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30	urnal or p O	RIGINAL RESEARCH PAPER	Anatomy			
Indian	PARIPET RAJ	RELATIVE STUDY OF 2D:4D RATIO WITH CK CIRCUMFERENCE IN CORONARY HEART EASE WITH NORMAL – A CENTRAL ASTHAN STUDY	KEY WORDS: Digit Ratio, Coronary Heart Disease, Neck Circumference, testosterone			
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	In this sense, the ratio of second finger length to fourth finger length (2D:4D) is an important physical attribute for determining the levels of sex-related hormonal factors and collected information about personal preferences and abilities (Fowkes et al.).53 2D:4D ratios are under the influence of exposure level of testosterone and oestrogen during the prenatal period (Manning et al., 2003).55 One of the most important factors that contribute to CAD is obesity. There					

In this sense, the ratio of second linger length to fourth linger length (2D:4D) is an important physical attribute for determining the levels of sex-related hormonal factors and collected information about personal preferences and abilities (Fowkes et al.).53 2D:4D ratios are under the influence of exposure level of testosterone and oestrogen during the prenatal period (Manning et al., 2003).55 One of the most important factors that contribute to CAD is obesity. There are many methods of assessing obesity.63 The most widely used is Body Mass Index (BMI). Another indicator for obesity that is gradually replacing BMI is the neck circumference (NC). It is an indicator of upper body subcutaneous adipose tissue distribution. Although results in metabolic abnormalities of upper body obesity is more strongly associated with cardiovascular risk. Thus NC as a measure of body fat distribution has been reported to carry a higher predictive value for cardiovascular risk factors.64MATERIAL & METHOD-Correlative type of study was done in Cardiology department of J.L.N. Medical College, Ajmer performed on 1000 (500 Males and 500 females) Out of which 500 were coronary Heart Diseases patients and 500 were control normal subjects. **RESULT AND CONCLUSION-** mean neck circumference as higher values in CHD group i.e 38.36cm while in control group is 32.81cm; having frequency distribution of BMI and Neck Circumference along with gender distribution in both CHD and Control groups. Maximum Frequency was observed is 38.5cm neck circumference in BMI as 27-29kg/m²

INTRODUCTION-

Researchers proved that the relative lengths of digits are set before birth35 and surprisingly in human hands, the relative lengths of the index finger vary between male and female.36 In the study of Manning et al, it is seen that shorter index fingers in men have been associated with increased levels of physical aggression throughout their life.37 Men with even smaller index finger are reported as being more masculine and dominant in nature and gravitate to perform better in a number of physical activities.³⁸

Neck Circumference has been reported as a marker of risk for cardiovascular disease. One of the dimorphic features is the quotient of length the second (2D) and fourth (4D) finger. The value of the quotient of the finger lengths is determined at the end of the 3rd month of embryonic development, which is mainly under the influence of prenatal testosterone (PT) and remains unchanged through all phases of human ontogenesis.61, 62 researchers believe that finger ratios might be the symptoms of some diseases when considered along with the relationship between neck circumference and myocardial infarction (Fink et al., 2006).⁵⁴

Body obesity and the metabolic syndrome, are cluster of conditions associated with hypertension and are considered as major risk factors for coronary heart disease (CHD) which is associated with an elevated risk for stroke and early mortality. Ben - Noun et. al. tested a method identifying overweight or obese patient solely by measuring the circumference of neck (NC). Their results demonstrated a significant association between Neck Circumference, body mass index (BMI), age, weight, waist circumference and hip circumference. It stated that higher Neck Circumference is associated positively with the factors of the metabolic syndrome and is hence likely to increase the risk of Coronary Heart Diseases (CAD).^{65,66}

MATERIAL & METHOD

The study population consisted of 1000 cases in which 500 subjects were with Coronary artery diseases from both sexes ageing above 18 years from consecutive hospitalized cases in

the center of cardiology in government and private hospitals. The remaining 500 subjects were included as control without Coronary artery diseases, with similar age and basic clinical characteristics in each sex. The control were mostly the family members and the blood relations of the patients

RESULTS Distribution of subjects according to mean neck

circumference

Neck Circumference (In Cms)	CHD Group (N=500)	Control Group (N=500)	P-value*
Mean ± SD	38.36 ± 5.44	32.81 ± 2.78	< 0.001

Comparative Distribution of subjects according to BMI and Neck Circumference

BMI CHD CR			GROIII	D	CONTROL GROUP			
(In MAI Kg/		ALE	FEMALE		MALE		FEMALE	
m [*])	BMI (In Kg/ m2)	Mean Neck circu mfere nce (In Cms)	BMI (In Kg/m 2)	Mean Neck circu mfere nce (In Cms)	BMI (In Kg/ m2)	Mean Neck circu mfere nce (In Cms)	BMI (In Kg/ m2)	Mean Neck circum ferenc e (In Cms)
Belo w 21	19.8 5	39.1	18.56	35.6	20.06	30.66	-	-
21-23	22.3 2	37.2	22.26	34.8	22.29	32.11	22.41	32.63
23-25	24.2 4	37.3	24.21	39.1	23.97	32.69	24.15	31.84
25-27	25.9 7	38.0	25.98	39.3	25.73	32.94	25.83	32.75
27-29	27.7 1	38.5	27.88	39.3	27.72	34.61	27.83	34.20
Abov e 29	29.9 7	36	30.72	38.1	30.65	37.25	30.51	35.64

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Correlation of right 2D:4D ratio with neck circumference in CONTROL and CHD group

varia	bles	Control Group Right 2D:4D Ratio	CHD Group Right 2D:4D
Neck Circumferen	Pearson Correlation	0.068	-0.011
ce	Sig. (2- tailed)	0.131	0.804
	N	500	500

Correlation of left 2D:4D ratio with neck circumference in CONTROL and CHD group

		Control Group Left 2D:4D Ratio	CHD Group Left 2D:4D Ratio
Neck Circumfere	Pearson Correlation	0.032	0.028
nce	Sig. (2- tailed)	0.472	0.528
	Ν	500	500

DISCUSSION

NC was positively correlated with 2D:4D ratios when body weight was controlled observed by B Fink, JT Manning.200 This association was present in men but not in women. This may be due to the sexual dimorphic pattern of body fat distribution in men and women, which is known to be closely linked to sex-steroid hormones, and thus influences cardiovascular and metabolic disease processes.²²¹ Previous studies suggested NC as a simple screening measure for identifying overweight and obese patients. positive correlations between NC and body weight, and also NC and WHR when weight was controlled, support this measure. In stronger in men than in women. WHR as a measure of body fat distribution has been reported to have a high predictive value for cardiovascular risk factors.^{222,223}

Earlier researches have established relationship between 2D:4D and anthropometric traits (height, weight, NC, WC and BMI). But none have shown its relationship with WHtR, thus to the best of our knowledge this Sexual dimorphism in ratio of second and fourth digits and its relationship with metabolic syndrome indices and cardiovascular risk factors.²¹³

It is the first study that finds a relationship between 2D:4D and WHtR in any population. Our result presented a significant relationship between 2D:4D and these traits either in right or left hands, which agrees with other reports.²¹³

Significant positive correlations in both hands between 2D:4D and BMI, WC, NC and WHtR reported in this study implies that 2D:4D could be a surrogate marker for these important MetS and CVD risk factors, in that they could be used as predictors for MetS and CVD risk factors in Ilorin, North central Nigeria. Lastly, this study results showed that these relationships were stronger in the right hand and male 2D:4D. Thus right hand 2D:4D would be a better predictor of these traits.²¹³

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