A STUDY OF WRIST CIRCUMFERENCE AND WAIST TO HEIGHT RATIO IN PATIENTS WITH CORONARY ARTERY DISEASE IN SOUTH INDIAN TERTIARY CARE HOSPITAL

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ABSTRACT
Cardiovascular disease (CVD) is one of the leading causes of the death. The prevalence of CVD is steadily and rapidly increasing, nearly to be 14.2%. A study was carried out for a period of 6 months from November 2018 to April 2019 to determine the wrist circumference [WrC], waist to height ratio [WHtR] and waist circumference in coronary artery disease (CAD) and non-CAD patients. A total of 150 patients were enrolled and divided into two groups as CAD and non-CAD groups. Wrist circumference [WrC] was significantly higher in CAD compare to non-CAD patients [CAD =64% and non-CAD 58%]. As wrist circumference as anthropometric index 64% of CAD patients and 58% of non-CAD patients are in medium frame and 20% of CAD and 16% of non-CAD are in large frame. These results show only mild association. Waist circumference measurements shows 48% of CAD patients are at risk and 18% of non-CAD patients are at risk. From our results we can conclude that as there was not much differences in CAD and non-CAD regarding anthropometric indices, it cannot be studied in 6months, it requires more sample size and 5-6 years long term study.

Keywords: Wrist circumference, Waist to height ratio, Cardiovascular diseases, Coronary artery disease.

INTRODUCTION

Cardiovascular disease (CVD) is one of the leading cause of the deaths after infectious disease and malnutrition. In 2010, CVD accounts for 16millions of deaths all over the world[1]. Within the Indian sub continent the prevalence of cardiovascular disease [CVD] steadily and rapidly increasing, nearly to be 14.2%[2]. The global rise in cardiovascular disease [CVD] is the result of changes in the etiology of morbidity and mortality[3]. In the industrialized world, physical activity continues to decline while total calorie intake increases resulting epidemic of obesity[4-6]. Prevalence of type2 Diabetes Mellitus (DM), Hypertension (HTN) and lipid abnormalities are increasing day by day and these trends are particularly witnessed in paediatrics[7-8]. If these risk factors continue, age adjusted CVD mortality would increase in the coming years. The preventive programs in developing countries resulted in downward trend of CVD over the past decade, However lack of such educational programs made CVD even more prevalent in low income countries during the recent years.

Therefore, now a days early diagnosis and control of CVD is more important among developing countries. The cardio metabolic risk is associated with obesity and overweight and these may be varied by age, dietary habits

and gender. There are well documented studies established that obesity, hypertension and dyslipidemia are the risk factors for cardio vascular diseases [CVD]. The anthropometric index such as body mass index [BMI] has been studied and reported to be a significantly related to Cardiovascular disease [CVD] risk factors, where as other anthropometric indexes such as wrist circumference [WrC] waist circumferences [WC], hip circumference [HC], and waist to height ratio [WHR] are not studied properly in India[9-11]. To fill this gap our present study made an attempt to determine the study of wrist circumference (WrC), waist circumference, waist to height ratio in CAD and non-CAD patients.

METHODOLOGY
It is a cross-sectional study with a sample of 150 patients who met the inclusion criteria were recruited in the study which was conducted over a period of 6 months from Nov 2018 – April 2019 at Dr. PSIMS & RF which is a 850 bedded tertiary care teaching hospital Chinnoutpally, Gannavaram Mandal, Krishna district, Andhra Pradesh, India. Initially a study protocol was approved by IEC of Dr. PSIMS & RF. All the individuals who underwent angiogram were included in the study, and non-CAD patients are considered as controls, CAD patients are considered as cases, and only male patients were considered in the study.
Patients who are not willing to participate, who had wrist injuries, and with altered mental status, pregnant women and female patients were excluded from the study. The data collection form was designed to collect each patient demographic details, past medical history, angiogram reports and information from patient interview. Measurement of wrist and waist circumferences was taken and comparison was performed among CAD and non-CAD patients.

Wrist circumference measurement
In subjects wrist circumference is measured in a seated position using a tape measure position over the Lister tubercle of the distal radius and over the distal ulna. Wrist circumference was measured on the right arm at the wrist crease distal to styloid processes(minimum circumference in these region) without the tape is too tight or too lose with lying flat on the skin. In the case of any deformity we measured the left wrist in examination. Wrist circumference between 17.5- 17.8 cms were considered as medium frame and less than 17.5 cms as small frame and greater than 17.8 cms as large frame.

BMI Calculations
BMI were identified as screening tool for obesity. If a persons BMI is outside of the healthy range, their health risks may increase significantly.
BMI was calculated by dividing the weight (kgs) with the square of heights (in metres).

$$BMI = weight(in\ kg)/height(\ in\ metres(sq).$$

BMI between 18.5- 25 kg/msq considered as normal range and less than 17kg/msq considered as underweight and 25-30 kg/msq considered as a overweight greater than 30 kg/msq considered as obese.

Waist circumference measurement
Waist circumference indicates fat around the waist. Increase in the waist circumference associated with health problems such as type2 DM, heart disease and high blood pressure. It is measured by standing with a feet shoulder width apart and back straight. Locate at top of hip bone. Start at the top of hip bone and then bring the tape measure all the way around the body level with belly button. Make sure it's not too tight and it should be straight, even at the back. Don't hold your breath while measuring. Check the number on the top measure right after you exhaled and measure the value. Waist circumference between 86-93cms considered as normal range and greater than 94cms as risk and greater than 102 cms as substantial risk.

Waist to height ratio (WHtR)
Waist to height ratio is a much better indicator of increased risk of heart attack, stroke or death than the more widely used body mass index(3).

$$WHtR = waist\ circumference\ (in\ ms)/height\ (cms)$$

WHtR 0.4-0.5 considered as normal range, 0.51- 0.6 as overweight and 0.61- 0.7 as obese.

RESULTS AND DISCUSSION
Table 1 depicts 4%(4 patients) are in the range of 25-35 years for both CAD and non-CAD, 13%(13 patients) of CAD and 14%(7 patients) of non-CAD are in the range of 36-45 years , 34%(34 patients) of CAD and 18%(9 patients) of non-CAD are in the range of 46-55 years and 49%(49 patients) of CAD and 60%(30 patients) of non-CAD are in the range of 56 years and older.
Table 2 explains all the anthropometric indices measured in our study. It compares the values of wrist circumference, waist circumference, BMI, waist to height ratio in CAD and non-CAD

patients. In case of wrist circumference majority of the patients are in medium frame in both coronary artery disease (64%) and non-coronary artery disease (58%). 20% and 16% of patients of coronary artery disease and non-coronary artery disease respectively are in large frame. In the measurements of BMI majority of patients are found to be normal in both coronary artery disease (57%) and non-coronary artery disease(60%). 33(33%)patients and 14(28%)patients of coronary artery disease and non-coronary artery disease respectively are fall under over weight category. Waist circumference and waist to height ratio are important anthropometric indices to measure the risk of cardiovascular diseases. In case of coronary artery disease patients majority (48%) have the waist circumferences values fall under risk category. Non coronary artery disease patients were mostly (82%) have normal waist circumferences values. Waist to height ratio values shows mostly patients are over weighed with 55% and 48% in CAD and non-CAD patients respectively.

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CONCLUSION
From our results we can conclude that as there was not much differences in CAD and non-CAD regarding anthropometric indices, it cannot be studied in 6months.it requires more sample size and 5-6 years long term study.

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Conflicts of interest
The authors declare that there is no conflict of interest with anyone or any institute.

Table 1: Age frequency in CAD and non-CAD patients

Age	Frequency (CAD)	Percent (CAD)	Frequency (non-CAD)	Percent (non-CAD)
25-35	4	4.00%	4	8.00%
36-45	13	13.00%	7	14.00%
46-55	34	34.00%	9	18.00%
56 and older	49	49.00%	30	60.00%

Table 2: Anthropometric indices values in CAD and non-CAD patients

Anthropometric Indices	Category	CAD	non-CAD
Wrist Circumference	Small frame(<17.5 cms)	16(16%)	13(26%)
	Medium frame(17.5-17.8cms)	64(64%)	29(58%)
	Large frame(>17.8cms)	20(20%)	8(16%)
BMI	Normal(18.5-25kg/msq)	57(57%	30(60%)
	Obese(>30kg/msq)	4(4%)	6(12%)
	Overweight(25-30kg/msq)	33(33%)	14(28%)
	Underweight(<18.5kg/msq)	6(6%)	0(0%)
Waist Circumference	Normal(86-93 cms)	36(36%)	41(82%)
	Risk(>94cms)	48(48%)	9(18%)
	Substantially risk(>102 cms)	16(16%)	0(0%)
Waist to Height ratio	Healthy (0.4-0.5)	11(11%)	2(4%)
	Overweight (0.51-0.6)	55(55%)	24(48%)
	Obese (0.61-0.7)	34(34%)	24(48%)

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