Comparison of Lower Limb Arterial Atherosclerosis by Doppler Ultrasound in Diabetic and Non Diabetic Patients

ARSHAD SALEEM SAHI1, SAJID SHAHEEN MALIK2, MIAN ABDUL WAHEED3

ABSTRACT

Aim: To compare lower limb arterial atherosclerosis in diabetic and non diabetic pts.

Materials: This cross-sectional descriptive study was performed in Cheema Heart & General Hospital and Al-Raee Trust Hospital Gujranwala, from tenth August 2017 to tenth February 2018. One hundred and twenty individuals were conveniently selected from the lower limb arterial atherosclerosis by Doppler ultrasound in diabetic and non diabetic patients. Doppler study was performed by high frequency probes (convex & linear) 5-11MHz Hitachi EUB-5500. Colour Doppler study was identified by colours in the vessels (present or absent or trickle flow). Spectral Doppler assessment was done by graphic presentation.

Result: 120 individuals included in this study of which 58 were diabetics and 62 were non diabetics. Regarding gender 23 males 19.2% and 97 (80.8 %) females. They were categorized in three age groups, maximum 73(60.8%) were enrolled from 35-60 age group. It was found that. only six diabetic patients out of 58 show atherosclerotic changes in lower leg arteries. On the other hand eight non diabetic patients out of 62 show atherosclerotic changes in upper leg Aretries.

Conclusion: It is concluded that diabetic patients show atherosclerotic changes prominently in lower arteries of leg on the other hand these changes were seen in upper arteries of the leg in non-diabetic patients.

Keywords: Arterial Atherosclerosis, Doppler Ultrasound and Diabetic & Non Diabetic Patients.

INTRODUCTION

Atherosclerosis is characterized by formation of atheromatous fibro-fatty plaque after injury to tunica intima. Atheroma occurs to different degrees in different parts of an individual's cardiovascular system esp leg arteries. In peripheral arterial disease, blood flow reduces slowly to legs or arms or the plaque can rupture causing embolism. Atherosclerosis often occurs long before the clinical symptoms become apparent. In the early stage Atherosclerosis mainly shows intermittent claudication however if disease exacerbates such as in association with infection and neural lesions, local gangrene may develop which gradually progresses to ulceration and ultimately amputation. Cigarette smoking, high sugar level, high blood pressure and hyperlipidaemia are major risks for peripheral arterial disease. Atheromatous formation tends to be well localized and usually occurs in the proximal or mid-portions of a given arterial bed. However Patients with diabetes generally present with more distal disease. About 2% of late middle age adults in Western countries have claudication1 and each year in England and Wales around 50 000 patients are admitted to hospital with PAD and 15 000 will require amputation2.

There are many factors which may influence the development of disease and, in general terms, the prevalence of peripheral vascular disease detected by noninvasive procedures is about three times greater than the prevalence of intermittent claudication3.

DM is a leading health devastating condition in the whole world these days4 with high prevalence in developing nations5 and with highest prevalence in pakistan6. DM has many late complications disturbing natural life style mostly due to vessel involvement7.

Occurrence of Peripheral ischemia are higher (20 times) in diabetics with PAD than in non-diabetics8,9. More than 30% of diabetic patients have evidence of PAD, when > 40 years. PAD is a major risk factor in diabetic patients leading to leg amputation10. In DM patients early Diagnosis of PAD is high valuable to see high risk patients of subsequent MI or stroke and to treat PAD, causing disability and amputation11.

So consistent investigation is necessary for better treatment to reduce the effect of comorbidities on the diseased person. Doppler Ultrasound is non-invasive, harmless, real time, cost effective high resolution in contrast to angiography which is invasive, time consuming and costly. So Doppler sonogram well accepted as a noninvasive imaging modality to be used for finding and grading the intensity of disease12.

Patients with severe, limb-threatening ischaemia will normally proceed straight to arteriography prior to surgery, but patients who are not surgical candidates may have an ultrasound scan to see if there is any lesion appropriate for angioplasty, which may improve circulation and reduce the likelihood of amputation. At the other end of the spectrum, patients with atypical symptoms that might be due to ischaemia can be examined to exclude the presence of significant illness. Rationale of research is to find out the PAD and comparison of hazards between diabetic & non diabetic patients.

METHODOLOGY & MATERIAL

The study design is Comparative, cross sectional in Cheema Heart & General Hospital and Al-Raee Trust Hospital Gujranwala. Whereas, the Study duration is 9
months having modality 3 D U/S examinations with high frequency linear and convex probes 5-11, Mega Hertz Hitachi EUB-5500. The study followed Simple Random Sampling technique of 120 patients, all diabetic and non diabetic patients with claudicating /ischemic legs. After taking informed written consent from parents / guardians of the patient, data will be collected through Performa before the imaging. Data collection sheet will be used to record the observed data. Questionnaire will be collected according to variables: Demographic data will be taken from the parents / guardians of the patients.

Questionnaire will be filled according to lower limb arterial atherosclerosis findings by Doppler ultrasound in diabetic and non diabetic patients

RESULTS

One hundred and twenty patients, comprising 58 (48.3%) diabetic and 62 (51.7%) non diabetic were included in this study. Mean age in diabetic and non-diabetic group was 51.6±9.75 (35 to 82) and 49.1±8.81 (35 to 74) years respectively. The mean of all the individuals was 50.39±9.32 (35 to 82) years (Table I). All the individuals have been categorized in three age classes. Group 35-60 years contains 73 (60.8%), group 61-75 contain 46 (38.3%) and group 76-85 year contain 1(0.8%) individuals, (Table 2). Frequency distribution of male and female gender out of total 120 patients was 23 (19.2%) and 97(80.8%) respectively (Table I). While frequency distribution of diabetics and nondiabetics were 58 (48.3%) and non-diabetics 62(1.7%) respectively. Cross tabulation of Clinical presentation and diabetes shows that Pain in both legs at rest in 2 (1.7%), Diabetic foot (Lt) 2 (1.7%), and Pain Both Legs after exercise with diabetes were 54 (45.0%) and without diabetes were 62(51.7%), Cross tabulation of the Doppler Findings and Gender shows that Female with Atherosclerotic Changes Both Lower Leg Arteries were 0 and Male with Atherosclerotic Changes Both Lower Leg Arteries were 4(3.3%). And Female with Atherosclerotic Changes Both Upper Leg Arteries 1(0.8%) and male with Atherosclerotic Changes Both Upper Leg Arteries 7(5.8%).

Atherosclerotic Disease 21(17.5%), while male with No Atherosclerotic Disease 85(70.8%). There was a very weak relation between diabetes and atherosclerotic disease which was statistically nonsignificant with P-value 0.66 and Pearson’s correlation coefficient r = 0.040. As shown in the (Table XI and graph VII).

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<th>Table I: Frequency of age</th>
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DISCUSSION

Atherosclerotic disease is the major cause of death in the world although significant work done in the management of risk factors26. Main cause for this is the ongoing epidemic of obesity-induced insulin resistance and type 2 diabetes21. Atherosclerosis is the hardening and narrowing, due to the deposition of fats around the artery walls22. Atherosclerotic disease disturb the flow of blood around the body, giving raise to serious complications23. Arteries carry blood from the heart to the rest of the body21. Innermost layer of Artery is called the endothelium or intima25. Atherosclerosis starts when the intimal layer becomes damaged, allowing the harmful type of cholesterol to build up in the artery wall26,27. Normal arteries have elasticity to overcome the excessive pressure exerted by heart and works as a shock absorber. With the development of atherosclerotic disease this elastic activity of the arteries become effected. Ultimately all the pressure exerted by heart will be reached to the terminal
part of the arteries which results in arterial rupture. There are numerous causes and predisposing factors of atherosclerotic disease, some most common of them are listed as: Hypertension, Hypercholesteremia, High triglycerides, smoking and other sources of tobacco, arthritis, systemic lupus erythematosus or infections, inflammation of unknown cause, and Insulin resistance, obesity or diabetes. Researchers showed how DM drastically accelerates atherosclerosis, by promoting inflammatory process and slowing down blood streaming. Once agreed that arterial stiffness, appeared when hypercholesteremia blocked arteries with plaques. Heart attacks and strokes happens When completely occluded. Now a days majority of the scientists are agreed that body's immune system response to fat deposition, is higher than itself build-up, produces the risk of heart attack.

This possibility, mediated through epigenetic changes, may explain finding that improved glycemic control is most effective when started earlier in life compared with starting in patients with advanced type 2 diabetes and pre-existing cardiovascular disease. The prediction that the obesity epidemic will continue to accelerate the incidence of type 2 diabetes and its deadly consequence of atherosclerotic vascular disease over the next decades emphasizes the importance of further mechanistic and translational work in this critical area of biomedical research. Although few pts in our study but still we see a relation of diabetes with atherosclerosis as shown in table XI and graph VIII.

CONCLUSION
It is concluded that diabetic patients show atherosclerotic changes prominently in lower arteries of leg. On the other hand non-diabetic patients show these changes in upper arteries of the leg. As we have very small proportion of diabetic patients included in our study but we observed that there is a week relation between diabetes and atherosclerotic disease which is statistically nonsignificant. If the sample size of the diabetic individuals is increased or followed for some period of time then more significant results are expected. If the duration of diabetes is correlated with atherosclerotic disease, then it is expected that there will be strong correlation between them.

REFERENCES
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