

ASSOCIATION OF NON-ALCOHOLIC FATTY LIVER DISEASE IN YOUNG HEALTHY ADULTS WITH DYSLIPIDEMIAS

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ABSTRACT

Objective: Present research work aims to assess association of fatty liver disease in young healthy adults with dyslipidemia.

Material and Methods: Present cross-sectional study was conducted at CMH Kharian, from January 2020 to January 2021. It included individuals with age of 20-30 years of either gender. In total 500 patients were screened for presence of fatty liver disease and hyperlipidemia. The demographics of the participants including age and gender were recorded. Blood samples of fasting participants were taken for lipid profile including total cholesterol, LDL, HDL and triglycerides. Moreover, liver transaminases were evaluated including aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels. Dyslipidemia was confirmed if any of lipid profile parameters were abnormal including total cholesterol (TC) more than 5.2 mmol, low density lipoprotein (LDL) more than 2.84 mmol, triglyceride (TG) more than 1.5 mmol and high-density lipoprotein (HDL) less than 0.9 mmol. Non-alcoholic fatty liver disease (NAFLD) was confirmed from ultrasonography.

Results: The mean age for participants was 24±2.9 years with age range of 21-28 years. Female participants were in majority (n=265; 53%) as compared to male participants (n=235; 47%). It is evident that 136(27.2%) patients comprised of both fatty liver disease and hyperlipidemia. Mean age for such patients was 23.76±2.89 years.

Conclusion: The co-existence of dyslipidemia and NFLD has been advocated.

Key Words: Dyslipidemia, Liver disease, Non-Alcoholic fatty liver disease.

This article can be cited as: Shehzadi A, Balooch S, Niazi NK, Afridi N, Qayyum A, Bukhari SARS. Association of non-alcoholic fatty liver disease in young healthy adults with dyslipidemias. Pak J Pathol. 2021; 32(3): 120-123.

INTRODUCTION

The non-alcoholic fatty liver disease (NAFLD) is defined as the presence of steatosis in liver with absence of any other identifiable cause such as alcohol consumption. It may be primary cause of chronic liver disease [1]. In the past few years, NAFLD is increasing tremendously. The reason for this increase lies in the enhanced prevalence of diabetes, obesity and metabolic syndrome. However, its natural history and pathophysiology is still questionable. It may range from mild liver fat accumulation to severe necroinflammation. It may exist with or without fibrosis [2].

Prevalence of NAFLD was found to be 30-40% in United States, 15-44% in Asia, 24.7-43.9% in China and 2-44% in Europe, as study conducted by Salvoza et al [3]. The western world has a prevalence of 20-30% for liver disease. Overall world prevalence of NAFLD has been recorded as 25.24%. The increase in fatty liver disease is quite alarming for the

researchers and practitioners. In USA, NAFLD was present in 47% of liver diseases in year 1998; which significantly increased from 47% to 75% as reported in year 2008.

Long term complications comprise of cirrhosis, cardiovascular diseases and hepatocellular carcinoma [4]. Such conditions emphasize the need of awareness of this disorder by physicians. This is more pronounced by the fact that NAFLD is highly associated with mortality due to liver linked and liver unlinked reasons [5]. Recently it is considered as the major reason for liver linked mortality and morbidity; where mortality mostly results from cirrhosis. NAFLD further increases the prevalence of other significant morbidities such as diabetes, cardiovascular diseases and chronic kidney disease.

Recent research works have laid emphasis on association of NAFLD with components of metabolic syndrome (MeS). Dyslipidemia is defined as an abnormal lipid metabolism, comprised of high triglyceride (TG) and low levels of high-density lipoprotein cholesterol (HDL-C) [6]. Krishan et al⁷ found that dyslipidemia is an important factor for occurrence of NAFLD. On the other hand, dyslipidemia has been associated with risk factors such as obesity, diabetes, environmental exposure,

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Received: 26 Nov 2020; Revised: 10 Aug 2021; Accepted: 10 Sep 2021

age, gender, ethnicity and geographical region. Several studies have pointed out strong association between NAFLD and dyslipidemia [8].

Dyslipidemia in NAFLD comprises of low HDL-cholesterol (HDL-C), increased plasma triglycerides (TGs), small and dense LDL-cholesterol (LDL-C). Thus, the management of atherogenic dyslipidemia is mandatory in the setting of NAFLD [9]. The combination of dyslipidemia and NAFLD results in hypertriglyceridemia and increase in size of very low-density lipoprotein. On the other hand, many research works indicate the link between NAFLD and development of nonalcoholic steatohepatitis (NASH). The present study is a contribution towards literature devoted for understanding association of dyslipidemia and NAFLD. For this purpose, healthy patients visiting out-patient department for general check-up have been screened for presence of NAFLD and dyslipidemia. The combined existence of NAFLD and dyslipidemia has also been assessed. Various previous research works have been oriented towards finding prevalence of NAFLD among different populations. Similarly, dyslipidemia has been recognized as an increasing morbidity among people of various ages [5]. The most alarming situation appears for the individuals with young age. The decreased intake of healthy food and increased use of junk food has resulted in occurrence of hyperlipidemia in this age group. Resultantly, the prevalence of other co-morbidities is on rise¹also resulting in higher mortality rate. Thus, there is need to address this situation.

MATERIAL AND METHODS

The present descriptive, cross-sectional study was conducted at radiology department CMH Kharian, from January 2020 to January 2021. It included individuals with age range of 20 – 30 years. The patients with either gender visiting for routine checkup and willing to participate in the study were asked to fill consent form. The adults under use of corticosteroids or antiepilepsy medication were excluded from the study. In total 500 patients were screened for presence of fatty liver disease and hyperlipidemia.

The demographics of the participants were recorded. This included age and gender. The blood samples of fasting participants were taken for lipid profile including total cholesterol, LDL, HDL and triglyceride. Moreover, liver transaminases were evaluated including aspartate aminotransferase (AST) and alanine aminotransferase (ALT) and were included in results. Dyslipidemia was confirmed if any of lipid profile parameters were indicated to be

abnormal including total cholesterol (TC) more than 5.2 mmol, low density lipoprotein (LDL) more than 2.84 mmol, triglyceride (TG) more than 1.5 mmol and high-density lipoprotein (HDL) less than 0.9 mmol. NAFLD was re-confirmed from ultrasonography.

The descriptive analysis was conducted to present data as mean \pm standard deviations or frequency and percentages. Statistical package for social sciences (SPSS) V.17 was used for data analysis.

RESULTS

Table-I shows demographics of participants including the mean age for participants with age range of 21 to 28 years. Confounding variables like Obesity were recorded and BMI was checked for obese patients. The prevalence of fatty liver disease is increasing tremendously among young adults, due to which the patients of this particular category were included in present study. The increasing mortality of young adults due to enhanced rate of fatty liver disease and hyperlipidemia is a growing concern. The female participants were in majority (n=265; 53%) as compared to male participants (n=235; 47%).

Table-I: Demographics of patients

Demographics	Descriptive statistics
Age (years) mean \pm SD	24 \pm 2.9
Gender n(%)	
Male	235 (47%)
Female	265 (53%)

The Table-II shows comparative presence and absence of fatty liver disease and hyperlipidemia. It is evident that 136 (27.2%) patients comprised of both fatty liver disease and hyperlipidemia. However, fatty liver disease was evident in total of 252 (50.4%) participants, whereas, 248 (49.6%) patients did not have fatty liver disease. On the other hand, hyperlipidemia was present in 270 (54%) participants, whereas, absence of hyperlipidemia was indicated in 230 (46%) patients.

In total, 116 (23.2%) patients were reported with presence of fatty liver disease and absence of hyperlipidemia. On the other hand, presence of hyperlipidemia and absence of fatty liver disease was indicated in 134 (26.8%) patients. Only 114 (22.8%) patients were reported with absence of both hyperlipidemia and fatty liver disease. Thus, it is evident that majority of the patients (27.2%) carried both the diseases of hyperlipidemia and fatty liver disease. Out of 252 participants with fatty liver disease 165 have increased levels of ALT (more than 55 units per liter) while 87 have normal levels of ALT.

The AST levels was raised (greater than 48 units per liter) in 75 participants out of 252 with fatty liver disease. 65 participants with no fatty liver disease on ultrasonography have raised levels of ALT. Only 35 participants with absence of fatty liver has raised AST levels.

Table-II: Comparative presence and absence of fatty liver disease and hyperlipidemia.

Characteristic n (%)	Presence of Hyperlipidemia	Absence of Hyperlipidemia	Total
Presence of fatty liver disease	136 (27.2%)	116 (23.2%)	252 (50.4%)
Absence of fatty liver disease	134 (26.8%)	114 (22.8%)	248 (49.6%)
Total	270 (54%)	230 (46%)	500 (100%)

The Table-III shows demographics of patients with co-morbidity of fatty liver disease and hyperlipidemia. The mean age for such patients was 23.76 ± 2.89 years. The female participants were majority (n=92; 67.64%), whereas, male participants were in minority (n=44; 32.35%). Thus, female patients might be more prone towards presence of both the diseases of hyperlipidemia and fatty liver disease.

Table-III: Demographics of patients with fatty liver disease and hyperlipidemia.

Demographics	Descriptive statistics
Age(years) mean \pm SD	23.76 ± 2.89
Gender n (%)	
Male	44 (32.35%)
Female	92 (67.64%)

DISCUSSION

The exact mechanism of NFLD is still debatable. However, research has indicated the involvement of insulin resistance, oxidative stress, steatosis and release of inflammatory cytokines. Other important factors involve central adiposity, hypertension, increased BMI, and hyperlipidemia [10]. Such events are characteristics of metabolic syndrome and result in fibrosis and cirrhosis. The lipid propagation in non-adipose tissue is significant in terms of such events. Endothelial dysfunction comprised of atherogenic cytokines and abnormal vascular reactivity is also an important feature. Such patients have high mortality rate due to enhanced chances of cerebrovascular diseases, vascular disease, coronary and peripheral disorders [11]. The pathological hallmark of NAFLD includes lipid accumulation in hepatocytes, which indicates

association between abnormal lipid metabolism and NAFLD. However, abnormal lipid metabolism due to other morbidities can also result in NAFLD [9].

Dyslipidemia comprises of high triglyceride (TG) and low high-density cholesterol (HDL-C) levels. Both these factors work together to result in atherosclerosis. About 20 % -80% of NAFLD patients suffer from dyslipidemia [6]. On the other hand, common change in metabolic profile of patients with diabetes, metabolic syndrome and obesity is the fluctuation of serum lipid levels, which is indicative of dyslipidemia. Thus, NAFLD has close relationship with other important diseases of diabetes, obesity and metabolic syndrome. With the increase in NAFLD and dyslipidemia, other relevant diseases are also on increase [12].

The most common form of co-existence of NAFLD and dyslipidemia is evident from atherogenic dyslipidemia. It comprises of high LDL-C levels, low HDL-C levels and hypertriglyceridemia. Long duration of dyslipidemia result in enhanced expression and activity of sterol regulatory element binding protein-1c [13]. This transcription factor negatively impacts profiles of lipid and lipoprotein synthesis in the liver. Resultantly, triglycerides, low-density lipoprotein and very low-density lipoprotein levels are increased with reduced high-density lipoprotein levels [14].

The present research work is a contribution towards understanding the association of hyperlipidemia with fatty liver disease. This stance has long been advocated by several research works [15]. Same has been justified with the findings of present study. In present research work, 136 (27.2%) showed presence of hyperlipidemia and fatty liver disease. This figure is high enough to justify the co-existence of the two important diseases [16].

The age for patients with co-morbidity of liver disease and hyperlipidemia was 23.76 ± 2.89 years. The previous research works advocate the appearance of hyperlipidemia and NFLD in young adults [17]. On the other hand, previous research works showed that probability of hyperlipidemia and NFLD is higher in male population [18]. However, this finding has been opposed by the outcomes of present research work. The present research work showed female population to be in majority with 67.64%. Anyhow, this difference can be justified on the basis of the fact that female population was in majority from the start of study. This may have suppressed the results associated with the male gender.

Certain limitations were encountered during this study. Firstly, the present study comprised of females in wide majority, which might have altered

the results. Secondly, liver biopsies were not performed on participants because no definite risk factors existed for advanced NAFLD in population. Thus, NASH was not predictable in present study. The reason of not including liver biopsies was the benign nature of NAFLD. Biopsies are highly associated with hazards and in the absence of effective therapies, role and efficacy of liver biopsies becomes contentious. Despite these facts, liver biopsies remain the appropriate and adequate method for diagnosing NASH. Moreover, liver biopsies enable detection of severity of liver damage [15].

Although healthy participants were screened during the present study, majority of them were diagnosed with either dyslipidemia or NAFLD. On the other hand, wide majority were suffering from co-morbidity of NAFLD and hyperlipidemia. Only 114 (22.8%) patients were devoid of both the diseases. This indicates the increasing prevalence of hyperlipidemia and NAFLD, and most importantly their co-existence. As the co-morbidity of NAFLD and hyperlipidemia result in various other important diseases, this situation needs to be addressed. Thus, the future research works should focus on proper management of both the diseases. Further exploration is required to assess effective ways of managing the co-morbidity situation of NAFLD and dyslipidemia.

CONCLUSION

The findings of present study suggest that there is an association of dyslipidemia and NAFLD. As prevalence of both the diseases is increasing tremendously, so is the rate of their co-existence. Thus, the management of hyperlipidemia and NAFLD on individual basis has become mandatory. On the other hand, their management as in co-existing form has also become attention seeking for practitioners and researchers. The present study advocates the co-existence of both the diseases and advocates their combined management.

AUTHORS CONTRIBUTION

Anum Shehzadi: Original concept, paper write up

Salahuddin Balooch: Data analysis and interpretation, paper write up

Najam-Us-Saqib Khan Niazi, Nighat Afridi, Adil Qayyum: Manuscript revision and literature review discussion writing

Syed Aown Raza Shah Bukhari: Proofread and literature review

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