ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 9 | September - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ROLE OF IL-6 AND LIPID PROFILE IN PREDIABETIC AND DIABETIC PERSONS

Biochemistry

Dr. Deepti Bhatt Senior lecturer,RR Dental College and Hospitals.

Dr. Swati Jain* Senior demonstrator Biochemistry, Pacific Medical College & Hospitals.
*Corresponding Author

Dr. Ashish jain Assistant Professor Community Medicine, Ravindranath Tagore medical college and hospitals.

ABSTRACT

Background: Prediabetics have greater chance to convert into diabetics. Early detection and treatment of dyslipidemia in pre diabetic patient may reduce the rate of conversion into diabetes and its complications. Proinflammatory cytokines such as IL-6 may play role in increasing the insulin resistance. This study was planned to compare lipid profiles and IL-6 level in pre-diabetics and diabetics with control. **Methods:** It is a cross sectional study carried out in Department of Biochemistry of tertiary health care institution in southern Rajasthan. The study consist of 50 cases of individuals aged >/=25 years with diabetes mellitus and 50 cases with prediabetes and 50 controls. Lipid profile was analyzed by spectrophotometric method in Roche Cobas 6000 and IL- 6 was measured by ELISA. **Results:** Result of our study shows that TC LDL,TG and VLDL were significantly elevated in prediabetics and diabetics as compared to normal healthy subjects, whereas HDL was markedly lower in prediabetics and diabetics. The value of IL-6 in Prediabetes patients was 0.86±0.27 and Diabetes patients was 1.09±0.20, which was more than value of control 0.72±0.34, which was statistically significant (P value <0.0001). **Conclusion:** In our study, we found that Immunological Markers and Lipid Profile may have statistically significant role in the progression of prediabetes into diabetes.

KEYWORDS

Prediabetics, Diabetics, Il-6, Lipid Profile.

INTRODUCTION:-

Prediabetes mostly becomes the precursor of diabetes in future and is characterized by impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) .There is higher prevalence of Prediabetes among older adults [1]. In comparison to people who have normal glucose metabolism, people with Prediabetes have 5 to 15 time's greater risk of development of diabetes type 2[2]. However, prediabetes is an irreversible state [3], but early identification of and if the risk factors are identified at an early stage it may prevent the conversion of prediabetes individuals into diabetic individuals. Increase in triglyceride levels and decrease in High Density Lipoproteins (HDL) cholesterol level is a characteristic feature of dyslipidemia which is in association with diabetes type 2 and insulin resistance [4,5]. Low Density Lipoproteins (LDL) cholesterol levels may not be frankly elevated in type 2 diabetes, there may be increase in the amount of small and dense LDL cholesterol particles which are more atherogenic in nature [6]. In addition to LDL cholesterol, elevated triglyceride levels and reduced HDL cholesterol levels are both risk factors for coronary heart disease (CHD) [7]. Interleukin (IL)-6 is a pleiotropic cytokine with a key impact on both immunoregulation and nonimmune events in most cell types and tissues outside the immune system [8]. A vast number of epidemiological, genetic, rodent, and human in vivo and in vitro studies have investigated the putative role of action/lack of action of IL-6 in the pathogeneses underlying obesity, insulin resistance,β-cell destruction, type 1 diabetes, and type 2 diabetes. [9].

METHODOLOGY:

A cross sectional study was carried out in Department of Biochemistry, Geetanjali Medical College & Hospital, Udaipur, Rajasthan after obtaining ethical committee permission. Patients attending OPD of Geetanjali hospital, Udaipur were enrolled in this study **during** October 2018 – April 2019, Based on the inclusion and exclusion criteria 50 cases of individuals aged >/=25 years with diabetes mellitus and 50 cases with prediabetes and 50 controls were included in the present study after obtaining informed consent. A pre-tested proforma was used to record relevant information. After obtaining informed consent from all patients and healthy control, 5 ml of venous blood was collected in a sterile plain bulb under all aseptic precautions. Blood was drawn from anticubital vein in plain vial. After samples collection, samples were centrifuged in REMI centrifuge at 3000 RPM for a period of 15 minutes at central laboratory of Geetanjali Hospital. Serum was separated after centrifugation. Serum was kept frozen at -20^{0}C (for IL-6) until assayed. All lipid parameters were analyzed by spectrophotometric method in Roche Cobas 6000,TC by CHOD-POD method, TG by Lipoprotein Lipase Glycerol Method, HDL by PEG-cholesterol esterase, LDL and VLDL by calculation. IL-6 estimation done by Enzyme Linked Immunosorbent Assay (ELISA) on ELISA Reader. Statistical Test done to analyze all the parameters were one way ANOVA and student t test.

RESULT:-

In our study Mean age of control group was 48.6±13.57, in diabetes group was 51.6±10.75 and in prediabetic group 44.7±12.1.51.3% of the participants were males and 48.6% were females. The table2 shows that the mean value of fasting glucose in controls is 89.66with SD 7.81, in Prediabetes it is 116.23 with SD 8.72 while the mean in diabetes is 154.32 with SD 19.86. There is significant difference (p<0.0001) in Fasting Glucose between Control, Prediabetes and Diabetes. **TC** in prediabetes individuals was found to be 183.7±24.42 ,in diabetes patients and control was found to be 204.21±41.27 & 163.60±29.47 respectively. **TG** in prediabetes patients was found to be 148.12± 11.74, in diabetes patients and control was found to be 171.74±16.70 & 128.08±58.74 respectively, The value of **HDL** in prediabetes patients was found to be 45.9± 4.50, in diabetes patients and control was found to be 39.4±5.12 & 49.71±11.65 respectively. **LDL** in prediabetes ,diabetes patient and control was 108.17±25.11, 130.46±43.04 & 88.268±27.21 respectively. **VLDL** in prediabetes patients was found to be 29.6±2.3 whereas, VLDL in diabetes patient and control was found to be 34.34±3.3 & 25.6±11.61 respectively, the difference between groups in all lipid profile parameters was found statistically significant (P value <0.0001). The value of IL-6 in Prediabetes patients was 0.86±0.27 and Diabetes patients was 1.09±0.20, which was more than value of control 0.72±0.34, which was statistically significant (P value <0.0001).

Table-1 Distribution of participatants According to Sex

Sex	Group			Total
	Control	Diabetes	Prediabetes	
Male	27(54%)	27(54%)	23(46%)	77(51.3%)
Female	23(46%)	23(46%)	27(54%)	73(48.6%)
Total	50(100%)	50(100%)	50(100%)	150(100%)

Table 2 Comparison of All Parameters in Control, Prediabetes and Diabetes

Parameter	Mean±sd			P value (one way anova)
	Control	Prediabetes	Diabetes	
Fasting glucose	89.66±7.81	116.23± 8.72	154.32± 19.86	<0.0001
TC	163.60±29.47	183.24 24.42	204.21± 41.27	<0.0001
TG	128.08±58.74	148.12± 11.74	171.74± 16.70	<0.0001

HDL	49.71±11.65	45.9± 4.50	39.4± 5.12	<0.0001
LDL	88.26±27.21	108.17± 25.11	130.46± 43.04	<0.0001
VLDL	25.62±11.74	29.60± 2.3	34.34± 3.3	<0.0001
IL-6	0.72±0.34	1.09±0.20	0.86±0.27	0.0079

Figure 1:Comparison of means of fasting glucose and lipid profile

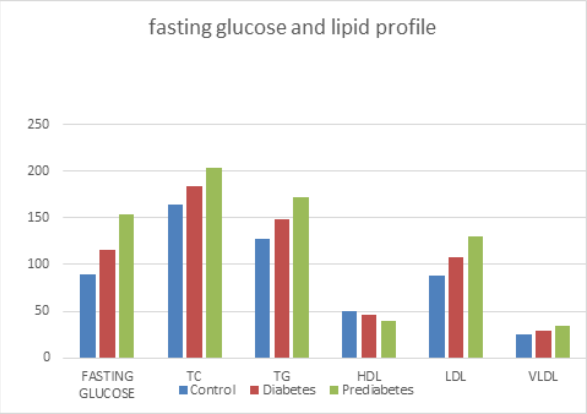
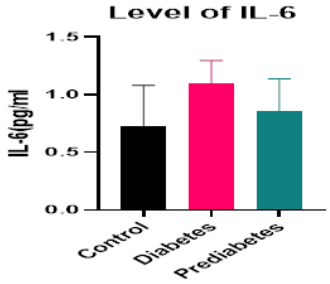


Figure 2Comparison of means of IL-6



DISCUSSION:-

Our study shows Mean age of control group was 48.6±13.57, diabetes group was 51.6±10.75 and in prediabetic was 44.7±12.1The disease was more prevalent in the early middle aged population as the risk of developing Type 2 Diabetes increases with age. This finding is similar with the results of Victoria Laishram et al., [10].Mean value of fasting glucose in controls is 89.667 ±7.817, in Prediabetes it is 116.23 ±8.72 while the mean in diabetes is 154.32 ±19.86. These findings are similar to study done by Victoria Laishram et al., Verma M et al[10,11]. Mean value of TC in prediabetes individuals was found to be 183.7±24.42 which is significantly higher than control. Similar study done by, Subodh Kansal et al,in 2016 [12] also found that mean value of total cholesterol for cases 184.75 ± 46.02 mg/dL was significantly more than controls 170.99 ± 38.27 mg/dL. Vydehi Veeramalla et al, [13] in their study shown that higher values in TC in all age groups in pre diabetics than control group. The Mean value of TG in prediabetes patients and diabetics was found to be 148.12± 11.74, 171.74±16.70 whereas Mean of TG in control was found to significantly lower(128.08±58.74) . Our results are consistent with Subodh Kansal et al and Rahbar et al [12,14]. HDL in prediabetes patients was 45.9± 4.5 whereas in diabetes patients and control was 39.4±5.12 & 49.71±11.65 respectively. Similar results shown in study done by Subodh Kansal et al, 2016 [12].Many Authors in their studies observed low HDL levels in prediabetic subjects than controls. [12-15]. The result of LDL and VLDL in prediabetes patients and diabetics was significantly higher than control, which is similar to other studies. [12-15]. The value of IL-6 in Prediabetes patients was 0.86±0.27 and Diabetes patients was 1.09±0.20, which was more than value of control 0.72±0.34, which was statistically significant (P value <0.0001). Spranger et al and Zahran A et al in their study had reported that circulating levels of IL 6 were high in type 2 diabetic patients [16-17].

CONCLUSION:-

In our study we found that Total cholesterol, low density lipoprotein (LDL), triglyceride (TG), very low density lipoprotein were significantly elevated in prediabetics and diabetics as compared to normal healthy subjects, whereas high density lipoprotein (HDL) was markedly lower in prediabetics and diabetics.The level of serum IL 6 is raised in diabetic and prediabetic patients that shows that IL-6 might be one of the factor responsible for insulin resistance. In our study, we found that Immunological Markers and Lipid Profile level is statistically significant different in prediabetics and diabetics.

REFERENCES

1. Beletate V, El Dib R, Atallah ÁN. Zinc supplementation for the prevention of type 2 diabetes mellitus. Cochrane Database of Systematic Reviews. 2007(1)
2. Twigg SM, Kamp MC, Davis TM, Neylon EK, Flack JR. Prediabetes: a position statement from the australian diabetes society and australian diabetes educators association. Medical journal of Australia. 2007 May;186(9):461-5..
3. Haase H, Overbeck S, Rink L. Zinc supplementation for the treatment or prevention of disease: current status and future perspectives. Experimental gerontology. 2008 May 1;43(5):394-408.
4. Siegel RD, Cupples A, Schaefer EJ, Wilson PW: Lipoproteins, apolipoproteins, and low-density lipoprotein size among diabetics in the Framingham offspring study. Metabolism 45:1267–1272, 1996.
5. Krauss RM: Lipids and lipoproteins in patients with type 2 diabetes. Diabetes Care 27:1496–1504, 2004.
6. Garvey WT, Kwon S, Zheng D, Shaughnessy S, Wallace P, Hutto A, Pugh K, Jenkins AJ, Klein RL, Liao Y: Effects of insulin resistance and type 2 diabetes on lipoprotein subclass particle size and concentration determined by nuclear magnetic resonance. Diabetes 52:453–462, 2003.
7. Gordon DJ, Probstfield JL, Garrison RJ, Neaton JD, Castelli WP, Knoke JD, Jacobs DR Jr, Bangdiwala S, Tyroler HA: Highdensity lipoprotein cholesterol and cardiovascular disease: four prospective American studies. Circulation 79:8–15, 1989.
8. Kamimura D, Ishihara K, Hirano T: IL-6 signal transduction and its physiological roles: the signal orchestration model. Rev Physiol Biochem Pharmacol 149:1–38, 2003
9. Sandler S, Bendtzen K, Eizirik DL, Welsh M. Interleukin-6 affects insulin secretion and glucose metabolism of rat pancreatic islets in vitro. Endocrinology. 1990 Feb 1;126(2):1288-94.
10. Victoria Laishram, Suman Debnath, Davina Hijam, Tina Das, Sneha Saha. Evaluation of Serum Interleukin 6 in Type II Diabetes Mellitus. Int J Med Res Prof. 2017; 3(1):156- 60. DOI:10.21276/ijmrp.2017.3.1.030
11. Verma M, Paneri S, Badi P, Raman PG. Effect of increasing duration of diabetes mellitumoglobin and insulin sensitivity. Ind J Clin Bioch 2006;21(1):142-6.
12. Kansal S, Kamble TK. Lipid profile in prediabetes. J Assoc Physicians India. 2016 Mar;64(3):18-21
13. Veeramalla V, Swetha Madas. Comparison of lipid levels in the diabetic and non diabetic patients: a study in a tertiary care hospital Int J Adv Med. 2017 Dec;4(6):1573-1577
14. Rahbar S. An abnormal hemoglobin in red cells of diabetics. Clin Chem Acta 1968; 22:296 298
15. Mk Bhatnagar, Ritika Sud, Akshay Goel. Comparison of lipid profile in prediabetic and diabetic patients. Santosh University Journal of Health Sciences 2016;2(1):15-17
16. Spranger J, Kroke A, Mohlig M, Hoffmann K, Bergmann MM, Ristow M, Boeing H, Pfeiffer AF. Inflammatory cytokines and the risk to develop type 2 diabetes: results of the prospective population-based European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam Study. Diabetes 2003; 52 (3):812-7.
17. Zahran A, Enas S. Essa Waleed F.and Abd Elazeem Study of Serum Tumor Necrosis Factor Alpha and Interleukin 6 in Type 2 Diabetic Patients with Albuminuria. Life ScienceJournal 2012; 9(1): 877-882.