

An anthropometric study for correlation between digit ratio and demographic and psychological parameters

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Abstract

Background: The 2D:4D ratio was considered as an indicator of prenatal sex hormones mainly estrogen and testosterone. Association was reported between the psychological and demographical parameters with the ratio of digits.

Aims and objectives: The study aimed to observe the correlation between ratio of digits and demographic and psychological parameters. **Materials and methods:** A total of fifty healthy female participants within the age group of 20-28 years were part of the study. The length of the right hand second and fourth digit finger was measured as specified in the literature and the ratio of two was mentioned as 2D:4D ratio. Height and weight were measured by standard methods. Psychological parameters were measured using standard questionnaire. **Results:** There was negative association between the ratio of digits and depression and stress whereas positive association between the ratio of digits and anxiety. There was negative association between the ratio of digits and height and weight. **Conclusion:** The digit ratio has negative correlation with depression, stress, height and weight parameters and has positive correlation with the anxiety. We recommend further detailed studies in this area to understand the association of these parameters.

Key Word: Digit ratio, stress, anxiety, depression, correlation.

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INTRODUCTION

Understanding and estimating the prenatal parameters helps to estimate the diseases to which particular individual are more prone for. One such parameter is assessment of ratio of 2nd and 4th finger length. It is called as 2D:4D ratio, which is attracting the interest of researchers as it is being correlated with not only with anthropometric data but also with psychological and clinical parameters. Further, it was reported that males

have significantly lower digit ratio than females.¹ Digit ratio was reported as a measure of prenatal sex hormones mainly estrogen and testosterone. These steroid hormones play a pivot role in fetal development.²⁻⁵ There was a correlation between the anthropometric parameters, behavioral parameters with the digit ratio.⁶⁻⁸ The digit ratio may correlate with the cardiovascular diseases also.⁹ Higher ratio of digits, higher is the prevalence of development of cardiovascular diseases. There were contradictory results regarding association of the ratio of digits with the demographic parameters. Some studies reported negative association¹⁰ and some reported no correlation.¹¹ The current study was aimed to observe the correlation between digit ratio and demographic and psychological parameters.

MATERIALS AND METHODS

Study design: Cross-sectional study

Study participants: The study included fifty healthy female participants. The following criteria were used in the selection of the participants.

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Inclusion and exclusion criteria: Healthy participants within the age group of 20-28 years and those willing to participate in study were included in the study. Those undergoing any treatment or therapy were excluded from the study.

Study setting: The present study was conducted at M.R. Medical College, Gulbarga, Karnataka.

Digit ratio: The lengths of second digit and fourth digit was measured from the fingertip to the midpoint of the basal crease, on the ventral surface of the hand, using digital vernier calipers. The 2D:4D ratio is obtained by dividing these values^{12,27}

Assessment of height and weight: Height and weight was measured by using standard methods.¹³

Assessment of psychological measures: The psychological parameters that is depression, anxiety and stress are recorded using the standard DASS scale 42.¹⁴

Ethical consideration: The study protocol was approved by institutional human ethical committee.

Data analysis: Data was analysed using the version of SPSS 20.0. To observe the association between the variables we have used Pearson correlation coefficient. Probability less than 0.05 considered as significant.

RESULTS

There was negative association between the ratio of digits and depression and stress whereas positive association between the ratio of digits and anxiety (table no 1). There was negative association between the ratio of digits and height and weight (table no 2).

Table 1: Association of 2D:4d ratio with depression, anxiety and stress. (Data was presented as Mean and SD).

Parameter	Mean ± SD	2D:4D ratio	r	P value
Depression	16.22±4.71	0.97±0.1256	-0.3507	0.3548
Anxiety	13.0±4.0		0.2405	0.5330
Stress	19.0±5.75		-0.1594	0.6821

Table 2: Association of 2D:4d ratio with height and weight. (Data was presented as Mean and SD).

Parameter	Mean ± SD	2D:4D ratio	r	P value
Height (cm)	162.22±13.47	0.97±0.1256	-0.5275	0.1444
Weight (kg)	76.75±9.92		-0.4434	0.2319

DISCUSSION

There was negative association between the ratio of digits and depression and stress whereas positive association between the ratio of digits and anxiety. There was negative association between the ratio of digits and height and weight. Digit ratio is also called as 2D:4D ratio which is stable throughout the life.¹⁵ Lower digit ratio was observed in males when compared to females.¹⁶ The length of the second digit was slightly less than fourth in case of males.¹⁷ In female population, low ratio of the

digits indicates the features of autism and other disorders.¹⁸ Some studies reported presence of association is only between the ratio of digits ratio with the height and no association with any other anthropometric parameters.¹⁹ Other studies also mentioned presence of association between the ratio of digits and the demographic parameters.²¹ In contrast, other study that reported presence of association only between the ratio of digits and weight.²⁰ Females experience more psychological problems than males. Hence, early diagnosis of these psychological changes is very beneficial as they allow us to offer effective management techniques. Earlier studies reported that higher the digit ratio, higher is the depression scores.²² This correlation of digit ratio with stress and other psychological disorders may be explained as the cortisol and testosterone levels are associated and the ratio of digits indicates the prenatal testosterone levels.²⁴ The digit ratio is associated with the stress levels.²³ It was reported that higher 2D:4D ratio has negative impact on health status.²⁵ The Homeobox genes were reported to regulate the growth of the fingers. These genes were associated with the sex steroids.²⁶ Earlier studies has not found correlation with male digit ratio. However, majority of the studies has observed correlation with females' digit ratio. Interestingly it was reported that in females the digit ratio was also associated with the Neuroticism. The present study included healthy female population and we have observed the correlation between the digit ratio with the anthropometric and the behavioural parameters. Less sample size may be the possible cause for non-significance of the correlation. This can be solved further conducting the study with more samples and also multiple centres.

CONCLUSION

There was a negative correlation between the digit ratio with depression, stress, height and weight parameters and has positive correlation with the anxiety. We recommend further detailed studies in this area for better understanding the association and to suggest the digit ratio as a simple and cost-effective measure for the stress levels.

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