



## STATISTICAL CORRELATION BETWEEN LIPID PROFILE PARAMETER AND THYROID PROFILE PARAMETER IN TYPE II DIABETES MELLITUS

Pawan Kumar Gupta

KAHS, Kathmandu, Nepal, India

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**Abstract:** The study was conducted on known type II diabetes mellitus subjects having nearly equal sex ratio. Overnight fasting blood sample was collected in fluoride as well as in plain tube and estimated the lipid profile parameter and thyroid profile parameter by using BS-300 automated analyzer and Advia centura CB immunoassay system (By Bayer) for T<sub>3</sub>, T<sub>4</sub> and TSH. Calibration and control was run before analyzing the sample and strictly followed manual instruction. The present study concluded that in type II diabetes mellitus Hyperlipidemia and hypothyroidism is observed. T<sub>3</sub> has negative correlation with cholesterol, positive correlation with HDL cholesterol, no correlation with LDL cholesterol and triglyceride and decreasing trend with VLDL cholesterol. T<sub>4</sub> has negative correlation with cholesterol and triglyceride, positive correlation with HDL cholesterol and no correlation with LDL cholesterol. TSH positive correlation with cholesterol, negative correlation with triglyceride and no correlation with HDL and LDL cholesterol.

**Keywords:** Diabetes, Hyperlipidemia, Hypothyroidism, Carl's Pearson correlation coefficient.

### INTRODUCTION

The type II diabetes mellitus is one of the common metabolic diseases and has high prevalence rate in Asia. The surveys conducted in 1960/1970 showed that 4% urban population and 2% Rural population suffering with Diabetes mellitus in India and Nepal.<sup>1</sup>

Type-2 Diabetes Mellitus associated with cluster of lipid abnormalities like elevated triglyceride level, cholesterol level and reduced HDL cholesterol which is associated with increased risk of cardiovascular diseases<sup>15,16</sup>. Both Diabetes Mellitus and hypothyroidism are major endocrine disorder leading to hyperlipidemia.<sup>2</sup>

Thyroid dysfunction is frequently observed in type 2 Diabetes mellitus, and frequency of susceptible is high in females<sup>3</sup>. Hypothyroidism and hyperthyroidism are two primary conditions that involve thyroid gland and hypothyroidism seen in diabetes mellitus defined as deficiency of thyroid activity<sup>4,5</sup>. Thyroid stimulating hormone is best measurement index for thyroid dysfunction<sup>6</sup>. Hypothyroidism is associated with increase oxidation of LDL partical<sup>7</sup>, and HDL cholesterol is normal or decrease<sup>8</sup> but in hypothyroidism it has been reported to increase<sup>9</sup> or normal<sup>10</sup> or even decrease.<sup>11</sup> There are few studies on type -2 diabetes mellitus and thyroid dysfunction which indicate an assurance of thyroid dysfunction among diabetic when compare to normal population is most dysfunction<sup>12</sup>. Diabetes is also "the bergh" disease which affect at least 20 million people worldwide. Its prevalence is 2-5%

in adult population. In developing countries such as Philippines, the disease prevalence is growing rapidly due to frequent change in life style. IDDM effect 1 in 500 children and 1 in 200 adolescence.<sup>13</sup>

### MATERIAL AND METHODS

The present study consists of 200 subjects of known type II diabetes. Subjects with hypertension, alcoholism, smokers and preexisting thyroid diseases were excluded from the study. Subjects with triglyceride level >400 mg% were excluded from the study. The overnight fasting blood sample, 2ml in fluoride bulb for sugar estimation and 2 ml in plain bulb collected for thyroid profile and lipid profile from the cubital vein. Serum was separated by centrifugation at 3000 rpm for 10 minutes.

Analytical method:

1. Blood sugar estimation: By GOD-POD enzymatic photometric method<sup>14</sup>
2. Serum Cholesterol: By GOD-POD enzymatic photometric method<sup>15</sup>
3. Serum HDL-Cholesterol: By Immunoinhibition photometric method<sup>15</sup>
4. Serum LDL-Cholesterol: By Immunoinhibition photometric method<sup>16</sup>
5. Serum LDL-Cholesterol: By calculation method = triglyceride/5<sup>17</sup>
6. Serum triglyceride: By enzymatic glycerol-3 phosphate oxidase method<sup>18</sup>
7. Serum Total T<sub>3</sub>: By Chemiluminescence method<sup>19</sup>
8. Serum Total T<sub>4</sub>: By Chemiluminescence method<sup>19</sup>
9. Serum TSH: By Chemiluminescence method<sup>19</sup>

Pearson correlation has been used to find the

### \*Corresponding Author:

Pawan Kumar Gupta,

KAHS, Kathmandu,

Nepal,

Mail-pawangupta80@yahoo.com



relationship between lipid parameters and Thyroid parameters.<sup>20</sup>

**RESULT**

Present study analyzed lipid profile parameter (Serum cholesterol, HDL -Cholesterol, LDL- Cholesterol, VLDL- Cholesterol and triglyceride) and thyroid parameter (T<sub>3</sub>, T<sub>4</sub> and TSH) of known diabetic patient. The study consist of 51% of male and 49% of female subjects. The personal history consisting of diet, use of alcohol with family history of subject was recorded. The correlation between lipid parameter (Serum cholesterol, HDL -Cholesterol, LDL- Cholesterol, VLDL- Cholesterol and triglyceride) and thyroid parameter (T<sub>3</sub>, T<sub>4</sub> and TSH) is done by Carl's Pearson correlation co-efficient.

Thyroid parameters	Group	Lipid parameters				
		Total cholesterol	HDL	LDL	VLDL	Triglyceride
T <sub>3</sub>	Subjects	-0.235* (0.019)	0.320* * (0.001)	-0.134 (0.185)	-0.085 (0.401)	-0.080 (0.432)
T <sub>4</sub>	Subjects	-0.253* (0.011)	0.193+ (0.056)	-0.182+ (0.072)	- 0.324** (0.001)	-0.325** (0.001)
TSH	Subjects	0.087 (0.391)	-0.015 (0.886)	0.082 (0.417)	0.038 (0.707)	0.044 (0.667)

Results are presented in r value (p value)

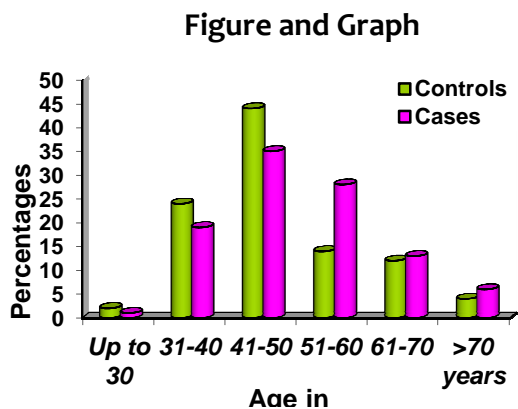


Fig.1: Age sex distribution

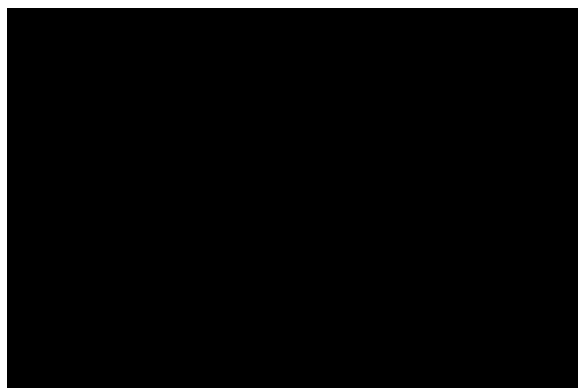


Fig.2: gender distribution

Figure.3: Pearson correlation of lipid parameters with thyroid parameters

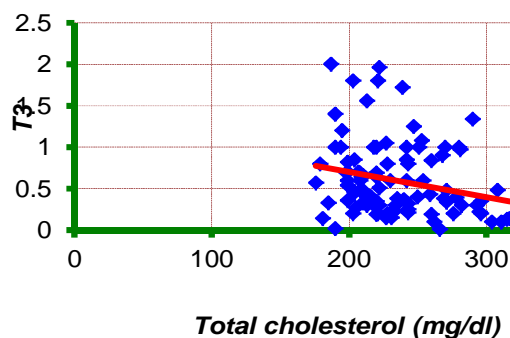


Figure.4: Pearson correlation of t<sub>3</sub> with total cholesterol

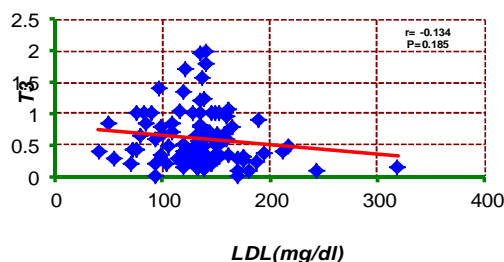


Figure.5: Pearson correlation of t<sub>3</sub> with ldl cholesterol

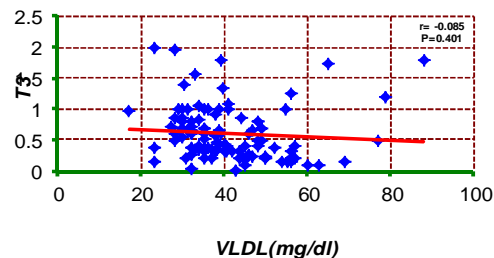


Figure.6: Pearson correlation of t<sub>3</sub> with ldl cholesterol

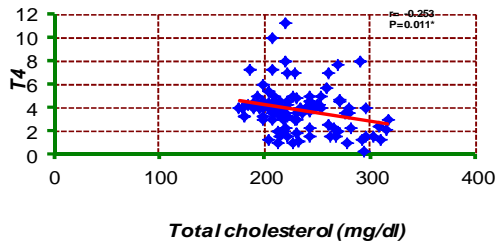


Figure.7: Pearson correlation of t4 with total cholesterol

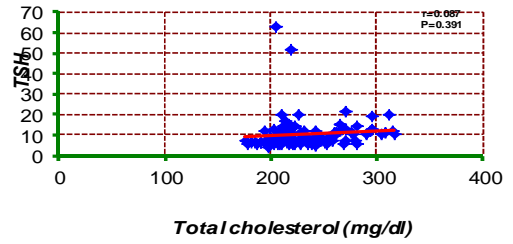


Figure.11: Pearson correlation of tsh with total cholesterol

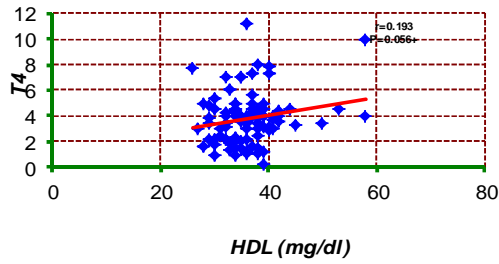


Figure.8: Pearson correlation of t4 with hdl cholesterol

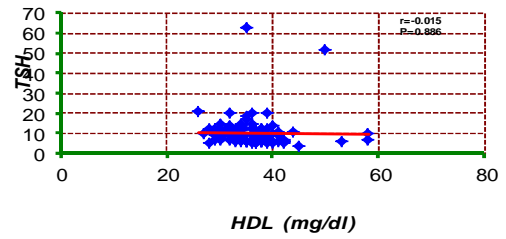


Figure.12: Pearson correlation of tsh with hdl cholesterol

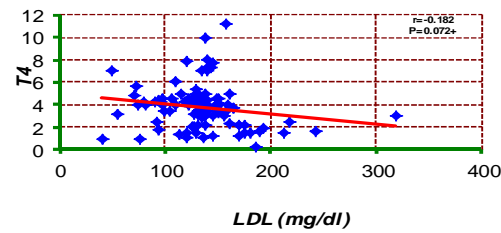


Figure.9: Pearson correlation of t4 with ldl cholesterol

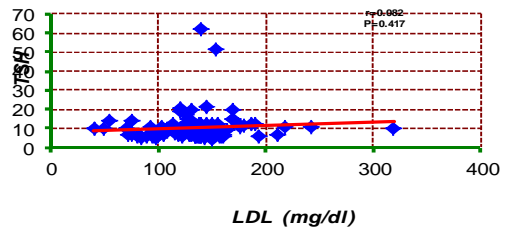


Figure.13: Pearson correlation of tsh with ldl cholesterol

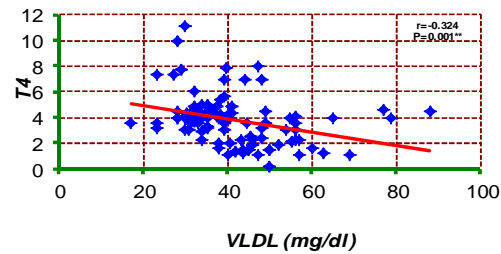


Figure.10: Pearson correlation of t4 with vldl cholesterol

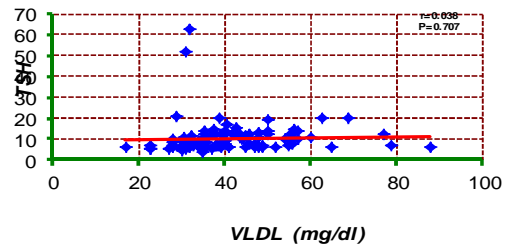
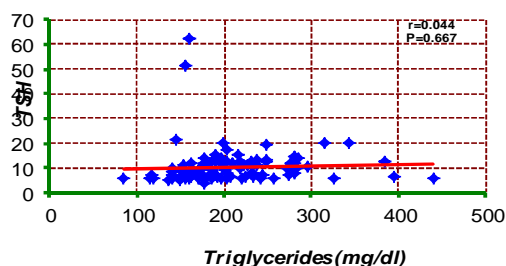


Figure.14: Pearson correlation of tsh with vldl cholesterol



**Figure.15:** Pearson correlation of tsh with triglyceride

Serum cholesterol has negative correlation with T<sub>3</sub> and T<sub>4</sub> and positive correlation with TSH. HDL-cholesterol has positive correlation with T<sub>3</sub> and no significant correlation with T<sub>4</sub> and TSH but appear as positive trend with T<sub>4</sub>. LDL -Cholesterol has negative correlation with T<sub>3</sub> and no significant correlation with T<sub>4</sub> and TSH but decreasing trend have been noticed. VLDL cholesterol has decreasing trend with T<sub>3</sub>, T<sub>4</sub> and no correlation with TSH. Triglyceride has no significant correlation with T<sub>3</sub> but decreasing trend noticed and has statically negative correlation with T<sub>4</sub> and no correlation with TSH.

## DISCUSSION

The cholesterol level significantly elevated in subjects, has negative correlation with T<sub>3</sub> and T<sub>4</sub> and positive correlation with TSH is supported by many other author<sup>21,22</sup>. When serum cholesterol level increase, TSH level will also increase but T<sub>3</sub> and T<sub>4</sub> level will decrease at same time. The HDL cholesterol is reduced and has positive correlation with T<sub>3</sub>, no correlation with TSH which is supported by many other report<sup>23,24,25</sup>. LDL-cholesterol elevated and has negative correlation with T<sub>3</sub> and no significant correlation with T<sub>4</sub> and TSH<sup>26,27,28</sup>. VLDL -cholesterol is elevated and decreasing trend have been noticed with T<sub>3</sub> and T<sub>4</sub> and no significant correlation with TSH<sup>24,29</sup>. Triglyceride level is elevated and has no significant correlation with T<sub>3</sub> and TSH but significant correlation with T<sub>4</sub>.<sup>29,30</sup>

So if we can manage the lipid profile parameter and thyroid profile parameter within normal range along with blood sugar level, we can manage the life of subjects' long way.

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**Conflict of interest:** Nil