



Original Research Article

Comparison of hepatic and renal parameters between Diabetic and Non Diabetic Individuals of Dakshina Kannada: A cross sectional study

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ABSTRACT

Objectives: To compare fasting plasma glucose levels, HbA1c, hepatic and renal parameters in diabetes mellitus (DM) subjects and compare the values with healthy controls.

Materials and Methods: A total of 67 (n=67) reports were collected from Central laboratory, Yenepoya Medical College Hospital, Mangaluru from January 2018 to June 2018. Patients with FBS values more than 126mg/dl or HbA1c more than 6.5% who have been advised LFT and RFT by the physician were included in diabetic group (34) and other 33 reports of LFT & RFT with normal FBS & HbA1c levels included in non-diabetic group. All the data viz. FBS, HbA1c, Total Bilirubin, Direct Bilirubin, Indirect Bilirubin, S GOT, SGPT, Blood Urea and S. creatinine values were entered in excel sheet and subjected for statistical analysis.

Results: Inter group comparison of biochemical parameters was done by Non-Parametric test (Mann-Whitney) and Pearsons Chi square tests. The values {mean $\pm$ inter quartile range (IQR)} of FBS, HbA1c, Total Bilirubin, Direct Bilirubin, Indirect Bilirubin, SGOT, SGPT, Blood urea and S. Creatinine in diabetic group are 184.5mg(171-274.5), 8.9% (7.2-10.5), 0.7mg (0.5-0.8), 0.3mg(0.2-0.4), 0.4mg (0.3-0.4), 28U (21.5-33), 25.5U(20-32.25), 30.5mg (21.75-38) and 0.9mg (0.8-1) respectively obtained in Mann-Whitney test. Similarly, values of 96mg (78-103), 5.8% (5.3-5.9), 0.5 mg (0.4-0.7), 0.2mg (0.2-0.2), 0.3mg(0.2-0.45), 23U (20-28), 24U (19-36), 18mg(16-21), and 0.7mg(0.6-0.8) were respectively noted in non-diabetic group. The Mann-Whitney test showed significant difference in all the parameters except in Indirect Bilirubin, SGOT, and SGPT levels between two groups ($p < 0.05$). However, Pearson Chi square test revealed there is no significant difference in these parameters between diabetic and non-diabetic group with $p > 0.05$.

Conclusion: The present study suggests that there is no statistical significant difference in hepatic and renal parameters between diabetic and non-diabetic groups with respect to Chi-square test. Many previous studies have shown significant organ dysfunction in diabetic individuals, but our study result revealed there is no difference in the biochemical parameters of diabetic and non-diabetic individuals.

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1. Introduction

Diabetes mellitus (DM), commonly referred to as diabetes, is a group of metabolic diseases associated with elevated blood sugar levels over a prolonged period.¹ The symptoms of high blood sugar include frequent urination, increased thirst and increased hunger.² Diabetes can cause many complications like diabetic

ketoacidosis and nonketotic hyperosmolar coma and also serious long-term complications like cardiovascular diseases, stroke, kidney failure, foot ulcers and damage to the eyes.³

Around 381 million people in the world are suffering from diabetes mellitus and incidence of DM is on rise.⁴ India has more number of diabetics than any other country in the world.⁵ It is estimated that, more than 62 million Indians, which is more than 7.1% of India's adult population

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are diabetics.⁶ Moreover, 1 million Indians die due to Diabetes every year.⁵ The average age of onset is 42.5 years.⁵ The high incidence is due to genetic susceptibility and adoption of a high-calorie, sedentary lifestyle by Indians.⁷

Type 2 DM (T2DM) is directly linked to dyslipidemia due to the lack of effect of insulin. Altered lipoprotein pattern and elevated liver enzymes have been identified as independent risk factors for the development of cardiovascular complications in DM. The prevalence of altered liver enzymes ranges from 7.2 to 22.9% in Type 2 DM patients.⁸⁻¹⁰

Diabetes disrupts metabolic functions of the body hence electrolyte homeostasis is disturbed. In diabetic patients, acid – base and electrolyte disorders are commonly seen even if the renal function is normal. Metabolic alkalosis and metabolic acidosis, in addition to hypernatremia and hypokalemia are seen in type 2 DM patients.¹¹

2. Objectives

To compare fasting plasma glucose levels, HbA1c, Total Bilirubin, Direct Bilirubin, Indirect Bilirubin, SGOT, SGPT, Blood urea and S. Creatinine in diabetes mellitus (DM) subjects and compare the values with healthy controls.

3. Materials and Methods

The present descriptive cross sectional study was conducted in Yenepoya Medical College Hospital, Yenepoya University, Mangalore from January 2018 to June 2018. Institutional Ethics Committee approval was obtained before starting the study.

3.1. Study participants

T2DM patients and non diabetic individuals attending outpatient department of Yenepoya Medical College Hospital, Deralakatte, Mangalore.

3.2. Study sample

Considering mean serum creatinine difference of 0.19 (SD: 0.27) with an alpha (α) error of 0.05, power of 80% and 1:1 allocation in study groups, a minimum sample size of 33 in each group was estimated.

3.3. Methodology

Patients diagnosed as T2DM and non-diabetic individuals who have been advised liver function test and renal function tests by the treating physician/surgeon as routine investigations attending outpatient departments of Yenepoya Medical College Hospital were included in this study. Informed consent was obtained from the participants. Renal function and liver function test reports were collected from central laboratory and relevant information was entered in case

report forms when the patient is collecting reports from central laboratory of Yenepoya Medical College Hospital.

3.4. Inclusion criteria

1. Known diabetic patients of either sex aged between 35-70 years of age, FBS>126mg/dl or HbA1c > 6.5 %
2. Healthy non diabetic individuals of either sex aged between 35 -70 years of age.

3.5. Exclusion criteria

1. Individuals not willing to participate or to give consent.
2. Individuals suffering from hepatic or renal diseases, chronic alcoholics and past history of liver and renal diseases.
3. Patients who are already taking hypolipidemic agents.
4. Patients suffering from thyroid disorders.
5. Patients who are on oral contraceptive pills and corticosteroids.

3.6. Analysis

The values are expressed in Median $\pm$ IQR (Inter Quartile Range). Intergroup comparison of biochemical parameters was done by Non-Parametric test (Mann-Whitney) and Pearsons Chi square tests.

4. Results and Discussion

Management of Diabetes mellitus has become a great challenge to the medical field. Long term Diabetic vascular complication is a leading cause of end stage renal failure, blindness, neuropathies and atherosclerosis. These complications are the major cause of morbidity and mortality in diabetic patients.¹²

Many previous studies have shown significant increase in the liver and renal parameters in diabetic patients when compared to healthy individuals.^{13,14} The main cause for organ dysfunction in Diabetes Mellitus could be the angiopathy. Chronic hyperglycemic state damages blood vessels by causing atherosclerosis due to the deposition of glycoproteins to basement membrane of blood vessels. This results in microvascular and macrovascular diseases.

In this study effort was put to compare the renal and hepatic parameters in diabetic and healthy individuals. A total of 67 reports were collected from the central laboratory. The statistical analysis was done by Mann-Whitney (for continuous variables) and Chi-square tests (for categorical variables). The Mann-Whitney test showed significant difference in all the parameters except in Indirect Bilirubin, SGOT and SGPT levels between two groups ($p<0.05$). Pearson Chi square test (for categorical variables) revealed there is no significant difference in

Table 1: Comparison of parameters in diabetic & Non-diabetic group (By Mann-Whitney test)

Parameters		Diabetic Group (Median $\pm$ IQR)	Healthy Individuals	P value
Age		45.5 (41.75-57.25)	48 (41.5-61)	0.633*
Sex	Male	17	15	0.710*
	Female	17	18	
FBS		184.5(171-274.5)	96 (78-103)	<0.001***
HbA1c		8.9 (7.2-10.5)	5.8 (5.3-5.9)	<0.001***
Total Bilirubin		0.7 (0.5-0.8)	0.5(0.4-0.7)	0.016**
Direct Bilirubin		0.3(0.2-0.4)	0.2 (0.2-0.2)	0.003**
Indirect Bilirubin		0.4 (0.3-0.4)	0.3(0.2-0.45)	0.461*
SGOT		28 (21.5-33)	23 (20-28)	0.283*
SGPT		25.5(20-32.25)	24 (19-36)	0.875*
Blood Urea		30.5 (21.75-38)	18(16-21)	<0.001***
Serum Creatinine		0.9 (0.8-1)	0.7(0.6-0.8)	<0.001***

*Non Significant ($p>0.05$), **Significant ($p<0.05$), *** Highly Significant ($p<0.001$)

Table 2: Comparison of parameters in diabetic & Non-diabetic group (By Pearson Chi-Square test)

Parameters		Diabetic Group	Healthy Individuals	P value
FBS	Normal	00	32	<0.001***
	Abnormal	34	01	
HbA1c	Normal	00	33	<0.001***
	Abnormal	34	00	
Total Bilirubin	Normal	01	31	0.537*
	Abnormal	33	02	
Direct Bilirubin	Normal	25	29	0.138*
	Abnormal	09	04	
Indirect Bilirubin	Normal	34	33	a
	Abnormal	00	00	
SGOT	Normal	33	30	0.288*
	Abnormal	01	03	
SGPT	Normal	33	32	0.983*
	Abnormal	01	01	
Blood Urea	Normal	32	33	0.157*
	Abnormal	02	00	
Serum Creatinine	Normal	29	30	0.479*
	Abnormal	05	03	

*Non Significant ($p>0.05$), a: No statistics are computed because I.Bilirubin is a constant.

these parameters between diabetic and non-diabetic group with respect to abnormality of parameters is concerned ($p>0.05$). Hence, with respect to Chi-square test, even though the hepatic parameters are increased in diabetic individuals, they are within the normal range. The limitation of present study is that we have not categorized the diabetic patients depending upon the duration of disease, may be this could be the reason for statistically non significant result in Chi square test.

The efforts will be made by authors to continue this research with more sample size and to address the limitation of the present study.

5. Conclusion

The present study suggests that there is no statistical significant difference in hepatic and renal parameters between diabetic and non-diabetic groups with respect to Chi-square test. Many previous studies have shown significant organ dysfunction in diabetic individuals, but our study result revealed there is no difference in the biochemical parameters of diabetic and non-diabetic individuals.

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None.

8. Conflict of interest

None.

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