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Determination of Serum Lipid Profile in Elderly and Non-elderly Pakistani Acute Myocardial Infarction Patients

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Abstract

Lipid abnormality is one of important risk factor for cardiovascular disease in AMI patients. In particular, LDL-C and HDL-C is an important factor for atherosclerosis and cardiovascular disease development. Lipid profile is not that much experienced with cardiovascular diseases (Acute myocardial infarction) in Pakistan.The purpose of the study was to investigate the serum lipid levels in both elderly and non-elderly AMI patients for both male and female. A total of 265 patients with myocardial infarction were collected in Jan 2019 from different Hospitals, Lahore, Pakistan. Demographic Information of each participant that's age, sex, were recorded as well. Lipid profile parameters were done as; Selectra Pro-M and AMP Diagnostic kits were used according to the manufacturer guidelines. After drawing a sample of 5ml from each patient into clot activator tube centrifuged the sample at 8000 rpm for 10–15 min, serum sample was putted in a selectra serum cup and then placed that cup in automated selectra rooter and later been performed according to the standard operating protocol of the selectramachine.In this study there were 265 patients with AMI. The mean age was comparable between non-elderly and elderly ; 52 years for men in non-elderly and 72 years for men in elderly, 54 years for women in non-elderly and 75 years for women in elderly). Levels of TC, LDL, and TG were lower in elderly than in non-elderly for the males and found significant (<0.05) except HDL whom level was comparable. Female lipid profiles between non-elderly and elderly, which containing TC, LDL, HDL, and TG, were also found in-significantly (> 0.05). However, in the non-elderly group, there were no significant differences in TC, LDL, and TG between male and female except HDL, whereas, in elderly group all the lipid parameters were found drastically significant. In addition, as we discussed female were drastically increased than male in this study for most of the lipid parameters, we also compared male elderly and female non-elderly

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which were noted as insignificant as well. Similarly, as for as female elderly is concern against the male non-elderly individuals the Anova compare mean test depicted a comparable association in between (>0.05).Dyslipidemic feature is pre-dominantly frequent in the non-elderly than elderly individuals for males. Serum Levels of all lipid parameters including TC, LDL, HDL, and TG were found raised in females than males for the elderly Pakistani individuals. Consequently, these patients may require lipid-lowering therapy to overcome the increased risk of cardiovascular disease. Another thing is that high TG which should be reduced as we found overall TG as independent factor for AMI in this study, so it may be critical to such patients.

Keywords: Serum, Lipid Profile, LDL-C, HDL-C, cardiovascular disease.

Introduction

Acute myocardial infarction is the leading cause of death in United States (US). About 1.5 million cases reported suffered from acute MI and one third of them die(1).Myocardial infarction depend on a number of factors; however, impaired lipid metabolism is one of the vital factor in the development of the disease(2).Observed significantly higher total cholesterol (TC) and triglyceride (TG) levels and lower high-density lipoprotein cholesterol (HDL) levels in AMI patients(3).The biomarkers potential of using various lipids parameters for predicting risk of acute myocardial infarction (AMI) is ambiguous, therefore, mountain body of studies have been conducted in the past regarding all the lipid profiles parameters and their role including; serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL), high-density lipoprotein cholesterol (HDL) and triglycerides (TG)(4). Epidemiological surveys have shown that atherosclerosis due to dyslipidemia is directly correlated with a risk of IHD.

Coronary artery disease (CAD) has been directly linked to hypercholesterolemia, particularly elevated plasma levels of cholesterol in low-density lipoproteins (LDL-C)(5). Increased risk of AMI has been noticed in patients with low plasma levels of high-density lipoprotein (HDL-C) cholesterol(6). In the Pakistani population, a recently published study reported that 63% of the population had one or more deranged lipid parameters. The common, isolated forms of lipid irregularity were low HDL-C (17.3%) and high triglyceride (TG) (11.2%) (7),Both of these parameters have been regarded as linear risk factors for CAD and stroke In a study with young patients of AMI(8) (within 24 hours), it was seen that 60.83% were dyslipidemic; the most common isolated deranged lipid fraction was TG (45%) whereas low HDL was least common (10.83%)(9)(1). Impairment in lipid metabolism (dyslipidemia) can result in premature atherosclerosis, leading to the development of cardiovascular disease(8). It has recently been pointed out, that there is an epidemic of cardiovascular disease in urban South Asia (10, 11), Pakistan being a part of this region with a very high rateof coronary disease.Dyslipidemia being modifiable risk factors of coronary heart disease needs special focus(2). Although there is conflicted information for causative factors as for as total lipids and serum(3, 4).It is reported that cholesterol levels are no longer valid after 24 hours from presentation of acute myocardial infarction as it causes a rapid decline during the first 24 hours (5, 6). The clear mechanism Studies on middle-aged men demonstrated that a sigmoid relationship (curvilinear) between total serum cholesterol level and prevalence of coronary artery disease

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especially in total cholesterol(22). more High frequency of dyslipidemia is reported in many atherogenic lipid triad, is more common than others, and consists of the co-existence of increased very low density lipoprotein (VLDL) remnants manifested as mildly elevated triglycerides (TG), increased small dense low-density lipoprotein (LDL) particles, and reduced high density lipoprotein-cholesterol (HDL-C) levels (7, 8). This study was conducted to find out the pattern of dyslipidemia in elderly and non-elderly patients of myocardial infarction.

Cardiovascular (CV) disease is a leading cause of death worldwide, accounting for approximately 31.4% of deaths globally in 2012. It is estimated that, from 1980 to 2000, reduction in total cholesterol accounted for a 33% decrease in coronary heart disease (CHD) deaths in the United States. In other developed countries, similar decreases in CHD deaths (ranging from 19%–46%) have been attributed to reduction in total cholesterol. Low-density lipoprotein cholesterol (LDL-C) has now largely replaced total cholesterol as a risk marker and the primary treatment target for hyperlipidemia(9).According to the World Health Organization (WHO), the prevalence of non-communicable diseases worldwide has been increasing, and among these, cardiovascular diseases (CVDs) are one of the most serious and leading cause of mortality and morbidity. CVDs are responsible for almost half of all the deaths worldwide and majority of these deaths occur in low-to-middle-income countries and among people aged 70 years and above, and 15 years and above due to obesity (10). Acute myocardial infarction (AMI) is a critical health problem because it can quickly lead to death or leads to serious post-acute-period complication (11). The purpose of the study was to investigate the serum lipid levels in both elderly and non-elderly AMI patients for both male and female.

Map of Lahoe

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Subjects

This was a retrospective study. A total of 265 patients with myocardial infarction were collected in Jan 2019 from different Hospitals, Lahore, Pakistan. The patients were excluded containing ,Incomplete details of lipid profiles, Patients with chronic liver dysfunction, Diabetes mellitus, malignant tumors and other serious medical diseases, Patients who were taking medications of lipid-lowering, such as statins and fibrates. Inclusion criteria majorly were those who have been diagnosed for acute myocardial infarction initially and then these patients were determined for their lipid profile parameters.The data was recorded on a pre-designed tested questionnaire and with the help of it each patient was evaluated attentively and detailed medical history of each individual was taken and noted.

Demographic Information of each participant that's age, sex, were recorded as well. Before including in the study written consent was obtained from each participants, showing theircustom in order to participate in the study. Patients who got any type of external factor responsible for disturbing lipid level e.g. drug etc. Pregnant women were also excluded from the study. The study approved by Human Ethics Committees of Department of medical laboratory sciences, Faculty of health & Allied sciences, Lahore, Pakistan.Lipid profile parameters were done as; Selectra Pro-M and AMP Diagnostic kits were used according to the manufacturer guidelines. After drawing a sample of 5ml from each patient into clot activator tubecentrifuged the sample at 8000 rpm for 10–15 min, serum sample was putted in a selectra serum cup and then placed that cup in automated selectra rooter and later been performed according to the standard operating protocol of the selectramachine.It was a retrospectively collected data, such as gender, age, and lipid profile.

Determination of Lipid profile

Estimation of cholesterol

For the estimation of cholesterol, Selectra Pro-M and AMP Diagnostic kits were used. The standard was prepared and calibration was done. 200ul of sample was taken in a selectra serum cup and was put in selectra rooter and test was performed.

Estimation of Triglycerides

For the estimation of triglycerides, Selectra Pro-M and AMP Diagnostic kits were used. The standard was prepared and calibration was done. 200ul of sample was taken in a selectra serum cup and was put in selectra rooter and test was performed.

Estimation of High Density Lipoprotein (HDL)

For the estimation of HDL, Selectra Pro-M and AMP Diagnostic kits was used. The standard were prepared and calibration was done. 200ul of sample was taken in a selectra serum cup and put in selectra rooter and test was performed.

Estimation of Low Density Lipoprotein (LDL)

For the estimation of LDL, SelectraPro-M and AMP Diagnostic kits were used. The standard was prepared and calibration was done. 200ul of sample was taken in a selector serum cup and was put in

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selector rooter and test was performed.

Statistical analysis

The continuous variables and categorical variables were expressed as mean ± standard deviation, as %, or frequencies with percentage, respectively. IBM SPSS Statistics 22.0 (IBM, Armonk, NY, USA) was used for all statistical analyses. Differences lipid profiles between groups based on were analyzed using $\chi 2$ test, Kreskas-Wallis test or One-way ANOVA analysis of variance test. A probability value of $P < 0.05$ was considered significant for this study.

Results

Clinical characteristics of selected patients are given in table 1. In this study there were 265 patients with AMI. The mean age was comparable between non-elderly and elderly ; 52 years for men in nonelderly and 72 years for men in elderly, 54 years for women in non-elderly and 75 years for women in elderly). Levels of TC, LDL, and TG were lower in elderly than in non-elderly for the males and found significant except HDL whom level was comparable (table 1). Female lipid profiles between non-elderly and elderly, which containing TC, LDL, HDL, and TG, were also found in-significantly (table 2). However, in the non-elderly group, there were no significant differences in TC, LDL, TG between male and female except HDL, whereas, in elderly group all the lipid parameters were found drastically significant in male than female except HDL found higher in female than male (table 3). In addition, as we discussed female were drastically increased than male in this study for most of the lipid parameters, we also compared male elderly and female non-elderly which were noted as insignificant as well (table 4). Similarly, as for as female elderly is concern against the male non-elderly individuals the Anova compare mean test depicted a comparable association in between (Table5).

	Male Elderly (n=90)	Male Non-Elderly (n=50)	P-value
TC	4.55 ± 1.11	4.85 ± 1.19	<0.01*
HDL	1.31 ± 0.40	1.29 ± 0.39	>0.01ns
LDL	2.60 ± 0.84	2.83 ± 0.83	<0.01*
TG	1.49 ± 1.0	2.15 ± 1.6	<0.01*

Table 1. Lipid levels between Male elderly and non-elderly

	Female elderly (n=50)	*Female non-elderly (n=60)*	*P-value*
TC	5.15±1.25	5.27 ± 1.622	<0.01 ns
HDL	1.43 ± 0.41	1.47 ± 0.399	<0.01 ns
LDL	2.82 ± 0.97	2.83 ± 0.92	<0.01 ns
TG	1.87 ± 1.44	1.91 ± 1.33	<0.01 ns

Table 2. Lipidlevels between Female elderly and non-elderly

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Variables	Elderly		P value	Non-Elderly		P value
	Male	Female		Male	Female	
cases	90	50		65	60	
Age						
TC	4.55 ± 1.11	5.15±1.25	<0.01	4.89 ±1.19	5.27 ± 1.622	n.s
HDL	1.31 ± 0.40	1.43 ± 0.41	<0.01	1.25 ± 0.39	1.47 ± 0.399	<0.01
LDL	2.60 ± 0.84	2.82 ± 0.97	<0.01	2.80 ± 0.83	2.83 ± 0.92	n.s
TG	1.49 ± 1.0	1.87 ± 1.44	<0.01	2.15 ± 1.60	1.91 ± 1.33	n.s

Table 3. Clinical characteristics of AMI patients

	Male elderly (n=90)	Female non elderly (n=50)	P –value
TC	4.35 ± 1.11	5.27 ± 1.62	<0.01 *
HDL	1.3 ± 0.4	1.47 ± 0.39	<0.01 *
LDL	2.36 ± 0.84	2.83 ± 0.92	<0.01 *
TG	1.49 ± 1	2.12 ± 1.33	<0.01 *

Table 4. Comparison of lipid parameters between male elderly and female non-elderly

	Male non elderly (n=65)	Female elderly (n=50)	P value
TC	4.89 ±1.19	5.15±1.25	> 0.01 ns
HDL	1.25 ± 0.39	1.43±0.41	> 0.01 ns
LDL	2.80 ± 0.83	2.82±0.97	> 0.01 ns
TG	2.15 ± 1.6	1.87±1.44	> 0.01 ns

Table 5. Comparison of lipid parameters between male non-elderly and female elderly

Discussion

Lipid abnormality is one of important risk factor for cardiovascular disease in AMI patients. In particular, LDL-C and HDL-C is an important factor for atherosclerosis and cardiovascular disease development (12). More and more evidences that a decrease in LDL-C levels or an increase in HDL levels can prevent the occurrence of cardiovascular disease (13). This study was aimed to an investigate serum lipid levels in AMI patients in Lahore, Pakistan. Our research shows that, different age and gender subgroups had different lipid abnormality patterns. Compared with the elderly, the nonelderly had higher levels of LDL for males (2.83 ± 0.83) vs. TG (2.15 ± 1.6) and females 2.83 ± 0.92 vs. 1.91 ± 1.33, off note according to the previous studies TG is an independent risk factor for cardiovascular disease 14(52), and found solely TG raised levels in both male and female in the non-elderly group, it indicated they are more prone to be trapped by cardio vascular diseases.

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In addition, Male were found insignificant against the female in non-elderly group for TC, LDL and TG, whereas, HDL were found significantly decreased in male compare to female for, which is supported by a study was conducted in china 14(49). All inclusive portrayed that dyslipidemia was more prevalent among the nonelderly than the elderly. Therefore, it is necessary for the nonelderly to accept lipid-lowering therapy and choose more effective lipid-lowering drugs in order to. Merely, TG levels in nonelderly were higher compared to elderly for both males and females in Pakistan which is supported by another study conducted in Pakistan (15). Previous studies have proved estrogen play an important role in lipid metabolism ,(16). There may be unique environmental and socioeconomic factors due to high TG levels in nonelderly with AMI. Changes in diet and lifestyle may be were main factors, which reflect in residents of the area prefer to eat greasy food that increases the risk of dyslipidemia. At the same time, several studies also have shown that elevated TG levels are strongly related to lifestyle factors, which including increased body mass index, lower physical activity levels, increased intake of high calorie foods, and the specific mechanism was unclear (17-19).Interestingly, as we discussed there was a significant difference between male and female in elder group, this comparison slightly different from the non-elder group and LDL was found same while TG was found higher in female than male which was contrary in non-elderly individuals20(79). It shows that TG which is a possible independent risk factor for cardio vascular diseases due to this reason, Elder Females have more chance to get dyslipidimic based cardiac problem. A study reported in USA also had the same results 21(58).

According to the diagnostic criteria of dyslipidemia from guidelines for the prevention of dyslipidemia in adults 2007, Our data indicated that 31.1–40.6% of the nonelderly and 43.1–48% of the elderly AMI patients had normal lipids, and that AMI patients who had LDL levels <80 mg/dL accounted for 23%. Therefore ,most of AMI patients require lipid-lowering therapy in Pakistan. Studies had shown that early statin treatment reduced mortality, at the same time, it also can significantly improve the prognosis of patients with myocardial infarction who regardless of the level of blood lipids (22,23). The main mechanism is that statins are used to delay the progression of coronary atherosclerosis, minimize and stabilize plaques, eventually reducing cardiovascular events. Thus, it is necessary promoted intensive lipid-lowering therapy for AMI patients who had normal lipid files (24). Our study found that compared with females, males had higher LDL and TG for elderly patients, while contrary to low HDL. LDL-C and HDL-C were considered to produce adverse effects on the risk of myocardial infarction. The level of LDL can be reduced to the low limit approaching normal state (< 70 mg/dL) by statin therapies (25). However, statins do not completely prevent cardiovascular events, which data shown that cardiovascular events were reduced only 25–40% (26). In addition elevated LDL-C levels, lower level of HDL is strongly associated with cardiovascular events. Although there has been little acceptable treatment to improve HDL levels, these findings have important implications for lipid-lowering therapy in patients with acute myocardial infarction, in which lower HDL levels was associated with increased risk for myocardial infarction even if statin-treated patients who achieve LDL-C < 70 mg/dL.

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Conclusion

In conclusion, our findings confirmed that, lipid levels in serum are different in term of age and sex in Pakistani patients with acute myocardial infarction. Dyslipidemic feature is pre-dominantly frequent in the non-elderly than elderly individuals for males. Serum Levels of all lipid parameters including TC, LDL, HDL, and TG were found raised in females than males gender for the elderly Pakistani individuals. Consequently, these patients may require lipid-lowering therapyto overcome the increased risk of cardiovascular disease. Another thing is that high TG which should be reduced as we found overall TG as independent factor for AMI in this study, so it may be critical to such patients.

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