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Ankle Brachial Index (ABI): is it Essential to Make it Part of Routine Medical Examination

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Abstract: *Ankle Brachial index is a reliable indicator of presence of arterial stenosing disease of lower limb. Also it is of predictive value in follow up of patients with cardiovascular diseases (Sikkink CJ, 1997).*
In this study, ABI was used in examination of individuals without lower limb complaints to assess its value as part of routine clinical examination. The relations between ABI and weight status and age are studies as well. As there is significant error in ABI results when brachial systolic pressure is more than 200mm Hg, diastolic ABI is proposed as a possible alternative.
Keywords: *ABI, Ankle brachial index, Systolic ABI, Diastolic ABI, lower limb occlusive vascular diseases, BMI*

I. Introduction

Normally systolic pressure in the tibial arteries is equal to or greater than the brachial pressure. Any decrease in ankle pressure relative to that of brachial one is indicative of presence of flow limitation condition in the proximal artery of lower limb (Pellerito, 2012).

It has been shown that the mean value of a normal AB1 is 1.11+_ 0.1 (YAO, 1970). Errors may result in interpretation of patient condition if brachial pressure is more than 200mm Hg or if the AB1 is greater than 1.3 as a result of elevated tibial artery pressure caused by calcification of the tibia arteries (Pellerito, 2012).

Researchers found that ABI is reliable to be used for detection of lower limb arterial occlusive disease as well as the value of severity of it. it was documented that ABI in the range of 0.5- 0.9 is noticed in patients with mild to moderate occlusive condition while severe condition usually exhibit ABI less than 0.3 (Pellerito, 2012). Yao (YAO, 1970)reported ABI as less as 0.2 in Ischemic limbs. In the late 1990s investigators have found a significant relation between the ABI and cardiovascular morbidity and mortality as they demonstrated 5-year survival rate of only 63% in patients with an AB1 less than 0.5 (Sikkink CJ, 1997).Zhang and Coworkers in 2008 found that an ABI greater than 1.4 predicted mortality similar to that of ABI less than 0.9. Also they demonstrated that patients with peripheral arterial disease had an increased incidence of coronary events (Zhang Y, 2008).

In this work, systolic and diastolic ABI were used in randomly selected individuals who do not complain of lower limb diseases to evaluate their usefulness as part of routine examination.

II. Materials and Methods

Twenty five randomly selected individuals of different age were included in this work to study ABI nonvascular diseased persons and to find out any relation with age, weight status. All of them do not complain of lower limb symptoms of vascular or cardiac disease.

Blood pressure was measured in both arms and ankles using Mercury Sphygmomanometer. Ankle Brachial Index (ABI) was calculated by dividing systolic pressure of right ankle over the systolic pressure of right arm. Also it was calculated by using the highest systolic of ankles to highest systolic of arms. The diastolic pressure was used to calculate the diastolic ABI to study it significance in comparison with that of systolic pressure. ABI more than 1.4 is regarded as high ABI (Pellerito, 2012).

Diastolic ABI was proposed and suspected to have some significant relation with the already used ABI by systolic pressure. Data were included in tables below and graphs were plotted for comparison.

Weight and height were measured and body mass index (BMI) was calculated according to formula (BMI= Weight in Kg/ (Height in meter)^2.BMI of 18.5 – 24.9 is of normal weight and 25-29.9 is labeled mild obesity (termed overweight by WHO) and BMI of 30-39.9 is labeled moderate (termed obese by WHO) and BMI of 40 and higher is termed severe obesity (termed severely obese by WHO) (WHO, 2000).

III. Results and Discussion

BMI with Normal ABI	Percentage
Normal BMI with Normal ABI	**12**
Mild Obesity with Normal ABI	**20**
Moderate Obesity with Normal ABI	**40**

Table 1: Percentages from total of individuals with normal ABI and different BMI.

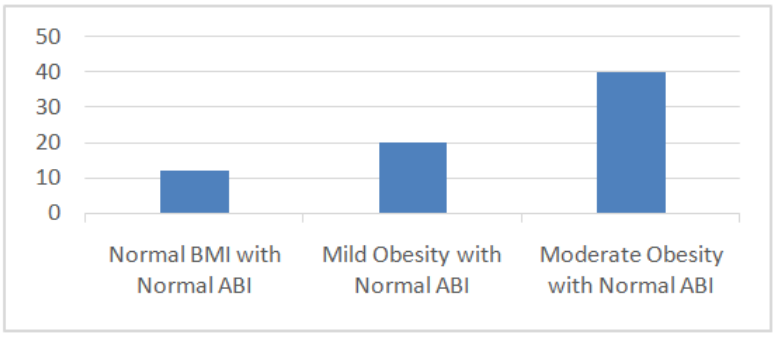

Figure1: Normal ABI with different weight status as BMI

BMI with increased ABI	Percentage
Normal BMI with Increased ABI	**8**
Mild Obesity with Increased ABI	**8**
Moderate Obesity with Increased ABI	**12**

Table 2: Percentages from total of individuals with increased ABI and different BMI.

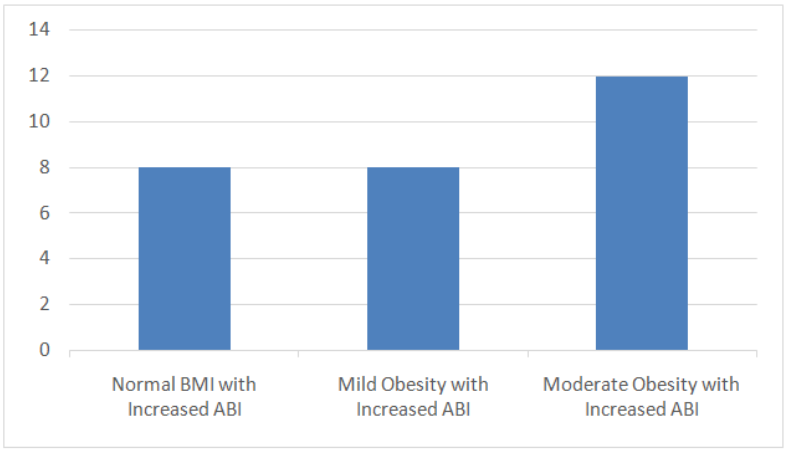

Figure 2: Percentages from total of individuals with increased ABI and different BMI.

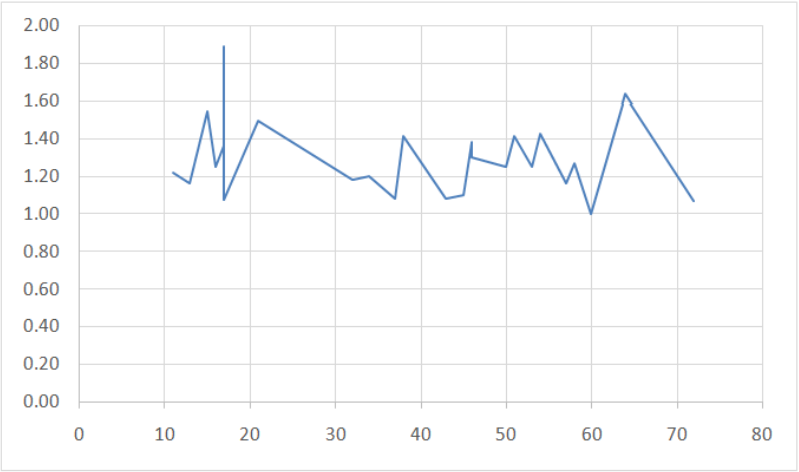

Figure 3: Relation of ABI with age.

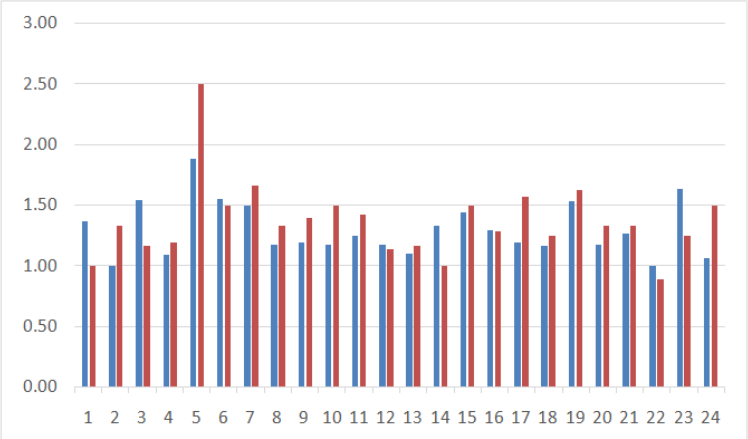

Figure 4: Blue represents right systolic and Red represents right diastolic ABI.

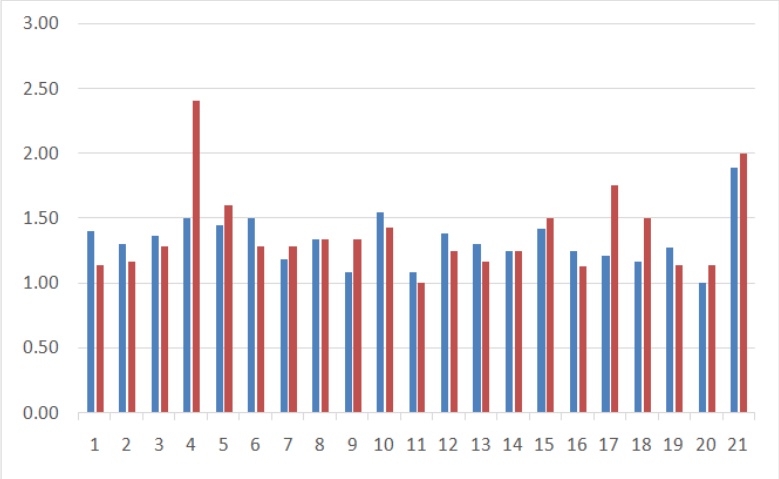

Figure 5: Blue represents left systolic and Red represents left diastolic ABI.

Table 1 and Figure 1showed that 72% of this selected group have normal ABI regardless of their weight status. 12% 0f normal ABI have normal weight and 20% are of mild overweight and 40% are of moderate increase in weight. 8% have normal weight with increased ABI. Table 2 and Figure 2 showed 8% have mild increase in weight with increased ABI. 12% havemoderate increase in weight with high ABI. So 28% of the whole group have high ABI regardless of their weight status but 71% of them have high BMI. 60% of those with high ABI and high BMI are over 50years of age. The age by itself does not show any significant and informative relation with ABI as shown in figure3. In our study in 2010(Kadhim et al, 2010) it was found that obesity is significantly high in age groups 36-50 and 56-60 years of age and in our study of 2011(Kadhim, 2011) showed a significant incidence of hypertension in same age groups as well. Taking all these parameters into consideration, It can be said that human after 50 years of age encounter a combined serious health problem as they are at risk of hypertension and have ABI indicative of cardiovascular morbidity and mortality and the majority of them have increase in body weight for a reason or another. From these data, it can be suggested that ABI is better to be included in every routine medical check of individuals whether they attend a clinic for general or special problem evaluationas this may have correlation to prognosis of patient condition.

It is well known that diastolic phase is significantly longer than systolic phase of blood circulation and tissue perfusion is more relevant in the former than the later. Assuming that diastolic parameters of blood flow can be more significant in vascular examinations, so in this work we calculated a diastolic ABI of right side(right arm and right ankle) and of the left side(left arm and left ankle) in a similar way of calculating systolic one and made a comparison between systolic and diastolic ABI of right side and those of left side each in a separate graph as seen in graphs (4 and 5). It is clearly seen that Diastolic ABI is nearly similar to systolic one and so both systolic and diastolic ABI give the same information and probably indicate the same clinical significance and implications. Because we have small number of data it is suggested that a future work with a large number of patients can give more information or probably can be more specific especially if it is studied in patients who are already suffering from lower limb vascular diseases. Diastolic pressure has strong relation with peripheral resistance of small vessels and capillaries so it may be more informative than systolic one in small vessel diseases which can occur in diabetes mellitus and as Systolic ABI may produce significant errors if systolic pressure is more than 200mm Hg(Pellerito, 2012), Diastolic ABI may replace it in such situations.

As a conclusion from this small work, we suggest for ourselves to start a wide study of our community to implement these parameters in cardiovascular and diabetes clinics.

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