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AN IMPROVED EVALUATION OF THE CARDIOVASCULAR (CVD) RISK IN THE NON-HDL CHOLESTEROL RETROSPECTIVE ANALYSIS

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Abstract:
Objective: Research was aimed at the retrospective analysis of the Non-HDL cholesterol assessment as a marker of CVD risk added with the cholesterol low density lipoprotein.
Methods: We conducted a retrospective research in Mayo Hospital, Lahore from Feb, 2016 to Jan, 2017 after the ethical approval from the administration of the hospital and informed consent from the participants. Retrospective analysis was carried out on the non-HDL and LDL Cholesterol in lipid profile 2115 and analysis was carried out in serum fasting or EDT A Plasma through Daytona and Randox Rx Imola analyzers with the help of Randox kits. Because of the retrospective nature every case was included for the lipid profiles in the said period of research, as it was retrospective research so it did not require any sample size for the completion of the research.
Results: SPSS-22 was used for the data analysis and it was observed in the data analysis of the 2115 profiles of the lipid that 1389 profiles (66%) were observed with levels of Triglyceride more than 1.7mmol/l of and among these female and male were respectively 642 (46%) and 747 (54%). Elevated non-HDL cholesterol was observed in males 77/747 (10%) as (above 3.4mmol/l) in the level of LDL cholesterol as (below 2.6 mmol/l). Remaining 22/747 male (2.9%) cases, LDL-cholesterol was increased in normal non-HDL cholesterol presence. Females 66/624 cases (10%) an increased non-HDL cholesterol (above 3.4mmol/l) was observed in normal LDL-cholesterol presence (below 2.6 mmol/l) and increased LDL-cholesterol in normal non-HDL cholesterol presence among 15/642 females (2.3%) cases.
Conclusion: A non-HDL cholesterol was required for the true analysis of CVD risk in addition to the LDL-cholesterol specifically in the elevated triglycerides samples. We recommend that non-HDL cholesterol can be stated as an integral lipid profile part.
Keywords: Atherosclerosis, non-HDL cholesterol, LDL-cholesterol, cardiovascular risk (CVR) and lipid profile.

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INTRODUCTION:

Researchers and clinicians have utilized lipid profile for the assessment of CVD risk [1]. Primary focus has been given to the LDL-cholesterol1-5 measurement and also considered as the indicator for diagnostic to focus on the therapy [2]. However, in the recent research studies patients have been observed with the target goals of LDL-cholesterol with persistent complexities of AVD (Atherosclerotic Vascular Disease). It becomes clear that in the patient care a narrow consideration of the LDL-cholesterol is not advised. Because no increased incidence of LDL-cholesterol level is in addition as the atherogenesis indicator. Considering this point identification of physicochemical event becomes important which occasions atherosclerosis as being sterols entrance into arterial wall with a succeeding internalization through macrophages resultantly creates the foam cells [3].

An increased incidence of Apolipoprotein in lipoproteins B significantly responsible for cholesterol entrance in the vessels of blood that causes atherosclerosis. Furthermore, sterols are taken to arterial intima through concentration gradient, which resultantly quantifies circulating at (ß lipoproteins) hero genic lipoproteins which helps in the assessment of the cardiovascular risks and the objectives of the therapy [4]. It is also required that research should target the circulation of Non-HDL cholesterol for the assessment of the CVD risk additionally with LDL-cholesterol.

Atherosclerosis development risk is noticed to be linked with the increased LDL-cholesterol levels, but in the recent studies there is an increased evidence about the better indication of the Non-HDL cholesterol for atherosclerotic risk in comparison to the LDL-cholesterol [5]. We can determine the Non-HDL cholesterol through subtraction of the HDL-cholesterol from total serum cholesterol, which means about the Non-HDL cholesterol becomes the sum of all ß-lipoproteins. Its relevant may be associated to the evaluation of the triglycerides levels and in the patients of diabetes [6]. We aimed at the determination objective of Non-HDL cholesterol usefulness in lipid profile by taking it as sole and complete assessment source of CVD risk factor.

MATERIAL AND METHODS:

We conducted a retrospective research in Mayo Hospital, Lahore from Feb, 2016 to Jan, 2017 after the ethical approval from the administration of the hospital and informed consent from the participants. Retrospective analysis was carried out on the non-HDL and LDL Cholesterol in lipid profile 2115 and analysis was carried out in serum fasting or EDT A Plasma through Daytona and Randox Rx Imola analyzers with the help of Randox kits. Because of the retrospective nature every case was included for the lipid profiles in the said period of research, as it was retrospective research so it did not require any sample size for the completion of the research. SPSS-22 was used for the data analysis and it was observed in the data analysis of the 2115 profiles of the lipid that 1389 profiles (66%) were observed with levels of Triglyceride more than 1.7mmol/l of and among these female and male were respectively 642 (46%) and 747 (54%). Elevated non-HDL cholesterol was observed in males 77/747 (10%) as (above 3.4mmol/l) in the level of LDL cholesterol as (below 2.6 mmol/l). Remaining 22/747 male (2.9%) cases, LDL-cholesterol was increased in normal non-HDL cholesterol presence. Females 66/624 cases (10%) an increased non-HDL cholesterol (above 3.4mmol/l) was observed in normal LDL-cholesterol presence (below 2.6 mmol/l) and increased LDL-cholesterol in normal non-HDL cholesterol presence among 15/642 females (2.3%) cases. Samples of the serum fasting were collected for the profiles of the lipid in the vacutainer tubes from an antecubital vein in the adult females and males above eighteen years old, clotting was given five minutes time and centrifuging was carried out for five minutes at 3000 G and subsequent analysis was made through Randox kit as mentioned above and parameters of the lipid were analyzed as total serum cholesterol through an enzymatic end point technique (CHOD-PAP), total serum triglycerides through enzymatic Glycerol Phosphate Oxidase / Peroxidase, serum LDL-cholesterol (LDL-C) and HDL-cholesterol (HDL-C) through direct homogenous assay in the presence of procedures of internal quality control (IQC). Parameters assay variation coefficient were found for the observation of the outcomes including total cholesterol, total triglycerides, HDL and LDL cholesterol with respective proportions of 1.8%, 3.3%, 2.3% and 2.3%. Statistical analysis was carried out with the help of T-test, SPSS-22 with a significant P-value of (< 0.05) as shown in Table-I.

Table-I. Lipid and Lipoprotein analysis parameters with the evaluation of non-HDL cholesterol or raised LDL cholesterol

Variable	High Non-HDL C with normal LDL C in male N=77	High Non-HDL C with normal HDL C in male N=22	T-test	High Non-HDL C with normal LDL C in female N=66	High Non-HDL C with normal HDL C in female N=15	T-test
	Mean ± SD	Mean ± SD	P-Value	Mean ± SD	Mean ± SD	P-Value
Non-HDL C mmol/l	3.86 ± .61	3.15 ± .17	0.001	3.91 ± .98	2.82 ± .61	0.001
LDL C mmol/l	2.19 ± .38	2.78 ± .17	0.001	2.18 ± .33	2.82 ± .22	0.001
Triglyceride mmol/l	3.62 ± 1.88	2.37 ± .81	0.003	3.58 ± 1.98	2.25 ± .85	0.012
HDL mmol/l	.82 ± .18	.81 ± .13	0.735	.88 ± .17	1.15 ± .50	0.001
Triglyceride/HDL Ratio	4.41 ± 2.8	2.92 ± .85	0.015	5.2 ± 2.11	1.95 ± .79	0.019

It is pertinent to mention that the non-HDL cholesterol is significant for both females and males having high triglycerides in the CVD risk evaluation.

RESULTS:
During the data analysis of the 2115 profiles of the lipid that 1389 profiles (66%) were observed with levels of Triglyceride more than 1.7mmol/l of and among these female and male were respectively 642 (46%) and 747 (54%). Elevated non-HDL cholesterol was observed in males 77/747 (10%) as (above 3.4mmol/l) in the level of LDL cholesterol as (below 2.6 mmol/l). Remaining 22/747 male (2.9%) cases, LDL-cholesterol was increased in normal non-HDL cholesterol presence. Females 66/624 cases (10%) an increased non-HDL cholesterol (above 3.4mmol/l) was observed in normal LDL-cholesterol presence (below 2.6 mmol/l) and increased LDL-cholesterol in normal non-HDL cholesterol presence among 15/642 females (2.3%) cases. Moreover, detailed analysis also reflected that lipoprotein and lipid parameters regarding the evaluation of Non-HDL or assessed LDL-cholesterol are shown in Table-I.

DISCUSSION:
Our research focuses on the non-HDL cholesterol estimation in the case of a CVD risk assessment. LDL-cholesterol determination is not able to form the required outcomes and it can cause a mishandling of the CVD risk category specifically in the raised levels of triglyceride. Outcomes show that enhanced non-HDL cholesterol cases LDL-cholesterol is significantly less because of the increased TG : HDL ratio and LDL is more atherogenic in this group [7]. There is a possibility that in the two individuals level of LDL-cholesterol is same in the varying stages of CVD risk. Main point is that LDL-cholesterol is an indicator of the cholesterol in the particles of LDL and also produces some information for the particle number and it is not a marker of CVD risk. It is

reliable in the assessment process of CVD risk for the atherogenic particles estimation in serum because non-HDL cholesterol is recommended as a healthier CVD marker in comparison to the LDL-cholesterol.

Our outcomes analysis through SPSS-22 and T-test reflect that it is particularly relevant for dyslipidemia cases having excessive triglycerides as (1.7 mmol/l). Instead of having normal level of LDL-cholesterol these patients have enhanced Non-HDL cholesterol levels in males and females respectively 77/747 & females 66/624). In the national awareness program for the identification of the LDL and non-HDL cholesterol as target therapy when assessed CVD risk and non-HDL cholesterol subjects taken as primary target in the evaluation of the triglycerides. It also reported in abundance that level of triglyceride (above 100 mg/dl), as the increased herogenics mall dense particles of LDL are in dominance due to the small size and potent to penetrate in the surface of endothelial & atherosclerosis initiation [8].

In the past research studies CVD risk is because of the raised serum triglycerides and enhanced triglyceride: HDL proportion as 16 – 18 in the increased TG : HDL proportion as an indicator of the dense small particles of LDL suspected for more atherogenic in comparison to the normal level of LDL. Our research shows that lipid profiles analysis of dyslipidemia groups in males and female both as (TG > 1.7mmol/l) that has been assessed with non-HDL cholesterol, which was observed as significant low LDL-cholesterol; on the other hand, it is to be taken inconsideration that in the presence of similar levels of LDL-cholesterol the particles of LDL particles are reported more atherogenic potential due

to their smaller size and increased ratio of TG : HDL. Numerous research studies also report in the several cases with the targets of LDL-cholesterol with developed complexities by atherosclerosis. Consequently, it is a need for the assessment of an alternate measurement that is able to provide even better diagnostic which is reliable and ranges from non-HDL cholesterol, particle number of LDL, levels of Apo B [9]. The factors involved behind the making of non-HDL as a valuable addition for existing lipid profile is possibly due to the summarized because it demands 2 analyses. Total and HDL cholesterol (non-HDL-cholesterol (mg/dL) = TC − HDLC), non-HDL-cholesterol analysis does not depend on sample of fasting and also not added to the lipid profile case analysis with no extra analysis, non-HDL-cholesterol may also be considered as a better marker of CVD risk due to its full evaluation of potent atherogenic Apoprotein B which contains lipoproteins (VLDL, IDL & Lpa) and non-HDL-cholesterol estimate is relevant in the raised triglycerides cases the LDL-cholesterol estimation alone never provides an accurate CVD risk as its LDL simple estimation is not able to provide wholesome assessment for apolipoprotein B which carried lipoproteins. In addition to that non-HDL-cholesterol is reflected in the association with clinical results which is shown in the numerous research studies investigations about the lipid profile parameters role on CAC (Coronary Artery Calcification); which is an early sub clinical atherosclerosis marker. There is a significant correlation of Non-cholesterol with the atherogenesis process. Non-HDL-cholesterol utility in CVD diagnosis was confirmed in various clinical trials and also contrasted with the non-HDL-cholesterol diagnostic values as acute coronary events prognostic factor and myocardial infarction in the healthy patients including diabetes. There is also a significant correlation documented among non-HDL-cholesterol and intima media thickness (IMT) in carotid artery growing IMT documented in the elevation of the CAD and also in the enhancement of the concentrations of non-HDL-cholesterol [10]. It is strongly recommended that that non-HDL-cholesterol is to be added for the regular lipid profile reporting because no additional cost is required for the reliability of the diagnosis process. Research had one limit that it was a retrospective analysis and no sample determination was carried out for the relation development of the non-HDL-cholesterol to arterial changes with other research studies.

CONCLUSION:
It is concluded in our research that a non-HDL

cholesterol was required for the true analysis of cardiovascular disease risk in addition to the LDL-cholesterol specifically in the elevated and assessed triglycerides samples. It is also recommended that non-HDL cholesterol can be stated as an integral lipid profile part.

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