



CORONARY HEART DISEASE AND 2D:4D FINGER LENGTH RATIO IN CENTRAL RAJASTHAN POPULATION

| | |
|----------------------------------|---|
| Mrs. Praveen | PhD Scholar. |
| Dr. Chandra Kala Agarwal* | Senior Professor & H.O.D. SMS Medical College, Jaipur. *Corresponding Author |
| Dr. Arpit Kumar Mathur | Junior Resident, Dept. of Onco Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur. |

ABSTRACT

Coronary Artery Disease (CAD) is promptly increasing in prevalence across the world. Therefore, it would be useful to identify a group of uncomplicated and reliable indicators for the recognition of the persons at risk of Coronary Heart Diseases in earlier stages so that a health intervention program is possible.¹ The formation and maintenance of the Cardiovascular System is responsive to testosterone and estrogen in men. 2D:4D ratio being a presumed marker for in utero levels of these hormones, is expected to show sexual dimorphism in the risk of development of Coronary Artery Diseases.^{2,3}

MATERIAL & 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-Digit ratio in CHD patients was higher 1.01 as compared to Control group which was 1.00. The Digit ratio was observed to be higher in males than in females.

KEYWORDS : Digit Ratio, Coronary Heart Disease, Testosterone

INTRODUCTION

Digit ratio is the ratio of the lengths of different digits or fingers typically measured from the midpoint of bottom crease (line) where the finger joins the hand to the tip of the finger. Among the digit ratios, 2D:4D (index: ring) digit ratio has been the most extensively studied ratio. 2D:4D is sexually dimorphic. The 2nd digit is typically shorter in both male and female, but the variation between the lengths of the 2nd digit is greater in male than that in female.⁴

Testosterone has revealed effects on insulin resistance, obesity, myocardium, coagulation, inflammation, vasodilation, and endothelial function. Higher androgen levels have previously has been linked with an increased risk for Coronary Artery Disease.

Coronary heart disease(CHD) is rapidly increasing in prevalence across the world. Therefore , it would be useful to identify a group of simple and reliable indicators for the identification of the persons at risk of CAD in the earlier stages in order to enable appropriate health interventions.

Although literature reports the finding of lower 2D:4D ratio in men than in women, investigations revealing the body composition status of men and women with 2D:4D ratio less than or more than one was not found.

Further Rajasthan, being diverse ethnicity, earlier literature is limited to examine the 2D:4D and its relation to the anthropometric body composition. Therefore the present study attempted to systematically investigate the 2D:4D ratio and its association with coronary heart diseases.

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.

Inclusion Criteria

1. Individuals with no morphologically identifiable physical anomalies or deformities.

Exclusion Criteria

1. Hand injuries and any congenital or acquired deformities.
2. The subjects with any inflammation, trauma, or deformities, and those who had underwent a recent major surgery were excluded because of their unsuitability for the present investigation.

RESULTS

Distribution Of Subjects According To Mean Right 2d:4d Ratio

| Right 2D:4D Ratio | CHD Group (N=500) | | Control Group (N=500) | |
|-------------------|-------------------|-------------|-----------------------|-------------|
| | Mean ± SD | 1.01 ± 0.05 | | 1.00 ± 0.02 |
| | Male | Female | Male | female |
| | 1.01 ± 0.48 | 1.01 ± 0.04 | 0.99 ± 0.02 | 1.00 ± 0.02 |

Distribution Of Subjects According To Mean Left 2D:4D Ratio

| Left 2D:4D Ratio | CHD Group(N=500) | | Control Group (N=500) | |
|------------------|------------------|-------------|-----------------------|-------------|
| | Mean ± SD | 1.00 ± 0.04 | | 1.00 ± 0.02 |
| | Male | Female | Male | Female |
| | 1.01 ± 0.03 | 1.00 ± 0.04 | 1.00 ± 0.02 | 0.99 ± 0.02 |

DISCUSSION-

Frederic Wood Jones introduced the concept of 'Digital formula' in 1920 to demonstrate the typical characteristics of the hand. Jones discovered that in human hand the absolute length of the Index finger is usually longer than the ring finger (human digital formula, 2D > 4D) whereas in apes the ring finger is longer than index finger.⁵

Analyzers showed a small difference in between the lengths of index and ring finger in both sexes and thus the ratio between both the digits the index and ring is close to 1. Ratios are not considerably related to stature on age therefore sex differences in their ratio are independent of body size. Thus due to their criteria many researchers in world are

implementing the theory of digit ratio.⁶

The present study showed that the digit ratio of males with CHD is higher than compared to males without CHD and similar was the observations in case of females. The present study showed a significant variation. (p value= <.001 for right hand whereas p value= 1 for left hand).

The present study has revealed a novel relation between the hypertension and index finger to ring finger length ratio(2D:4D). Coronary Heart Diseases are a major health problem in India and other developing countries. Prevalence of CHD is found to be highest among the north Indian states.⁷The relative lengths of the 2nd and 4th digits (2D:4D) may provide an easily measurable and stable anthropometric index of prenatal androgen exposure.⁸ It has become widely used as a means to study the effects of prenatal androgenisation in humans.

However, for those with lower ratio, it doesn't necessarily mean that they would definitely have heart diseases at younger age compared to those of lower ratio.^{9,10} To this context, we strongly believe that, correlation of 2D:4D with heart related disorder may not be a reliable parameter for the prediction of heart problem that could encounter later in older age. Further, regional differences based on geographic distribution could also play a role in the differential data as, in the current study we observe pertaining to Malaysian population. The limitation of our study includes the fact that, while conducting this study other aspect or parameters was not being taken into account. For example; stress level, level of cholesterol in the body, BMI of the person and also their lifestyle such as diet and frequents of exercise.

The following is the table showing the comparison with other studies

Table :- Digit Ratio And Sexual Dimorphism With CHD Patients And Control Group

| Variables | | | Present study | Kumar N | Xing Li Wu |
|---------------|---------|----------|---------------|---------|------------|
| CHD Study | Males | Lt. hand | 1.00 | 0.99 | 0.95 |
| | | Rt. Hand | 1.00 | 1.01 | 0.96 |
| | Females | Lt. hand | 1.01 | 0.98 | 0.93 |
| | | Rt. Hand | 1.01 | 0.99 | 0.93 |
| Control group | Males | Lt. hand | 0.99 | 1.02 | 0.96 |
| | | Rt. Hand | 0.98 | 0.95 | 0.96 |
| | Females | Lt. hand | 1.00 | 0.93 | 0.93 |
| | | Rt. Hand | 1.00 | 0.92 | 0.93 |

REFERENCES-

- Roger VL, Go AS, Lloyd-Jones DM, Adams RJ, Berry JD, Brown TM et. al. Heart Diseases and stroke statistics-2011 update-A report from the American Heart Association Circulation 2011; 123:e18-e209
- Glueck CJ, Glueck HI, Stroop D, Speers J, Hamer T, Tracy T. Endogenous testosterone , fibrinolysis and coronary artery disease risk in hyperlipidaemic men. J.Lab Clin.Med. 1993; 122:412-20
- Lerner DJ, Kannel WB. Patterns of coronary heart disease morbidity and mortality in the sexes: a 26 yr. follow up of the framinghans population. Am. J. Cardiology 1986; 111:383-90
- Gillam. L., Mc. Donalad. R., Ebling. F.J.P and T.M. Mayhew (2008). Human 2D (index) and 4D (ring) finger length and ratio; cross-sectional data on linear growth patterns, sexual diamorphism and lateral asymmetry from 4 to 60 yrs of age. Journal of Anatomy 213,325-335,doi 10.1111/j.2008
- F Wood-Jones .The principles of anatomy as seen in the hand J. & A. Churchill, London (1920), p. 354)
- Lippa RA. Are 2D:4D finger-length ratios related to sexual orientation? Yes for men, no for women. J Pers Soc Psychol 2003;85:179–88
- National family health survey. International institute for population sciences (IIPS) and ORC Marco, 1998-99; Mumbai IIPS, NFHS-2,2000.
- Knickmeyer RC, Woolson S, Hamer RM, Konneker T,Gilmore JH. 2D:4D ratios in the first 2 years of life: stability and relation totestosterone exposure and sensitivity. Horm Behav 2011;60(3):256-63.
- Roger VL, Go AS, Lloyd-Jones DM, Adams RJ, Berry JD, Brown TM. Heart disease and stroke statistics–2011 update: a report from the American Heart ssociation. Circulation. 2011;123:e18-e209
- Wu X, Yang D, Zhao Y, Lu C, Wang Y. Effectiveness of percutaneous coronary intervention within 12 hours to 28 days of st-elevation myocardial infarction in a real world Chinese population. PLoS One. 2013;8(3):e58382.