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RESEARCH ARTICLE

POOR GLYCEMIC INDEX ($HbA1_C$) IN TYPE – II DIABETES MELLITUS PLAYS AN IMPORTANT ROLE IN PROGRESSION OF DIABETIC RETIONOPATHY

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ABSTRACT

Back ground: Diabetic Retinopathy is one of the main complication of both types; type I and II Diabetes mellitus. HbA1c is the gold standard parameter to estimate the glycemic index nowadays. Poor glycemic index means high blood sugar level which is the proceeding factor for development of retinopathy.
Methodology: Total 80 subjects were include in the study, from which 40 were type II diabetes without retinopathy and 40 were diabetes type-II with retinopathy. HbA1c was estimated by Bio Red Variant. Retinopathy was assessed by indirect ophthalmoscope.
Results: The mean of HbA1c Type II diabetic patients without retinopathy was11.05 ± 1.27%and in Type –II diabetes mellitus with retinopathy as, 13.05 ± 0.83% respectively. These results showed that glycemic control in type II diabetes with retinopathy highly poor than type II diabetic patients without retinopathy.
Conclusion: Poor glycemic index take a part in proceeding diabetic complications like retinopathy.

INTRODUCTION

According to the World Health Organization, in 2000 at least 171 million people worldwide suffered from diabetes mellitus, or 2.8% of the population of all over the world (**Wild *et al*., 2004**). In 2007, 246 million people world-wide suffered from diabetes making the disease one of the most common non-communicable global diseases and the fourth leading cause of death in the world according to IDF estimates (**Samreen Riaz, 2009**).Diabetes mellitus occurs throughout the world, but is more common (especially type II) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found up to 2030 (**Wild, 2004**). Pakistan is one of the South Asian countries with population of 150 millions and prevalence of Diabetes in Pakistan is high ranging from 7.6% to 11% of adult population (**IDF, 2010, Jaffar *et al*., 2004**).

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Diabetic Retinopathy is the damage to the retina caused by complications of diabetes mellitus, which can eventually lead to blindness. It is an ocular manifestation of systemic disease which affects up to 80% of all patients who have had diabetes for 10 years or more (**Kertes *et al*., 2007**). The incidence of diabetic retinopathy in Pakistan is 9.1% to 13% of diabetic population (**Kazi *et al*., 2005**).Currently 4 major biochemical pathways have been hypothesized to explain the mechanism of diabetic eye diseases, all starting initially from hyperglycemia induced vascular injury (**Balasuramanyam *et al*., 2002**). These mainly include:

- Enhanced glucose flux through the polyol pathway
- Increased intracellular formation of advanced glycation end products
- Activation of protein kinase C isoforms
- Stimulation of hexosamine pathway

HbA_{1c} is the major fraction, constituting approximately 80% of Hb_{A1}. It is formed by the condensation of glucose with the N-terminal valine residue of each beta chain of HbA to from an unstable Schiff base (aldimine). The Schiff base may either

dissociate or undergo an amadori rearrangement to form a stable ketoamine (**Sacks, 2006**).Nowadays normally cut point of HbA_{1C} is 6.5% of total Hb in non-diabetic individuals (**W.H.O., 2011**).It is the main indicator of glycemic index level in human body and uncontrolled level of HbA1c is main proceeding factor for development of diabetic complications.

MATERIALS AND METHODS

The current study was carried out at the Department of Biochemistry with collaboration of Department of Allied Medicine and Department of Ophthalmology of Liaquat University of Medical and Health Sciences Jamshoro Sindh Pakistan. Total 80 patients were enrolled from them 40 were diagnosed cases of Type II diabetes mellitus without retinopathy and 40 were diagnosed cases of Type II diabetes mellitus with retinopathy. 2ml of blood sample drawn by venipuncture under aseptic measure from each subject under study, then transferred the blood into anticoagulant bottle containing EDTA. Samples were first diluted with hemolysis reagent then incubated at 18 -28 ^{0}C for minimum of 30 minutesHbA_{1C} level will be measured by BIO-RED VARIANT ^{TM}HemoglobinA_{1C} program, utilized the principle of ion – exchange high performance liquid chromatography (HPLC) for automatic and accurate separation of HbA_{1C}.Retinopathy was assist by indirect ophthalmoscope. Independent student –t test was applied to observe the significance value (P.value) between these two groups. MS word and Excel 2010 used for generate the tables and graphs.

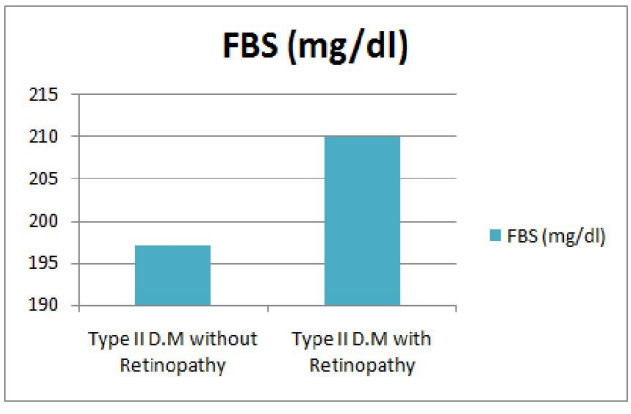
RESULTS AND DISCUSSION

The mean fasting blood glucose levels in type II diabetes mellitus without retinopathy was 197.60 ± 5.33 and in retinopathy it was 210.90 ± 10.65 (P.value<0.05) where the mean HbA1c level in diabetic patients without retinopathy was 11.05 ± 1.27 % while in diabetic patients with retinopathy it was 13.05 ± 0.83 % (P.value< 0.001) these results were shown in following table and graphs.

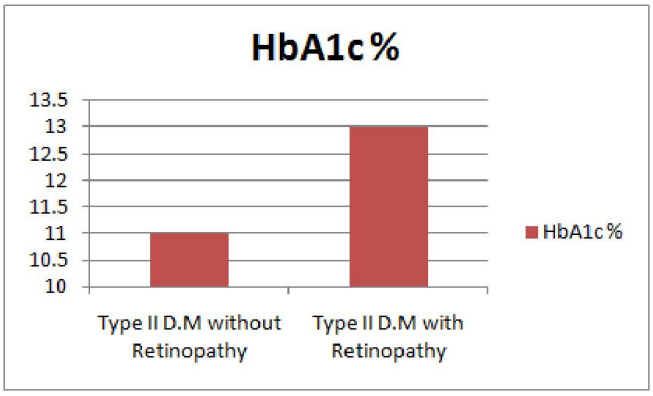
Table 1. FBS & HbA1c In Type II Diabetes with and without Retinopathy

Variable	Type II Diabetes Mellitus without Retinopathy	Type –II Diabetes mellitus with Retinopathy.
FBS (mg/dl)	197.60 ± 5.33	210.90 ± 10.65*
HbA1c %	11.05 ± 1.27	13.05 ± 0.83**

(* = p <0.05, ** = p<0.01)



Graph 1. FBS (mg/dl)



Graph 2. HbA1c %

The above graphs tables show that there is significance relation of poor glycemic index in development retinopathy.HbA1c is the gold standard parameter to rule out the blood glucose level status in diabetic patients. Poor glycemic control significantly observed in different in different complications of diabetes mellitus as in diabetic retinopathy. Different studies regarding this problem also has been done like: (**Santos *et al*., 2005**), have done cross sectional study on 210 patients from them 99 patients of diabetes mellitus without retinopathy and 111 patients of diabetes mellitus with retinopathy. They demonstrated that glycemic control (HbA_{1C}) were more poor in diabetic retinopathy (p<0.001). (Farhan *et al*., 2005) have reported in their study that poor glycemic control (p<0.0001) and longer duration of diabetes mellitus (p<0.0001) were important predicting factors of diabetic retinopathy. (**Rama and Pradeepa 2007**), **(Ishrat Kareem *et al*., 2004), (Zélia Maria da Silva Corrêa1 *et al*., 2003)** also reported in their studies that poor glycemic control and longer duration of diabetes mellitus were more prone to development of diabetic complications like retinopathy.The present study shows that the levels of HbA_{1C} % are significantly raised in type –II diabetic patients with retinopathy as compare with type- II diabetic patients without retinopathy (p<0.001). This concluded that good glycemic control can prevent the diabetic patients from retinopathy, so regular monitoring of fasting blood sugar level (FBS) and HbA1c % must necessary for diabetic patients from prevention of diabetic complication like retinopathy.

Conclusion

This concluded that good glycemic control can prevent the diabetic patients from retinopathy, so regular monitoring of fasting blood sugar level (FBS) and HbA1c % must necessary for diabetic patients from prevention of diabetic complication like retinopathy.

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