



Correlation of HBA1c and Serum Cholesterol in Diabetic Patients

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Authors' contributions

This work was carried out in collaboration among all authors. Authors ML and SM designed the study, authors ZT and AA performed the statistical analysis, authors FA and AT wrote the protocol and wrote the first draft of the manuscript. Authors AT and AA managed the analyses of the study. Authors ML and KAM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To determine the correlation of HBA1c and serum cholesterol in diabetic patients.

Methodology: This case control study was completed at the Biochemistry and Medicine Departments of Liaquat University Hospital Jamshoro from October 2015 to March 2016. Total number of study subject was 100 and they were divided into two groups. Group A (case group, n=50) comprises diagnosed T2DM subjects while group B (control group, n=50) consists of healthy normal subjects (HNS), healthy normal subjects with mean age 50±6.34 years. These subjects were assessed to find association of glycosylated hemoglobin with serum Cholesterol levels in Type-2 Diabetes mellitus patients. Those patients diagnosed as T2DM with age 30- 60 years were

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included while those patients diagnosed as diabetic erectile dysfunction, diabetic nephropathy, diabetic renal failure, familial dyslipidemia, and hypercholesterolemia was excluded in this study. Blood specimens were collected from both groups aseptically then blood glucose, HbA1c, Blood cholesterol, were estimated. Written consent was taken by all subjects including in this study. Data was analyzed by SPSS version 21.0. P value ≤ 0.05 were considered significant. Results: The mean fasting blood sugar (FBS) of study participants of both groups was 162.74 ± 25.42 mg/dL and 82.60 ± 10.03 mg/dL respectively. The mean random blood sugar of both groups was 299.72 ± 57.88 mg/dL and 142.72 ± 31.63 mg/dL respectively and mean glycosylated hemoglobin (HbA1C) of both groups was 8.40 ± 1.27 and 5.75 ± 0.24 mg/dL respectively. The mean serum cholesterol values of DP and HNS were 7.05 ± 1.02 and 5.74 ± 1.45 mg/dl respectively. Conclusion: It was observed a positive correlation between HBA1c and serum cholesterol in type2 DM patients.

Keywords: *Efficacy; Type-2 DM; serum cholesterol; glycated hemoglobin; fasting blood sugar; hypercholesterolemia.*

1. INTRODUCTION

Type-2 Diabetes Mellitus is one of the leading causes of premature illness and death across the world. It is one of the leading cause of blindness and renal failure [1]. In South Asian region over 151% its prevalence has estimated to increase between year 2000 and 2030 [2].

Pakistan is the tenth largest nation with this issue across the world [3,4]. In 2012 nearly 6.6 million adult people facing this problem in Pakistan. Currently Approximately 6.9 million people in Pakistan affected with DM, which expected to double by 2025 and affect up to 11.5 million people [5]. According to a study, in Pakistan prevalence of recently diagnosed diabetic patients was about 5.1% in males and 6.8% in females in urban areas while 5.0% in males and 4.8 females in rural areas [6]. This situation is alarming for health care policy makers in the country. Clinical chemistry plays a major role in diagnosis and management of diabetes [7]. Glycemic control, the routine measurement of HbA1c is usually suggest to prevent from complications of DM [8,9]. Increase in HbA1c level in blood can cause various pathophysiological changes in muscles and fat, the increased LDL cholesterol that may results to damage to cardiovascular system [10,11]. Diabetic patients with elevated HbA1c severity of hyperlipidemia increases. The two major risk factors of diabetic complications are increased HbA1c and hyperlipidemia [12]. There may be increased risk to develop coronary artery diseases in diabetic patients with increased HbA1c and dyslipidemia due to increase levels of LDL cholesterol [10,13]. The purpose of the present survey was to study the correlation of HbA1c and serum cholesterol in type-2 DM patients. These patients with poor glycemic

control need regular blood HbA1c levels monitoring together with elevation of fasting and random blood glucose levels as they can be prevented from hypercholesterolemia and coronary artery disease for their better survivals.

2. MATERIALS AND METHODS

This case control study was done at the Medicine and Biochemistry Departments of Liaquat University Hospital Jamshoro for the duration of six months from October 2015 to March 2016. This study was planned to determine the correlation of HBA1c and serum cholesterol in diabetic patients. Total number of study subjects was One hundred male and they were divided into two groups. Group A (case group) consist of 50 diagnosed type 2DM patients while group B (control group) comprises 50 healthy normal subjects (HNS).

Diagnosed type 2 Diabetic patients with age 30-60 years was included in this study and those patients diagnosed as diabetic erectile dysfunction, diabetic nephropathy, diabetic renal failure, met form in therapy, familial dyslipidemia, and hypercholesterolemia was excluded. Blood specimens were collected from both groups aseptically then blood glucose was estimated by glucose hexokinase method through Hittachi/Rochi/Cobas system 501 and HbA1c was also estimated by using Hittachi/Rochi/Cobas system 501. Blood cholesterol was estimated by cholesterol esterase method. The procedure was performed on Cobas C501 analyzer by Roch HittachiCobas system. (Roche, USA at the diagnostic and research laboratory, LUMHS Jamshoro.

Written consent was taken by all subjects including in this study. Confidentiality of

subjective data was maintained strictly. Data was analyzed by Statistical Package for Social Sciences (SPSS) version 21.0 (IBM, incorporation, and USA). P value ≤ 0.05 were considered significant.

3. RESULTS

Total hundred male individuals with age between 30-60 years were assessed to find correlation of HbA1c and serum cholesterol levels in type 2 DM (Fig 1).

The mean age of study participants of Group A and B was 52.64 ± 5.67 and 47.36 ± 7 years respectively.

The mean FBS of participants of both groups was 162.74 ± 25.42 mg/dL and 82.60 ± 10.03 mg/dL respectively. The mean RBS of participants of both Groups was 299.72 ± 57.88 mg/dl and 142.72 ± 31.63 mg/dl respectively (Fig 2). The mean glycosylated hemoglobin of participants of both Groups was 8.40 ± 1.27 and 5.75 ± 0.24 mg/dl respectively. The complete statistics of FBS, RBS, and HbA1c of both groups and the comparison of fasting blood sugar and random blood sugar of Group A and Group B is given in Graph- 2 and 3 respectively.

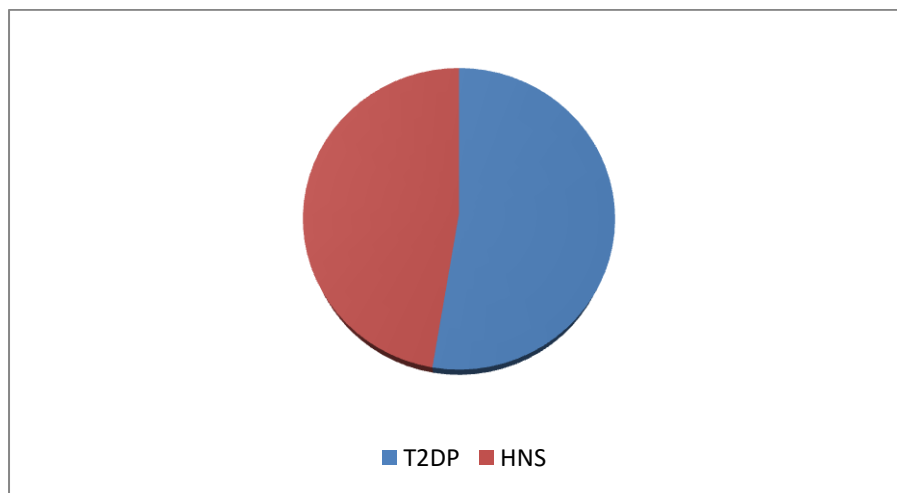


Fig. 1. Age of group A Type 2 diabetic patients (T2DP) and group B healthy normal subjects (HNS)

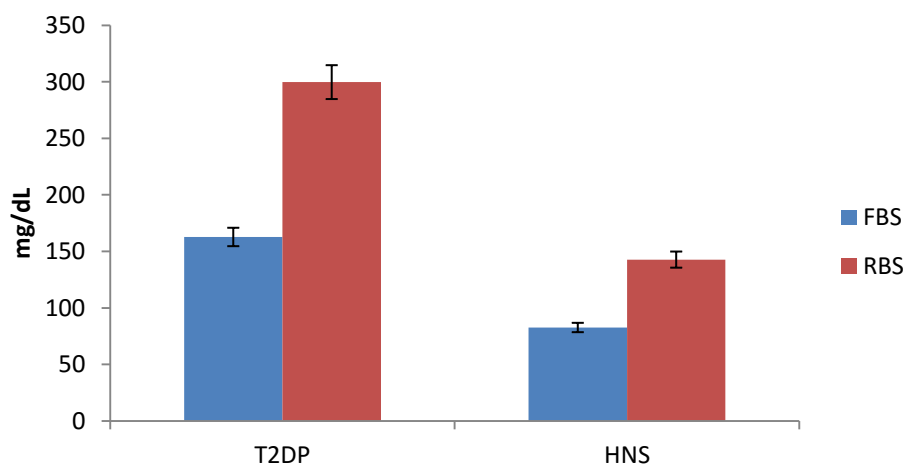


Fig. 2. Comparison of serum levels of fasting & random blood glucose in t2dp and hns

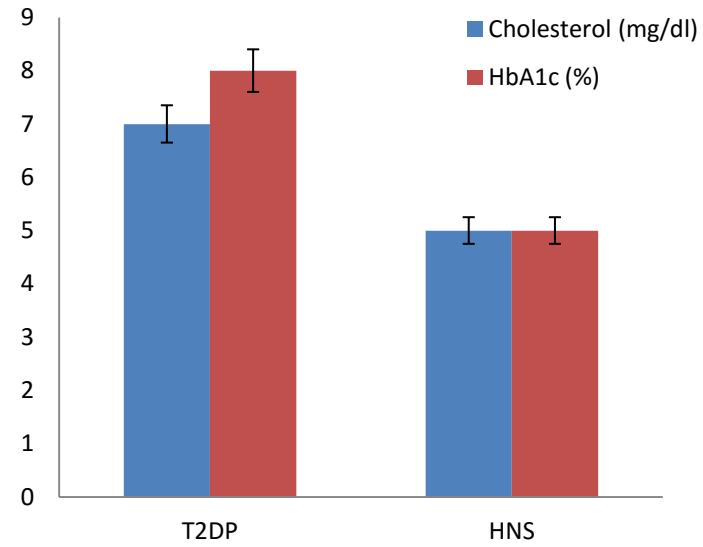


Fig. 3. Comparison of hba1c and cholesterol level between male t2dp and hns

The Comparison of glycosylated hemoglobin in both Groups is shown in Graph – 3. The mean Blood cholesterol levels of the Group A and Group B was 7.05 ± 1.02 , 5.74 ± 1.45 respectively and their complete description is given in Fig 3.

4. DISCUSSION

The blood glucose levels in DM can control by monitored the HbA1c. The increased HbA1c is associated with complications of DM. Higher HbA1c levels denotes the poor glycemic control that lead to abnormal. Elevation of (LDL) cholesterol that may lead to formation of athermanous plaque and may lead to coronary artery disease and Myocardial Infarction, and that poor glycemic control (Increased HbA1c) may also lead to nephropathy, maculopathy, retinopathy, and neuropathy [17].

According to clinical trials and diabetic complications the hba1c has been established as the gold standard measure of glycemic control and its appropriate values were showed to reduce the risk of diabetic complications [18, 19]. patients with their poor glycemic control (worst HBA1c \geq 9%) showed the severely of dyslipidemia specifically LDL cholesterol that may lead to increased complication of DM2, like coronary artery disease (CAD) and fatty liver [20].

5. CONCLUSION

Therefore, it shows that those (T2DM) patients with poor Glycemic control need a regular blood HbA1c levels monitoring together with evaluation of fasting and random blood glucose levels as they can be prevented from hypercholesterolemia and coronary Artery disease for their better survivals. It was observed a positive correlation of HBA1c and serum cholesterol level in type 2 DM patients.

CONSENT

All authors declare that 'written informed consent was obtained from the patient.

ETHICAL APPROVAL

The research was approved by ethical review committee of the LUMHS Jamshoro.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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