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CAROTID ATHEROSCLEROSIS;

PREVALANCE IN OBESE PATIENTS HAVING HEPATIC STEATOSIS AND ITS EFFECT ON THE DEVELOPMENT OF MI

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ABSTRACT... Objectives: To determine the frequency of carotid atherosclerosis in obese patients having hepatic steatosis and its effect on the development of MI. **Design:** Cross-sectional study. **Setting:** Department of Radiology Allied Hospital, Faisalabad. **Period:** From January 2012 to June 2013, **Patients and method:** A total of 96 patients were included in this study. LOGIC 5 Doppler ultrasound machine was used. B-mode ultrasonography of common carotid arteries was performed on both sides with a 7.5 MHz linear array transducer. Ultrasound was done in supine position & elevation of chest by pillow. Patient head will be turned to the opposite side. Intima media thickness was accessed in the distal wall of common carotid artery of both sides 1.0 cm proximal to carotid bulb. **Results:** Mean age of the patients was 46.69±11.86 years. Out of 96 patients, 51 (53.1%) were males while remaining 45 patients (46.9%) were females. Presence of carotid atherosclerosis was noted in 96 patients (100.0%). Out of these patients, myocardial infarction was present in 81 patients (84.4%). Mean BMI was 30.67±0.47, mean weight was 91.86±7.57 Kg and intima media thickness was 0.84±0.12 mm. **Conclusion** Prevalence of atherosclerotic changes in carotid arteries detected by Doppler ultrasound among obese patients having hepatic steatosis and its effect on the development of MI is remarkable

Key words: Carotid atherosclerosis, Obesity, Hepatic steatosis, Myocardial infarction

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INTRODUCTION

The zenith in obesity is proving to be a major dilemma in almost all countries around the world because of increased number of diseases associated with it.[1] Prevalence rate of obesity is about 10.3% in Pakistan.[2] Obesity is proving to be a main culprit in causing many health related problems like IHD, DM, HTN & many more and therefore hampering the quality of life.[3,4]

Fatty liver and steatohepatitis are the components of Non-alcoholic fatty liver disease. Non-alcoholic fatty liver disease (NAFLD) includes a broad spectrum of liver diseases that occurs in the absence of significant alcohol intake. The spectrum of diseases include the macro vesicular steatosis and an entity called (NASH) non-alcoholic steatohepatitis which is proving to be a predisposing factor in the development of cirrhosis, diffuse fibro sing nodular liver condition.[5]

In contrast to gold standard, the hepatic biopsy for detection and quantification of hepatic steatosis, the evolution of imaging techniques has an emerging role as a non-invasive alternative to liver biopsy as is evident by many studies.[6]

Magnetic resonance spectroscopy (H-MRS) is generally considered the best technique and is immensely used as a reference paradigm in manipulating hepatic fat contents as a non-invasive way, because of its high precision and an optimum choice by most of the patients to abstain from liver biopsy.[7]

NAFLD is related to obesity, which itself triggers many health related problems like the development of insulin resistance and metabolic syndrome. It is evident that there is strong association of obesity with the occurrence of carotid atherosclerotic plaque lesions. Raised

carotid intima media thickness values were found in the presence of NAFLD and the prevalence of carotid atherosclerotic plaques was higher in the patients with NAFLD when compared with the healthy persons without NAFLD.[8]

Carotid intima media thickness (IMT) is thought to be a strong predictor in atherosclerotic disease process development in the presence of various risk factors like hyperlipidemia, diabetes mellitus and the hypertension.[9]

With the aid of ultrasonography, carotid IMT can be measured nonintrusive and it corresponds well with histological evidence of subclinical atherosclerosis. Raised IMT is also thought to be linked with an inflated risk of many life threatening cardiovascular and cerebrovascular diseases, and therefore with the severity of generalized life periling atherosclerosis.[10]

Obese patients with fatty liver have strong association with carotid atherosclerotic plaques formation and are the main cause of the majority of cardiovascular event myocardial infarction (MI). The carotid atherosclerosis findings matches well with the magnitude of atherosclerotic disease elsewhere in the body and is a better prognosticator of vascular events, like MI and CVA.[11] The prevalence rate of MI was found to be 52% on follow up in a prospective study of Bari et al in patients having carotid atherosclerotic plaques.[12]

The purpose of our study was to detect sub clinical atherosclerosis at an early stage to identify high risk individuals and take appropriate measure as to either change their lifestyle or use pharmacological measures. Our study would help these patients and physicians in preventing these patients from the risk of developing MI and so to reduce the mortality and morbidity.

PATIENTS AND METHODS

This was a Cross-sectional study undertaken in Department of Radiology, Allied Hospital, and Faisalabad. Study was carried out over a period of eighteen months from January 2012 to June 2013.Ninety six patients who ranged from > 25 yrs and < 65 yrs of age of both genders with BMI more than 30.

MRS showing hepatic steatosis and carotid Doppler USG showing increased IMT (carotid atherosclerosis) with no previous history of MI were recruited in the study.

The patients excluded from the study are those with history of Alcohol consumption, smoking and of previous stroke and with unstable vitals, general MRI contra-indications (metallic implants and pacemakers)

Patients were collected from OPD of Radiology and medical department of Allied Hospital Faisalabad. BMI of each individual was calculated who full fill the inclusion criteria.

LOGIC 5 Doppler ultrasound machine was used for the assessment of carotid vessels. B-mode ultrasonography of common carotid arteries was performed on both sides with a 7.5 MHz linear array transducer. Ultrasound was done in supine position & elevation of chest by pillow. Patient head was turned to the opposite side. Intima media thickness was accessed in the distal wall of common carotid artery of both sides 1.0 cm proximal to carotid bulb. The sampling gate was placed at the center of the arterial axis & flow velocities were recorded only after the signal has stabilized. Peak systolic velocity was measured in the common carotid artery with insonation angle adjusted between 500 & 600 to the course of vessel. The luminal diameter of common carotid artery was measured between the bright internal echogenic lines of parallel vessel wall, & percentage of narrowing of its lumen would be measured.

To minimize bias, all of the measurements should be taken in the same position at the same level. Patients having increased IMT were followed for twelve months for evaluation of MI as a sequel of carotid atherosclerosis

Data was analyzed by using SPSS version 17. Descriptive statistics was calculated for all

variables. Mean and standard deviation was calculated for all quantitative variables like age, weight, and BMI and intima media thickness. Frequency and percentages were calculated for all qualitative variables like gender, presence of carotid atherosclerosis and MI.

RESULTS

Majority of the patients were between 36-45 years of age with mean age of the patients was 46.69±11.86 years (Table-I) and 51 (53.1%) were of these were male (Table-II).

Presence of carotid atherosclerosis was noted in 96 patients (100.0%). Out of these patients, myocardial infarction was present in 81 patients (84.4%). (Table-III and-IV).

Mean values of BMI, weight and intima media thickness (Table-V).

Age (Year)	Number	Percentage
26-35	18	18.8
36-45	31	32.3
46-55	24	25.0
56-65	23	23.9
Total	**96**	**100.0**
Mean±SD	**46.69±11.86**	

Table-I. Distribution of cases by age

Gender	Number	Percentage
Male	51	53.1
Female	45	46.9
Total	**96**	**100.0**

Table-II. Distribution of cases by gender

Carotid atherosclerosis	Number	Percentage
Yes	96	100.0
No	-	-
Total	**96**	**100.0**

Table-III. Distribution of cases by presence of carotid atherosclerosis

Myocardial infarction	Number	Percentage
Yes	81	84.4
No	15	15.6
Total	**96**	**100.0**

Table-IV. Twelve months follow-up myocardial infarction (MI)

Variables	Mean	Standard deviation
BMI	30.67	0.47
Weigh (Kg)t	91.86	7.57
Intima media thickness (mm)	0.84	0.12

Table-V. Mean values of BMI, weight and intima media thickness

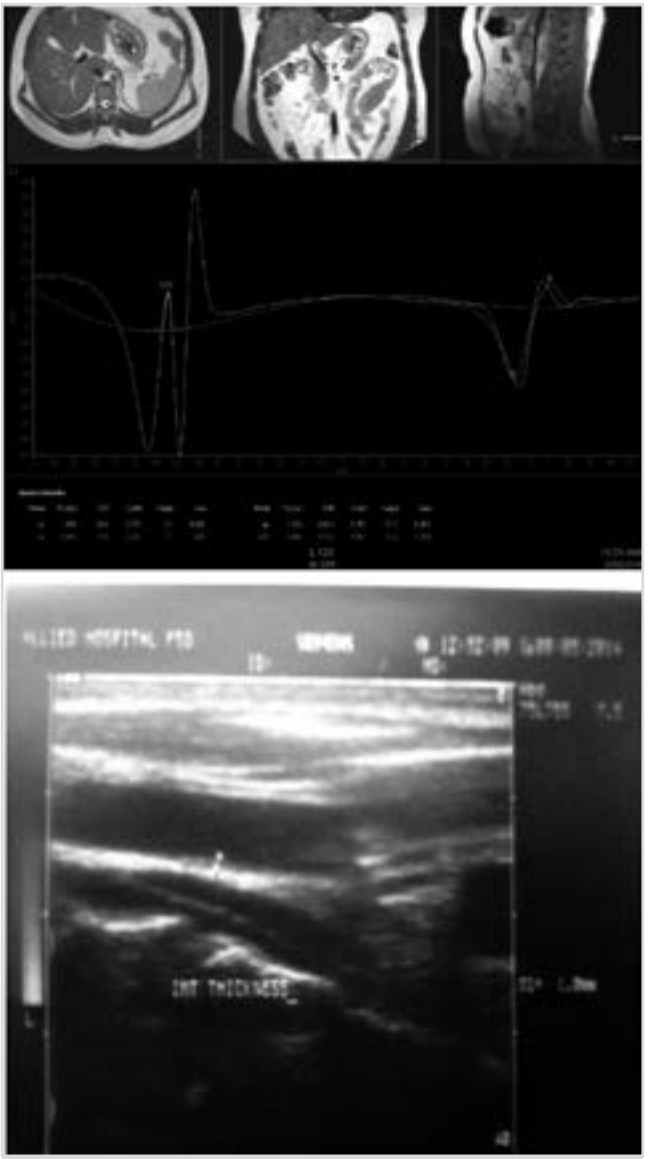

Figure-1: MR Spectra of liver showing raised lipid peak relative to water peak suggestive of Grade I Steatosis.

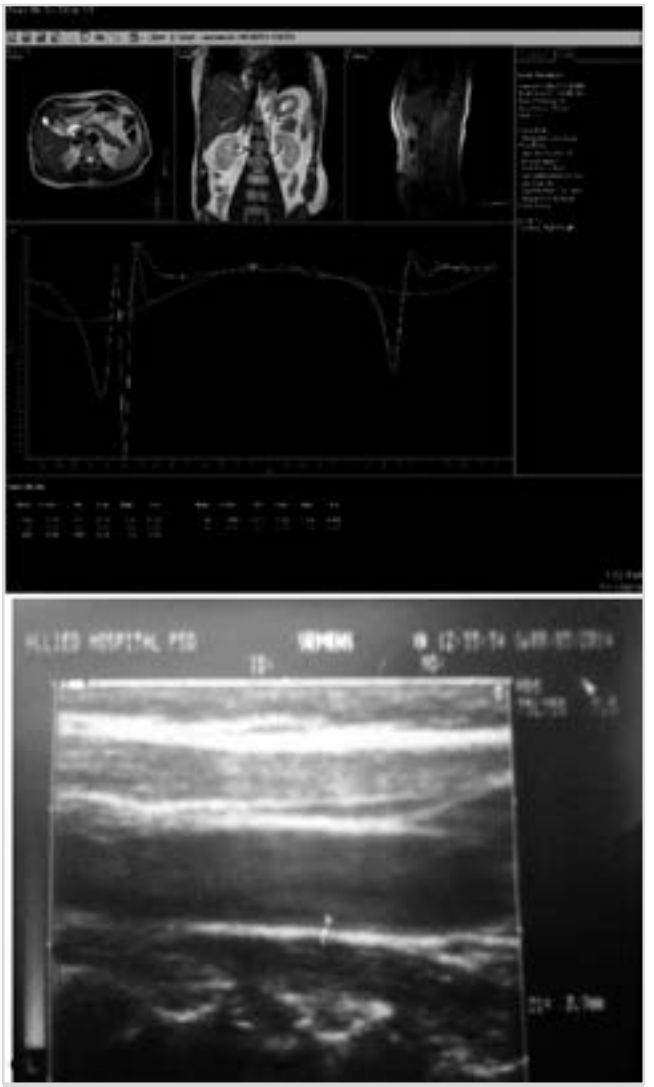

Figure-2: MR Spectra of liver showing raised lipid peak relative to water peak Suggestive of Grade II Steatosis.

DISCUSSION

The extensive rise in the transience and macabre rate in industrialized countries are due to cardiovascular diseases. Atherosclerosis causes the luminal narrowing by the deposition of atherosclerotic plaque formations and is considered among the leading causes of myocardial infarction or cerebrovascular accidents.[13]

Presence of atherosclerotic plaque in one arterial bed does not signify its sole involvement instead according to many studies there do exist strong alliance between severity of atherosclerotic disease in one arterial bed and involvement of other vessels.[14]

Presence of any atherosclerotic findings like raised intima media thickness in the common carotid artery or carotid bulbs was associated with 3 times increased risk of developing acute myocardial infarction (AMI) according to Tuomiletito J et al study and the presence of small or large plaque in the same area showed a quadruple size of AMI compared to the healthy subjects free of disease process.[15] Thus nonintrusive evaluation of carotid atherosclerosis can be used to forecast coronary atherosclerosis and upcoming corona events.

The assessment of diseased atherosclerotic arterial segment can be made properly and with high levels of accuracy with the help of high resolution ultrasonography. Using ultrasonography we can measure the exact arterial wall thickness, proper assessment of the luminal reduction is done easily and nature of the plaque can also be commented precisely.

Development of ultrasonography has made the estimation of severity of atherosclerosis of large superficial arteries much easier and accurate. Ultrasonography enables the measurement of wall thickness of the superficial arteries; where as in angiography only lumen diameter can be assessed. Intima-media thickness of common carotid artery with the aid of ultrasonography has been recommended as a useful speculator to assess the presence of coronary artery disease in a publication of the American Heart Association.[16] Nature of carotid atherosclerotic plaque, elevated plaque score, increased number of plaques and degree of carotid stenosis are strongly collated with higher risk of development of coronary atherosclerosis, myocardial infarction and cerebrovascular events. These atherosclerotic changes are well examined with the help of carotid duplex ultrasound.[17]

Ultrasonography is the emergent nonintrusive, safe, economic and reliable method to assess atherosclerotic changes of large arteries located superficially such as carotid arteries. In our study, detectable carotid arterial atherosclerotic

changes were present is 52.1% of patients. Myocardial infarction was present in 84.0% of the patients. Our findings are comparable with study of Bari et al.[12]

Tanaka et al showed that there is found a strong co-existence between the extent of CAD, upcoming coronary events, and advancement of carotid atherosclerosis.[18] Crouse et al also found that there is strong co-existence between coronary artery statuses with mean intima-media thickness (IMT) at each of three carotid segments.[19] Thus carotid Doppler ultrasound findings of the present study correlate well with the previous similar studies done abroad.

CONCLUSION

The preponderance of atherosclerotic changes in carotid arteries detected by Doppler ultrasound among obese patients having hepatic steatosis and its effect on the development of MI is remarkable. Doppler ultrasound findings are also a good prognosticator of CAD and the procedure is non-intrusive, safe and easily approachable for interrogation but still least practiced in our country. Meticulous Doppler ultrasound findings may be helpful to identify patients prone to develop cerebrovascular or coronary events. So early treatment of such patients will help to reduce death rate and disability.

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"Stop cursing the darkness and light some candles."

Unknown

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