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Correlation of Serum Uric Acid level with Lipid Profile among students of Plateau State College of Health Technology Zawan, Jos Nigeria.

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ABSTRACT
Hyperuricemia is often associated with dyslipidemia which in turn is associated with cardiovascular diseases. This study was conducted to correlate the serum uric acid level with lipid profile pattern of undergraduate students attending Plateau State College of Health Technology Zawan, Jos Nigeria. One hundred and forty one students participated in the study. Ninety-one (64.5%) were males and 50 (35.5%) were females. The fasting blood specimen was collected from the left or right superficial vein by venipuncture from each student. Enzymatic method was used for the measurement of uric acid, Total cholesterol, Triglyceride and HDL. Friedwalds's formula was used to calculate LDL cholesterol. The data generated were analyzed using statistical package for social sciences (SPSS) Software version 16.0. There was a positive and significant ($p<0.05$) correlation ($r= 0.371$, $r= 0.317$, $r= 0.349$) between uric acid and Total cholesterol, Triglyceride and Low density lipoprotein($r= 0.371$, $r= 0.317$, $r= 0.349$) respectively. There was also a positive but not significant ($p>0.05$) correlation between serum uric acid and HDL ($r=0.081$). In conclusion, a positive correlation was observed between serum uric acid and lipid profile among the students. It is recommended that students should be careful of diet modification which can lead to increase of uric acid and lipid profile level that may prone them to developing the cardiovascular diseases.

Key words: Uric acid, Total cholesterol, LDL cholesterol, HDL cholesterol Triglyceride, Correlation

I. INTRODUCTION

Uric acid is the metabolic end product of purine metabolism in humans. It has antioxidant properties that may be protective but can also be factors for dyslipidemia and the inflammatory process leading to atherogenesis. (12)

Low density lipoprotein cholesterol is always considered to be bad cholesterol and increase in Low density lipoprotein results in atherosclerosis which leads to various pro-oxidant, depending on its chemical microenvironment (1) Hyperuricemia is a metabolic consequence originating with a wide range of etiology concerned with production and excretion of uric acid or a combination of both. By definition, hyperuricemia is an increase in urate concentration >420 µmol/ L (7.0 mg / dl) in blood (2). **L**ipids commonly known as fats are large heterogeneous organic substances which are insoluble in water but are soluble in organic solvents. (3) Lipids have a dual role. First, lipids are composed of mostly carbon-hydrogen (C-

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H) bonds; they are a rich source of energy and efficient way for the body to store excess calories. Lipids have unique physical properties, serves as an integral part of cell membranes and therefore play an important structural role in cells (4).

Cardiovascular diseases such as stroke or ischemic heart disease was thought to be associated with serum uric acid and has been confirmed by numerous epidemiological studies conducted since1950s (5-11). Hyperuricemia is said to be a mediator of pro inflammatory endocrine imbalance in the adipose tissue which may be one of the cardiovascular events ranging from angina to myocardial infarction (13-15) as hyperuricemia is often associated with dyslipidemia which in turn is associated with Cardiovascular Diseases, identifying hyperuricemic subjects and treating the condition can be a preventive measure for cardiovascular diseases.

II. MATERIALS AND METHODS

The study was carried out in the Plateau State College of Health Technology Zawan, Jos Northern Nigeria. A Simple random sampling technique was used in selecting the subjects. A total of 141 students of Plateau State College of Health Technology Zawan, Jos Nigeria were recruited for the study. The sample size was determined by using a standard formula for calculating minimum sample size. Subjects with hypertension, Diabetes mellitus, thyroid or endocrine disorder, alcohol consumption, cigarette smokers and obese were excluded from the study.

Ethical approval was obtained from the Ethical Committee of Plateau State College of Health Technology Zawan, Jos Nigeria., in accordance with the Helsinki declaration. Informed consent was sought from the individuals on willingness to participate in the study The fasting blood specimen was collected from the left or right superficial vein by venipuncture. Five milliliters (5mls) of blood was drawn and allowed to clot at room temperature, centrifuged at 4000 revolution per minute (rpm) for 10minutes. The serum was then stored frozen at - 20 ^{o} C until the day of assayed. The subject's height were taken using a potable height scale and measured to the nearest meters. The weight of the subjects were taken by means of a portable weight gauge and measured to the first decimal function of kilograms. Blood pressure was measured using an automatic sphygmomanometer (cuff width 12.5cm).

Serum uric acid concentration was estimated using uricase
–POD enzymatic colorimetric method with 4-amino- antipyrine as described by Barham *et al* (16). Serum total cholesterol (TC) was estimated using enzymatic method as described by Allain *et al*.and Roeschlau *et.al* (17, 18). Serum Triglyceride (TG) was determined using enzymatic glycerol phosphate oxidase /peroxidase method as described by Fossati *et al (19).* High density lipoprotein (HDL) was determined by enzymatic oxidase/peroxidase after protein precipitation by phosphotungstate as described by Grove. [20] Serum low density lipoprotein (LDL) cholesterol was calculated by Friedwalds's formula (21).

The data generated were analyzed using statistical package for social sciences (SPSS) Software version 16.0. Student t-test was used to test for the difference between means. The correlations were done by Pearson's linear correlation. A p- value of less than or equal to 0.05 ($p \leq 0.05$) was considered as statistically significant.

Table 1: Distributions of subjects according to sex

Sex	Frequency	Percentage
Males	91	64.5%
Females	50	35.5%
Total	**141**	**100.0**

III. RESULTS

One hundred and forty one (141) subjects (91 males and 50 females participated in this study (table 1). The mean age of the participants was 20.55±0.22 years old (table 2). The pattern of uric acid and lipid profile among the study subjects are also shown in the same table.

In our study, there was no significant ($p>0.05$) difference between the means of TC, TG, HDL and LDL in male and female subjects and between age groups in the study. However, the mean serum uric acid was significantly higher in males as compared to the female subjects (285.24±75.47 versus 198± 62.17) µm/l .This is shown in table 3. There was a positive and significant ($p<0.05$) correlation between uric acid and TC, TG and LDL. However the correlation between uric acid and HDL was not significant ($p>0.05$) as presented in table 5. These correlations are shown by scatter plot in fig 1, 2, 3 and 4 respectively.

Table 2: Uric acid and lipid profile pattern among the study subjects

Variables	Study subjects (n =141)
Age (years)	20.55±0.21
BMI (Kg/m²)	20.61±0.22
TC (mmol/l)	3.71±0.86
TG (mmol/l)	0.59±0.32
HDL (mmol/l)	1.00±0.31
LDL (mmol/l)	2.37±0.64
Uric acid (µmol/l)	257.25±6.69

Values are expressed as Mean ±SD

Table 3. Comparison of means of biochemical variables between male and female subjects

Variables	Male	Female n=91	p-value n= 50	Remarks
TC (mmol/l)	3.58±0.89	3.87± 1.28	> 0.05	NS
TG (mmol/l)	0.57±0.33	0.56 ± 0.46	> 0.05	NS
HDL (mmol/l)	0.97±0.34	1.07± 0.45	> 0.05	NS
LDL (mmol/l)	2.43± 0.70	2.2 ± 0.89	> 0.05	NS
Uric acid (µmol/l)	285.24±75.47	198.22±62.17	< 0.0001	S

Values are expressed as Mean ±SD, S=Significant, NS=Not significan

Table 4: Comparison of means of biochemical variables between age groups

Variables	Age group(years) 18-22	23-27	P- value	Remarks
TC(mmol/l)	3.66 ± 1.03	3,91 ± 1.27	>0.05	NS
TG(mmol/l)	0.57 ± 0.37	0.65 ± 0.47	>0.05	NS
HDL(mmol/l)	1.00 ± 0.31	0.95 ± 0.50	>0.05	NS
LDL(mmol/l)	2.37 ± 0.79	2.15 ± 0.63	>0.05	NS
Uric Acid(?mo/l)	258.32 ± 84.02	238.00 ± 78.39	>0.05	NS

Values are expressed as Mean ± SD

Table 5: Correlation between serum uric acid and lipid profile

Variables	r-value		P- value	Remarks
Uric acid and TC	0.371		< 0.0001	S
Uric acid and TG	0.317		< 0.0001	S
Uric acid and HDL	0.081	> 0.05		NS
Uric acid and LDL	0.349		< 0.0001	S

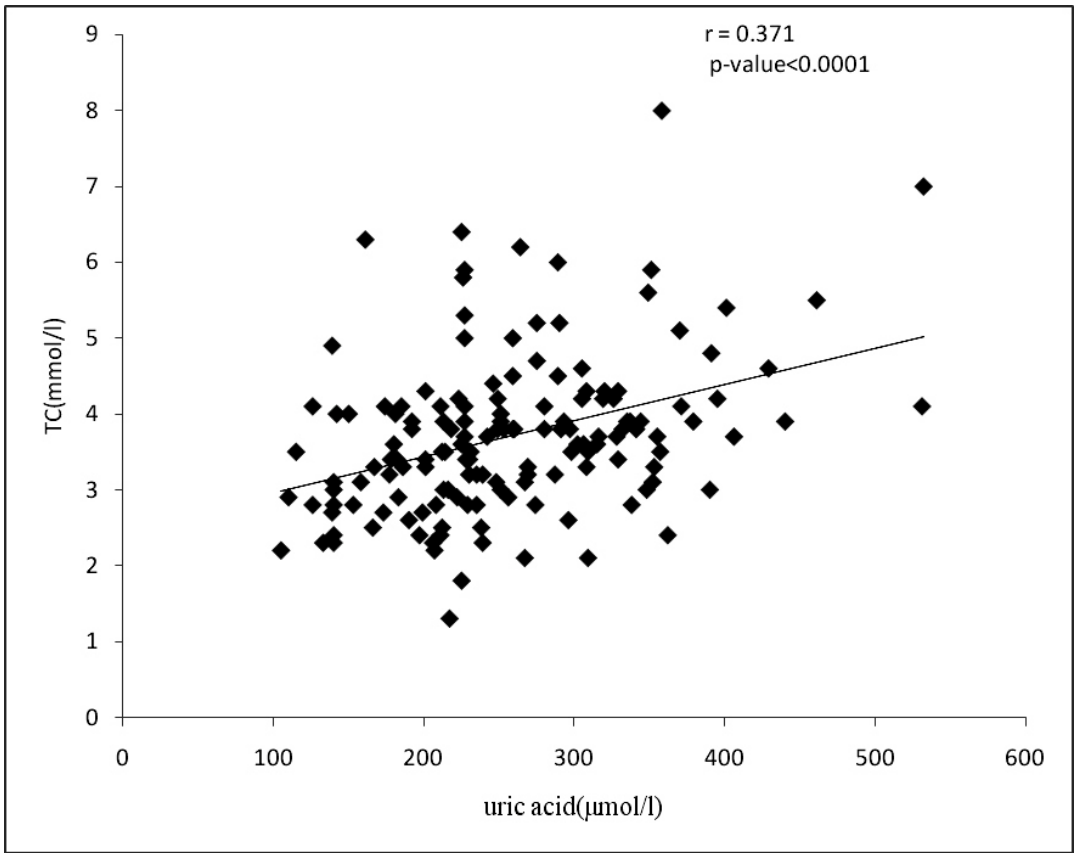

Fig. 1: Correlation plot between serum uric acid and total cholesterol

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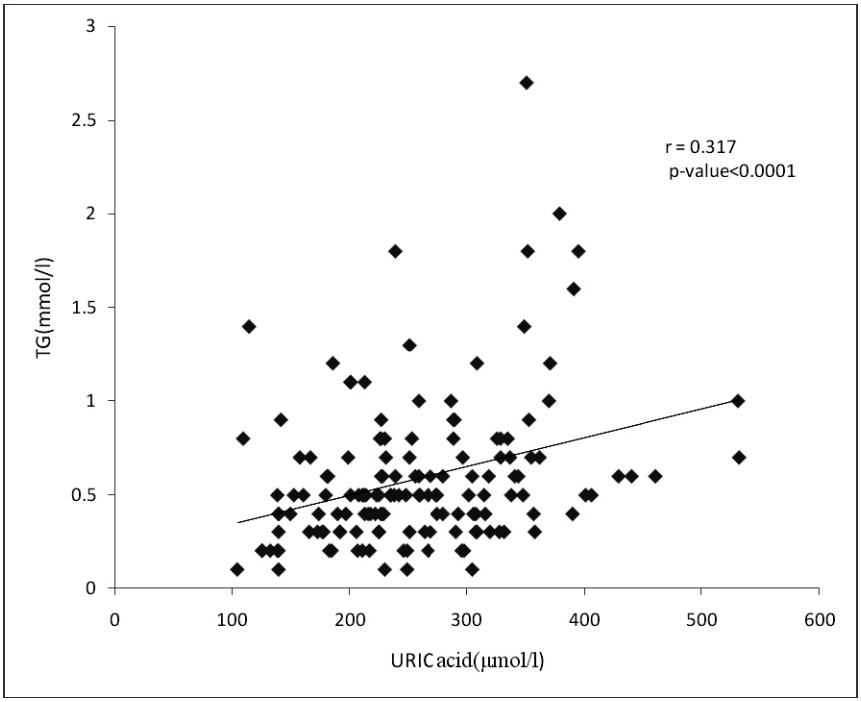

Fig. 2: Correlation plot between serum uric acid and triglyceride

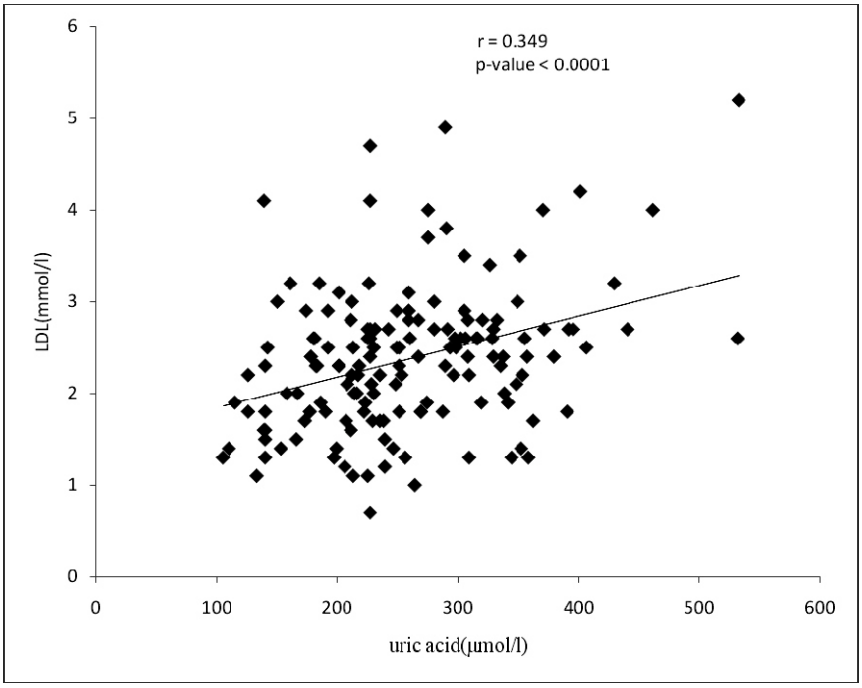

Fig. 3: Correlation plot between serum uric acid and LDL

significant ,which means that whenever there is an increase in uric acid level, there is also an increase in the levels of TC,TG and LDL, this is in consistent with the study done by Conen *et al* (22).The correlation between HDL and uric acid was not significant .The observed association between the serum uric acid and triglyceride is more stronger than that of uric acid and TC as well as LDL ,this findings also agreed with the studies of Matsubara *et al* and Chamorro *et al (*23, 24) who reported a close link between TG and serum uric acid. Conen and colleagues conducted a study in a

population undergoing healthy examination, which demonstrated that TG was more strongly associated with serum uric acid than HDL-C and TC (22). Russo and colleagues reported that TG had a more closely relationship to serum uric acid than other lipids even in the healthy people (25). The connection between serum uric acid and triglyceride levels were linear and evident. (22, 26) This present study is in complete agreement with their findings.

The relationship between triglyceride and uric acid has been attributed to genetic factors (27). It is tempting to speculate that the synthesis of triglycerides involves NADPH, which resulted in increased uric acid production. [1 3] The positive correlation(r=0.081) between HDL and uric acid but not significant (p>0.05) may be due to Genetic, dietary and physical activity which are factors that influence the levels of HDL (28) . Physical activity determines HDL cholesterol levels, through stimulation of lipoprotein lipase (LPL) in the surface of skeletal muscle, adipose tissue and liver.

IV. DISCUSSION

This research work was aimed at correlating the uric acid level with lipid profile pattern among undergraduate students of Plateau State College of Health Technology Zawan, Jos Nigeria. which could be helpful in creating awareness of conditions that may lead to dyslipidaemia among the students as well as reducing the risk of cardiovascular morbidity among them.

In this study, the Pearson correlation co-efficient between serum uric acid and TC ,TG and LDL shows a positive and there is an increase in serum uric acid level, an increase in lipid profile will also occur. High level of serum uric acid results in hyperuricemia and this can lead to dyslipidemia and may result in cardiovascular diseases. Collectively, this study implies that uric acid may accelerate many pathophysiological mechanism associated with the risk of cardiovascular diseases.

We therefore recommend that students should be careful of diet modification which can lead to increase of uric acid

V. CONCLUSION

Based on our research, it could be concluded that there is a positive correlation between serum uric acid level and lipid profile among the subjects. This implies that whenever and lipid profile level. This is because University students are likely involved in a variety of health risk behaviors such as drinking, unhealthy diet and sedentary life styles, which may prone them to the development of cardiovascular diseases.

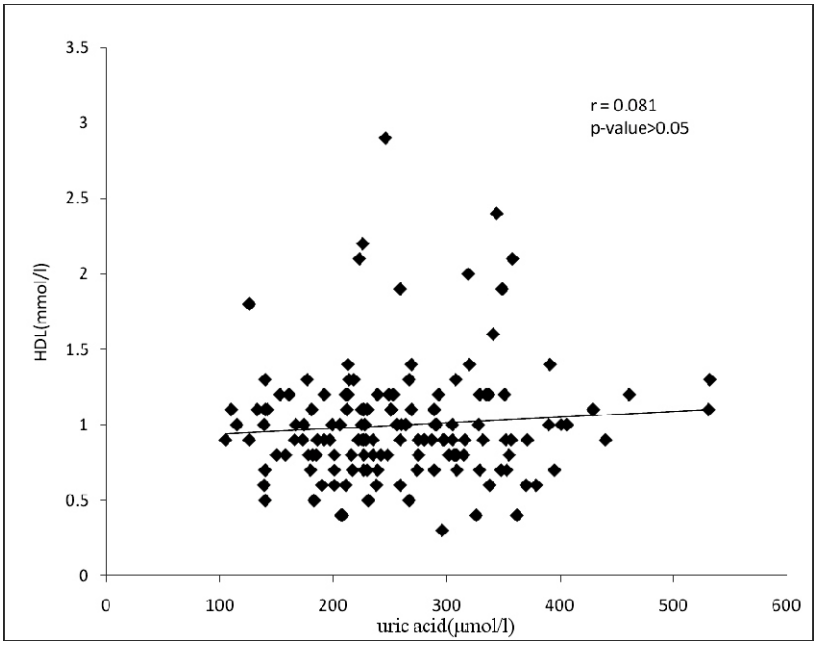

Fig. 4: Correlation plot between serum uric acid and HDL

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CONFLICT OF INTEREST

There was no conflict of interest.

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