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Association of Small Dense LDL (sd LDL) Levels with Diabetic Retinopathy in Patients with Diabetes Mellitus Type 2

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Abstract: ***Objective: The relationship between the condition of small dense low density lipoprotein (sd LDL) in patient with diabetes mellitus type 2 with Diabetic Retinopathy. Method: The subjects of the study were 35 people (70 eyes), all of whom had been confirmed to have Diabetic Retinopathy who had met the inclusion criteria. Based on the research subject can be obtained data shown in tabulation form. On the subject of research done a sharp examination of vision, examination degree of Diabetic Retinopathy with Indirect Funduscopy Tool and accompanied by supervision of Vitreo Retina. Results: Patients with NPDR with normal sd LDL are 24 (85.7%) and high 4 (14.3%), while patients PDR with normal sdLDL are (85,7%) and High is 1 (14,3%). Conclusions: that there is no relationship between normal or high levels of Small Dense LDL with Diabetic Retinopathy***

Keywords: sd LDL, diabetic rethinopathy

1. Introduction

Diabetic retinopathy is a retinal disorder (retinopathy) found in people with Diabetes Mellitus (DM) and is one of the causes of blindness found throughout the world, so In Vision 2020 the right to sight prevention of Retinopathy Diabetika becomes one of its programs. Keep in mind so far awareness of the dangers of Retinopathy Diabetika is still low, both at the Specialists of Internal Medicine and Eye Specialist, especially the community and the patient Diabetes Mellitus own.[1,2]

According to the 1992 National Program for Control of Blindness (NPCB), blindness due to retinal disorders is ranked fourth (6.3%) after cataracts, corneal abnormalities, and atrophy optics. According to Andrha Padesh Eye Disease Study (APEDS), blindness due to retinal disorders was second (22.4%) after cataract.[3]

Retinal disorders that often cause blindness include Diabetic Retinopathy (nearly 80% of all retinal disorders are Diabetic Retinopathy), according to WHO in 2002, Diabetic Retinopathy is the cause of blindness that reaches 4.8% worldwide. The prevalence of blindness due to Diabetic Retinopathy is also found to be high in the United States and UK, in the United States there is an average blindness of 5,000 people per year due to diabetic retinopathy, whereas in the UK Retinopathy Diabetika is the fourth leading cause of blindness of all causes of blindness. Based on Visual Impairment and Blindness in Europe, Diabetic Retinopathy tops the cause of blindness at the age of 45-64 years.[4,5,6,7]

Among the most prevalent DM complications are Diabetic Retinopathy. 75% of DM patients who have had DM for about 20 years will get Retinopathy Diabetika as a complication.[3,8]

Long suffering from Diabetes, the ability to control blood sugar levels, pregnant women with diabetes, people with anemia, hyperlipidemia and smokers are risk factors for retinopathy.[1]

Based on the above facts, one of the contributing factors to the increasingly severity of diabetic retinopathy is dyslipidemia. Serum lipid levels consist of total cholesterol, Triglyceride levels, Low Density Lipoprotein (LDL), and High Density Lipoprotein (HDL). Dyslipidemia ie high total cholesterol, Triglycerides, LDL, and decreased HDL levels also increase the weight of diabetic retinopathy so that the condition of dyslipidemia should be decreased so that the number of blindness caused by DM can be slow.[9,10]

Small dense low density lipoprotein (sd LDL) is a lipid storage molecule formed by the action of extrahepatic lipoproteins in very low density lipoprotein (VLDL) and intermediate density lipoprotein (IDL), considered a risk factor for cardiovascular disease because it can increase the risk of developing arterosclerosis because of its shape small enough to penetrate the arterial wall, more susceptible to oxidation and may be in the bloodstream long enough. Increased serum triglyceride levels are known to be associated with the formation of sdLDL.[11]

Therefore, in this study researchers will try to examine the presence or absence of small dense low density lipoprotein (sd LDL) relationship with the degree of Diabetic Retinopathy and is expected with this research will be able to increase our knowledge and vigilance in an effort to slow the blindness caused by diabetic retinopathy

2. Method

This research is an analytic prospective research with cross sectional method by taking data from eye patients Vitreo Retina section and patient of disease in Endokrin poly at USU Hospital and RS network.

The inclusion criteria for this study were Diabetes Mellitus and diagnosed Retiopathy Diabetika NPDR on both eyes or PDR on both eyes, Diabetics Retinopathy patients whose degree of severity ranges from mild, moderate, severe NPDR to microaneurisma dot blood or cotton wool spot appearance to PDR with or without macular edema, Clear refractive media, Not in get abnormalities of disease in other ratina, separti galukoma, toxoplasmosis and others, and Willing to participate in research.

The sample data were collected by performing Indirect funduscopy examination and blood collection for sd LDL examination. The data were processed using Exact Fischer test. All statistical tests used p <0.05 as a meaning margin with SPSS software.

3. Result

This research is prospective analytic done in Eye Polyclinic of Vitreo Retina Hospital of USU and RS network from March to May 2018. Total research subjects amounted to 35 people (70 eyes), all of which have been confirmed Diabetika Retinopathy Sufferers who have met the inclusion criteria . Based on the research subject can be obtained data shown in tabulation form. On the subject of research done a sharp examination of vision, examination degree of Diabetic Retinopathy with Indus Funduscopy Tool and accompanied by supervision of Vitreo Retina section.

Table 4.1: Distribution of patient characteristics

Characteristics	Total	%
age		
< 50 Y.O	3	8,6
≥ 50 Y.O	32	91,4
gender		
male	17	48,6
female	18	51,4
body mass index		
over wieght	28	80,0
obesity	7	20,0
how long DM		
< 20 years	21	60,0
≥ 20 years	14	40,0
Blood sugar level		
Normal	10	28,6
high	25	71,4
diabetic retinopathy		
Npdr	28	80,0
Pdr	7	20,0

In Table 4.1. above explained that patients <50 years old were 3 (8.6%), while patients> 50 years old were 32 (91.4%), with total patients as many as 35 (100%). Patients with male sex were 17 (48,6%), while female with female were 18 (51,4%), with total patient 35 (100%). Patients with body mass index with excess body weight (23-29,9) kg / m2 were 28 (80,0%), while obese patient (≥ 30) kg / m2 were 7 persons (20,0%), with total of patients as many as 35 (100%). Patients with long-term Diabetes Mellitus <20 years were 21 (60%), while patients with Diabetes Mellitus> = 20 years were 14 (40%), with a total of 35 patients (100%). Patients with blood sugar level normal (≤ 130) mg / dl of 10 (28.6%), while patients with high KGDS (> 130) mg / dl were 25 (71.4%), with a total of 35 (100%) ODS patients were 28 (80%) with ODS (Proportiveative Diabetic Retinopathy (ODS) as many as 28 (20%), with a total of 35 patients (100%).

Table 4.2: Distribution of the distribution of the lipid profile according to the study patients

Characteristic	Total	%
Apo B		
normal	21	60,0
high	14	40,0
LDL		
normal	3	8,6
high	32	91,4
SLDL		
normal	30	85,7
high	5	14,3

In Table 4.2. above explained that patients with normal Apolipoprotein B were 21 (73-109) mg / dl (60.0%), whereas patients with high Apolipoprotein B were 14 (<109) mg / dl (40.0%) , with a total of 35 patients (100%). Patients with normal LDL levels were 3 (≥ 100) mg / dl (8.6%), while patients with high LDL levels were 32 (<100) mg / dl (91.4%), with a total of 35 patients (100%). Patients with normal sd LDL levels were 30 (85.7%), whereas patients with high sd LDL level were as high as 5 (14.3%), with a total of 35 patients (100%).

Table 4.3: Distribution of posterior segment abnormalities of the study patients

Posterior Segment Abnormality	Total	%
- 1+2	24	68,6
- 1+2+3	1	2,9
- 1+2+3+4	6	17,1
- 1+2+4	4	11,4
Total	35	100,0

Note:
1) Retinal haemorrage
2) Eksudat
3) Neovaskularisasi
4) Macular edema

Posterior segment examination results are:
Retinal hemorrhage and exudate counted 24 (68.6%), retinal hemorrhage, exudate and neovascularization of 1 (2.9%), retinal haemorrhage, exudate, neovascularization and macular edema, 6 (17.1%), retinal haemorrhage , exudate and macular edema without neovascularisasis of 4 (11,4%), with total patient of research counted 35 patients (100%).

Table 4.4: Distribution of SLDL, Apo B, LDL relationship with body mass index

	Body mass index				total		p.
	Over weight		Obesity				
	n	%	n	%	n	%	
SLDL							
- Normal	24	85,7	4	14,3	28	100,0	0,559
- High	2	25	5	75	7	100,0	
Apo B							
- Normal	18	85,7	3	14,3	21	100,0	0,401
- High	10	71,4	4	28,6	14	100,0	
LDL							
- Normal	3	100	0	0	3	100,0	1,000
- High	25	78,1	7	21,9	32	100,0	

In Table 4.4 above explained that patients with sd LDL were normal in patients with over weight were 24 (85.7%) and obese were 4 (14.3%), whereas patients with high sd LDL had over weight patients as 2 (25%) and obese patients as 5 (75%), Fischer Exact Test test results were found p. = 0,559 indicating that there is no correlation between increase of sd LDL level with body mass index. In this table seen patients with body weight Obesity has a risk of increased levels of Small Dense LDL larger. Patients with normal Apolipoprotein B had over weight body mass index were 18 (85.7%) and a high with obesity were 3 (14.3%), while patients with high Apolipoprotein B had a overweight of 10 (71.4%) and patients with high Apolipoprotein B had obesity were 4 (28.6%), Fischer Exact Test test results were found p. = 0.401 indicating that there is no relationship between Apolipoprotein B and body mass index. In this table it is seen that all study patients had over weight to obesity where there were 18 people with excess body weight had normal Apo B level. Patients with normal LDL levels had over weight were 3 (100%), while patients with high LDL levels had overweight were 25 (78.1%) and high LDL patients with obesity were 7 (21,9%), Fischer Exact Test test result p. = 1,000 indicating that there is no relationship between LDL levels and body mass index.

Table 4.5: Distribution asossiation of SLDL, Apo B, LDL with Diabetic Retinopathy

	Diabetic retinopathy				total		p.
	NPDR		PDR				
	n	%	n	%	n	%	
Apo B							
- Normal	19	67,9	2	32,1	28	100,0	0,900
- high	9	32,1	5	71,4	7	100,0	
LDL							
- Normal	2	7,1	1	14,3	28	100,0	0,499
- high	26	92,9	6	85,7	7	100,0	
SLDL							
- Normal	24	85,7	4	85,7	28	100,0	1,000
- high	6	14,3	1	14,3	7	100,0	

In table 4.5. above explained that patients with non-Proliferative Diabetic Retinopathy (NPDR) ODS with normal Apolipoprotein B level of 19 people (67.9%) and with high Apolipoprotein B level of 9 people (32.1%), while patients with Proliferative Diabetic Retinopathy (PDR) ODS with normal Apolipoprotein B level of 2 people (28,6%) and with high Apolipoprotein B level of 5 people (71,4%), Fischer Exact Test test result p. = 0.90 which states there is no relationship between the level of Apolipoprotein B with the degree of Diabetic Retinopathy. Patients with Non Proliferative Diabetic Retinopathy (NPDR) of ODS with normal LDL level of 2 people (7.1%) and with high LDL level of 26 people (92.9%), while patients with Proliferative Diabetic Retinopathy (PDR) ODS Normal LDL of 1 person (14.3%) and with high LDL level of 6 people (85.7%), Fischer Exact Test test results p. = 0.499 where there was no significant relationship between LDL levels and the degree of Diabetic Retinopathy. Patients with non-Proliferative Diabetic Retinopathy (NPDR) OD with normal sd LDL level were 24 (85.7%) and high were 6 (14.3%), while patients with Proliferative Diabetic Retinopathy (PDR) OD with normal sd LDL level were 6 (85,7%) and with high sd LDL level were 1 (14,3%), Fischer Exact Test test result got p. = 1,000 stating that there is no relationship between normal or high levels of sd LDL with Diabetika Retinopathy.

Table 4.6: Distribution of BMI relationship with Diabetic Retinopathy

BMI	Diabetic retinopathy				total		p.
	NPDR		PDR				
	n	%	n	%	n	%	
Over weight	22	78,6	6	85,7	28	100,0	1,000
obesity	6	85,7	1	14,3	7	100,0	

In Table 4.6 above explained that patients with Non Proliferative Diabetic Retinopathy (NPDR) ODS with over weight of 22 people (78,6,9%) and with obesity counted 6 people (85,7%), while patient with Proliferative Diabetic Retinopathy (PDR) ODS with overweight as much 6 people (85,7%) and with obesity counted 1 person (14,3%), result of Fischer Exact Test test p. = 1.00 which states there is no relationship between the large levels of Apolipoprotein B with the degree of Diabetic Retinopathy.

4. Conclusion

There is no relationship between levels of Small Dense LDL in the body with the degree of Diabetic Retinopathy, There is no significant relationship between LDL levels and the degree of Diabetic Retinopathy, There is no relationship between the large levels of Apolipoprotein B with the degree of Diabetic Retinopathy, There is no relationship between LDL levels and body mass index, There is no relationship between Apolipoprotein B levels and body mass index and There is no relationship between increasing levels of Small Dense LDL with body mass index .

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