Association between Uric Acid Levels and Lipid Profiles in Adult Population of Alkharj City

*Abdulrahman Bader Alaql[1], Abdulrahman Ibrahim Almousa[1], Fahad Saleh Alonazi[1], Mohammed Abdullah Aldossari[1], Deepak Pathania[1].

[1] Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia
Corresponding author: Abdulrahman Ibrahim Almousa, E-mail: dr.abdulrahmanim@gmail.com

ABSTRACT

Background: High uric acid level used to predict many diseases including left atrial thrombus, it may indicate aspirin-resistant patients. It could be also used as a biochemical index for diagnosing adolescence depression. High uric acid level is a known risk factor for deterioration of renal function in chronic kidney disease. It is also as a risk factor for cardiovascular disease and found to be associated with increased arterial stiffness **Aim:** is to investigate the independent association between serum uric acid and lipid profiles. **Methods:** Cross sectional study conducted over 200 patients who attended the various out-patient department of Prince Sattam Bin Abdulaziz University Hospital Al Kharj in Saudi Arabia. The data included individuals between 20 and 75 years old with lab test within the last year. **Results:** The data showed that the highest level of uric acid was in patients older than 50 years old (394 SD ±77.77) and it decreased in proportionate. The data showed significant association between the uric acid and the triglyceride (P = 0.003) and no significant association with the total cholesterol (P= 0.511). It also revealed no significant differences between the antihypertensive as well as antidiabetic groups and normal patients (P = 0.520 and 0.594 respectively). **Conclusions:** There is strong association between the uric acid and triglyceride, while high level of uric acid is not associated with high level of total cholesterol. The antidiabetic as well as antihypertensive drugs have significant effect over the triglyceride level while there is no significant effect on the TC level and the UA.
Keywords: triglyceride, total cholesterol, antihypertensive drugs, antidiabetic drugs, hyperuricemia.

INTRODUCTION

High uric acid level used to predict many diseases including left atrial thrombus[2], it may indicate aspirin-resistant patients[3]. It could be also used as a biochemical index for diagnosing adolescence depression[4]. High uric acid level is a known risk factor for deterioration of renal function in chronic kidney disease[5]. It is also a risk factor for cardiovascular disease and found to be associated with increased arterial stiffness[6].

The investigation of different factors or risk markers is an important clinical task to prevent several chronic diseases, particularly cardiovascular ones. Many of these risks are well defined while others need to be identified. One relevant risk condition to health is the metabolic syndrome (MS), which comprises a cluster of combined clinical and laboratory abnormalities, including increased waist circumference, overweight or obesity, dyslipidemia, systemic arterial hypertension, and glucose intolerance or type II diabetes, all of which reflect insulin resistance and constitute important atherogenic risk factors[7].

Uric acid (UA) is not considered a criterion for the diagnosis of MS, but some studies have shown an association between high levels of UA and the syndrome in different populations[8]. Furthermore, not all dyslipidemic disorders (especially those associated with a predominant increase in low-density lipoprotein, LDL, levels) are components of MetS, and it is of interest to see how uric acid levels relate to these non-MetS lipid components, which are typically measured routinely in lipid clinic patients. Indeed, some studies have suggested that serum uric acid fell by about 4–8% in dyslipidemic patients on specific lipid-lowering medications[9, 10].

Hyperuricemia is a condition with increased uric acid in the blood, uric acid (urate) is produced through the metabolism of purine compounds. The normal adult male has a total body urate pool of approximately 1200 mg, about twice that of the normal adult female. This gender difference may be explained by an enhancement of renal urate excretion in women of childbearing age due to the effects of estrogenic compounds[11]. Hyperuricemia may occur because of decreased excretion (underexcretors), increased production (overproducers), or a combination of these two mechanisms[12]. Uric acid has now been identified as a marker for a number of metabolic and hemodynamic abnormalities[13]. Along with hyperuricemia, dyslipidemia has been described as major risk factor of similar abnormalities. Dyslipidemia refers to lipoprotein disorders detected by laboratory tests, and usually occur without signs or symptoms during childhood and young adult age. Proper recognition and management of lipoprotein disorders can reduce cardiovascular morbidity and mortality.

The worldwide prevalence of hyperuricemia is high, with reported rates of 35.1% (men) and 8.7% (women) in the Seychelles, 10.6% in Thailand, 7.2% (men) and 0.04% (women) in England and Scotland, 11.2% in the USA and 8.4% in Saudi Arabia. The relation between hyperurecemia and dyslipidemia is not well understood. This study was conducted as an attempt to find association between uric acid levels and dyslipidemias[14-18].

AIM & OBJECTIVES

The objective of our study was to investigate the independent association between serum uric acid and lipid profiles.

METHODOLOGY
A brief description of the research method:
Study design:
Cross sectional.
Study population:
200 patients attending the various out-patient department of Prince Sattam Bin Abdulaziz University Hospital Al Kharj, Saudi Arabia.
Inclusion criteria:
Individuals who are more than 20 years old with lab test within the last year.
Study area:
Prince Sattam Bin Abdulaziz University Hospital Al Kharj, Saudi Arabia.

Sample size:
200 patients based on convenience sampling depending on financial and personnel resources

Tools:
Data was recorded from patient's record files on four separate occasions. Files were randomly started from serial NO 1000. Consecutive files were seen to find out whether the patient has carried out both lipid profile and uric acid levels in the last year. The process was stopped after the requisite NO of 200 was reached.
Types of questionnaire
(self-constructed, both open and closed ended electronic questionnaire).
Data collection
Data were collected on papers which was then transferred to computer excel sheets to facilitate data analysis.
**Data management**
All statistical analyses were computed using SPSS complex samples (Version 11.0 for Windows, SPSS, Inc., Chicago, IL, USA) Data was presented as means, standard deviation P values and 95% CI were also calculated
Tests used in analysis
CHI square and Man-Watney TEST to find association between two qualitative parameters.

RESULTS
The data were obtained from 201 patients from both genders, the mean age (±SD) was 39.85(±10.0). The age ranged between 21 and 75 years-old patients. The level of uric acid as well as total cholesterol and triglyceride were obtained and the data showed that their mean (±SD) were 319.2±78.4, 4.75±0.97, and 1.53±0.97 respectively.
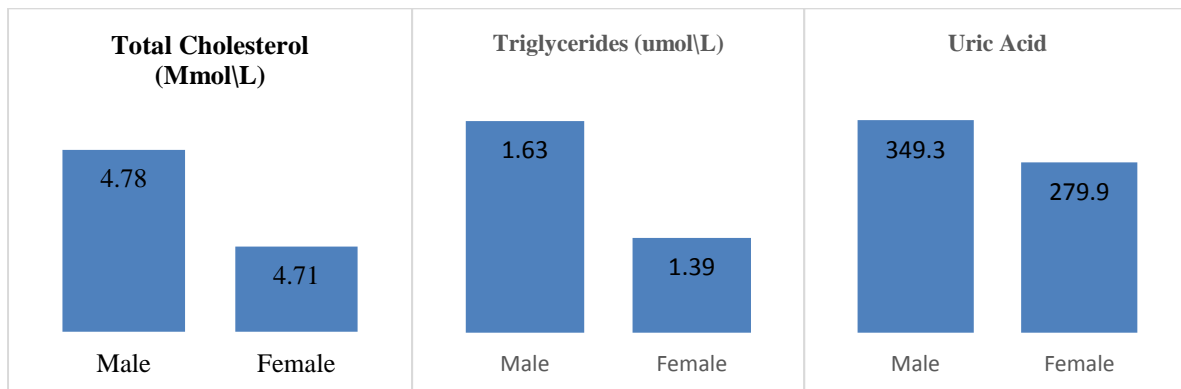
Figure 1: the mean of total cholesterol, triglyceride and uric acid among males and females
The data were subdivided into four groups of age and showed that the highest level of uric acid was in patients older than 50 years (394±77.77) and it decreased in proportionate. While the level of total cholesterol was highest between ages 30 and 40 years (4.94±1.09) and for the triglycerides was (1.7±0.96).
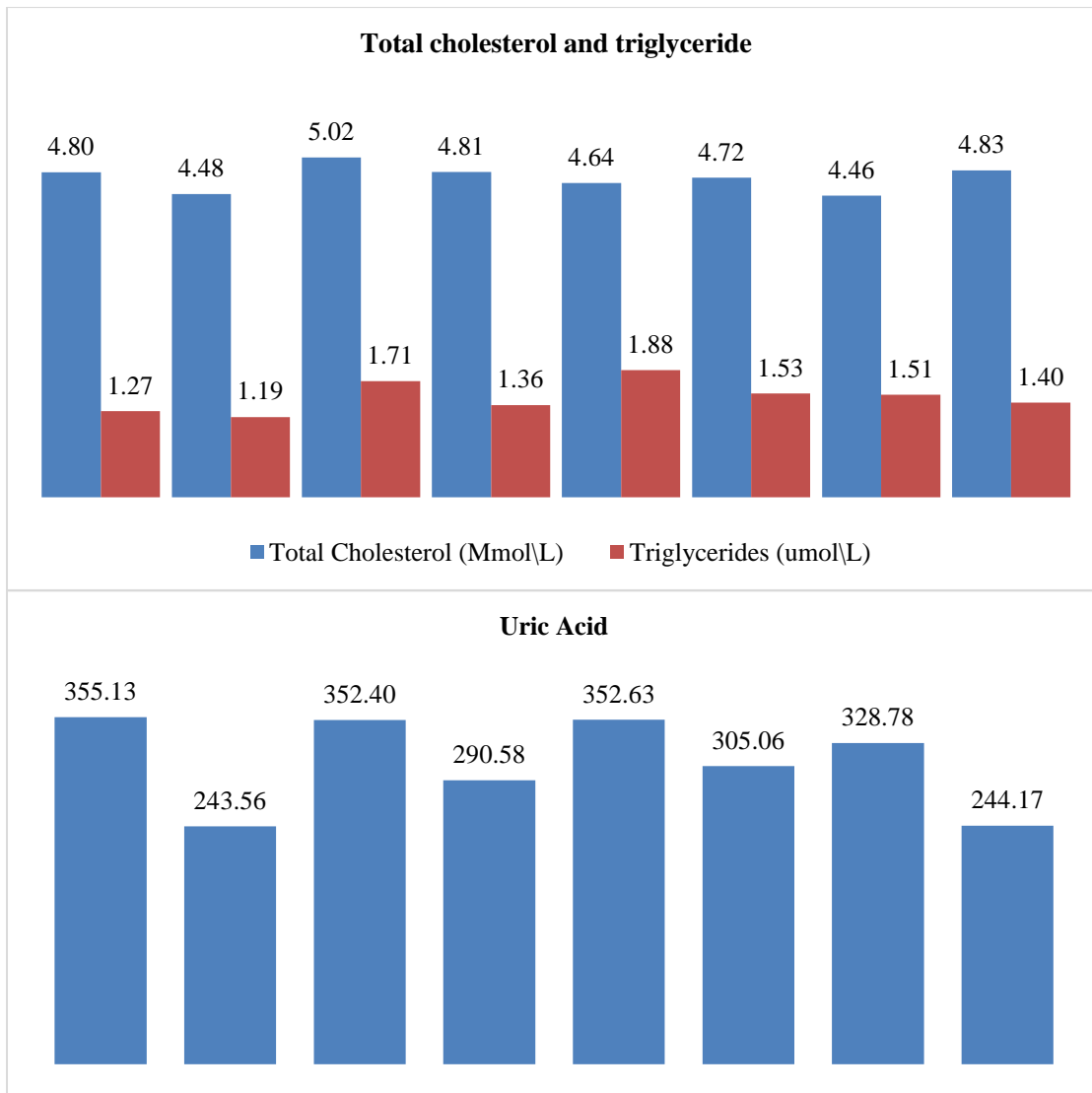
Figure 2: the mean of total cholesterol, triglyceride and uric acid among age groups in males and females

The data were tested for the association between the level of the uric acid and lipid profile specifically triglyceride and total cholesterol and the results showed significant association between the uric acid and the triglyceride (P = 0.003) while it was insignificant with the total cholesterol (P= 0.511).

Table 1: Uric acid level in relation to the triglyceride and total cholesterol

		Uric Acid		Total	Chi-Square Tests		
		Normal	High		Value	df	P value
Total Cholesterol	Desirable	60.70%	9.95%	70.65%	1.344[a]	2	.511
	Borderline	17.91%	3.48%	21.39%			
	High	5.97%	1.99%	7.96%			
Triglyceride	Desirable	61.69%	6.47%	68.16%	11.706[a]	2	.003
	Borderline	11.94%	4.98%	16.92%			
	High	10.95%	3.98%	14.93%			

The patients were distributed in accordance to whether they use antidiabetic and/or antihypertensive drugs, figure (3 & 4) shows the level of total cholesterol level in compare to the uric acid level for both groups.
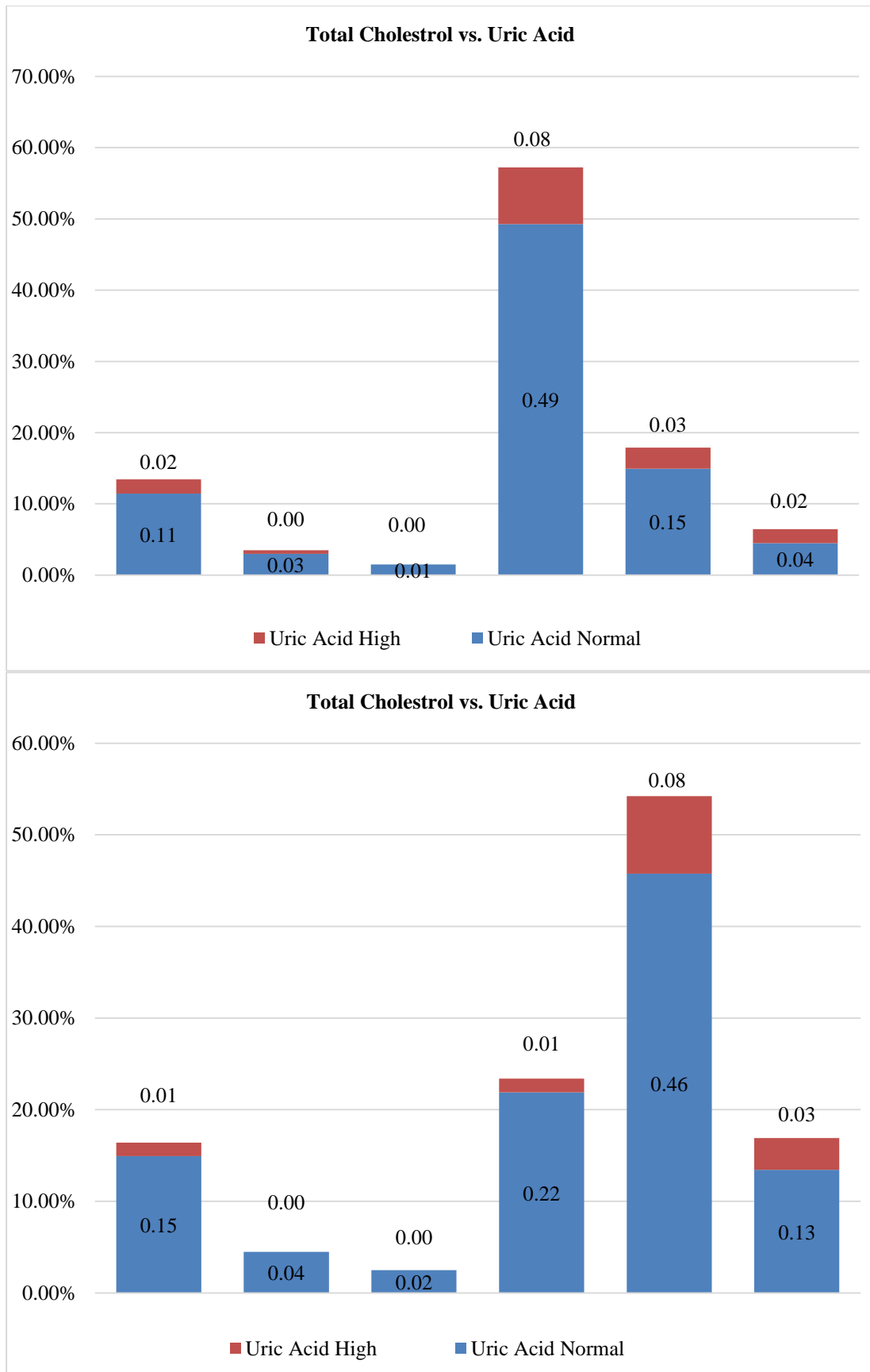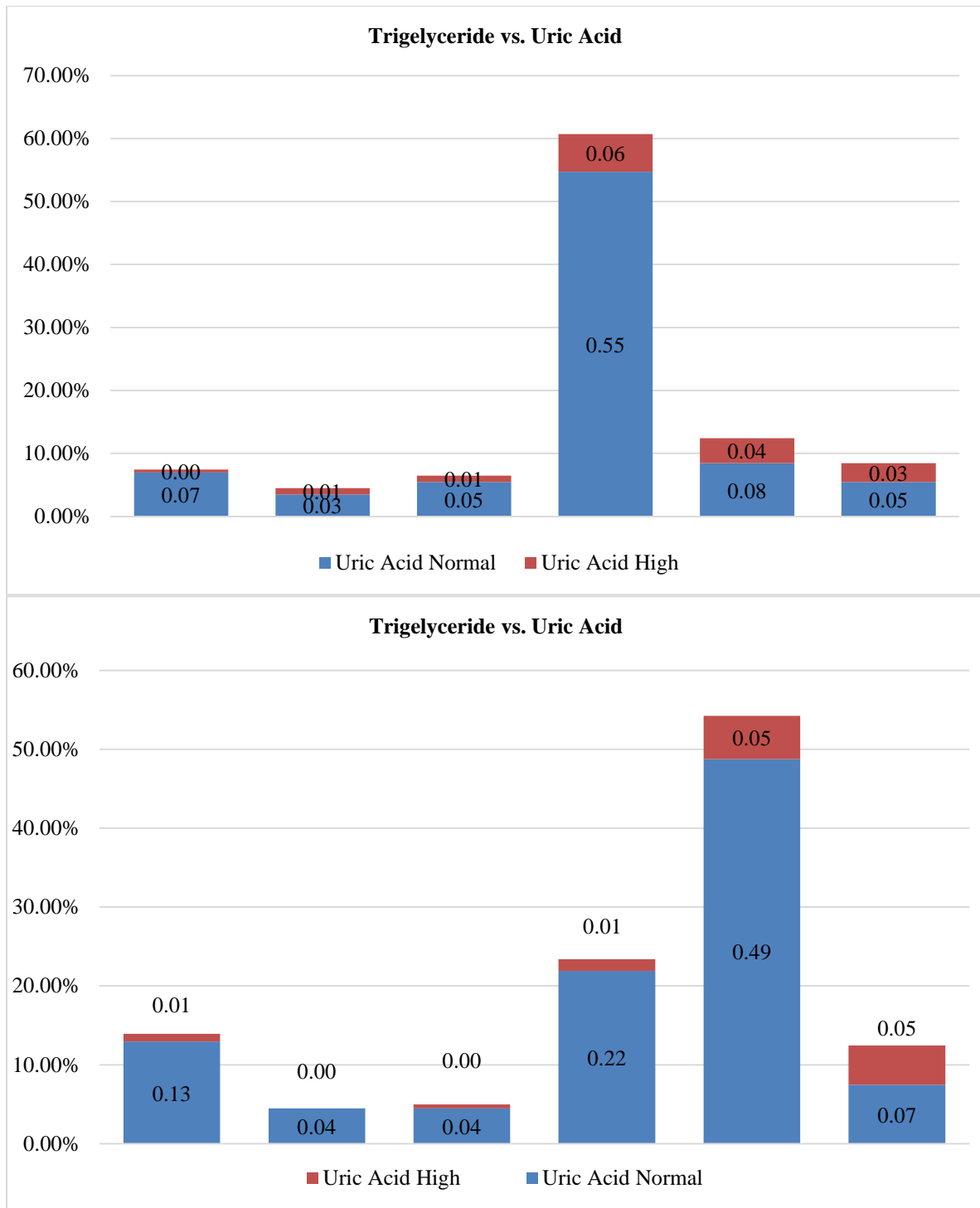
Figure 3: level of total cholesterol in compare to uric acid level in add and ahd groups

Figure 4: Level of triglyceride in compare to uric acid level in ADD and AHD groups

The data also was tested to see if there is any significant differences between the level of the uric acid, triglyceride and total cholesterol between the patients who have been using the antihypertensive and antidiabetic medications from those who haven't, and the results showed that there is no significant differences between the level of the uric acid and total cholesterol between the antihypertensive as well as antidiabetic groups ($P = 0.520$ and 0.594 respectively), but there is high significant differences in the group who has used the antidiabetic drugs ($P = 0.000$).

Table 2: the effect antidiabetic medications on the level of triglyceride and total cholesterol and uric acid

	Antidiabetic Drugs	Mean	t	P value	95% Confidence Interval of the Difference	
					Lower	Upper
Total Cholesterol (Mmol\L)	Positive history of medicine intake	4.6403	-.648	.520	.55561	.28506
	No medication	4.7755				
Triglycerides (umol\L)	Positive history of medicine intake	2.1946	4.878	.001	.48466	1.14234
	No medication	1.3811				
Uric Acid	Positive history of medicine intake	313.51	-.535	.594	33.500	19.356
	No medication	320.59				

Table 3: the effect antihypertensive medications on the level of triglyceride and total cholesterol and uric acid

	Antihypertensive Drugs	Mean	t	P value	95% Confidence Interval of the Difference	
					Lower	Upper
Total Cholesterol (Mmol\L)	Positive history of medicine intake	4.6249	-.876	.384	.53859	.21032
	No medication	4.7890				
Triglycerides (umol\L)	Positive history of medicine intake	1.7685	1.482	.144	.10925	.72964
	No medication	1.4583				
Uric Acid	Positive history of medicine intake	311.00	-.926	.357	34.005	12.382
	No medication	321.81				

DISCUSSION

Many studies have suggested different levels of measurements and they have been assessing according to the variations among healthy individuals[19]. Also, some studies concluded that the level of uric acid was strongly associated with the lipid profile and that the level might be affected by "age, genders, smoking, alcohol consumption, obesity and insulin resistance"[20]. The results of study conducted by **Baliarsingh** [21] showed that the increase in the level of serum uric acid significantly increases the level of hypertriglyceridemia, a result which support our findings. Yet our results have shown that no significant difference between neither the males and females nor the age groups to the uric acid level.

Disagreement with the findings that have proven the association between the uric acid and total cholesterol level, our results have shown that high level of total cholesterol is not significantly associated with high uric acid level. And since our data included patients who were under antidiabetic and antihypertensive drugs; the results have been tested for whether these medications have strong effect over the findings or not, and though there were high significant difference between the level of triglyceride in both groups, yet no significant difference has been found in the total cholesterol level. This result indicates that the total cholesterol high level might not be affected significantly by antidiabetic and antihypertensive drugs, a finding that requires more investigation for more confounding factors.

According to our findings, the level of the uric acid might not be an indicator of high lipid profile level even at younger age which disagree with a study that concluded this association at ages below 45 years old[21]. Though our results have shown strong association between the triglyceride and uric acid

level, many authors have concluded that it is not enough to classify high or low TC in accordance[22].

CONCLUSION

Males are more affected than females by the high uric acid level. And there is strong association between the uric acid and triglyceride, while high level of uric acid is not associated with high level of total cholesterol. The antidiabetic as well as antihypertensive drugs have significant effect over the triglyceride level while there is no significant effect on the TC level.

RECOMMENDATIONS

- Conduct more studies to confirm the findings.
- Investigating more confounding factors that might have strong effect over the results.
- Covering wider areas and testing more lipid profile parameters.

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