

## **Total Protein and Total Fucose in Sera of Patients with Thyroid Dysfunction and Control**

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### **Abstract**

Total protein and total fucose were determined in sera of thyroid disorder patients.

Sera of (40) diagnosed by consultant hyperthyroidism, and 40 hypothyroidism were analyzed for the above parameter for control, sera of (40) normal individuals were used.

They were healthy with no appearing disorder results analysis revealed no significant differences ( $P < 0.05$ ) in the (mean  $\pm$ SD) of total protein values in sera of hyper and hypothyroidism were compared with normal control, also no significant difference was found between hyper and hypothyroidism themselves.

Total fucose revealed a significant decrease in the (mean  $\pm$  SD) values in sera of hyper and hypothyroidism compared with normal healthy.

### **Introduction**

Serum protein levels primarily reflect synthesis by the liver or protein loss. In adults, there is a slight and probably insignificant decrease in serum protein concentration with age (1)

Shifts in body fluid between the vascular bed and the interstitial spaces can bring about significant changes in serum protein concentration (2)

Results for males are approximately 1g/L higher than results for females: this difference is probably not of clinical significance (3)

Increase in total serum protein can be seen in dehydration or as the result of an increase in immunoglobulins: the latter situation is often seen in patients with monoclonal gammopathies (4)

L-fucose (6-deoxy-L-galactose) is a monosaccharide that is a common component of many N- and O-linked glycans and glycolipids produced by mammalian cells.

Fucose frequently exists as a terminal modification of glycan structures (5). FUT8 is an alpha (1,6)-fucosyltransferase that directs addition of fucose to asparagine – linked GLcNAc moieties, a common feature of N-linked glycan core structures (6).

POFUT1 encodes an O-fucosyl transferase that adds fucose directly to polypeptide chains (7), the H transferase (FUT1 gene product) is an alpha(1,2) –Fucosyl transferase expressed in erythroid precursors that synthesizes a structure known as the H antigen by directing the addition of fucose to terminal galactose residues on oligosaccharide precursors decorating several glycoproteins and glycolipids (8).

The aim of the study is to investigate the levels of total L-fucose in sera of patient with thyroid dysfunction and the possibility of using the alteration in L-fucose levels as a diagnostic parameter detection of patients with thyroid dysfunction.

### **Sampling**

The samples were collected from (Specialized Center of Endocrinology and Diabetes).

They have been classified into three groups as the following:

- Control group: include (40) healthy individuals from both sexes, with no previous disease, which may interfere with the parameters analyzed in this study.
- Hyperthyroidism patients group: include (40) patients suffering from hyperthyroidism from both sexes.
- Hypothyroidism patients group: include (40) patients suffering from hypothyroidism from both sexes.

### **Collection of blood**

Ten ml Venous blood was taken from the above groups, place in a plane tube (no anti coagulant) left for (15 min) at room temperature,

the centrifuged (at 2500 rpm for 10min) to get the serum, which is stored at (-20oC) unless used immediately.

## Methods

### Determination of total proteins (TP)

Total proteins determination according biuret methods (9).

### Determination of total fucose (TF)

Total fucose determination according dische and sheetels methods (10).

### Statistical analysis

Data presented were the means and standard deviations, student-t-test was used to compare the significance of the difference in the mean values of any two groups. ( $P < 0.05$ ) was considered statistically significant (11).

The overall predictive values for the results in all studied groups were performed according to the program of office XP 2002.

## Results and discussion

Table (1) and Fig(1) show the results of total protein (TP) in (g/dl),

total fucose (TF) (mg/dl) and  $\frac{TF}{TP}$  (mg/g) ratio in sera of control, hyperthyroidism and hypothyroidism.

Total protein for control group is ( $7.2 \pm 0.58$ ), for hyperthyroidism group is ( $7.1 \pm 0.55$ ) g/dl, for hypothyroidism group is ( $7.3 \pm 1.20$ ) g/dl total fucose concentration was found to be ( $14.9 \pm 0.54$ ), ( $5.8 \pm 2.5$ ) and ( $12.3 \pm 1.11$ ) mg/dl for control, hyperthyroidism and hypothyroidism, respectively. TF/TP ratio was ( $2.1 \pm 0.17$ ), ( $0.8 \pm 0.35$ ), ( $1.7 \pm 0.34$ ) for control, hyperthyroidism and hypothyroidism ,respectively.

From the table, there was no significant difference in total protein levels between hyperthyroidism group and control group consider control group; with P value equals (0.68) which is higher than (0.05) as ( $P < 0.05$ ) is considered significant, no significant difference between control and hypothyroidism group P value equals (0.43) also no significant differences between both patient groups hyper and hypothyroidism with P value equals (0.30).

The plasma levels of proteins depend on the balance between their synthesis and their catabolism or loss from the body many plasma

proteins are synthesized in the liver, but the plasma cells and lymphocytes of the immune system synthesis immuno globulins, and proteins of the complement system are synthesized by macrophages as well as hepatic cells total protein levels may be misleading, and may be normal in the face of

quite marked changes in the constituent proteins, only low albumin levels are of clinical importance (12).

From the table, there was a significant reduction in total fucose levels between hyperthyroidism and control groups, hypothyroidism and control groups as well as between hyper and hypothyroidism P value equals (0.0001).

Fucoses in blood serum of animal were investigated and an alterations was reported as an effect of different thyroid hormones changes. The alteration in glycoprotein fractions and hexoses was reported (13).

Fucosylated glycans have been implicated in the pathogenesis of several human diseases. (14).

Moreover, increased alpha (1,6)- fucosylation of alpha-fetoprotein is observed in hepato cellular carcinoma patients and can be used clinically as a marker for distinguishing hepatocellular carcinoma from chronic liver disease (6).

On the other hand, Boland and Deshmukh (15) found a reduction of fucose content of mucins from colon cancer patients compared to normal control.

The low level of TF in this study could be explained that the formation of mature TSH involves several post-translational steps including the excision of signal peptides from both subunits and Co-translational glycosylation with high mannose oligosaccharides (16), (17).

As the glycoproteins are successively transferred from the rough endoplasmic reticulum to the golgi apparatus, the trimming of mannose and further addition of fucose, galactose and sialic acid occurs (18), the primary intracellular role of these glycosylation events may be to allow proper folding of the alpha and TSH beta subunits permitting their heterodimerization and also preventing intracellular degradation (19), (18).

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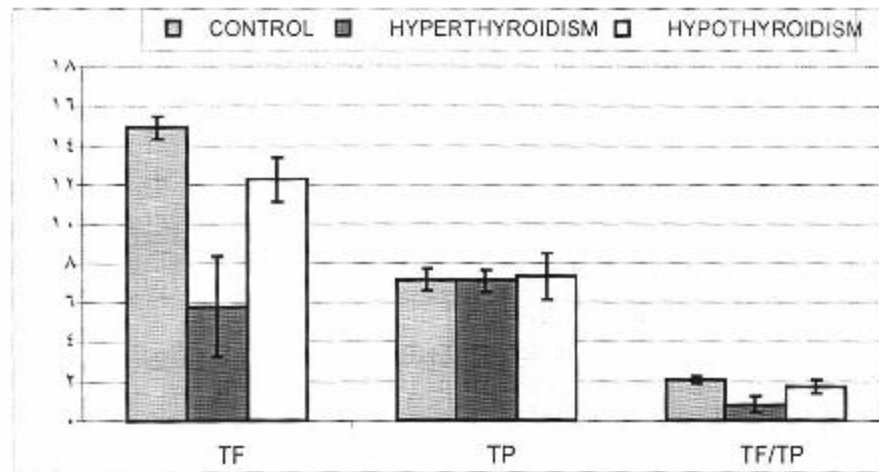
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$$\frac{TF}{TP}$$

**Table (1) TP, TF levels and  $\frac{TF}{TP}$  ratio in sera of three-studied group**

Group description	No.	TP (g/dl) mean $\pm$ SD	P	TF (mg/dl) mean $\pm$ SD	P	TF/TP (mg/g) mean $\pm$ SD	P
Control	40	7.2 $\pm$ 0.58		14.9 $\pm$ 0.54		2.1 $\pm$ 0.17	
Hyperthyroidism	40	7.1 $\pm$ 0.55	0.68	5.8 $\pm$ 2.53	0.0001	0.8 $\pm$ 0.35	0.0001
Hypothyroidism	40	7.3 $\pm$ 1.20	0.43	12.3 $\pm$ 1.11	0.0001	1.7 $\pm$ 0.34	0.0001
			0.30*		0.0001*		0.0001*

\* Represent P value between hyperthyroidism and hypothyroidism



**Fig. (1) TF, TP levels and TF/TP ratio in sera of hyperthyroidism, hypothyroidism and control**

## البروتين الكلي والفوكوز الكلي في مصل دم مرضى الخلل الوظيفي في الدرقية

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### الخلاصة

تم قياس البروتين الكلي والفوكوز الكلي في مصل دم مرضى الخلل الوظيفي في الدرقية، (40) نموذج لمرضى مشخصين بالفرط في إفراز الدرقية و (40) نموذج لمرضى مشخصين بالقصور في إفرازها كما وتم اخذ (40) نموذج من مصل دم الأصحاء .

أظهرت النتائج عدم وجود اختلافات معنوية في (المعدل  $\pm$  الانحراف المعياري ) لمستوى البروتين الكلي في مصل دم مرضى الفرط في إفراز الدرقية ومرضى القصور في إفرازها مقارنة مع مجموعة السيطرة من الأصحاء وكذلك عدم وجود اختلافات معنوية بين مرضى الفرط ومرضى القصور أنفسهم .

ظهر أيضاً انخفاضاً معنوياً في قيمة (المعدل  $\pm$  الانحراف المعياري) للفوكوز الكلي في مصل دم مرضى الفرط في إفراز الدرقية ومرضى القصور في إفرازها .