

Saúde Coletiva:

Uma Abordagem Multidisciplinar

2

Renata Mendes de Freitas
(Organizadora)

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APRESENTAÇÃO

A coleção “Saúde Coletiva: Uma abordagem multidisciplinar” é uma obra composta por três volumes organizados por áreas temáticas. O volume 1 traz estudos que tratam do tema Saúde Coletiva no contexto da Vigilância epidemiológica na Atenção básica. O volume 2 apresenta uma diversidade de trabalhos interdisciplinares aplicados ou relacionados com a Atenção básica; e por fim, o volume 3 contempla os estudos realizados em uma perspectiva de Ensino e Formação em Saúde para todos os profissionais da área.

A Saúde Coletiva é um campo de estudo da saúde pública, cujo objetivo é investigar as principais causas das doenças e encontrar meios de planejar e organizar os serviços de saúde. Neste sentido, a proposta do livro traz a abordagem multidisciplinar associada à inovação, tecnologia e ensino da saúde coletiva aplicada às diversas áreas da saúde.

Renata Mendes de Freitas

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USE OF HAND FINGER MEASURES TO DETERMINE THE SEX OF INDIVIDUALS IN SOUTHEAST BRAZIL

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ABSTRACT: Human identification from dismembered body parts is one of the targets of forensic studies. The anthropometric hand dimensions have been provided a reliable source for sex determination when an isolated hand is detected in crime scenes or natural disasters. The study aimed to evaluate the accuracy of the use of hand measurements to determine the gender of individuals from a Southeast Brazilian region. The database contains hand measurements from 475 volunteers (210 men and 265 women). The lengths of the second (2D) and fourth (4D)

finger, the digit ratio (2D:4D), the hand breadth (HB) and the length of the palm (HPL) of both hands. This dataset was divided into two parts: one part with 380 data (classification set), and another part with 95 data (test set). A descriptive analysis was applied and the Student's t test was used to assess the significance of sexual dimorphism in the measurements. The test data set was used to verify the accurate sex classification quantitatively. The results obtained indicate that all finger length measurements have significant differences between the sexes (p-value <0.05). The cutoff points for all variables were obtained from their means by sex. In the case of overlapping areas, two cutoff points were established. The digit ratio (2D:4D) did not distinguish the sex of the population. However, the hand breadth was proved to be the most accurate measure for determining sex, reaching 89% of the correction tax. Therefore, the use of anthropometric hand measurements proved to be adequate to accurately determine the sex of the study population.

KEYWORDS: Cutoff point; Digit Ratio (2D:4D); Hand measurement; Percentage of classification; Sex determination, Sexual dimorphism.

USO DE MEDIDAS DE DEDOS DAS MÃOS PARA DETERMINAÇÃO DO SEXO DE INDIVÍDUOS DO SUDESTE DO BRASIL

RESUMO: A identificação humana a partir de partes do corpo desmembradas é um dos alvos dos estudos forenses. As dimensões antropométricas da mão têm sido uma fonte confiável para a determinação do sexo, quando

uma mão isolada é detectada em cenas de crime ou desastres naturais. O estudo teve como objetivo avaliar a acurácia do uso de medidas das mãos para determinar o sexo de indivíduos da região sudeste do Brasil. O banco de dados contém medições das mãos de 475 voluntários (210 homens e 265 mulheres). Os comprimentos do segundo (2D) e do quarto (4D) dedo, a relação entre os dedos (2D:4D), a largura da mão (HB) e o comprimento da palma da mão (HPL), de ambas as mãos. Esse conjunto de dados foi dividido em duas partes: uma parte com 380 dados (conjunto de classificação), e outra com 95 dados (conjunto de teste). Foi aplicada uma análise descritiva e o teste t de Student foi usado para avaliar a significância do dimorfismo sexual nas medidas. O conjunto de dados de teste foi usado para verificar quantitativamente a classificação exata do sexo. Os resultados obtidos indicam que todas as medidas do comprimento dos dedos apresentam diferenças significativas entre os sexos (p -valor $<0,05$). Os pontos de corte de todas as variáveis foram obtidos a partir de suas médias por sexo. Nos casos de áreas sobrepostas, foram estabelecidos dois pontos de corte. A proporção de dígitos (2D:4D) não distinguiu o sexo da população. No entanto, a largura da mão revelou-se a medida mais precisa para determinação do sexo, chegando a 89% da taxa de correção. Portanto, o uso de medidas antropométricas das mãos mostrou-se adequado para determinar com precisão o sexo da população em estudo.

PALAVRAS - CHAVE: Ponto de corte; Razão dos dígitos (2D:4D); Medição da mão; Porcentagem de classificação; Determinação do sexo, Dimorfismo sexual

1 | INTRODUCTION

Several studies were conducted using features such as sex, age, and anthropometric measurements (stature, hands, long bones, etc.) to determine the biological profile and sex of an individual (Sue, 1755; Orfila, 1823; Topinard, 1888; Gupta et al., 2017). These studies can be used to assist the forensic investigation area and other law enforcement agencies since human identification has always been their major challenge (Krogman and Isçan, 1986). This kind of identification has become essential when mutilated body remains are found, as in cases of war or natural calamities, in the bomb blast, in accidents, etc. In such situations, considering the recovered peripheral parts of the body is fundamental, being hands one of them. In general, the process of human identification focuses mainly on establishing the biological profile by estimating the sex, age, and stature (Krogman and Isçan, 1986; Francisco et al., 2011).

In the forensic area, some measures, as anthropometric hand measurements, have been used to determine the sex of different populations. Some of the hand measurements represent a likely variable of sexual difference related to prenatal exposure to gonadal hormone, as in the case of the Index Finger Length (IFL) divided by the Ring Finger Length (RFL) (so-called digit ratio 2D:4D) (Manning, 2002; Ökten et al., 2002; Lutchmaya et al., 2004). Thus, studies have determined a cutoff point based on male and female digit ratio values, which is used as a human identification parameter. Figure 1 shows how the index and ring finger lengths are measured.

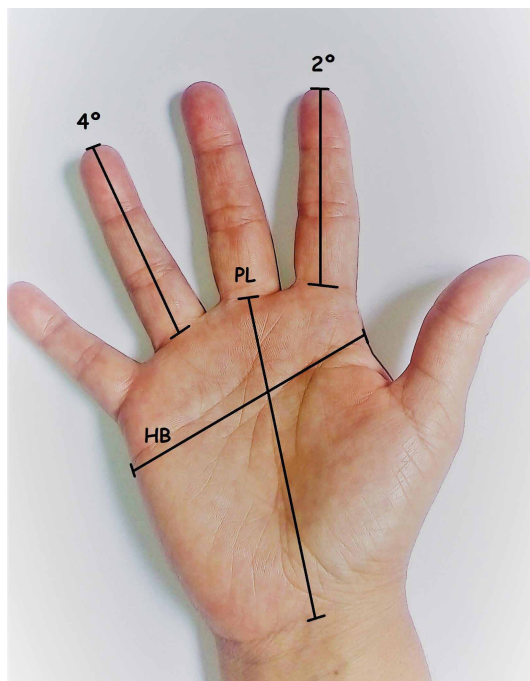


Figure 1. Hand anthropometric measurements: second (2°) and fourth (4°) finger, hand breadth (HB) and hand palm length (HPL).

In several studies, on average, men have 2D:4D measurement lower than women (Manning, 2002; Manning et al., 2007; Agnihotri et al., 2015) and among animals (Brown et al., 2002), making it an important indicator of sexual dimorphism. Also, Weinberg et al. (2015) stated that a lower digit ratio indicates high levels of testosterone hormone and low levels of estrogen hormone in the prenatal period. Another study considering fetuses showed that, on average, these proportions of digits (2D:4D) do not change with gestational age (Malas et al., 2006). Galis et al. (2010) and Malas et al. (2006) mentioned these proportions are, probably, established during the 10-week gestation.

Recent researches were carried out to determine sex from the digit ratio (2D:4D), presenting statistically significant results. Ibrahim et al. (2016) reached a high precision in determining the sex of an individual through hand dimensions among the North Saudi Arabia population, concluding that the anthropometric measurements of hands can be important variables for human forensic identification. Aboul-Hagaga et al. (2011) also concluded that 2D:4D can be used in sex determination for the Upper Egypt population, from an isolated hand when submitted to a medico-legal examination.

Another approach found in the literature is the comparison between the use of phalanges or metacarpals lengths. Case and Ross (2007) observed that the use of phalanges measurements is better for sex determination than the metacarpals lengths uses. However,

when Khanpetch et al. (2012) sought to better understand sexual dimorphism in human metacarpals, they concluded that the use of two or more metacarpal lengths combined ensures a higher level of accuracy in determining sex.

Kanchan and Rastogi (2009) also investigated sexual dimorphism from the men and women's hands' dimensions from Northern and Southern India. They found that hand dimensions (hand length, hand breadth, and hand palm length) show greater precision in determining sex when compared to hand (hand breadth/hand palm length $\times$ 100) and palm (hand breadth/hand palm length $\times$ 100) indexes. Moreover, the breadth of the hands was the one that obtained the greatest accuracy in determining sex.

As depicted, the forensic identification from anthropometric hand data may vary across nations due to specific ethnic groups' characteristics. However, the sex determination from anthropometric measurements of hands has not yet been done with data from a Brazilian population. Therefore, this paper aimed to investigate whether the use of the digit ratio (2D:4D) or other hand measurements could identify the sex of Brazilian personals.

2 | METHODS

2.1 Data source

The database used in this study was previously created and cataloged by a forensic group of the Federal University of the ABC Region in São Paulo (UFABC), which was described by Souza (2016). The database included a total of 475 observations of anthropometric measurements of hands evaluated in research carried out in Brazil in 2016. All of the data were of Southeast Brazilian citizens composed of university students and servants from UNIFESP. The ages ranged from 18 to 55 years, which the average was 23.6 and 23.7 years for women and men, respectively. Volunteers who had any deformity or disease, any injury, fractures or amputations, or history of any surgical procedure in their hands were excluded from the database. The database was approved by the Ethical Committee in Research of the Federal University of São Paulo under No 1,334,138.

Although the database contains hand measurements obtained by the direct (with a caliper) and the indirect (with a flatbed scanner) method, only the handprints measurements using the ruler in the ImageJ software were considered in this study. The total of 475 observations corresponds to 210 and 265 sample lines of men and women hand anthropometric measurements. Five measurements (second finger length - 2D, fourth finger length - 4D, the ratio of the lengths of the second and fourth fingers - 2D:4D, hand breadth - HB, and hand palm length - HPL) were taken for both hands from each participant.

2.2 Data analysis and statistics

The software R (R Core Team, 2020) was used to perform all statistical analyses. Firstly, a descriptive analysis of the finger length measurement data was made to analyze the

behavior of each variable (2D, 4D, and 2D:4D). Specifically, the mean, standard deviation, and the mean standard error were calculated. Then, the Shapiro-Wilk test (Shapiro and Wilk, 1965) was performed to verify the normality of the variables quantitatively. The significance of sexual dimorphism from the finger measurements was evaluated from the independent Student's t-test, which was, therefore, verified from the statistical significance of differences between male and female means of all variables in both hands. Consequently, Fisher's F test, also known as the F-test of equality of variances, had to be used to check the equality of variance for the different groups (female and male), also for both hands. More details about these tests can be found in Snedecor and Cochran (1980). Statistical significance was defined as $p\text{-value} < 0.05$.

Besides, the use of other anthropometric hand measurements was analyzed in search of greater accuracy in sexual classification. This step included analyzing the measurement of hand palm length and hand breadth separately, as found in studies (Varu et al., 2016; Jowaheer and Agnihotri, 2011; Krishan et al., 2011) available in the literature.

The considered dataset was randomly partitioned into two separate subsets: one, comprising 80% (380 observations) of the data, was used as a classification dataset in setting up sex classifying points; the second one, comprising 20% (95 observations) of the data, was used as the test set. With a classification dataset, it was established some points to classify the male and female groups. The testing data should be used as new observations to verify the accuracy of the proposed methodology.

For each variable, the empirical distributions for males and females were obtained from the classification dataset observations. A cutoff point to distinguish individuals' sex was habitually defined as the average of the means by sex. However, the desired sex identification is impaired in cases of overlapping areas of female and male measurements. Thus, in these overlapping cases, this work proposes the establishment of two cutoff points. These two dividing lines are, respectively, the lower (LL) and upper limits (UL) of the area of the most considerable overlap. This area will be mentioned only as an overlap area throughout this paper, which consists of the area of similar hand female and male measurements. Therefore, each variable was analyzed, and their respective cutoff points were established.

The established cutoff points' classification ability was verified, computing the percentage of correct sex classification of future unknown observations Fraley and Raftery (2002) from the test dataset. This percentage is obtained considering the frequency of the values in the test dataset that were correctly classified. It is important to emphasize that the percentage of correct sex classification was computed with the extremes values out of the overlap area when this area is identified.

3 | RESULTS

Descriptive statistics and comparisons of male and female means for considered variables (2D, 4D, and 2D:4D) for both hands are shown in Table 1. The Shapiro-Wilk test showed a normal distribution for all variables. Thus, except for 2D left hand, Fisher's F-test values indicate that no differences were observed between the variances for women and men measurements of considered variables ($p\text{-value} > 0.05$). However, the means of the 2D:4D indices were different for men and women, both for right and left-hand values ($p\text{-value} < 0.05$). Statistically significant differences were also found between the 2D and 4D measurements for women and men by the t-test ($p\text{-value} < 0.05$) at a 5% level of significance. Therefore, for males, the 2D and 4D finger lengths are significantly larger than for females.

Male Measurement (n = 210)	Hand Side					
	Right			Left		
	2D	4D	2D/4D	2D	4D	2D/4D
Mean	73.924	76.794	0.963	73.896	76.637	0.965
s.d.	4.529	4.732	0.033	4.627	4.849	0.033
Female Measurement (n = 265)	2D	4D	2D/4D	2D	4D	2D/4D
Mean	68.105	69.832	0.976	67.738	69.392	0.977
s.d.	4.100	4.392	0.032	3.989	4.304	0.033
F-test comparison of variances						
F - statistic	0.819	0.861	0.916	0.743	0.788	1.038
p-value	0.126	0.252	0.499	0.023	0.067	0.780
Independent Student's t-Test						
t - statistic	-14.663	-7.788	4.209	-15.302	-17.224	3.894
p-value	<0.001	<0.001	< 0.001	<0.001	<0.001	< 0.001

2D: second finger of the hand, 4D: fourth finger of the hand, 2D/4D: division of the second finger of hand for the fourth finger of the hand, s.d.: standard deviation.

Table 1. Descriptive statistics and comparisons of mean hand measurements (in mm) for both hands.

Figure 2 shows the sex distribution of the 2D:4D ratio for the right and left hands of the classification dataset used in this study. In both graphics, there is a lighter tone region corresponding to the digit ratio (2D:4D) of the male individuals, and a darker region corresponding to the female 2D:4D observations. The middle-gray tone area corresponds to the overlap of the ratio between index and ring finger length. Thus, the histograms for both

men and women largely overlap. Therefore, it is not possible to determine any cutoff point over 2D:4D to be used as a sex classification limit. This behavior was seen for both right and left hands for the digit ratio (2D:4D) values.

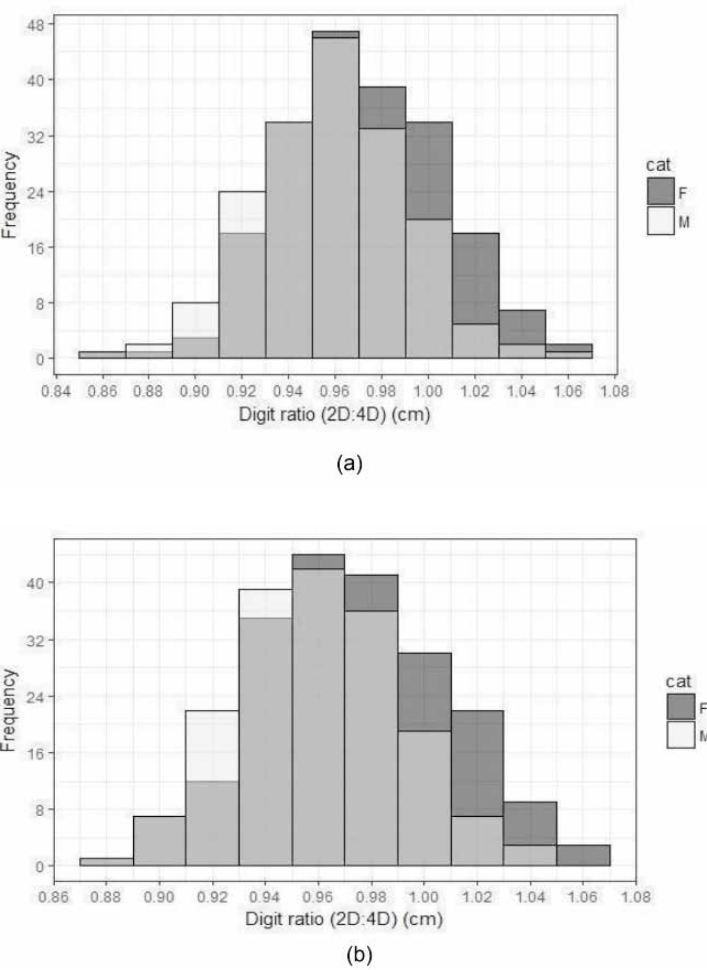


Figure 2- Distribution of the 2D:4D digit ratio in the (a) right and (b) left hands from the classification dataset.

In this study, considering the average of the means by sex, as proposed by Dey and Kapoor (2016), cutoff points of 0.970 for the right and 0.971 for the left hands were established. However, the use of these points was not satisfactory due to the low accuracy of hits obtained for both hands, which vary from 54% to a maximum of 60% between men and women classifications. Thus, as the male and female digit ratio from the population of the Southeast region of Brazil presents a large overlap area of values, the use of the

2D:4D variable cannot discriminate the sex of the study population. This result reflects the fact that the 2D:4D ratio values of both men and women are similar in the study population. Therefore, it was not possible to recommend a cutoff point for this variable that would differentiate human sex.

Based on the 2D:4D variable's findings, it was considered the analyses of 2D and 4D variable separately to obtain the sex determination of individuals of the considered population. The distributions of the 2D and 4D measures of men and women are presented in Figures 3 and 4. The 2D and 4D variables distributions for both hands were considered from the classification dataset. These graphics showed a considerable frequency of overlapping male and female measurements. These overlap areas indicate similar men and women values, delimited by dotted lines.

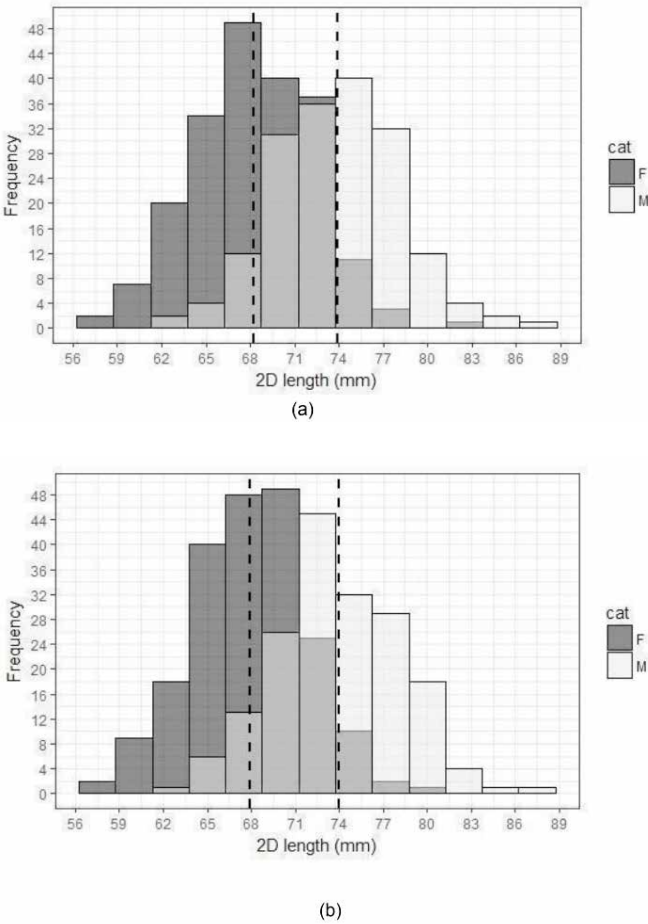


Figure 3- Distribution of the 2D variable in the (a) right and (b) left hands from the classification dataset.

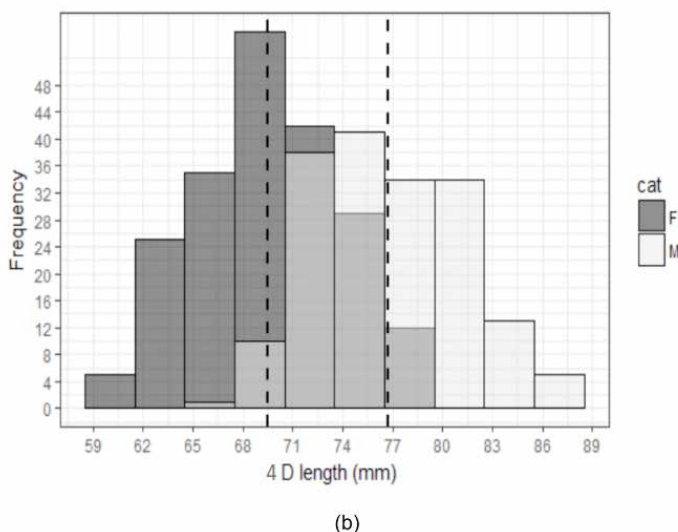
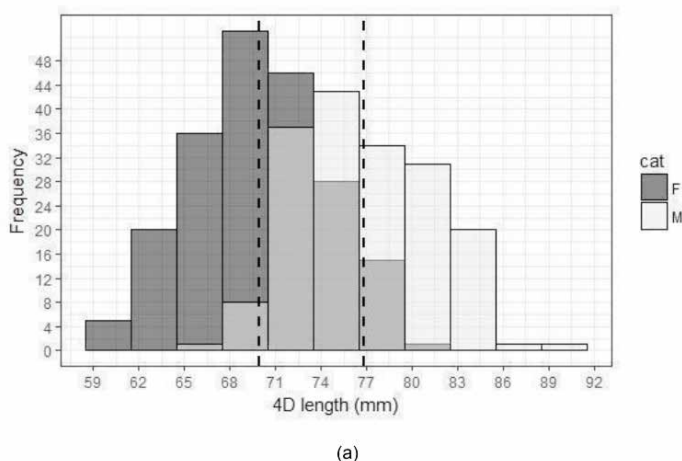


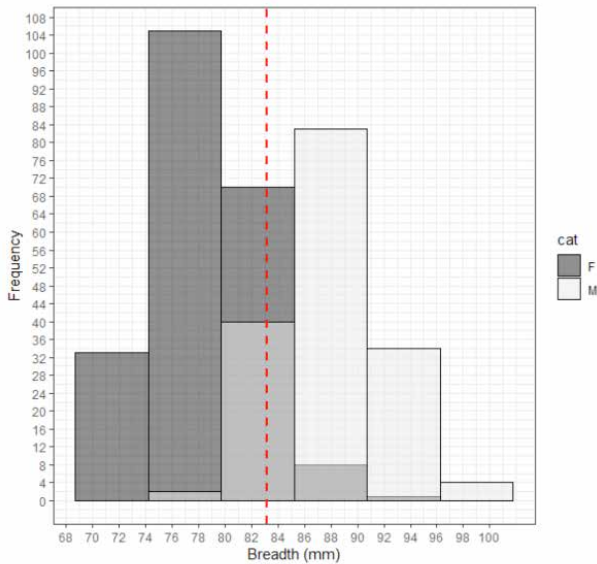
Figure 4- Distribution of the 4D variable in the (a) right and (b) left hands from the classification dataset.

The mentioned dotted lines were considered cutoff points in the 2D and 4D measurements to discriminate individuals' sex, based on these variables. These cutoff points were established as the averages by sex in the considered variable, respectively, from left to right, for women and men. These averages were considered as limit points because the region between them presented plenty of overlap points. So, the women's and men's averages are that respective sought LL and UL values. The observations between these limit points were not considered for the percentage of correct determination calculus, since the empirical distributions for both sexes largely overlap in this area because of the similarity of their values (see Figures 3 and 4). This overlap area can be considered as an

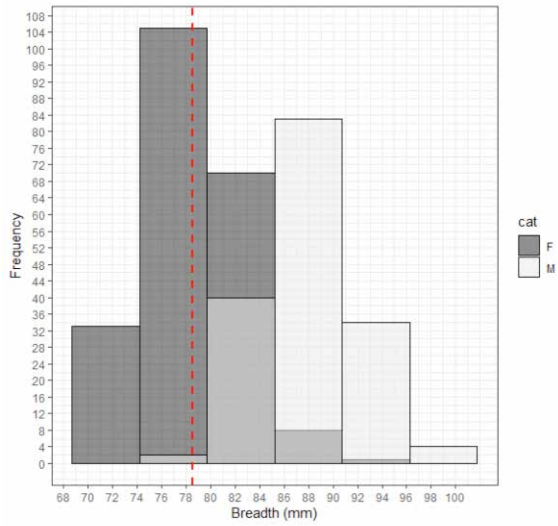
indecision area.

Therefore, measurement values equal or less the LL value is suggestive of female sex and, values equal or greater than LS value is indicative of male origin. In other words, the classification criteria were determined as FEMALE for 2D values less than the average women (=68.11) and MALE for 2D values higher than the average men values (=73.92), for the right hand. Similarly, the classification criteria can be replicated to the 2D measure of the left hand, and for the 4D measure of both hands.

From the observations of the variables breadth hand and hand palm length, the analyzes for the right and left hands were considered separately. The distribution of the hand breadth and hand palm length measures, from the set of classification data, are shown in Figures 5 and 6, respectively. These graphs showed a reduction in the frequency of overlapping male and female measurements (in medium gray).

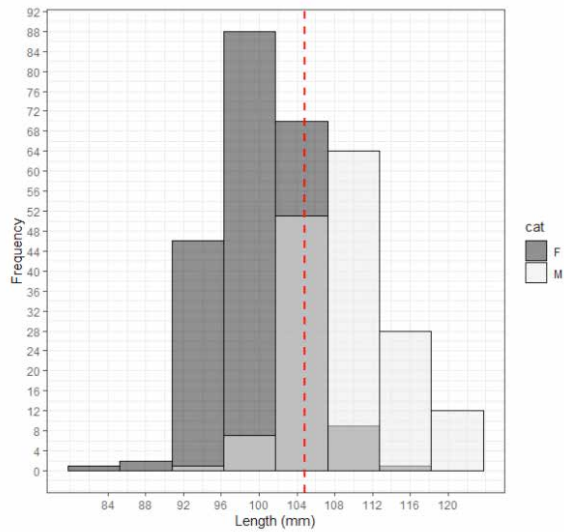


(a)



(b)

Figure 5- Distribution of the hand breadth variable in the (a) right and (b) left hands from the classification dataset.



(a)

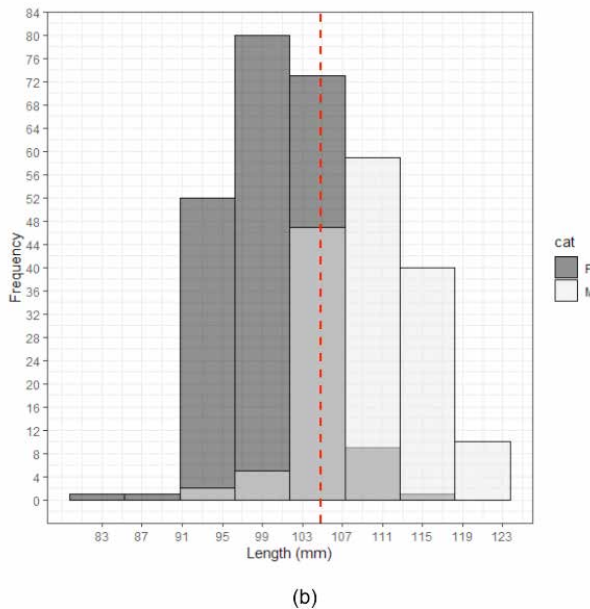


Figure 6- Distribution of the hand palm length variable in the (a) right and (b) left hands from the classification dataset.

The red dotted lines in the graphs of Figures 5 and 6 are the cutoff points applied to discriminate the sex of the individuals, based on the HB and HPL variables. These cutoff points were established as the average of the female and male means. Therefore, for these two variables, values lower than the cutoff point were classified as a FEMALE, otherwise (values greater or equal than the cutoff point) as MALE. For these variables, the small overlapping area existent was not highlighted, being all values of both datasets considered to obtain their respective percentage of correct classification.

Table 2 presents the percentages of correct sex determination for all variables. The cutoff points for 2D and 4D are the respective means of women's and men's values. For hand breadth (HB) and hand palm length (HPL), the only cutoff point is the average of the means by sex, as indicated in the literature.

Variable	Hand Side	Cutoff points (mm)	Classification Set (%)	Overlap Classification Set (n)	Test Set (%)	Overlap Test Set (n)
2D	Right	68.11 e 73.92	0.86	119	0.84	34
	Left	67.74 e 73.90	0.89	130	0.88	29
4D	Right	69.83 e 76.79	0.90	146	0.91	33
	Left	69.39 e 76.64	0.91	148	0.87	37
HB	Right	83.18	0.74	--	0.89	--
	Left	78.59	0.74	--	0.81	--
HPL	Right	104.85	0.84	--	0.87	--
	Left	104.85	0.85	--	0.87	--

2D: second finger of the hand, 4D: fourth finger of the hand, HB: hand breadth , HPL: hand palm length.

Table 2. Percentage of correct classification of females and males, considering cutoff points for each variable.

For the classification and test data sets, a total of 420 and 106 observations were randomly selected, respectively. From the classification set, the 2 cutoff points were obtained for the variables 2D and 4D, so the observations that belonged to the data overlap area were excluded from the calculation to reach the percentage of correct answers. Therefore, for these variables the total number of observations for the classification was 420 minus the number of overlapping observations and 106 minus the number of overlapping data.

4 | DISCUSSION

In this study, the female 2D:4D ratios were significantly higher than males for both hands, as presented in Table 1. These findings are in accord with previous results obtained in the literature (Bailey and Hurd, 2005; Kanchan et al., 2008; Aboul-Hagaga et al., 2011; Ibrahim et al., 2016). Furthermore, Brown et al. (2002) tested whether another mammalian species, in which the process of sexual differentiation is dependent on the androgen hormones presence, may also show a sex difference from digit proportions. In his study, the (2D:4D) ratio for the left and right hind paws of non-brown adult mice was calculated, being observed sex differences in the ratios measurements of the right hind paw. This finding supports the fact that sexual dimorphism is related to this index, and this relation may be a common feature of mammals.

Dey and Kapoor (2016) also concluded that the proportion of male digits (2D:4D) differed statistically from the female, considering a population in North India. However, a small overlap area was found from the sexes empirical distributions of ratio (2D:4D)

variable. With this, they determined a cutoff point that provided a percentage of correct sexual determination of 93% males and 90% females for the right hand and 87% males and 84% females for the left hand. The considered cutoff point was established as the average of the means by sex, of the variable considered by them. Thus, the data before the cutoff point of the 2D:4D variable would probably be men, and above the cutoff would probably be women. Similar results can be seen in (Aboul-Hagaga et al., 2011; Ibrahim et al., 2016; Gupta et al., 2017).

From the digit ratio (2D:4D) for the right hand, Ibrahim et al. (2016) obtained a percentage of correct classification of 93.6% for men and 91.3% for women, and for the left hand, the precision of 92.8% for men and 89.8% for women. They also analyzed the ROC curve of the 2D:4D and found that it discriminates sex in 98% for the right hand, and in tax varying from 94% to 96% for the left hand. Aboul-Hagaga et al. (2011) reported a precision in sex classification in 90.4% of males and 85.6% of females for the right hand, and 88.8% of males and 80.4% of females for the left hand, considering the digit ratio (2D:4D).

One finding of this paper is that there is no sense to use the digit ratio for sex determination with the population in the study. Although males show a lower 2D:4D than females, the distribution of 2D:4D is overlapping in males and females because the 2D:4D ratio varies in both sexes. For example, it was possible to find a low 2D:4D in females as well and a high 2D:4D among males. This fact can be explained due to the Brazilian population descends from different ethnic groups.

The results expressed in Table 2 indicate percentages of correct sex determination for both classification and test datasets of the 2D, 4D, breadth hand, and hand palm length variables. In general, there was a similar sex classification rate for both datasets.

The analysis of the 4D variable of the right hand (4D Right) showed the highest rate value (91%) for the test dataset. This variable showed the higher sex classification; it correctly classified from the test dataset 91% of individuals who were outside the overlap area. However, it is important to highlight that individuals whose measures were inside this indecision area ($69.83 < 4D \text{ Right value} < 76.79$) were not considered in this classification rate. The same interpretation can be extended to the other variables, considering their respective cutoff points.

For the analysis of the variables hand breadth and hand palm length of the hand, a cutoff point was drawn, through the average of the female and male averages. In this case, the verification of the correct classification quantity considered all the dataset values, because there was not a significant overlap area to be removed on the calculus. In this context, the hand breadth variable of the right hand (HB Right) presented the highest percentage (= 89%) of correct classification compared with other variables.

Therefore, according to the number of observations contained in the percentages calculus, the percentages found for HB and HPL are proportionally higher than those obtained in the other variables. And since the highest percentage obtained was the breadth of the

hand, it can be confirmed that this variable hand breadth guarantees greater precision than the others; although, the length of the palm has also obtained high and similar accuracies. This data set of Brazilians from the Southeast region also confirms that the percentage of correct answers for the variable hand width is greater than 80%, as found in the literature (Varu et al., 2016; Jowaheer and Agnihotri, 2011; Agnihotri et al., 2015).

In general, anthropometric measurements enable a person's sex determination. With precision among 82.6% and 96.5% with a 5% sexual bias, Shak et al. (2012) used the breadth and length of the hand as variables to determine the sex of the individuals in Western Australia. Besides that, other studies showed that the sex determination of individuals could also be given from measures of bones such as metacarpus (Manolis et al., 2009; Khanpetch et al., 2012), calcaneus Kim et al. (2013) long bones, especially the femur and tibia (İşcan and Miller-Shaivitz, 1984; İşcan et al., 1994; İşcan and Shihai, 1995; Steyn and İşcan, 1997). Thus, all these findings result support the use of other types of variables for sex determination in the forensic area since remaining members of any part of the body can appear in crime scenes and natural disasters. Similarly, the use of other variables may improve the accuracy of sex determination in the population database of this study.

4.1 Limitations and future perspectives

The dataset used in this study refers to volunteers from a region in Southeast Brazil, and in Brazil, there is very high miscegenation (Krogman and İşcan, 1986). Thus, it can be hypothesized that the determination of sex from the digit ratio (2D:4D) was not defined in overlap areas of this study, since the Brazilian population presents characteristics of other folks, such as Native Americans, Europeans and sub-Saharan Africans (Bonini-Domingos, 2009). Then, the limitations of this study were: the fact of the existence of miscegenation of the Brazilian population and the small sample limited to students and servants of UNIFESP. Although the sample used had a considerable amount of data compared to other studies (Kanchan et al., 2008; Manolis et al., 2009; Khanpetch et al., 2012; Kim et al., 2013; Ibrahim et al., 2016). Therefore, in further works, a more careful and controlled investigation is needed in these indecision areas, mentioned here as overlap areas.

This work is the first study using Brazilian data to determine the individual's sex from anthropometric hand measurements. Although the considered dataset contains only data from a Southeast Brazil region, the obtained results could be tested in individuals from other Brazil's areas. However, the dataset will be updated in future studies, including sample observations from different Brazilian regions. The aim will be to improve the accuracy of sexual classification using other statistical techniques (for example, discriminant analysis, logistic regression, and cluster analysis) to optimize the sex classification.

5 | CONCLUSION

The present study was the first to evaluate the accuracy of using anthropometric measurements of the hands to determine the sex of individuals from a Southeast Brazilian region. Research with this approach had not yet been conducted in Brazil.

The digit ratio (2D:4D) was significantly lower in men, although this variable did not provide good accuracy to discriminate the sex of the analysed population. The use of 2D and 4D variable separately revealed a promising approach for accurately determining individuals' sex. However, there is an area containing overlapping values for both sexes. This area was delimited by two established cutoff points being the means of males and females in each variable. This overlap area was considered as an indecision area, thereby impairing the sex determination of individuals who fit into this range of values. Thus, this area's values were not considered in the percentage of correct sex determination, reaching a tax of 84% and 91% for the right hand, and 88% and 87% for the left hand, respectively, for 2D and 4D variables.

Besides, it was possible to observe a significant improvement in accuracy of determination of sex with the use of the hand palm length and hand breadth variables, confirming that these anthropometric hand measurements could be used in the forensic area to accurately determine the sex of population in the study. The highest percentage was obtained from measurement hand breadth in the right hand, which reached 89% of correctness.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHORS' CONTRIBUTIONS

PG, FCMQ and MEK wrote the manuscript.

FCMQ and PG analyzed the data.

FCMG and MEK designed the study and directed the use of the MaoBD database.

PG, FCMQ and MEK edited the manuscript for intellectual content and provided critical comments on the manuscript.

REFERENCES

- ABOUL-HAGAG, Khaled E. et al. **Determination of sex from hand dimensions and index/ring finger length ratio in Upper Egyptians**. Egyptian Journal of Forensic Sciences, v. 1, n. 2, p. 80-86, 2011. <https://doi.org/10.1016/j.ejfs.2011.03.001>
- AGNIHOTRI, Arun Kumar; JOWAHEER, A. Aman; SOODEEN-LALLOO, Adiliah K. **Sexual dimorphism in finger length ratios and sex determination—A study in Indo-Mauritian population**. Journal of forensic and legal medicine, v. 35, p. 45-50, 2015. <https://doi.org/10.1016/j.jflm.2015.07.006>
- BAILEY, Allison A.; HURD, Peter L. **Finger length ratio (2D: 4D) correlates with physical aggression in men but not in women**. Biological psychology, v. 68, n. 3, p. 215-222, 2005. <https://doi.org/10.1016/j.biopsycho.2004.05.001>
- BONINI-DOMINGOS, Claudia R. **As hemoglobinopatias e a diversidade genética da população brasileira**. Revista Brasileira de Hematologia e Hemoterapia, v. 31, n. 6, p. 401-401, 2009. <https://doi.org/10.1590/S1516-84842009000600001>
- BROWN, Windy M.; FINN, Christopher J.; BREEDLOVE, S. Marc. **Sexual dimorphism in digit-length ratios of laboratory mice**. The Anatomical Record: An Official Publication of the American Association of Anatomists, v. 267, n. 3, p. 231-234, 2002. <https://doi.org/10.1002/ar.10108>
- CASE, D. Troy; ROSS, Ann H. **Sex determination from hand and foot bone lengths**. Journal of forensic sciences, v. 52, n. 2, p. 264-270, 2007. <https://doi.org/10.1111/j.1556-4029.2006.00365.x>
- DEY, Sangeeta; KAPOOR, A. K. **Digit ratio (2D: 4D)—A forensic marker for sexual dimorphism in North Indian population**. Egyptian Journal of Forensic Sciences, v. 6, n. 4, p. 422-428, 2016. <https://doi.org/10.1016/j.ejfs.2016.09.003>
- FRALEY, Chris; RAFTERY, Adrian E. **Model-based clustering, discriminant analysis, and density estimation**. Journal of the American statistical Association, v. 97, n. 458, p. 611-631, 2002. <https://doi.org/10.1198/016214502760047131>
- FRANCISCO, Raffaella A. et al. **Antropologia forense no Centro de Medicina Legal da FMRP/USP, estudo comparativo de casos de 1999-2009**. Medicina (Ribeirão Preto Online), v. 44, n. 3, p. 241-248, 2011. <https://doi.org/10.11606/issn.2176-7262.v44i3p241-248>
- GALIS, Frietson et al. **Sexual dimorphism in the prenatal digit ratio (2D: 4D)**. Archives of sexual behavior, v. 39, n. 1, p. 57-62, 2010. <https://doi.org/10.1007/s10508-009-9485-7>
- GUPTA, Sonia et al. **Index/ring finger ratio, hand and foot index: Gender estimation tools**. Journal of clinical and diagnostic research: JCDR, v. 11, n. 6, p. ZC73, 2017. <https://doi.org/10.7860/JCDR/2017/25807.10084>
- IBRAHIM, Mahrous AbdelBasset et al. **Sex determination from hand dimensions and index/ring finger length ratio in North Saudi population: Medico-legal view**. Egyptian journal of forensic sciences, v. 6, n. 4, p. 435-444, 2016. <https://doi.org/10.1016/j.ejfs.2016.11.002>
- İŞCAN, M. Y.; YOSHINO, Mineo; KATO, Susumu. **Sex determination from the tibia: standards for contemporary Japan**. Journal of forensic science, v. 39, n. 3, p. 785-792, 1994. <https://doi.org/10.1520/JFS13656J>

İŞCAN, M. Yaşar; MILLER-SHAIVITZ, Patricia. **Determination of sex from the tibia**. American Journal of Physical Anthropology, v. 64, n. 1, p. 53-57, 1984. <https://doi.org/10.1002/ajpa.1330640104>

İŞCAN, M. Yaşar; SHIHAI, Ding. **Sexual dimorphism in the Chinese femur**. Forensic science international, v. 74, n. 1-2, p. 79-87, 1995. [https://doi.org/10.1016/0379-0738\(95\)01691-B](https://doi.org/10.1016/0379-0738(95)01691-B)

ISHAK, Nur-Intaniah; HEMY, Naomi; FRANKLIN, Daniel. **Estimation of sex from hand and handprint dimensions in a Western Australian population**. Forensic science international, v. 221, n. 1-3, p. 154. e1-154. e6, 2012. <https://doi.org/10.1016/j.forsciint.2012.04.017>

JOWAHEER, Vandna; AGNIHOTRI, Arun Kumar. **Sex identification on the basis of hand and foot measurements in Indo-Mauritian population—a model based approach**. Journal of forensic and legal medicine, v. 18, n. 4, p. 173-176, 2011. <https://doi.org/10.1016/j.jflm.2011.02.007>

KANCHAN, Tanuj; KUMAR, G. Pradeep; MENEZES, Ritesh G. **Index and ring finger ratio—A new sex determinant in south Indian population**. Forensic science international, v. 181, n. 1-3, p. 53. e1-53. e4, 2008. <https://doi.org/10.1016/j.forsciint.2008.08.002>

KANCHAN, Tanuj; RASTOGI, Prateek. **Sex determination from hand dimensions of North and South Indians**. Journal of forensic sciences, v. 54, n. 3, p. 546-550, 2009. <https://doi.org/10.1111/j.1556-4029.2009.01018.x>

KHANPETCH, Pongsak et al. **Determination of sex from the metacarpals in a Thai population**. Forensic science international, v. 217, n. 1-3, p. 229. e1-229. e8, 2012. <https://doi.org/10.1016/j.forsciint.2011.10.044>

KIM, Deog-Im et al. **Sex determination from calcaneus in Korean using discriminant analysis**. Forensic science international, v. 228, n. 1-3, p. 177. e1-177. e7, 2013. <https://doi.org/10.1016/j.forsciint.2013.03.012>

KRISHAN, Kewal; KANCHAN, Tanuj; SHARMA, Abhilasha. **Sex determination from hand and foot dimensions in a North Indian population**. Journal of forensic sciences, v. 56, n. 2, p. 453-459, 2011. <https://doi.org/10.1111/j.1556-4029.2010.01652.x>

KROGMAN, Wilton Marion; İŞCAN, M. Yasar. **The human skeleton in forensic medicine**, Charles C. Thomas, Springfield, IL, p. 202-08, 1986.

LUTCHMAYA, Svetlana et al. **2nd to 4th digit ratios, fetal testosterone and estradiol**. Early human development, v. 77, n. 1-2, p. 23-28, 2004. <https://doi.org/10.1016/j.earlhumdev.2003.12.002>

MALAS, Mehmet Ali et al. **Fetal development of the hand, digits and digit ratio (2D: 4D)**. Early human development, v. 82, n. 7, p. 469-475, 2006. <https://doi.org/10.1016/j.earlhumdev.2005.12.002>

MANNING, John T. **Digit ratio: A pointer to fertility, behavior, and health**. Rutgers University Press, 2002.

MANNING, John T.; MORRIS, Laura; CASWELL, Noreen. **Endurance running and digit ratio (2D: 4D): implications for fetal testosterone effects on running speed and vascular health**. American Journal of Human Biology: The Official Journal of the Human Biology Association, v. 19, n. 3, p. 416-421, 2007. <https://doi.org/10.1002/ajhb.20603>

MANOLIS, Sotiris K. et al. **Sex determination using metacarpal biometric data from the Athens Collection.** Forensic Science International, v. 193, n. 1-3, p. 130. e1-130. e6, 2009. <https://doi.org/10.1016/j.forsciint.2009.09.015>

ÖKTEN, Ayşenur; KALYONCU, Mukaddes; YARIŞ, Nilgün. **The ratio of second-and fourth-digit lengths and congenital adrenal hyperplasia due to 21-hydroxylase deficiency.** Early human development, v. 70, n. 1-2, p. 47-54, 2002. [https://doi.org/10.1016/S0378-3782\(02\)00073-7](https://doi.org/10.1016/S0378-3782(02)00073-7)

ORFILA, Matthieu Joseph Bonaventure. **Leçons de médecine légale.** Béchet jeune, 1828.

SHAPIRO, Samuel Sanford; WILK, Martin B. **An analysis of variance test for normality (complete samples).** Biometrika, v. 52, n. 3/4, p. 591-611, 1965. <https://www.jstor.org/stable/2333709>

SNEDECOR, G. W.; COCHRAN, W. G. **Statistical method 7th Ed.** The Iowa state university press, Ames, Iowa, USA, p. 39-63, 1980.

SOUZA, F. 2016. **Criação de uma base de dados de mãos e estaturas para geração de modelos de regressão em antropometria forense.** Dissertação de mestrado em Engenharia Biomédica não publicada. Universidade Federal do ABC, Santo André, São Paulo, Brasil.

STEYN, Maryna; İŞCAN, M. Yaşar. **Sex determination from the femur and tibia in South African whites.** Forensic science international, v. 90, n. 1-2, p. 111-119, 1997. [https://doi.org/10.1016/S0379-0738\(97\)00156-4](https://doi.org/10.1016/S0379-0738(97)00156-4)

SUE, M. **Sur les proportions du squelette de l'homme, examiné depuis l'âge le plus tendre, jusqu'à celui de vingt-cinq, soixante ans, & au delà.** De l'Imprimerie Royale, 1755.

R Core Team. **R: A language and environment for statistical computing.** R Foundation for Statistical Computing, Vienna, Austria, 2020. <https://www.r-project.org>.

TOPINARD, Paul. **Le poids de l'encéphale d'après les registres de Paul Broca.** Mémoires de la société d'anthropologie, v. 3, p. 33-41, 1888.

VARU, P. R. et al. **Determination of sex using hand dimensions.** International Journal of Medical Toxicology and Forensic Medicine, v. 6, n. 1, p. 23-28, 2016.

WEINBERG, S. M. et al. **Prenatal sex hormones, digit ratio, and face shape in adult males.** Orthodontics & craniofacial research, v. 18, n. 1, p. 21-26, 2015. <https://doi.org/10.1111/ocr.12055>

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