



Assessment of aggression: an association with 2D:4D ratio among individuals in Mangaluru, India

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Abstract

Aggression is an integral part of most violent crimes and there are numerous ways to assess the aggression level of an individual. The present study aimed at assessing the aggression level of an individual with the digit ratio. This study was conducted among 500 students comprising both the genders of Mangalore city. The mean scores of physical aggression and verbal aggression in males were comparatively higher than females whereas anger and hostility were found to be higher in females. The study reveals that the least negative correlation was found in males between L2D:L4D and physical aggression, anger, hostility, and overall aggression. No correlation was found between digit ratio and aggression scales in the right hand of males, and in both the hands of females.

Keywords: Forensic psychology; aggression; 2D:4D digit ratio; criminality; prenatal androgen.

Introduction

Forensic psychology is a branch of forensic science and it is considered to be an applied psychological science to aid psychological disciplines especially in human behavior and it also provides psychological service to the judicial and legislative systems¹. The objective of forensic psychology is to analyze the motivation of the crime and diagnose the influence of the criminal behavior of an individual. In psychological aspects, aggression is the emotional state with clinical relevance, accompanied by psychological and biological changes. Even in the literature some of the authors described that aggressive behavior is a kind of behavioral disorder, and affects human discernment at the time of committing the offense². Usually, the aggression comes under the emotion called anger which is referred to as showing the conflict towards someone who has done wrong. Psychological experts said that anger is a good thing to find the solution to problems. But excessive anger harms physical and mental health to cause a problem for society and themselves. Aggression was classified into two types namely proactive and reactive which means aggression with emotions and aggression without emotions³.

The influence of aggressive behavior comprises biological, developmental effects, cognitive, and personal factors. Few psychologists believed that biological factors are contributing to delinquent and criminal behavior. The biological contribution of criminality is the exposure towards androgens (male sex hormones), which results in increasing the chance of individuals to conflict within themselves and harm others physically and in terms of acquiring other's property. Testosterone is considered the most effective androgen in this regard⁴.

The prenatal androgens are relatively associated with the development of the finger length ratio and discovered that the evidential study during the late 1990s, the measurement of the physiological trait known as the 2D:4D digit ratio (ring and index finger) would help to infer the prenatal androgen⁵. Compared to the left hand (digit ratio), the right hand (digit ratio) is superior to estimate prenatal androgen exposure⁶. The digit ratio is the ratio measured of the lengths of the fingers. Often, the digit length is measured from the center of the bottom interphalangeal crease (where the finger joins the hand) to the tip of the finger. A study has shown that the average digit ratio of male is 0.951 and female is 0.968 of 249 students from Warwick University⁷.

Researchers assessed the aggression level of an individual using various psychological tools like aggression videos, activities, and questionnaire methods. The most commonly used method to check the aggression level is the questionnaire method. The types of aggression questionnaires are the Brief Aggression Questionnaire (BAQ), Buss and Perry Aggression Questionnaire (BPAQ), and Buss-Durkee Hostility Inventory (BDHI). To check the reliability and validity of the aggression questionnaires there was a study conducted among the Virginia population. It was evident that the BAQ questionnaire has much potential application and efficiency to assess aggression⁸. The relation between the 2D:4D with aggression study was done among the Nepal population and it was evident that there is a correlation within the subscales of aggression level but there is no correlation between the average 2D:4D with any form of aggression scales in male and female⁹. In a study concerning reactive aggression, the author suggested that the digit length ratios were having associated with reactive aggression of females, given that sufficient provocation is delivered¹⁰.

However, a negative correlation was found between 2D:4D, and was evident that aggression in men indicates higher aggression on lower digit ratio¹¹. The study conducted by Bailey¹² and Honeykoop¹³ indicated that the aggression and digit ratio is correlated only in men, not in women, and predicted that there was no indication found to assess the aggression by hand. Especially, the above research samples were collected from the normal individual who does not have any mental illness and any criminal record. The above reviews are different literature of the same type of studies that have a different conclusion that is not similar to each other. The reviews lead to the question of the correlation between 2D:4D and aggression whether it is exactly correlated or not. Lee Ellis and Hoskin investigated the possible association between the prenatal androgen and criminality. The right-hand digit ratio was correlated with the 13 forms of criminal behavior and it is strongly associated with most of the offenses⁴. In this research, the investigator focused to find out the significant correlation between digit ratio (2D:4D) and aggressive behavior. As per the literature review, studies suggested that the biological changes (such as variations in hormone levels) lead to aggressive behavior in humans which predicted changes in the physical characteristics of an individual¹⁴⁻²⁰. Normally, a criminal act or behavior can be caused due to an uncontrolled anger level as a response to a negative stimulus. A criminal is regarded as aggressive; however, under close inspection, it can be viewed as an individual level of intolerance to negative stimulus²¹⁻²³. Essentially, a high or low 2D:4D ratio than average, need not infer that one might be more or less aggressive, as other physiological factors such as disease can also influence the digit ratio²⁴. This study aims to confirm whether anatomical evidence such as digit ratio influences human aggression behavior. Furthermore, this study will be very useful for future psychological research and may also hold major applications in the criminal justice system.

Materials and methods

Ethical statement: I hereby state that this research project entitled "Assessment of Aggression: An Association with 2D:4D ratio among Individuals in Mangaluru" is bonafide research carried out by me.

Participants: For this study, the individuals of Mangalore were taken as the universe. For this study, the investigator has selected randomly 500 students in Mangalore (250-males and 250-females). The sample is selected through the "Simple Random Sampling Technique". The age of the respondents is distributed from 18-25 years.

Research design: The experimental design is adopted for this study. The participants were administered the Buss and Perry Aggression Questionnaire and also subjected to digit ratio measurements. The independent variable is the measurements of the digit ratio (2D:4D) and the dependent variable is the aggression scales.

Tools of data collection: Buss and Perry's aggression questionnaire was used in this study for validating the aggression level of an individual. The facets of the Buss and Perry (B & P) aggression scale are Physical Aggression (PA), Verbal Aggression (VA), Anger (A), and Hostility (H). For measuring the finger length digital vernier caliper was used.

Procedure: First, the respondents were briefed about the aim of this research, and consent was obtained. The Buss & Perry aggression questionnaire was administered to them and the instructions to the participants were given in filling out the same. After obtaining the questionnaire, the measurements were taken from the individuals by using a digital vernier caliper. The subjects were asked to sit comfortably and told to keep a hand on the table. The measurements were taken from the proximal interphalangeal crease to the highest point in the tip of the index and ring finger of both the hands of the respondents and the photograph of the same is obtained. Three measurements were taken from each finger for avoiding the manual error and the average value was considered.

Data analysis: All data were analyzed using Microsoft Excel 2010 and IBM SPSS version 25. The alpha level for the correlation was considered at 0.05. First, the descriptive statistics were calculated in aggression scales and digit ratio. Followed by Karl-Pearlson co-efficient of correlation test was done to find the association between the two variables.

Results and discussion

Age of the respondents: Table-1 represents the total number of 500 samples comprising 250 males and 250 females of students of Mangalore City. The information obtained from the students during the data collection was analyzed statistically. The respondents were categorized according to age ranging from 18 to 25 years.

Descriptive statistics: Mean and Standard deviation: The mean and standard deviation for aggression scales and digit ratio is given in Table-2. On comparing the mean scores of aggression and digit ratio between male and female, it found that the mean value for physical aggression is higher in males (M=26.404, SD=6.775) compared to females (M=24.120, SD=6.233), verbal aggression is higher in males (M=15.336, SD=3.342) compared to females (M=15.284, SD=3.533), anger is higher in females (M=20.024, SD=4.688) compared to males (M=19.644, SD=4.964), hostility is higher in females (M=24.180, SD=5.634) compared to males (M=24.088, SD=15.439), overall aggression is higher in males (M=85.560, SD=15.439) compared to female (M=83.608, SD=15.460). Whilst comparing the mean digit ratio, in the right hand the females are having a higher digit ratio (M=0.967, SD=0.037) compared to males (M=0.965, SD=0.033), in the left-hand females are having a higher digit ratio (M=0.988, SD=0.035) compared to male (M=0.979, SD=0.037) respectively.

Table-1: Age of the respondents.

AGE	Male	Female
18	24	49
19	31	38
20	44	29
21	39	37
22	35	45
23	32	23
24	26	14
25	19	15

Descriptive statistics: Mean and Standard deviation: The mean and standard deviation for aggression scales and digit ratio is given in Table-2. On comparing the mean scores of aggression and digit ratio between male and female, it found that the mean value for physical aggression is higher in males (M=26.404, SD=6.775) compared to females (M=24.120, SD=6.233), verbal aggression is higher in males (M=15.336, SD=3.342) compared to females (M=15.284, SD=3.533), anger is higher in females (M=20.024, SD=4.688) compared to males (M=19.644, SD=4.964), hostility is higher in females (M=24.180, SD=5.634) compared to males (M=24.088, SD=5.439), overall aggression is higher in males (M=85.560, SD=15.439) compared to female (M=83.608, SD=15.460). Whilst comparing the mean digit ratio, in the right hand the females are having a higher digit ratio (M=0.967, SD=0.037) compared to males (M=0.965, SD=0.033), in the left-hand females are having a higher digit ratio (M=0.988, SD=0.035) compared to male (M=0.979, SD=0.037) respectively.

Inferential statistics: Karl Pearson Correlation: The Table-3 represents the correlation statistics for males and females between the digit ratio and aggression level. The correlation statistics indicate that in males the aggression scale such as physical aggression, anger, hostility, and overall aggression with digit ratio was found to be having the least negative correlation in the left hand. Whereas the said parameters in the right hand were having values less than 0.09 which indicates that the digit ratio and aggression were not correlated. In females, the correlation value was found to be less than 0.09 in all the parameters of both hands which indicates that there is no association between these parameters.

Discussion: The purpose of the present study is to investigate the correlation between the 2D:4D ratio and aggression of an

individual. Findings of the correlation between the digit ratio and aggression of males and females showed similar results to the previous studies. The digit ratio of both the right and left hands of males was found to be lesser than females, and this result is in accord with the previous study on digit ratio¹⁴. While comparing the aggression scales of males and females, the researcher found that the male scored higher in physical aggression, verbal aggression, and overall aggression than the female. In anger and hostility females scored higher compared to males. These results are different from the Bailey¹² and Mehta⁹ study. Results found from the present study that index finger length in males was shorter than ring finger length and significantly different as compared with females. The results confirm that the digit ratio (2D:4D) is sexually dimorphic. The average ratio of the finger length is comparatively smaller than the previously mentioned length which is published by Bailey¹². The study reveals that the least negative correlation was found in males between L2D:L4D and physical aggression, anger, hostility, and overall aggression. In the right hand of males, there is no correlation present between digit ratio and aggression scales. For females, there is no correlation found between digit ratio and aggression scale in both the hands.

Conclusion

The present study aimed at relating the aggression with digit ratio based on the fact that androgen is the responsible factor for criminality. Whilst comparing the correlation values of the said parameters in both males and females, it is indicating that the digit ratio and aggression scale were not correlated. But in males, the least negative correlation was found between L2D:L4D and physical aggression, anger, hostility, and overall aggression.

Table-2: Mean and Standard deviation of the Aggression scales and 2D:4D Ratio.

Parameters	Male		Female	
	Mean	SD	Mean	SD
PA	26.404	6.775	24.120	6.233
VA	15.336	3.342	15.284	3.533
A	19.644	4.964	20.024	4.688
H	24.088	5.195	24.180	5.634
OA	85.560	15.439	83.608	15.460
R2D:R4D	0.965	0.033	0.967	0.037
L2D:L4D	0.979	0.037	0.988	0.035

Table-3: Karl Pearson Correlation between 2D:4D Ratio and aggression scales of males and females.

Parameters		Male		Female	
		Karl Pearson Correlation	P-Value	Karl Pearson Correlation	P-Value
R2D:R4D	PA	-0.053	0.00*	-0.056	0.00*
	VA	0.049	0.00*	-0.097	0.00*
	A	0.001	0.00*	0.020	0.00*
	H	0.055	0.00*	-0.021	0.00*
	OA	0.006	0.00*	-0.046	0.00*
L2D:L4D	PA	-0.184	0.00*	0.049	0.00*
	VA	0.030	0.00*	-0.013	0.00*
	A	-0.210	0.00*	0.009	0.00*
	H	-0.138	0.00*	-0.065	0.00*
	OA	-0.186	0.00*	-0.004	0.00*

(Note: * indicates the value is statistically significant, p <0.05)

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