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FASTING VS. NON FASTING LIPID PROFILE AMONG SUDANESE IN KHARTOUM STATE

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ABSTRACT

Background: Lipid profile is always measured in fasting state as recommended by national and international guidelines. Recent studies have suggested that the lipid profile results are not significantly changed in response to food intake, moreover some studies concluded that non fasting lipid profile is more useful in predicting adverse cardiovascular outcomes. This study was conducted to investigate the association between fasting and non fasting lipid profile. **Methodology:** cross sectional study conducted over 6 months period since November 2015,the study included randomly selected 60 individuals in the age group 20-60 years, fasting and non-fasting blood samples were obtained from each individual and lipid profile was performed using enzymatic methods for cholesterol, triglycerides and HDL. LDL was calculated with Friedewald formula. **Results**: The study included 60 adult individuals, age group 20-60 years, 28 (46.7%) were males and 32 (53.3%) were female. The mean difference between fasting and non-fasting for all lipid profile was not significant indicated by p.values more than 0.05. For males p-values were (0.675, 0.806, 0.870 and 0.826) for cholesterol, triglycerides, HDL and LDL respectively and (0.080, 0.484, 0.449, 0.053) for females. Triglycerides had the most changed levels in both males and females with a mean difference of 8 mg/dl in males and 12 mg/dl in females, where HDL showed the least variation with a mean difference of 1 mg/dl in females and 3 mg/dl in males. The population was farther divided by their health status into normal, diabetic, dyslipidemic and hypertensive, there was no great difference in the results between these subgroups where all groups have p-values more than 0.05 for all lipid subclasses indicating no significant difference between fasting and non-fasting status. **Conclusion:** In conclusion, this study illustrated that non-fasting lipid profile have no significant difference from fasting lipid profile, including triglycerides. Guidelines which recommend fasting for lipid analysis should be reconsidered.

KEYWORDS: Fasting, Non fasting, lipid.

INTRODUCTION

Lipids are main class of biological components and play major roles in various cellular processes, also lipid are fundamental building blocks of cell membrane serve as fuel molecule, energy stores and signaling molecules.[1]

The principal lipids found in the cell are triglycerides, phospholipids, cholesterol and cholesterol esters. Triglycerides contain three fatty acid molecules attached to one molecule of glycerol by ester bonds. Cholesterol on the other hand is an unsaturated steroid alcohol contain four rings (A, B, C and D).[2]

Lipoproteins constitute the body's petroleum industry, according to their density and size they are classified into; chylomicrons, the largest lipid rich lipoprotein responsible for distributing dietary triglycerides through the circulation to the cells. The very low density lipoprotein (VLDL) carrying endogenously assembled triglycerides. The low density lipoprotein (LDL) delivers cholesterol to peripheral cells. The high density lipoprotein (HDL) gathers the excess cholesterol for transport back to the liver.[2]

Elevated plasma concentration of lipids, particularly, cholesterol are causally related to the pathogenesis of atherosclerosis, the process responsible for the majority of cardiovascular disease.[3]

Lipid profile is a laboratory test that includes four basic parameters: total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides. This test, alone or in combination with other tests, is considered as a biomarker in prediction of cardiovascular risk.[4]

For the assessment of cardiovascular risk both NCEP and European guidelines recommend that lipid profile should be done on fasting blood samples due to certain limitations in non fasting samples.[5,6] on definition the fasting state occurs after an 8- our fast, thus, most people

find themselves in the non fasting state for the majority of a 24-hour period, perhaps with the exception of the early morning hours.[7]

Efforts have been made recently to simplify blood sampling by replacing fasting lipid profile with non fasting lipid profile. Davinder Sidhu had reported that Fasting times showed little association with lipid subclass levels in his cohort study and suggested that fasting for routine lipid is unnecessary.[8] Another research conducted by Anne Langsted to test this hypothesis, concluded that lipid profile at most change minimally in response to normal food intake.[7] Jouko Sundvall et al have illustrated that correction of non fasting serum triglycerides to fasting values have no real significance and have no role in population studies.[9]

These researches and others are recommending using non fasting lipid profile instead of fasting.

The purpose of this study was to check this hypothesis by comparing between fasting and non-fasting lipid profile in Sudanese population in Khartoum state, as it appears there are no similar researches conducted in Sudan testing this theory.

MATERIALS AND METHODS

One hundred and twenty blood samples had been collected from 60 adult individuals, age group 20-60 years, 28 (46.7%) were males and 32 (53.3%) were female. two samples from each patient (fasting and non-fasting) as cross sectional descriptive study carried out on Muali Medical Center –Khartoum- Sudan from November 2015 to April 2016. Data achieved through self-administered questionnaire including: demographic information (age and sex), life style and medical history. All blood Samples were collected in tubes containing heparin then plasma was separated within 15 minutes and stored at -20°C, no sample was stored for more than 7 days. Blood drawn after 8 or more hours to their last meal comprised the fasting samples (n=60), and blood drawn prior 8 hours to their last meal comprised the non fasting samples (n=60). All laboratory procedures were done under controlled conditions on clinical chemistry Laboratory- faculty of medical laboratory sciences University of Khartoum using spectrophotometer (chemical analyzer). Triglycerides was measured using enzymatic method (triglyceride lipase), cholesterol and HDL levels were measured by enzymatic method (cholesterol esterase and proceeded by chemical precipitation before for HDL measurement). LDL levels was calculated by Friedewald calculation; LDL cholesterol= total cholesterol- HDL cholesterol- T.G\3.2 all levels of plasma triglycerides were less than 400 so the formula is valid for all the samples. Results are obtained by mg\dl for all parameters. All statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 16. Paired sample T-test was used with 95% confidence interval and the sample size was calculated using a formula.

RESULTS

The study included 60 adult individuals, age group 20-60 years, 28 (46.7%) were males and 32 (53.3%) were female. The mean difference between fasting and non-fasting for all lipid profile was not significant indicated by p.values more than 0.05 as shown in **table 1**.

For males p-values were (0.675, 0.806, 0.870, and 0.826) for cholesterol, triglycerides, HDL and LDL respectively and (0.080, 0.484, 0.449, 0.053) for females. Triglycerides had the most changed levels in both males and females with a mean difference of 8 mg/dl in males and 12 mg/dl in females, where HDL showed the least variation with a mean difference of 1 mg/dl in females and 3 mg/dl in males.

The population was farther divided by their health status into normal, diabetic, dyslipidemic and hypertensive, there was no great difference in the results between these subgroups as shown by **Table 2**, where all groups have p-values more than 0.05 for all lipid subclasses indicating no significant difference between fasting and non-fasting status.

DISCUSSION

Lipid profile test have become a routine test and a valuable marker in predicting cardiovascular disease, national and international guidelines recommend that lipid profile should be performed in fasting blood samples.[5,6] There are several drawbacks for requesting a fasting sample, most importantly is inconvenience for the patients and patients are in the non fasting state for the majority of the time, so non fasting results will not actually give good reflection about the postprandial abnormalities.[7,10]

The results of this study concluded that there were no significant difference between fasting and non fasting lipid profile as it was asserted in other studies.[7,8] The Canadian Cardiovascular Society's (CCS), 2012 guideline introduced the use of non-fasting specimens for the assessment of lipid profile which supports our rsults.[10] There was no significant difference between sub groups with respect to gender, this result corroborate the findings of previous studies.[7,9,10,11,12]

Davinder Sidhu et al study results showed variations of up to 10% in the mean of calculated LDL levels and the mean triglyceride levels showed variations of up to 20%, in contrast to our study which showed a variation of only 1% for calculated LDL and 5% for triglycerides, this variations may be due to the difference in the sample size, 209180 individuals compared to 60 individuals in our Taking fixed time for fasting sample (8-12 hours) is one of this study's limitation, as it would give more information if fasting was grouped from 2 hours up to 12 hours. Another limitation was that non fasting samples were not defined by specifying the last meal, on the other hand this reflects reality were non fasting patient won't exactly have the same meals.

Table 1: showed characteristics of fasting and non fasting lipid profile

	Fasting	Non Fasting	MD (SDD)	P-value
	Mean (SD)	Mean (SD)		
Cholesterol	173 (48.44)	176 (48.93)	3 (12.7)	0.095
T.G	113 (72.31)	134 (95.03)	21 (53.41)	0.105
HDL	65 (23.31)	63 (22.13)	1 (15.61)	0.465
LDL	71 (28.16)	74 (30.55)	3 (15.07)	0.115

Abbreviations: T.G = triglycerides; MD= mean different; SD= standard deviation; SDD= standard deviation difference.

Table 2: showed the mean differences between fasting and non fasting lipid profile subclasses in different groups:

	No		Fasting	Non Fasting	MD (SDD)
			Mean (SD)	Mean (SD)	
Normal	44	**Cholesterol**	156(32.35)	159(30.50)	3(11.71)
		TG	84(22.94)	87(24.43)	3(5.92)
		HDL	65(22.57)	62(19.61)	3(17.67)
		LDL	64(23.53)	68(23.64)	4(14.65)
Diabetic	4	**Cholesterol**	231(61.38)	232(66.84)	1(20.80)
		TG	191(120.30)	185(118.58)	6(4.76)
		HDL	68(34.19)	69(31.19)	1(7.14)
		LDL	100(15.26)	102(33.34)	2(22.93)
Dyslipidemic	8	**Cholesterol**	243(42.11)	247(49.42)	4(16.90)
		TG	246(70.40)	252(75.55)	6(12.98)
		HDL	65(28.59)	66(34.13)	1(8.41)
		LDL	96(35.79)	97(46.68)	1(16.74)
Hypertensive	4	**Cholesterol**	156(29.26)	158(30.45)	2(9.74)
		TG	79(19.97)	86(23.50)	7(8.66)
		HDL	67(16.99)	69(17.23)	2(6.06)
		LDL	63(26.48)	60(29.35)	3(10.84)

Abbreviations: T.G = triglycerides; MD= mean different; SD= standard deviation; SDD= standard deviation difference.

CONCLUSION

In conclusion, this study illustrated that fasting lipid profile failed to show superiority on non fasting lipid profile and have similar diagnostic value, this includes triglycerides which is the most affected by diet. Guidelines which recommend fasting for lipid analysis should be reconsidered.

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