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# ASSOCIATION BETWEEN BODY MASS INDEX (BMI), WAIST CIRCUMFERENCE (WC) AND RESTING BLOOD PRESSURE (RBP) WITH ANKLE BRACHIAL INDEX (ABI) IN 20-40 YEAR OLD INDIVIDUALS – A PILOT STUDY.

Dr Prachi Rajesh Chawan

Dr Titiksha Pol

Dr Asmita Karajgi

**ABSTRACT** **Aims And Objectives:** To find the correlation between BMI, WC, RBP and ABI of the right and left lower extremities individually in 20-40 year old individuals. **Methods:** 40 participants in the age group of 20-40 years were included where their BMI with the aid of therapist reported height and weight, waist circumference, resting blood pressure and ankle brachial index were assessed after an adequate rest pause. **Results:** Of the 40 participants, majority (67%) were females with a mean age of 29.48± 6.37 years. The association analysis was performed using Pearson's correlational test and Chi-Square test. The p-value of 0.37 and 0.97 and r value of -0.014 and -0.004 for correlation between BMI and ABI (R) and ABI (L) was obtained. A p-value of 0.12 and 0.41 and r value of -0.244 and -0.13 for correlation between WC and ABI (R) and ABI (L) was obtained. A p-value of 0.89 and an r-value of 0.004 and a p value of 0.89 and an r-value of 0.0037 for the correlation between RBP and ABI and correlation between MAP and ABI was obtained. **Conclusion:** A negative weak and statistically non-significant correlation was established between BMI and ABI, WC and ABI, was obtained whereas, a positive weak ,and statistically non-significant correlation was established between RBP and ABI, MAP and ABI.

**KEYWORDS :** Body Mass Index, Waist Circumference, Ankle Brachial Index, Hypertension.

## INTRODUCTION:

As per the 2018 consensus, India has seen a huge upsurge in the number of obese individuals with 1.6 billion adults being overweight and 650 million adults being obese [1]. Obesity can present in two forms: peripheral obesity and visceral obesity. Visceral obesity is a measure of the amount of fat present in and around the abdomen and the organs and may lead to the accumulation of free fatty acids and adipokines in the body. The presence of TNF alpha and IL 6 from the macrophages of the adipocytes causes further inflammation in the body [2]. The adolescent age group is the most vulnerable to the ill effects of obesity due to their various health behaviors like a sedentary lifestyle, physical inactivity, unhealthy eating habits, sleep disturbance, and addictions like tobacco smoking and alcoholism [3,4]. These health behaviors predispose the individual to the risk of various metabolic disorders such as insulin resistance, dyslipidemia, and diabetes mellitus (DM) [3,4]. The trend of obesity and overweight individuals is seen right from childhood with 19.3% of Indian children suffering from childhood obesity[5]. Transitioning from childhood and adolescent period to young adulthood with unhealthy lifestyles and behaviors further predisposes the individual to the development of the above-mentioned metabolic disorders [6]. Additionally, as per a systematic review by Amna Umer et al., childhood obesity has a positive and statistically significant association with cardiovascular risk factors if the individual is obese during adulthood [7]. Hence, childhood obesity is also a major determinant for the development of cardiovascular risk factors in adulthood. All these risk factors make adolescents and young adults between the age group of 20-40 years more vulnerable to the various ill effects of obesity [8].

It is observed that obesity is also a very important risk factor for Cardiovascular disease especially Ischemic heart disease (IHD) [9]. In accordance with a study by Dorairaj Prabhakaran et al., in the last two decades, India has faced a rise in the mortality rate of Ischemic Heart Disease (IHD) by 59% [9]. One of the major reasons for IHD is atherosclerosis of coronary arteries. Obesity, a confounding factor, triggers a series of inflammatory processes that leads to early atherogenesis in young adulthood. Along with the inflammation, sympathetic overactivity, and pre-existing dyslipidemia further increases peripheral vascular resistance, hence predisposing the individual to early/ premature hypertension. Another contributing factor to hypertension is the activation of RAAS and SNS, leading to increased circulating leptin in the body. Along with Hypertension, Diabetes Mellitus is also an equal contributor to CVD as it affects both the larger as well as the smaller blood vessels [10]. As per a study conducted by Pascal Geldsetzer et al., the crude prevalence of Hypertension was 25.3% and that of Diabetes Mellitus was 7.5% in Indians above the age of 18 years [11]. Hence, screening young individuals for obesity and its risk factors is very important. The various methods for the assessment of obesity include Body Mass Index (BMI), Waist Circumference (WC), Waist Hip Ratio (WHR), Skin fold Calliper assessment, and Body Fat Analyser (BFA). Of these, BMI is the most feasible and widely accepted method for the assessment of obesity. It is calculated as a ratio of the weight of the individual to the square of the height of the individual (kg/sq. m). Several factors play a role in influencing an individual's BMI like short height, increased lean muscle mass, etc. Therefore, BMI independently cannot be relied on for the assessment of central obesity. Another feasible and easily used method for the assessment of abdominal obesity is Waist Circumference (WC), assessed with the aid of non-elastic inch tape. Therefore, along with BMI, WC provides greater insight into the total obesity of an individual.

Obesity also leads to inflammation of the blood vessels. Along with atherosclerosis of the coronary arteries, it may also lead to atherosclerosis of the arteries of the lower limbs. With affection of more than one arterial bed, it can be stated that there is diffuse atherosclerosis in that individual. This atherosclerosis in the arteries of the lower limb is a leading cause for the development of peripheral arterial disease (PAD). A few risk factors for developing Peripheral Arterial Disease include cardiovascular disease, pre-existing hypertension, type 2 diabetes mellitus, smoking, etc. Of these, obesity is one of the major risk factors as it affects the blood vessels of the body.

It is observed that hypertension accounts for approximately 40% risk for PAD [12]. According to a study by Aaron W Aday et al., a dose-response relationship between hypertension and PAD with a relative risk of 2.6 for SBP > 140 mmHg and 1.6 for SBP between 120-139 mmHg was observed [12]. Along with this, it was also seen that Coronary Artery Disease (CAD) and PAD share a common pathogenesis making them a major cause of morbidity and mortality worldwide [12]. Individuals with diabetes mellitus are also strongly associated with the development of a severe form of PAD. It is known that active as well as passive smoking is also a leading risk factor for the development of PAD. Smoking is known to have an effect at both – macrovascular and microvascular levels. At the macrovascular level, cigarette smoking extracts (CSE) induce endothelial cell dysfunction which in turn leads to inflammation and hence atherosclerosis. At the molecular level, there is an abnormal metabolism of lipid cells accumulated in the blood vessels [10]. In a study by G Premalatha et al., it was found that the overall prevalence of PAD was 3.2% in the South Indian population [13]. As per a review published by Rupert Bauersachs et al. approximately, 18-35%

of individuals are diagnosed with CAD and 46-68% of individuals are diagnosed with PAD [14]. We all know that young adults are already at risk for the development of CAD and PAD due to their lifestyle and unhealthy behavioral habits adopted by them. This in turn leads to arterial stiffening and deposition of fat in the intima of blood vessels predisposing them to the risk of both – CAD and PAD [8]. Most of these individuals are asymptomatic and hence remain undiagnosed. It has already been studied that individuals above the age of 50 years are at risk for the development of PAD. Adolescents and young adults under the age of 40 years must be screened more often and thoroughly for the adverse effects of obesity and unhealthy lifestyles. As a result, they are at a greater risk for the development of premature hypertension, cardiovascular disease, and peripheral arterial disease due to their unhealthy lifestyle. In addition, most of these individuals remain asymptomatic making it even more difficult to identify them early. Hence, this pilot study aimed at screening and identifying the at-risk population for the adverse effects of obesity and to know if there exists an association between BMI, WC, RBP, MAP, and ABI and to identify the at-risk population for development of PAD.

## METHODS:

### Study Participants:

40 participants between the ages of 20-40 years predominantly residing in Mumbai, Maharashtra participated in the study. Both male and female genders were considered for the study wherein individuals with pre-existing peripheral arterial disease, cardiovascular disease, thoracic outlet syndrome, recent fractures, stroke, Parkinson's disease were excluded from the study.

### Study Setting:

This is a cross sectional study and the method of sampling was convenient. It was conducted in the Cardiovascular and Respiratory OPD of the parent institute and the total duration of the study was six months.

### Procedure:

The participants were provided with the patient information sheet and once the informed consent was obtained from the participants, the demographic details were taken with emphasis on the history of addictions, any comorbidities such as Diabetes Mellitus (DM), Hypertension (HTN), Hypothyroidism or Hyperthyroidism and any family history of Cardiovascular diseases.

The participant's height was assessed with the aid of a stadiometer wherein they were asked to stand tall and the height was taken with the participant in full inspiration. The height was measured twice and the mean of both values was recorded as the height of the participant[15].

The participant's weight was measured on a weighing scale calibrated in kilograms (kg). The participant was asked to stand on the weighing machine with minimal clothing. The weight was measured twice and the mean of both values was recorded as the weight of individual[15].

The Body Mass Index (BMI) was measured as the weight of the individual in kg divided by the square of height (in meters)[15]

For Waist Circumference, the midpoint of the participant's lowest border of the ribcage and the anterior superior iliac spine (ASIS) was identified and marked. At this point, the Waist Circumference was measured with the aid of a non-elastic inch tape. The Waist Circumference was measured twice and the mean of both values was recorded as the individual's waist circumference[15].

For measuring the resting blood pressure, the individual was given a rest time of 5 minutes (sitting on a chair). After the rest time, the BP cuff of the sphygmomanometer was applied on the right arm of the individual such that the middle of the cuff was at the level of the right atrium or the midpoint of the sternum. The diaphragm of the stethoscope was placed at the antecubital fossa and the cuff was inflated 20-30mmHg above the systolic blood pressure (palpatory). The cuff was deflated at a rate of 2mmHg/sec. The first audible sound marked the systolic blood pressure and the point at which the sound disappeared was the diastolic blood pressure. The readings were taken twice[16]

The ankle-brachial index (ABI) was measured with the patient in supine lying. Prior to the assessment, the individual was given a rest of 8 minutes in the supine position. For the pressure at the brachial artery (arm), the position of the cuff was similar to that of resting blood pressure. The brachial artery was palpated and the cuff was inflated. The cuff was then deflated at a rate of 2-3mmHg/sec and the point at which the brachial pulse was palpable marked the systolic pressure at the arm.

Similarly, for the systolic pressure at the ankle, the cuff was applied at the bare ankle, 2-3 cm above the malleolus. The posterior tibial pulse was palpated and the cuff was inflated. The cuff was then deflated at a rate of 2-3mmHg/sec. The point at which the posterior tibial pulse was palpable again marked the systolic pressure of the posterior tibial artery. The dorsalis pedis pulse was palpated and the procedure was repeated.

The sequence of assessing the ABI was
Right Arm ➡ Right Ankle (posterior tibial, dorsalis pedis) ➡ Left Ankle (posterior tibial, dorsalis pedis) ➡ Left Arm

The Ankle Brachial Index was calculated as the ratio of systolic pressure at the ankle to the systolic pressure at the arm where, the systolic pressure at the arm was the brachial artery with the highest pressure (right or left) and the systolic pressure at the ankle was the artery with the highest pressure (posterior tibial or dorsalis pedis of that lower extremity).

With a difference of more than 10 mmHg in systolic pressure at the right and left arm, the systolic pressure at the right arm was measured again[17]

### Data Analysis And Results:

This study included 40 individuals between the ages of 20-40 years with a mean age of 29.48± 6.37 years. Of these 40 participants, 67.5% were females and 32.5% were males.

Various other parameters such as Body Mass Index (BMI), Waist Circumference (WC), Resting Blood Pressure (RBP), Mean Arterial Pressure (MAP), and Ankle Brachial Index (ABI), of the population, were assessed and are presented in table 1. Their parameters such as Body Mass Index (BMI), Waist Circumference (WC), Resting Blood Pressure (RBP), Mean Arterial Pressure (MAP), and Ankle Brachial Index (ABI) were measured and classified for the statistical analysis as follows:

**a)** BMI was classified as underweight (<18.5 kg/sq. m), Normal (20-24.9 kg/sq. m), Overweight (25-30 kg/sq. m), and Obese (>30 kg/sq. m) [18]

**b)** Waist circumference was classified based on gender: for women, increased (>78-80cm) and for men (>85-90 cm) [19]

**c)** The Resting Blood Pressure (RBP) was classified as normal if the SBP and DBP were both below **120mmhg** and **80 mmHg** respectively and elevated if either of them (SBP or DBP) was elevated above their cutoff values of **120mmhg and 80 mmHg** respectively [20]

**d)** The Mean Arterial Pressure (MAP) was classified as normal (70-100 mmHg), decreased (<70mmHg) and increased (>100 mmHg) [21] and

**e)** The ABI was classified as normal (0.9-1.4) and decreased as value of <0.9 [22]

Table 1 shows that most of the participants had an increased BMI (45% were overweight and 5% were obese) followed by individuals with normal BMI (47.5%), and the least were underweight individuals (2.5%). Similarly, most of the participants were with normal WC (85%) and the remaining 15% of the participants had increased WC. The RBP was within normal limits in 77.5% of participants whereas it was elevated in the remaining 22.5% of participants and the MAP was within normal limits in 82.5% of participants, decreased in 10%, and increased in 7.5% of participants.

### Demographic Data:

Other demographic details of the population considered were history of smoking, comorbidities and family history of any cardiovascular disease. With history of smoking being considered 5% of the participants were occasional smokers, 7.5% of the participants had preexisting comorbidities like DM and HTN and 35% of the individuals had a family history of cardiovascular diseases.

**OUTCOME MEASURES:**

**Ankle Brachial Index (ABI):**

ABI was the main outcome measure used to assess the individuals at risk for the development of Peripheral Arterial Disease (PAD). PAD for the right lower extremity was identified with the help of ABI (ABI < 0.9) in 22.5% of individuals of which, 15% were females and 7.5% participants were males.

Similarly, PAD for the left lower extremity was identified in 37.5% of individuals of which, 20% were females and 17.5% participants were males (Table 2).

**Correlational Analysis Between The Various Attributes Of Our Population And ABI.**

Being a Correlational study, Pearson's correlational test and Chi-Square test were used to determine if a correlation existed between the various attributes of the population considered in our study. A scatter plot graph was plotted to understand the association of individual attributes and Ankle Brachial Index (ABI) of the right and left lower extremities separately.

**Correlational Analysis Between Body Mass Index (BMI) And Ankle Brachial Index (ABI).**

It was observed that the prevalence of PAD (right lower extremity) was found majorly in individuals with normal BMI (12.5%) followed by overweight individuals (7.5%), obese individuals (2.5%), and no prevalence in underweight individuals (table 3). Similarly, the overall prevalence of unilateral PAD for the left lower extremity was found to be the greatest in overweight individuals (17.5%), followed by individuals with normal BMI (15%) and then obese and underweight individuals (2.5% each) (table 4).

According to the scatterplot plotted between BMI and ABI (R), a negative, weak, and a non-significant correlation was established between BMI and ABI of the right lower extremity and the scatterplot for BMI and ABI (L) is suggestive of a negative, very weak and non-significant correlation. (Table 4) with a p value of 0.3787 and 0.9756 and an r-value of -0.1430 and -0.0049 for the right and left lower extremity individually (Table 4).

**Correlational Analysis Between Waist Circumference (WC) And Ankle Brachial Index (ABI):**

Waist Circumference being a measure of Abdominal Obesity provided a greater insight into the at-risk population for the development of PAD. It was observed that the prevalence of unilateral PAD (right lower extremity) was more in individuals with relatively increased waist circumference (20%) than in individuals with normal waist circumference (2.5%). Similar results were obtained for the prevalence of PAD of the left lower extremity with 30% of individuals with increased waist circumference having more risk of PAD than with normal waist circumference (7.5%) (Table 3).

As per Pearson's correlational test and the scatter plot, a negative, weak, and non-significant correlation was established between WC and ABI (R) and the scatterplot of WC and ABI (L) is suggestive of negative weak and non-significant correlation with an r-value of -0.2442 and p-value of 0.1292 (R) and an r-value of -0.1327 and a p-value of 0.4133 (L) (Table 4).

**Correlational Analysis Between Resting Blood Pressure (RBP) And Ankle Brachial Index (ABI):**

As per the results obtained from the analysis, it was observed that the at-risk population for the development of PAD of the right lower extremity were the normotensive individuals (15%) as compared to the hypertensive population (7.5%). Similarly, individuals at risk for the development of PAD of the left lower extremity were majorly normotensives (27.5%) and individuals with the least risk were hypertensive individuals (10%) (Table 3).

Table 4 demonstrates the correlational analysis between RBP and ABI wherein According to Pearson's correlational test and the scatterplot, a positive, very weak, and non-significant correlation between RBP and ABI (R) was found (Table 4) and the scatterplot of RBP and ABI (L) is suggestive of a positive, very weak and non-significant correlation with an r value of 0.0446 and 0.0217 and a p-value of 0.7846 and 0.8943 for SBP and DBP (R) and an r value of 0.0276 and 0.0387 and a p-value of 0.8658 and 0.8126 for SBP and DBP (L) (Table 4).

**Correlational analysis between MEAN ARTERIAL PRESSURE (MAP) and ANKLE BRACHIAL INDEX (ABI):**

The correlation between the MAP and ABI of the right lower extremity showed that individuals with the highest prevalence of PAD for the right lower extremity were those with normal MAP (15%), followed by individuals with reduced MAP (7.5%) and absence of PAD in individuals with increased MAP. Similarly, the prevalence of PAD for the left lower extremity showed that individuals with normal MAP were at the greatest risk of PAD (30%) followed by individuals with reduced MAP (5%) and individuals with increased MAP having the least risk of development of PAD (2.5%) (Table 3).

As per Pearson's correlational test and scatterplot of MAP and ABI (R), a positive very weak and non-significant correlation was obtained for unilateral PAD of the right lower extremity and the scatterplot of MAP and ABI (L) is suggestive of a positive, very weak and non-significant correlation with an R-value of 0.0301 and a p-value of 0.8537 (R) and an r-value of 0.0375 and a p-value of 0.8183 (L) (table 4).

**DISCUSSION**

The risk of development of PAD is a major concern in the young and at-risk population. With the ABI of both lower extremities being considered individually as the main outcome measure, we individually attempted to correlate various parameters such as BMI, WC, RBP, and MAP with the ABI of the right and the left lower extremities. The results of this study were suggestive of a greater risk of development of PAD in females (15% for the right lower extremity and 20% for the left lower extremity) as compared to the male participants (7.5% for the right lower extremity and 17.5% for the left lower extremity). Maria Pabon et al., in a study, found that this sex variation in the prevalence of PAD could be at multiple levels. When considering the pathophysiology, it is known that estrogen is the primary female sex hormone and it has a great role in influencing vascular health. It was further found that estrogen affects immune responses during atherosclerosis, which could probably justify the sex- specificity nature of this disease. In addition to the sex hormones, sex chromosomes have an equal contribution to the development of vascular function and dysfunction[23].

A negative, weak, and non-significant association between BMI and ABI was also found with individuals having normal BMI and overweight individuals at a greater risk for the development of PAD and obese and underweight individuals having the least risk for the same. The results are in consensus with a study by Joachim H Ix et al., which studied the prevalence of PAD based on the BMI of the participants where approximately 5419 participants >50 years of age participated in the study. These individuals were followed up every year for the change in BMI and progression of their PAD and the initial BMI and ABI were taken as baseline parameters. With the baseline parameters, it was found that in their population, there existed an inverse relation between BMI and the risk of developing PAD. This study also stated that with every 5-unit increase in BMI, there was a 9% decreased risk for the development of PAD at the age of 50 years and above. This study also suggested that smoking as well as reduced quality of life could lead to reduced BMI and at the same time predispose the individual with normal BMI and overweight individuals to the risk of developing PAD[24]. Individuals with a BMI of 25.7kg/sq. were at the least risk for the development of PAD – A statement provided by Junpei Li et al. Along with this, a U-shaped association was also established between BMI and PAD with underweight and obese individuals having a statistically significant association with the risk of developing PAD. It was hypothesized that this result could be due to a low level of inflammation (CRP) in individuals with normal BMI and overweight individuals as compared to obese individuals predisposing them to a lower risk of PAD[25]. The probable reason for the variability in the results could be the small sample size of our population (n=40). We hypothesize that had our sample size has been larger, we would get similar results.

It is known that along with BMI, a measure of intraabdominal fat is also strongly associated with the risk of developing PAD. Intra-abdominal fat was assessed with the aid of Waist Circumference. Intraabdominal fat is also associated with insulin resistance, which in turn is a crucial cause for the development of metabolic syndromes. It was also suggested that, unlike BMI, Abdominal Obesity (AO) was associated with a 4-fold greater risk of developing PAD. With insulin resistance, there is the presence of IL-6, which is the most important cytokine for the development of PAD. It is also involved in altering vascular health and endothelial function predisposing the individual to the risk of PAD[26]. The results obtained from this study are suggestive of a negative, weak, and non-significant correlation between WC and ABI and individuals with increased waist circumference were at a greater risk for the development of PAD.

With the Resting Blood Pressure of individuals being taken into consideration, normotensive individuals were at a greater risk for developing PAD as compared to hypertensive individuals. According to a study conducted in 2018, it was observed that individuals with lower Systolic Blood Pressure (SBP) <120mmHg were at a 26% greater risk of developing PAD. A similar association between Diastolic Blood Pressure (DBP) and the risk of PAD was reported. One of the reasons for this could be that perfusion takes place during the diastole phase of the cardiac cycle. In an already compromised blood vessel having atherosclerosis, there is reduced perfusion of the lower extremities. This perfusion is now dependent on the DBP during exercise, justifying the above-mentioned association. A positive, weak, and non-significant association was established between RBP and ABI with normotensive individuals at a greater risk for PAD than hypertensive individuals. It was also seen that the risk of developing PAD was lower at increased Mean Arterial Pressure (MAP) a finding similar to the results obtained from our study[27]. The above-mentioned hypothesis could be a probable reason for the similar results obtained from our study.

The strengths of the study involve the assessment of the participant's height and weight by the principal investigator for BMI, assessment of WC, and even the resting Blood Pressure by the principal investigator, unlike self-reported patient measurements. With the principle investigator assessing all these essential variables, the probability of errors is significantly reduced. This study had various limitations one of them is the study is a pilot study. The other limitations include not quantifying the history of addictions (into pack years) and a greater percentage of females participating in our study. The association between pre-existing comorbidities and PAD, addictions, and PAD, and family history and PAD remains to be established.

Future implications of this study involve conducting a similar study on a larger population wherein the results of the study would be more justifiable and valid and would thus help to provide a statistically significant statement on the associations we are attempting to establish.

## CONCLUSION

- A negative and weak correlation was established between BMI and ABI of right and left (extremely weak) which means that normal weight and overweight individuals could be at risk of developing PAD but it was not statistically significant.
- A negative and weak correlation was established between Waist Circumference and ABI of the right and left lower extremities, which were statistically not significant.
- A positive and very weak correlation was established between RBP and ABI of the right and left lower extremities, which was not significant.
- A positive and very weak correlation was established between MAP and ABI of the right and left lower extremities, which was not statistically significant.
- We also found that females were at a greater risk of developing PAD as compared to males.

**Table 1: Participant Parameters:**

| Parameters | Mean | Increased | Normal | Decreased |
|---|---|---|---|---|
| BMI | 24.58±4.05 kg/sq. m | 45% overweight 5% obese | 47.5% | 2.5% |
| WC | 82.28±8.05 cm | 15% | 85% | NA |
| SBP | 110.80±9.33 mmHg | 22.5% | 77.5% | NA |
| DBP | 68.20±11.25 mmHg | | | |
| MAP | 82.73±19.01 mmHg | 7.5% | 82.5% | 10% |

**Abbreviations :**

BMI- Body Mass Index, WC- Waist Circumference, SBP- Systolic Blood Pressure, DBP- Diastolic Blood Pressure, MAP- Mean Arterial Pressure, ABI (R)- Ankle Brachial Index of right lower extremity, ABI (L)- Ankle Brachial Index of left lower extremity.

**Table 2: Mean ABI Of The Population With Percentage Distribution Of Individuals With Decreased ABI.**

| | MEAN | | |
|---|---|---|---|
| ABI (R) | 1.04±0.007 | | |
| ABI (L) | 1.02±0.006 | | |
| | Individuals with affected ABI (ABI<0.9) | | |
| | Females | Males | Total |
| ABI (R) | 15% (n=6) | 7.5% (n=3) | 22.5% (n=9) |
| ABI (L) | 20% (n=8) | 17.5% (n=7) | 37.5% (n=15) |

**Table 3: Distribution Of Individuals Based On The Correlational Analysis Of Various Parameters And ABI.**

| | | BMI | | | | WC | | RBP | | MAP | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | UW | OW | OB | N | INC | N | INC | N | INC | DEC |
| ABI (R) | N | 35 % | 2.5 % | 37.5 % | 2.5 % | 12.5 % | 65 % | 62.5 % | 15 % | 67.5 % | 7.5 % | 2.5 % |
| | DEC | 12.5 % | 0 | 7.5 % | 2.5 % | 2.5 % | 20 % | 15 % | 7.5 % | 15 % | 0 | 7.5 % |
| ABI (L) | N | 32.5 % | 0 | 27.5 % | 2.5 % | 7.5 % | 55 % | 50 % | 12.5 % | 52.5 % | 5% | 5% |
| | DEC | 15 % | 2.5 % | 17.5 % | 2.5 % | 7.5 % | 30 % | 27.5 % | 10 % | 30 % | 2.5 % | 5% |

Abbreviations: ABI- Ankle Brachial Index, BMI- Body Mass Index, WC- Waist Circumference, RBP- Resting Blood Pressure, MAP- Mean Arterial Pressure, N- Normal, INC- Increased, DEC- Decreased

As per the table, most of the normal weight (12.5%) and overweight individuals (7.5%) were at a greater risk for the development of PAD, individuals with increased waist circumference were at a greater risk of PAD of right and left lower extremity (20% and 30%), normotensive individuals were at a greater risk for development of PAD (15% and 27.5%) for right and left lower extremity, and individuals with normal MAP were at a greater risk of developing PAD of both right and left lower extremities (15% and 30%).

**Table 4: Correlational Analysis Of Various Parameters And ABI Of Right And Left Lower Extremity Individually.**

| | **BMI** | | **WC** | | **RBP** | | **MAP** | |
|---|---|---|---|---|---|---|---|---|
| | **P Value** | **R-value** | **P Value** | **R-value** | **P Value** | **R-value** | **P Value** | **R-value** |
| ABI (R) | 0.3787 | -0.1430 | 0.1292 | -0.2442 | SBP= 0.7846 DBP= 0.8943 | SBP= 0.0446 DBP= 0.0217 | 0.8537 | 0.0301 |
| ABI (L) | 0.9756 | -0.0049 | 0.4133 | -0.1327 | SBP= 0.8658 DBP= 0.0387 | SBP= 0.0276 DBP= 0.0387 | 0.8183 | 0.0375 |

Abbreviations: ABI- Ankle Brachial Index, BMI- Body Mass Index, WC- Waist Circumference, RBP- Resting Blood Pressure, MAP- Mean Arterial Pressure,

As per the table, a negative, weak and non-significant correlation was established between BMI and WC with ABI of right and left lower extremity individually and a positive, weak and non-significant correlation was established between RBP and MAP with ABI of right and left lower extremity individually.

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