically significant difference. In Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) serum TC was not a significant factor in the severity of retinopathy but was significantly associated with the presence and severity of hard exudates in subjects with young-onset DM. [18]. In studies on Indian population, Gnaneswaran et al. [19] found significantly higher values of serum TC and LDL-C levels in DR

patients, whereas, Rema et al.[20] reported significantly higher mean serum TC, TG and non- HDL-C concentrations in subjects with DR. In studies comparing patients with DR and age matched healthy non diabetic controls, Kiran et al.[21] reported significantly deranged lipid profile in DR patients, while Agarwal et al.[22] found a statistically significant lower value of mean HDL-C in diabetic patients with or without Rimpal P et al found serum TG, LDL-C and TC were elevated and serum HDL-C was decreased in diabetic subjects as compared to healthy control, whereas serum TG, TC and LDL –C were more elevated in those with retinopathy than that those without retinopathy.[23] Various studies have shown that diabetes is associated with dyslipidemia in the form of hypercholesterolemia and hypertriglyceridemia.[ 24]

In general, patients in our study were found to have poor diabetic control, self-help and lifestyle regimen. A large number of the patients who attended diabetic eye clinic for the first time (67%) were not aware that diabetes can affect their eyes. Furthermore, despite having attended an eye clinic at least once before, 14% of them were not sure if the diabetes can affect eyes. It is likely that lack of awareness of diabetes and its complications would lead to inadequate self-help and poor lifestyles. A significant percentage of patients lacked awareness of diabetes and how it would affect the eyes. Our data also showed that a significant proportion of patients had to seek urgent

medical help, suggesting episodes of uncontrolled diabetes and a need for close monitoring of blood sugar levels.

In our study, strong positive correlation was found between serum TC, TG, LDL-C with both BSF and HbA1c, while HDL-C showed weak negative correlation with both BSF and HbA1c. Based on the findings of this study, it is recommended that stringent measures must be adopted to control modifiable risk factors associated with development and progression of DR in order to reduce the morbidity related with this disease. We found strong positive correlation between severity of DR with BSF, HbA1c, serum LDL-C, TC and TG, whereas, age and duration of DM showed moderately positive correlation with severity of DR. Smoking and serum HDL-C levels showed moderate inverse correlation with severity of DR. Correlation between DR with gender or BMI was not statistically significant.

We examined severity of DR (STDR, NSTDR), VA, FBS, and the duration and treatment of diabetes. We

also examined the diabetic awareness, self-help and lifestyle regimen of patient using a structured questionnaire. Patients were presenting at the eye clinic with very late-stage DR and with a reduced level of VA. A very high percentage (80%) of patients were found to have STDR.

#### CONCLUSION:

The present study demonstrated statistically significant difference of higher serum lipid levels in diabetic retinopathy patients than non diabetic retinopathy patients. Serum cholesterol, LDL-C and TG levels were significantly elevated and serum HDL-C level was decreased in patients with DR indicating a need to promptly address these modifiable risk factors in order to reduce the morbidity related to DR. Our study shows that alteration in Lipid profile has a role as a risk factor in causation and pathogenesis of Diabetic Retinopathy.

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