Original Article

Examinations Of Indian Patients Who Have Diabetes Mellitus.

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Abstract

Blood glucose (or blood sugar) levels that are elevated in people with diabetes are chronic metabolic conditions that over time cause substantial harm to the heart, blood vessels, eyes, kidneys, and nerves. The most prevalent type of diabetes is type 2, which often affects adults, and develops whenever the body stops producing enough insulin or becomes resistant to it. Type 2 diabetes has been much more common over the last three decades in nations of all income levels. Diabetes type 1 is a chronic condition in which the pancreas produces little or no insulin by itself. It was previously referred to as juvenile diabetes or insulin-dependent diabetes. The availability of affordable medical care, particularly insulin, is essential for the survival of individuals who have diabetes. Diabetes mellitus, which is primarily defined by hyperglycemia, polyuria, and polyphagia, has developed into a serious and persistent metabolic condition as a consequence of a dynamic interactions of hereditary and environmental variables. Numerous diabetes problems might arise from uncontrolled high blood sugar. Long-term diabetes causes severe complications, some of which are fatal. All around the world, the prevalence of diabetes patients is increasing at epidemic rates. Annually, diabetes and related disorders consume a sizable percentage of the national health budget. The etiopathogenesis of the disease and the emergence of the outbreak are both influenced by a number of adverse outcomes. According to reports, diabetes, which has no known cure, can be managed by maintaining daily self-care, receiving good diabetes education, and making significant gains .The untreatable condition of diabetes may be managed by maintaining personality in everyday life, providing appropriate diabetes education, and making significant advancements in knowledge, attitudes, skills, and management. In this scientific report, we will have presented reports which included data on the subjects' fasting, postprandial, and glycated hemoglobin blood sugar levels, lipid profile, LFT, and RFT. The data results analyzed is in table form.

Key words: hyperglycemia, diabetes mellitus, hyperlipidemia, pathogenesis of diabetes mellitus, risk and management of diabetes, free fatty acids and hemoglobin.

INTRODUCTION

A series of illnesses known as diabetes mellitus alter how the body utilizes blood sugar (glucose). The cells that make up the muscles and tissues rely heavily on glucose as a source of energy. It serves as the primary fuel for the brain [1]. Each form of diabetes has a different primary etiology. However, diabetes can result in an excess of sugar in the blood regardless of the type a person have [2]. Serious health issues can result from an excess of blood sugar levels. Type 1 diabetes and Type 2 diabetes are chronic diabetic diseases. Diabetes disorders including gestational diabetes and pre-diabetes may be reversible. When blood sugar levels are greater than usual, pre-diabetes develops [3]. However, the blood sugar levels are not elevated enough to be classified as diabetes. Additionally, if no preventative measures are taken, pre-diabetes might progress to diabetes. During pregnancy, gestational diabetes can develop [4]. However, it can disappear once the baby is born. A series of metabolic illnesses known as diabetes mellitus are characterized by chronic hyperglycemia brought on by deficiencies in insulin secretion, insulin action, or both. The significance of insulin as an anabolic hormone leads to metabolic irregularities in carbohydrates, lipids, and proteins metabolism [5] .These metabolic abnormalities are brought on by insufficient insulin levels to produce an adequate response and (or) insulin resistance of target tissues, primarily skeletal muscles, adipose tissue, and to a lesser extent, liver, at the level of insulin receptors, signal transduction system, and (or) effector enzymes or genes [6] .The kind and length of diabetes affect the severity of symptoms. Others with marked hyperglycemia and especially in children with absolute insulin deficiency may experience polyuria, polydipsia, polyphagia, weight loss, and blurred vision [7]. A few people who have diabetes, particularly those with type 2 diabetes during the early years of the disease, are asymptomatic. If untreated, uncontrolled diabetes can cause coma, stupor, and, in rare cases, death from non-ketotic hyperosmolar syndrome or ketoacidosis [8].

MATERIAL AND METHODS:

The technique for detecting and calculating the percent or concentration of a substrate bindable substance in a sample that contains both the substrate bindable substance to be detected and the substrate nonbindable material is the subject of the

current invention. More specifically, the invention pertains to a quick technique for identifying a substrate bindable material in a sample that also contains a substrate nonbinding substance and calculating its percentage or concentration. The absorbance of the sample including the substrate bindable material and substrate nonbindable substance is measured in accordance with the present invention, and a solid substrate with a particular binding or affinity agent attached is then added. The sample and a solid substrate with a binding agent attached are the basic elements in the binding reaction. The sample, a solid substrate with a binding agent attached, and a buffered solution compatible with the binding reaction are the essential elements in the binding process.

The amount or proportion of activity in the sample is inversely proportional to the amount of bindable substance bound by the solid substrate, and the absorbance of the sample is evaluated using an appropriate detection instrument after the binding reaction. The amount or proportion of activity in the sample is equivalent to the amount of bindable material bound by the concrete surface, and the absorbance of the samples is evaluated using an appropriate detection instrument after the binding reaction.

As a result, one aspect of the invention relates to a method for determining the presence and amount of a substrate bindable substance in a sample suspected of containing it. The method involves trying to measure the preliminary absorbance of the reaction mixture usually contains a substrate bindable substance and a substrate nonbindable substance, binding the substrate bindable substance to a solid support with a binding agent attached, and then trying to measure the absorption coefficient of the solid support and computing the substrate bindable substance percentage. The method for calculating the proportion of glycated hemoglobin in a sample that contains both glycated and non-glycated hemoglobin is a preferred element of the current invention. Attached to the solid substrate and included in a container that has been altered to mix and separate the particles from the test fluid is a binding or affinity agent that specifically binds glycated hemoglobin. The test solution is subjected to two absorbance readings: one right after the reagent/diluent is mixed with the test solution, and the second after a sizable amount of glycated hemoglobin has been bound to the solid substrate. The assay's chemical basis is the cis-diol molecules' affinity binding to 3-aminophenylboronic acid. . The ability to standardize and report quantities corresponding to% hemoglobin A1c is made possible by the linear association between total glycated hemoglobin and hemoglobin A1c.

A method of creating stable liquid glycated and non-glycated hemoglobin solutions for use in a method of determining glycated hemoglobin is another feature of the invention.
Another feature of the invention is kits for use in a procedure to measure glycated hemoglobin.
A method for calculating the % glycated hemoglobin useful in the diagnosis and monitoring of the diabetic patient is another feature of the invention.

Investigation

By examining the observations and analysis of three diabetic patients, it was possible to determine the relationship between dyslipidemia and (or) hyperlipidemia and hyperglycemia as in diabetes mellitus. The reports included data on the subjects' fasting, postprandial, and glycated hemoglobin blood sugar levels, lipid profile, LFT, and RFT.

Table 1.

	Patient 1	Patient 2	Patient 3	Normal range
Age, sex	64, Male	69, Male	36, Female	-
Fasting glucose	131 mg/dl	99 mg/dl	135 mg/dl	70-100 mg/dl
PP	170 mg/dl	123 mg/dl	211 mg/dl	70-140 mg/dl
HbA1c	6%	5.8%	7.2%	4-5%
HDL	56 mg/dl	58 mg/dl	39.7 mg/dl	>40 mg/dl
LDL	126 mg/dl	81 mg/dl	102.1 mg/dl	<100 mg/dl
VLDL	32 mg/dl	20 mg/dl	20.2 mg/dl	<30 mg/dl
Triglycerides	160 mg/dl	100 mg/dl	101 mg/dl	<150 mg/dl

RESULTS

Patient 1 shows diabetes mellitus along with borderline high triglycerides, normal HDL, above optimal LDL and VLDL. No comorbidities were present or reported at the time of testing.
Patient 2 The patient has low RBC count (4.41 million/mm^3), low hemoglobin (12.80 g/dl) and low Packed cell volume (38.9%). His report shows increased glycated hemoglobin, However no abnormal fasting and Post prandial glucose were present. The patients lipid profile was also normal. These findings are present along with increased ASR: ALT ratio (>1) and increased Albumin (4.9 g/dl) . The kidney function tests reveals high albumin and high phosphorus. These findings are indicative of violated kidney function and liver function. Hyperparathyroidism condition was ruled out as indicated by patients normal vitamin D and calcium levels.
Patient 3 shows diabetes mellitus along with decreased L and above optimal LDL. Her Albumin creatinine ratio is increased moderately. Vitamin D levels are low (43.78 nmol/L; norm.- 75-250) this predicts the high risk of bone disease in the patient. Liver function test showed high ALT (39 U/L) and AST (65 U/L). Complement blood count report shows decreased RBC, MCH, MCHC, RDW, Platelet and mean platelet volume.

DISCUSSION

Patients with diabetes mellitus may not always reveal significant amount of fluctuations with their lipid profile as expected in usual diabetic patients. In laboratory findings hyperglycemia is often seen with an upsurge of patients' triglycerides and LDLs, depleted or lowered HDL. Such conditions may arise as result of multiple complexities and related symptomatic or asymptomatic comorbid conditions particularly those pertaining to the endocrine system such as liver, pancreas and additionally thyroid gland; nephropathies and certain cardiovascular conditions which affects blood pressure like atherosclerosis and CHD. Often times the elevated HbA1c is not a definitive marker of hyperglycemia in the presence of certain undetected underlying diseases. Apart from iron deficiency anemia, lead poisoning, opioid drug abuse, chronic alcoholism can cause a false elevation in HbA1c levels. For the sake of correct diagnosis a thorough clinical examination, lab tests like CBC, LFT, RFT and lipid profile are recommended along with (or prior to) testing of blood glucose or HbA1c and medical history of the patient is taken into account to prevent mismanagement of the actual disease.

CONCLUSION

The reports were generated during winter month of December 2022 in India. The lower levels of vitamin D may partially be because of the lesser exposure to sunlight.

Of the 3 reports analyzed, 2 show consistent association of hyperglycemia with hyperlipidemia. Although 1 report was non-consistent with absence of dyslipidemia, however it showed presence of other comorbid conditions / diseases like those of liver and kidney which are commonly affected organs in diabetes mellitus. Iron deficiency anemia could be a reason of such high HbA1c and can be confirmed using CBC test.

ETHICAL APPROVAL

After receiving approval from the head of the hospital and lab, this study used secondary data taken from the medical files of a provincial lab. Because the database was anonymized for confidentiality purposes, it is impossible to track back the information on specific patients. The conclusions made here don't expressly mention anyone in particular.

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CONFLICT OF INTEREST STATEMENT

Disclosure of the author's potential conflicts of interest: According to the author, there are no potential conflicts of interest related to the publishing of this article.

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