Thyroid Levels as Hidden and Alarming Implicator among Diabetics

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ABSTRACT:

Introduction: Diabetes is amongst top of non-communicable disorders causing disability and pre mature mortality globally. The association of diabetes with factors like lipid disorder and hypertension is documented by various researchers, but the relationship of diabetes mellitus type 2 and thyroid disorders is conducted at very limited level.

Objectives: Analysis of diabetes with thyroid dysfunction is almost negligible in Punjabi population, the present study was hence planned to assess the same

Methods: To establish the relationship of diabetes and thyroid disorder, 156 diabetic patients and 50 subjects free of clinical diabetes from Medicity Hospital Bhatinda were included in the present study. The physical parameters like age, mass, blood pressure, were recorded manually and biochemical measures like lipid levels, fasting blood sugar and thyroid levels were estimated as per standard methods in laboratory of hospital by automated analysers.

Results: The present study type 2 diabetics have shown high cholesterol levels among 24% of the subjects, whereas 33% of individuals were found to be having low levels of T3 as compared with non diabetics. The results depicted a strong positive correlation between type 2 diabetes and thyroid dysfunction as well as increased lipid levels.

Conclusions: The thyroid dysfunction has been confirmed as an important factor in defining diabetes hence can be important for its diagnosis in pre-diabetic subjects also. There is requirement of more gender based and longitudinal studies to elucidate the effect of thyroid screening as well as in incur of diabetes.

1.   Introduction

Diabetes synonym to metabolic X syndrome is affected by several factors and is coupled with many co-morbidities. Diabetes is regarded as a group of various metabolic disorders due to hindered blood sugar levels because of unregulated insulin levels. The thyroid gland is an important endocrine gland that regulates the metabolic rate of the body. Due to the global economic burden, type II diabetes is attracting interest worldwide and is regarded as one of the principal global economic burdens [8, 16]. There are several factors associated with it, so various researchers are exploring different

dimensions to curb on increasing grasp of diabetes and thyroid dysfunction is one of them. Thyroid disease as an endocrine disorder can have a shared impact on diabetes as it contributes to the regulation of carbohydrate metabolism up to an extent. The disease record of diabetes mellitus is multifactorial affecting various aspects and metabolic disorders and clinical manifestations and can be important causative for incur of various types of cancers [14]. The researchers have successively described a higher prevalence of diabetes among thyroid disorder subjects as compared to those with normal levels of thyroid function [2]. Similarly, there has been an emphasis on multiple factors to be

involved in thyroid dysfunction among diabetics which can be precursors and lead to carcinomas [12]. Both disorders are endocrinal and have been suspected of some relation. Thyroid dysfunction alters the metabolism of the body and may have a huge impact on blood sugar levels too [9]. However, any association of thyroid disorders among diabetics has been denied by certain researchers [1]. Thus, there are many different views regarding the association of the thyroid with diabetes. Keeping this in mind present study was planned to explore the independent relationship between blood sugar levels, Hba1c, and total cholesterol levels with thyroid levels among the Punjabi population.

2. Objectives

The study was planned to explore the independent relationship between following :
Relationship among blood sugar levels and , Hba1c,
Relationship among blood sugar levels and total cholesterol levels.
Correlatin of diabetes mellitus type 2 with thyroid levels among Punjabi population.

3. Methods

The present study included 156 clinically proven type 2 diabetic subjects of age group 30 to 80 years from Medicity Hospital Bhatinda and 50 volunteer subjects free of clinical diabetes of the same age group were included as controls for assessment. The written approval of subjects was taken regarding inclusion for ethical requirements. The height, weight, and blood pressure were manually noted for each subject as per standard performa. Regarding biochemical analysis the levels of blood sugar and cholesterol levels were analysed after 12 hr fasting on Merilyzer Auto Quant 400i analyser, Hba1c levels were estimated on AFINION 2 analyser by Abbott and thyroid levels were estimated by Maglum I 800 auto analyser by Snibe diagnostics as per standard methodology at New Life Medicity Hospital lab at Bhatinda. The graphs and data were analysed as per Graphpad software.

4. Results and Discussion

In the present study, 156 diabetics and 50 controls ranging from the age group 30 to 80 years were considered for assessment and relationship of various parameters. The results were statistically analysed with t-test and correlation and values with p<0.05 were considered significant. The various factors for diabetic and control subjects are represented in Figure 3 and described ahead.

The levels of various biochemical parameters viz. Blood sugar, Hba1c, Total cholesterol levels and thyroid stimulating hormone are represented in Figure 1. Among the subjects studied 47% had very high blood sugar levels, 88% with very high TSH levels, 10% subjects showed very high cholesterol levels and 53% with very poor glycemic control of Hba1c regarding T3 levels 30 % of the studied population was having levels lower than optimum range while 6.6 % were at level more than requisite levels. In the case of T4, there are 63% of diabetics were within the optimum range whereas 27% were below and 10 % were above the desired levels.

Variation in various factors with Age: The findings of present study revealed very alarming disparity in levels of different biochemical parameters with advancing age. When the data is analysed as per advancing age as shown in Figure 2, a significant deviation is observed in blood sugar levels in different age groups where as the age group of 41-50 years showed comparatively good control. The younger age group of 31-40 years have shown comparatively higher levels as compared to higher age groups. The cholesterol levels have also revealed a declining level in the same age group as compared to lower and higher age groups. On progressing age the thyroid levels T3 levels, T4 and TSH levels have shown variable increments. Thus we found age group of 41-60 years had better control over metabolic processes as compared to their counterparts of above and below age groups. When compared with non-diabetic subjects of similar age groups we found highly significant increased levels among diabetic while T3 levels were lower in diabetics as compared with control as shown in Table 1.

Table 1: The levels of various factors for diabetics and controls

S. no	Variable	Diabetic	Control	P value	Significance
1	BMI (kg/m^2)	29.41 ± 3.93	24.84 ± 3.75	<0.001	S
2	B. Sugar (mg/dl)	315.15 ± 43.82	87.7 ± 3.89	<0.0001	HS
3	T. Chl (mg/dl)	294.57 ± 14.3	162 ±24.5	<0.001	S
4	Hba1c (%)	9.5 ± 0.9	3.94 ± 1.18	<0.0001	HS
5	T3 (mg/dl)	1.13 ±4.9	1.92 ± 2.8	<0.0001	HS
6	T4 (µg/dl)	7.86 ± 3.52	2.17 ± 1.4	<0.0001	HS

7	TSH (µIU/ml)	34.91 ±26.85	29.7 ± 0.64	<0.0001	HS

S= Significant, HS= Highly significant

Cholesterol and diabetes: The mean blood sugar level were found to be 315.5 ± 43.8 and significantly higher (p<0.001) than the normal controls. The mean total cholesterol levels in diabetics were found to be 294.57 ± 14.3 elevated in diabetics (p<0.001) as compared to controls as described in Figure 3. Thus cholesterol levels are quite raised among diabetics as compared to the non diabetic subjects. Regarding Hba1c we noticed a weak positive correlation with T. Chl. We also observed a significant positive correlation of cholesterol levels with TSH (r=0.71, P<0.001), and T3 (r= 0.53 p<0.05) and suggest screening of cholesterol levels as a vital factor among diabetics as a precautionary measure for preventing deterioration of health.

Thyroid levels and cholesterol: Among diabetic subjects mean level of cholesterol levels were quite high (294.57 ± 14.3) than controls (162 ± 24.5) as depicted in Table 1 and we found a significant correlation with T4 (r = 0.65, p<0.05) and TSH (r = 0.74, p < 0.001) while the relationship with T3 was found to be very weak (r= 0.43, p < 0.1) shown in Figure 4. Thus there is increased dyslipidemia with enhanced TSH levels (34.91 ± 26.8) which is suggested to be an important marker for lipid metabolism among diabetics and figure 3. The levels of T3 were significantly lowered among diabetics than controls while that of T4 was significantly increased. Among the present study subjects, we found a significantly positive correlation of moderate (r=0.1327 p<0.05 Significant) and high thyroid dysfunction among diabetics (r= 0.6481, p<0.001) as described in Figure 4.

5. Discussion

The results revealed in the study described age as an important related factor. As with the increasing age, metabolism is declining but we found a better metabolic control in the 41-50 years age group and 61-70 years as compared to the counterparts of age groups above and below the same hence having better levels and agreeing with the findings of certain researchers [11]. On the progression of age group, the T3 level has shown significantly lowered values and is having agreement with previous findings [10]. As Hba1c is regarded as an important indicator of diabetes risk and while assessing for other biochemicals we found a weak positive correlation of Hba1c with T. Chl which are quite similar to the former findings [11]. We also found a significant positive correlation of cholesterol levels with TSH (r=0.71, P<0.001), and T3 (r= 0.53 p<0.05) as depicted in figure 3, which is in affirmation with the previous researchers as some of them also suggested cholesterol screening to be an important factor among diabetics for precautionary measure for preventing deterioration of health [7,14]. We found thyroid dysfunction as a significant factor in diabetics as compared to controls and supporting the inferences of earlier researchers [3,9,16] while we do not find any agreement with the ones who discard any association of diabetes with thyroid disorders [1]. We emphasise thyroid levels among diabetics as an important aspect of diagnosis and we also support the need for population-based studies to determine the association of thyroid levels with the lipid levels for increased diabetic levels [6].
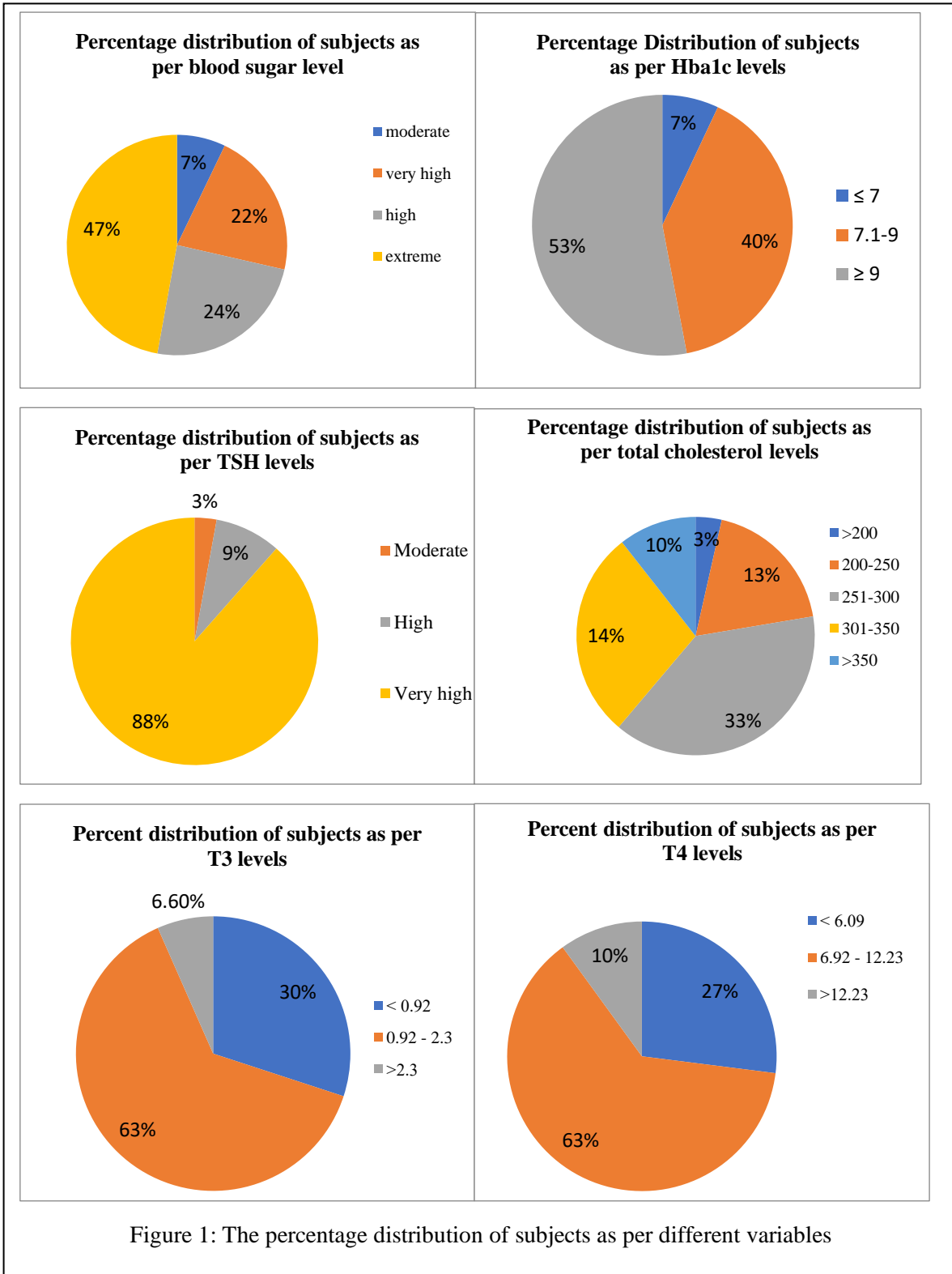
Conclusion:

In the present study, results expressed a positive association of thyroid dysfunction with diabetes as T3 levels are lowered among diabetics as compared with controls. The cholesterol levels also represented a positive correlation with the T4 and TSH levels suggesting better monitoring at initial levels. The age group 41-50 years has shown better control than other age groups hence age effective therapies need a special mention for cure. As the data of comparative study among comparative levels for gender-based studies are scarce hence, longitudinal studies of diabetics for thyroid disorders are need of hour so that it can be helpful to identify and manage diabetes. We strongly suggest screening thyroid levels while assessing blood sugar levels for future control of diabetes.
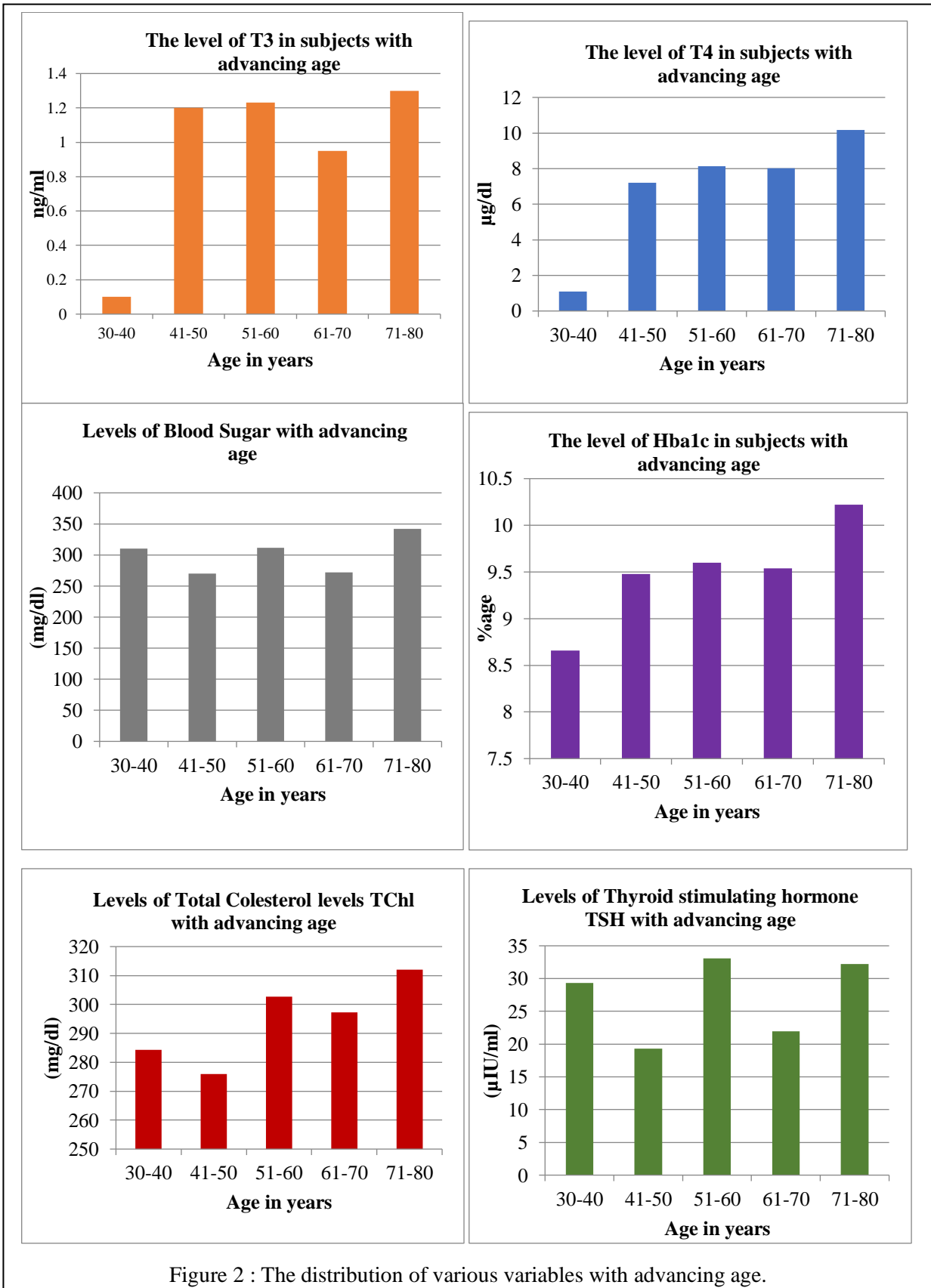
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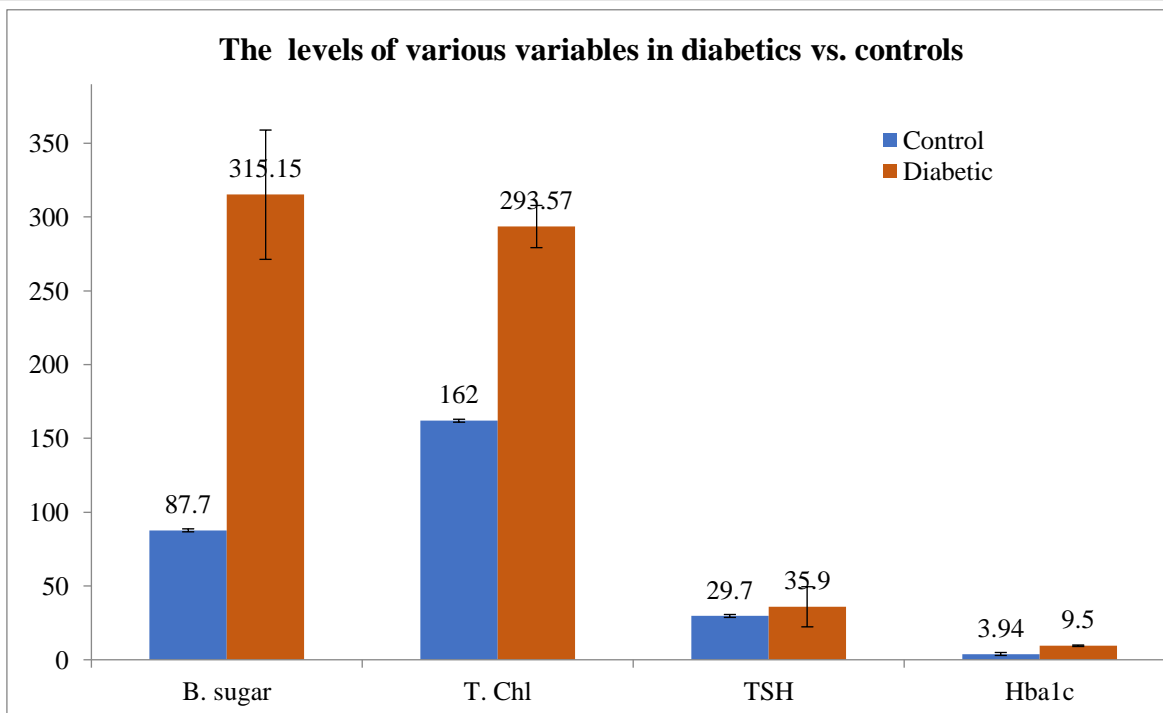
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Figure 1: The percentage distribution of subjects as per different variables

Figure 2 : The distribution of various variables with advancing age.

Figure 3: the comparison of various variables among diabetis and control subjects

X axis= Moderate TSH and Y axis = B. sugar; r=0.1327 p<0.05 Significant

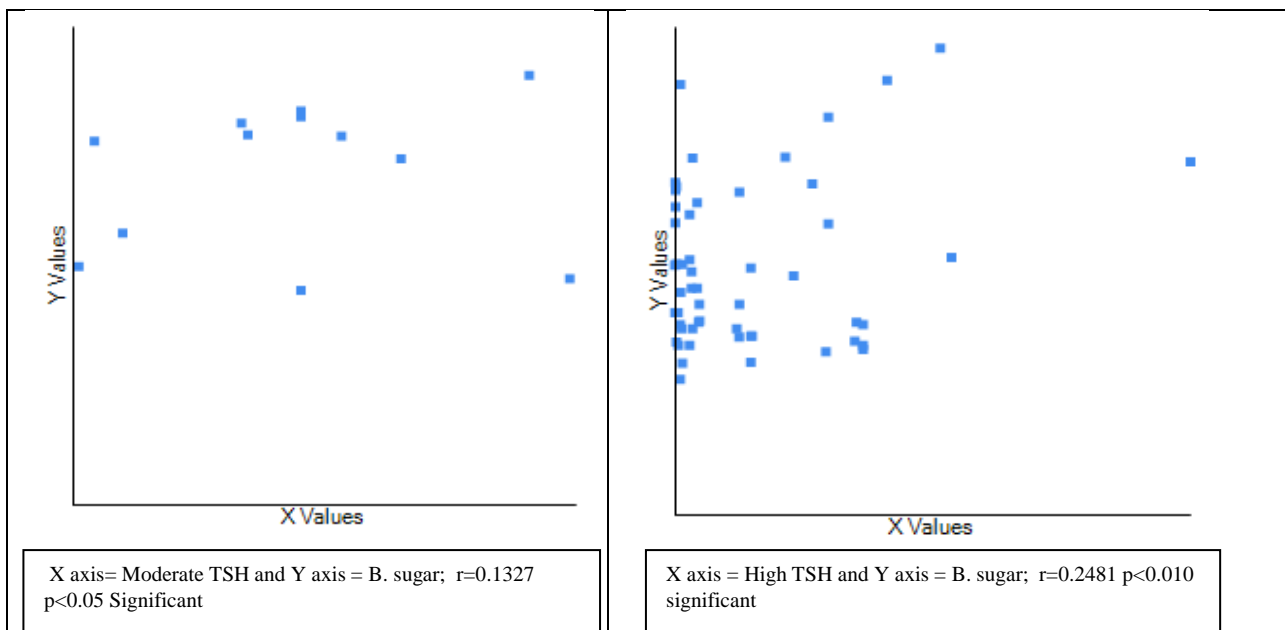X axis = High TSH and Y axis = B. sugar; r=0.2481 p<0.010 significant

Figure 4: The correlation of TSH and blood sugar levels