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Pelvimetric characteristics in agoutis (*Dasyprocta prymnolopha*) bred under human care*

Características pelvimétricas em cutias (*Dasyprocta prymnolopha*) criadas sob cuidados humanos

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Abstract

The aim of the study was to establish the pattern of the agouti pelvis by obtaining external and radiographic internal pelvimetric values. Forty-three agouti (*Dasyprocta prymnolopha*), females and males bred in under human care were used. The parameters measured were the external biiliac diameter; the external biischiatic diameter; right and left external ilioischiatic diameters and radiographic internal measurements (true conjugated, the diagonal conjugated; the vertical, the sacral, sagittal, coxal tuberosity, upper biiliac, lower biiliac, and biischiatic diameter. The inlet pelvic area and the outlet pelvic area were calculated, as well the height/width ratios of the entrance area of the pelvis and the pelvic outlet area were calculated. The mean values for each body measurement of females and males were: weight 1.91kg and 2.04kg, external biiliac diameter 6.32cm and 6.30cm, external biischiatic diameter 4.34cm and 4.28cm, right external ilioischiatic diameter 9.01cm and 9.33cm, left external ilioischiatic diameter 9.13cm and 9.30cm, true conjugated 3.90cm and 3.68cm, diagonal conjugated 7.13cm and 6.91cm, vertical diameter 2.59cm and 2.45cm, sacral diameter 2.63cm and 2.44cm, sagittal diameter 3.30cm and 3.09cm, coxal tuberosity diameter 2.52cm and 2.43cm, upper biiliac diameter 6.28cm and 6.24cm, lower biiliac diameter 2.98cm and 2.58cm, biischiatic diameter 2.60cm and 2.70cm, height/width ratio - vertical/ lower biiliac diameter 0.88cm and 0.95cm, sagital/coxal tuberosity diameter 1.32cm and 1.28cm, inlet pelvic area 82.38cm and 77.83cm and outlet pelvic area 24.76cm and 20.07cm. Agouti are dolichopelvic animals, demonstrating the existence of a discrete sexual dimorphism in adults and low intensity correlations between the external and internal measures studied.

Keywords: pelvimetria, pelvimetria radiográfica, roedor, cutia.

Resumo

O objetivo deste estudo foi estabelecer o padrão da pelve de cutia, masculina e feminina, por meio da obtenção dos valores médios da pelvimetria externa e interna radiográfica. Foram utilizadas 43 cutias (*Dasyprocta prymnolopha*), fêmeas e machos criadas sob cuidados humanos. Os parâmetros medidos foram o diâmetro biilíaco externo; o diâmetro biisquiático externo; diâmetros ilioisquiáticos externos direito e esquerdo e medidas internas radiográficas (diâmetros conjugado verdadeiro, diagonal conjugado, vertical, sacral, sagital, tuberosidade coxal, biilíaco superior, biilíaco inferior e diâmetro biisquiático). A área pélvica de entrada e a área pélvica de saída foram calculadas , assim como foram calculadas as razões altura/largura da área de entrada da pelve e da área de saída da pelve. Os valores médios para as medidas das fêmeas e dos machos foram, respectivamente: peso 1,91kg e 2,04kg, diâmetro biilíaco externo 6,32cm e 6,30 cm, diâmetro ilioisquiático externo 4,34cm e 4,28cm, diâmetro ilioisquiático externo direito 9,01cm e 9,33cm, diâmetro ilioisquiático externo esquerdo 9,13cm e 9,30cm, diâmetro conjugado verdadeiro 3,90cm e 3,68cm, diâmetro conjugado diagonal 7,13cm e 6,91cm, diâmetro vertical 2,59cm e 2,45cm, diâmetro sacral 2,63cm e 2,44cm, diâmetro sagital 3,30cm e 3,09cm, tuberosidade coxal diâmetro 2,52cm e 2,43cm, diâmetro biilíaco superior 6,28cm e 6,24cm, diâmetro biilíaco inferior 2,98cm e 2,58cm, diâmetro biisquiático 2,60cm e 2,70cm, relação altura/largura - vertical/diâmetro biilíaco inferior 0,88cm e 0,95cm, diâmetro sagital/coxal tuberosidade 1,32cm e 1,28cm, área pélvica de entrada 82,38cm e 77,83 cm e área pélvica de saída 24,76cm e 20,07cm. As cutias são animais dolicopélvicos, demonstrando a existência de um discreto dimorfismo sexual em adultos e correlações de baixa intensidade entre as medidas externas e internas estudadas.

Palavras-chave: pelvimetry, radiographic pelvimetry, rodent, agouti.

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Introduction

The pelvis is an osteoligamentous complex with multiple functions (Tonniollo and Vicente, 1995) of great importance because it allows diagnoses of pregnancy and dystocias to be made (Oliveira et al., 2003). In the obstetric sense, the pelvis is like a bone belt formed by ossa coxae laterally and ventrally, by os sacrum and the first caudal vertebrae dorsally. This bony structure allows for passage of important structures of the urinary, digestive and genital organs and is also called the birth canal. The entrance of this cavity is called as *apertura pelvis cranialis* and its exit is called apertura pelvis caudalis (Bahadir and Yildiz, 2016).

According to Melo et al. (2008), the pelvis has several aspects that differentiate it in relation to sex and the different species. In the female, the pelvis is generally wider, and its tubercles and protrusions are flatter than that of the male because the pelvis functions as an exit channel for the fetus during delivery.

Thus, pelvimetry, a study of the pelvic dimensions, is extremely important in the use of reproductive diagnostics, besides being a prophylactic method against complications of parturition (Ferreira, 1991; Valle et al., 2006). According to Vercelino and Lopes (2005), the clinical indication for the study of pelvimetry is associated with the probability of disproportion between the mother's pelvis and the head of the fetus. Therefore, this method has great value for giving birth and provides accurate information about the fetus-pelvis relationship.

The determination of measurements of distances and angles between structures of the pelvis can be done using palpation of the pelvic region and with pelvic radiography (direct study) or by external body measurements (indirect study) (Valle et al., 2006). In radiographic pelvimetry, measurements are directly on the radiographic film, and this has been shown to be a very efficient, prophylactic, and low-cost method, in addition to being of great help in reproductive management (Valle et al., 2006).

Although several studies have already been carried out in the areas of biology, morphophysiology, management, health and reproduction of agoutis, there are no reports in the literature of pelvimetric studies in this species.

Thus, the present work was developed to establish the typical anatomical biometric pattern of the agouti pelvis, male and female, by obtaining the average external and radiographic internal pelvimetric values. Moreover, the objective was to verify the existence of a correlation between the external and internal measures of the pelvis and to compare the pelvic characteristics of male and female agouti.

Material and Methods

The protocols used in the present study were authorized by the Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de Conservação da Biodiversidade – ICMBio) (SISBIO N° 3947-1) and approved by the Ethics Committee for Animal Experimentation at the Federal University of Piauí (N° 015/13).

Forty-three agoutis (*Dasyprocta prymnolopha*), 18 females and 25 males, from the Center for the Study and Preservation of Wild Animals at the Center for Agricultural Sciences at Federal University of Piauí (Breeding IBAMA Registration n° 02/08 - 618) were used to carry out this experiment.

The animals were individually identified and the data of weight, sex and the values of external and radiographic internal measurements were recorded in an individual form.

For the measurement of the external parameters, the animals were initially contained with animal capturing net for later manual containment. Then, the agoutis were subjected to chemical restraint with an association of ketamine hydrochloride (40mg/kg) and xylazine hydrochloride (1mg/kg) applied intramuscularly.

The parameters measured were the external biiliac diameter, measured between the lateral extremities of the right and left coxal tuberosities; the external biischiatic diameter, measured between the lateral ends of the right and left ischiatic tuberosities; right and left external ilioischiatic diameters, measured between the lateral extremities of the coxal and ischial tuberosities. External pelvic measurements were checked with a pachymeter with a precision of 0.1 cm.

After evaluating the external pelvic parameters, the animals were taken to the Diagnostic Imaging sector at the University Veterinary Hospital of the Federal University of Piauí, in Teresina, to perform the radiographic examination.

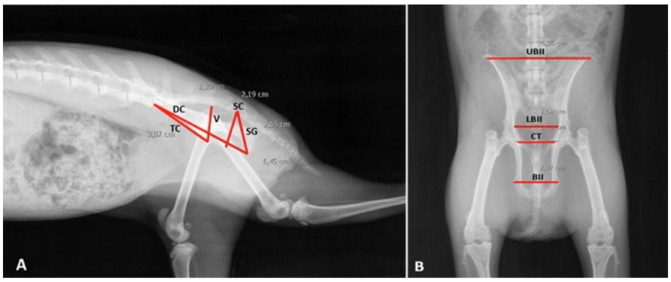
The animals were positioned in the right lateral and dorsal decubitus position for radiographs of the pelvis and the caudal portion of the lumbar spine in the left-right lateral and ventrodorsal projections, so that the pelvis remained as close as possible to the radiographic film, in order to obtain symmetrical positions of the pelvis. The Aex Apparatus (model RC 300D) with digital development was used. The radiographic technique used was 45 kilovoltage (KVp) and 0.1 milliamperage (mAs). After the radiographic examination and processing, internal pelvic parameters were measured directly on the radiographic images using a millimeter ruler

The following measurements were obtained: the true conjugated diameter, by measuring the distance between the promontory and the cranial portion of the pubic symphysis; the diagonal conjugated diameter, which is a measure of the distance between the promontory and the caudal portion of the pubic symphysis; the vertical diameter, measuring the vertical distance between the end of the cranial portion of the pubic symphysis and the sacrum, the sacral diameter, which is the vertical distance between the cranioventral end of the sacrum and the pubic symphysis; sagittal diameter, by measuring the distance between the caudoventral extremity of the sacrum and the symphysis; diameter of the coxal tuberosity, measured by the horizontal distance between the two coxal tuberosities; upper biiliac diameter, which is the horizontal distance between the ilium, lower biiliac diameter, measured by the horizontal distance between the acetabulae, and biischiatic diameter, which is the horizontal distance between the ischial tuberosities (Fig. 1)

The inlet pelvic area and the outlet pelvic area were calculated using the equations: inlet pelvic area = (true conjugated/2 + upper biiliac/2)^2 ×π (Eneroth et al., 1999); e outlet pelvic area = (diagonal conjugated/2 + lower biiliac/2)^2 × π (Van Donkersgoed, 1992). Beyond these measures, height/width ratios of the entrance area of the pelvis (vertical/lower biiliac) and the pelvic outlet area (sagittal/coxal tuberosity) were calculated, according to the methodology described by Campos et al. (2019).

The data were analyzed by the Shapiro-Wilk test to determine the use of parametric or non-parametric statistics and described using descriptive statistics (mean, standard error of the mean, standard desviation and coefficient of variation). To verify the effect of sex, Student's "t" test was used for independent samples, with a significance level of $p<0.05$.

Figure 1: A: Pelvic radiography of an agouti in left-right lateral projection to measure the diameters: true conjugate (TC), diagonal (D), vertical (V), sacral (SC) and sagittal (SG). B: Pelvic radiography of an agouti in ventro dorsal projection for measuring the diameters: upper biiliac (UBII), lower biiliac (LBII), between the coxal tuberosities (CT), and biischiatic diameter (BII).



The data were also analyzed by Pearson's correlation, to verify the existence of correlations between the studied parameters; and Student's t test to verify the significance of the coefficients. The null hypothesis of the test is that the correlation between the variables is statistically equal to zero.

Results and discussion

Pelvimetry is not usually applied in wild animals; hence, limited studies have been undertaken with these species. However, pelvimetric data were found in lion tamarins (*Leontopithecus* sp.) (Ramadinha et al., 2003), in owl monkeys (*Aotus azarai infulatus*) (Valle et al., 2006), in commom marmoset (*Callithrix jacchus*) (Pinheiro et al., 2016), in squirrel monkeys (*Saimiri scireus)* (Favoretto et al., 2018*)* and pacas (*Agouti paca*) (Smargiassi et al., 2019). To the best of our knowledge, the present study represents the first to describe the agouti pelvimetric characteristics using the radiographic technique.

The results obtained for external pelvic parameters (external biiliac diameter, the external biischiatic diameter, right and left external ilioischiatic diameters) and internal pelvic parameters (the true conjugated diameter, the diagonal conjugated diameter, the vertical diameter, the sacral diameter, sagittal diameter, diameter of the coxal tuberosity, upper biiliac diameter, lower biiliac diameter, biischiatic diameter), the inlet pelvic area and the outlet pelvic area, as well pelvic height/width ratios of the entrance area of the pelvis and the pelvic outlet area of the pelvis of female and male agoutis are shown in Table 1.

The average weight of the female agouti was 1.91 kg. For males, the average weight obtained was 2.04 kg. These findings are similar the average weight described for adult animals of this species, starting at 2 kg (Deutsch and Puglia, 1988). These observations demonstrated that the animals used in this study are within the standards established for agoutis.

When analyzing the coefficients of variation of the pelvic parameters of females (Table 1), it ranged from 6.61% to 23.57%, where the highest coefficients of variation were for the outlet pelvic area variables (23.57%), weight (21.32%), inlet pelvic area (20.14%), external biischiatic diameter (18.49%), lower biiliac diameter (16.63%). For males (Table 1), it was found that the coefficient of variation ranged from 4.68% to 16.04% where the highest coefficients of variation were for the variables weight (16.04%), external biischiatic diameter (14.75%), outlet pelvic area (14.29%), height/width ratios of the pelvic outlet area (14.13%) and coxal tuberosity diameter (14.08%). With these results, for both sexes there was a slight asymmetry of the values obtained, as there was a small difference between the arithmetic mean and the median. The observed coefficients of variation can indicate the degree of phenotypic variation between individuals collected from male and female agouti, indicating, therefore, the existence of genetic variability for the characteristics studied.

The result of the analysis of variance showed statistical significance between the values for female and male internal pelvic measurements true conjugated diameter, vertical diameter, sacral diameter, lower biiliac diameter, height/width ratio of the entrance area of the pelvis and outlet pelvic area, and the most of these parameters are higher in females than in males, except height/width ratio of the entrance area of the pelvis, which is higher in male agoutis.

The differences between the shape and size of the pelvis in males and females have been described in several species. In mammals, hormonal factors are involved with the sexual dimorphism of the pelvis, and if gonadectomized, young animals of any gender tend to have female-shaped pelvis (Stewart, 1984). In addition, heredity, nutritional factors and possibly other factors still unknown, can also affect sexual dimorphism (Morton, 1942). Li (2002) observed that postnatal growth patterns and the developmental trajectory of sexual dimorphism in varying degrees are responsible for the development of pelvic sexual dimorphism in four primate species (*Saimiri sciureus, Alouatta seniculus, Hylobates lar and Pan troglodytes troglodytes*). The degree of dimorphism of the entrance is strictly related to the cephalopelvic proportion and is largely determined by sexual differences in pubic growth (Li, 2002).

In our study most of the measured diameters were larger in females than in males, except for right and left external ilioischiatic diameters, the external biischiatic diameter and the height/width ratios of the entrance area of the pelvis. However, the analysis of variance indicated significant differences only between the true conjugated, vertical, sacral, lower biiliac diameters and outlet pelvic area of male and female agouti, and these parameters are higher in females than in males. This information corroborates Melo et al. (2008), who state that the pelvis has several aspects that differentiate it, both in relation to sex, as well as to the different species. In the female, the pelvis is generally wider than in males, and its tubercles and protrusions are flatter than that of the male, this is because the pelvis functions as an exit channel for the fetus during delivery. According to Okuda (1992) the lower biiliac diameter is the one that is direct correlated to delivery, so it is expected to be larger in females. These results explain the greater lower biiliac diameter and outlet pelvic area observed in this study.

Differentiated pelvic characteristics between males and females have also been described in dogs (Dobak et al., 2018), cats (Monteiro et al., 2013; Yilmaz et al., 2020), in lion tamarins (*Leontopithecus* sp.) (Ramadinha et al., 2003), in owl monkeys

Table 1: External and internal pelvic diameters (cm) measured in female and male agoutis (n=43)

Pelvic parameters		Female (n= 18)			Male (n= 25)			p-values
		Mean ± SE	SD	CV (%)	Mean ± SE	SD	CV (%)	
External pelvic parameters	BIL	6.32±0.13	0.58	9.29	6.30±0.08	0.44	7.11	0.9287
	EBII	4.34±0.18	0.80	18.48	4.28±0.12	0.63	14.75	0.7979
	RII	9.01±0.33	1.40	15.59	9.33±0.22	1.10	11.86	0.4016
	LII	9.13±0.30	1.30	14.27	9.30±0.21	1.08	11.63	0.6530
Internal pelvic parameters	TC*	3.90±0.08	0.37	9.67	3.68±0.05	0.29	8.03	0.0405
	DC	7.13±0.11	0.47	6.60	6.91±0.06	0.32	4.67	0.0730
	V*	2.59±0.05	0.24	9.39	2.45±0.03	0.18	7.44	0.0391
	SC*	2.63±0.06	0.28	10.65	2.44±0.03	0.17	7.28	0.0153
	SG	3.30±0.11	0.50	15.30	3.09±0.07	0.35	11.55	0.1187
	CT	2.52±0.09	0.41	16.38	2.43±0.06	0.34	14.08	0.4120
	UBII	6.28±0.17	0.73	11.70	6.24±0.11	0.56	8.99	0.8373
	LBII*	2.98±0.11	0.49	16.63	2.58±0.05	0.26	10.12	0.0051
	BIO	2.60±0.09	0.41	15.82	2.70±0.05	0.25	9.38	0.3966
	V/BII*	0.88±0.02	0.12	13.55	0.95±0.01	0.09	9.73	0.0366
	SG/CT	1.32±0.05	0.21	16.43	1.28±0.03	0.18	14.13	0.5292
	IPA	82.38±3.91	16.59	20.14	77.83±2.06	10.34	13.29	0.3134
	OPA*	24.76±1.37	5.83	23.56	20.07±0.57	2.86	14.29	0.0045

*P<0,05 pelo teste *t* de *Student*

BIL – External biiliac; EBII – External biischiatic; RII - Right ilioischiatic ; LII – Left ilioischiatic; TC - True conjugate; DC – Diagonal conjugate; V – Vertical; SC – Sacral; SG – Sagittal; CT – Coxal tuberosity; UBII – Upper biiliac; LBII – Lower biiliac; BII – Biischiatic; V/LBII e SG/CT – Height / width ratio; IPA – Inlet pelvic area; OPA – Outlet pelvic area; SE – Starndart error; SD – Standart desviation; CV(%) – Coefficient of variation.

(*Aotus azarai infulatus*) (Valle et al., 2006), New Zealand rabbits (Ozkadif et al., 2014), commom marmoset (*Callithirix jacchus*) (Pinheiro et al., 2016), in gazelles (*Gazella subgutturosa*) (Demircioglu et al., 2021), red foxes (*Vulpes vulpes*) (Ozkadif et al., 2022) and humans (Lorenzon et al., 2021). However, although some diameters are larger in females, there are disagreements as to those who have such differences. In common marmosets, in contrast to what was observed in agoutis, the lower biiliac diameter was smaller in females than in males (Pinheiro et al., 2016). In owl monkeys, all pelvic parameters were higher in females (Valle et al., 2006). In lion tamarins, Ramadinha et al. (2003) observed that both the upper and lower biiliac diameters are larger in males than in females. In gazelles, there was a significant difference between the female and male gazelles in data of conjugate diameter, vertical diameter, intermediate traverse diameter, cranial and medial transverse diameter, showing pelvic parameters higher in females (Demircioglu et al., 2021). Ozkadif et al. (2014) reported that intermediate transversal diameter and ventral transversal diameter did not cause a significant difference between male and female New Zealand rabbits but conjugate diameter and medial transverse diameter values were significant between males and females. In mesaticephalic male cats Monteiro et al. (2013) observed a larger transverse diameter than in females. Yilmaz et al. (2020) reported that there was no statistically significant difference between males and females of Van cat (*Felis catus*) in terms of conjugate diameter, intermediate transverse diameter, and ventral transverse diameter and only medial transverse diameter was significant. Thus, it appears that in addition to the differences between the sexes, the pelvis also differs in terms of the different species.

Regarding inlet pelvic area, in pelvimetry studies in owl monkeys (Valle et al., 2006), lion tamarins (Ramadinha et al., 2003) and commom marmoset (Pinheiro et al., 2016) it was found that inlet area of the pelvis is greater in females than in males, as well as in agoutis. Schultz (1949), in studies with chimpanzees, reports that this parameter presents a considerable difference between males and females, in which the widening of the pelvis in the female represents an adaptation for give birth. In humans, recent research has shown that pelvic entry does not have sexual dimorphism in all groups studied (Delprete, 2017). However, in the analysis of variance, there were no significant differences in relation to the inlet pelvic area of male and female agoutis. Likewise, Valle et al. (2006) demonstrated that there are no significant differences between males and females in relation to inlet pelvic area in owl monkeys.

The passage of the fetus through the pelvis is a universal feature in almost all mammalian species during the birth process. However, the morphology of the pelvis varies according to locomotor habits, neonatal size, and morphology of the species (Leutenegger 1990; Trevathan, 2015). Thus, regarding the shape of the pelvis, animals can be classified into dolichopelvic, mesatipelvic and platipelvic (Toniollo and Vicente, 1995). The results obtained in agoutis, male and female, allowed to classify these animals as dolichopelvic, since the true conjugated diameter is greater than the lower biiliac diameter. In addition, it appears that the pelvis is oval and flattened laterally. Besides agouti, other wild species also showed the same type of pelvis, such as lion tamarins (*Leontopithecus* sp.) (Ramadinha et al., 2003), in owl monkeys (*Aotus azarai infulatus*) (Valle et al., 2006), commom marmosets (*Callithirx jacchus*) (Pinheiro et al., 2016), squirrel monkeys (*Saimiri scireus*) (Favoretto et al., 2018) and paca (*Agouti paca*) (Smargiassi et al., 2019). Among domestic animals, ruminants (Oliveira et al., 2003), pigs (Araújo et al., 2014) and bitches of Pinscher, Poodle, Teckel and SRD breeds (Páfaro, 2007) also have dolichopelvic pelvises. Unlike cats (Páfaro et al. 2007, Monteiro et al. 2013) and bitches of the French Bulldog breeds (Campos et al., 2019), Fila Brasileiro, German Shepherd and Rottweiler (Páfaro, 2007) whose pelvis is classified as mesatipelvic.

The Pearson's correlation coefficients, among the characteristics evaluated in agoutis were mostly moderate and high, significant, and positive (Table 2). These results indicates that the variables are related to each other, that is, the variables tend to walk together and in the same direction (the trend line is ascending).

The analysis showed a moderate correlation between weight and external biiliac diameter (r=0.59). A high correlation was observed between the external pelvic measures right and left external ilioischiatic diameters (r=0.92). The evaluation of the correlation between external pelvic measures and radiographic pelvic measures showed a moderate correlation between external biiliac diameter and upper biiliac diameter (r=0.78), and external biiliac diameter and the inlet pelvic area (r=0.76).

The evaluation of the correlation between external and internal measurements was performed to verify the possibility of using external measurements to characterize the agouti's pelvis, without the need to perform radiographic exams, when it is not available. According to Campos et al. (2019), body weight represents the most correlated parameter, compared to internal pelvic measures in French Bulldog breed. In squirrel monkeys (*Saimiri scireus*), Favoretto et al. (2018) also described correlation between weight and some internal pelvic diameters. However, our analysis did not show the existence of significant positive correlation between body weight and internal pelvic measures. The same analysis indicated the existence of moderate significant positive correlations between external biiliac diameter and upper biiliac diameter, external biiliac diameter and the inlet pelvic area. The correlation between external biiliac diameter and the inlet pelvic area was also described in French Bulldog breed (Campos et al., 2019). Despite verifying the existence of correlations between some external and internal measures (external biiliac diameter and upper biiliac diameter, external biiliac diameter and the inlet pelvic area), most of them were of low intensity. Thus, the external measurements analyzed in this study in agoutis are not adequate for predicting the internal pelvic dimensions, corroborating the results of Valle et al. (2006) when studying owl monkeys.

Conclusion

The results of this research represent a great contribution to the understanding of the descriptive anatomy of the agouti pelvis, considering that there are no studies on the pelvimetry technique in this species. Finally, from the results of the pelvic measurement it was possible to classify the agouti as dolichopelvic, demonstrating the existence of discrete sexual dimorphism in adults and low intensity correlations between the external and internal measures studied.

Table 2: Values referring to the Pearson's correlation coefficient between variables in female and male agoutis

	WEIGHT	BIL	EBII	RII	LII	TC	DC	V	SC	SG	CT	UBII	LBII	BII	V/LBII	SG/CT	IPA	OPA
WEIGHT	1.000	0.5950^{***}	0.3925^{**}	-0.0407^{ns}	-0.0049^{ns}	0.2502^{ns}	0.4029^{**}	0.3897^{**}	0.3140^{*}	0.3716^{*}	0.3613^{*}	0.3433^{*}	0.2205^{ns}	0.4504^{**}	-0.0097^{ns}	-0.0744^{ns}	0.3484^{*}	0.2828^{ns}
BIL		1.0000	-0.0402^{ns}	0.3872^{*}	0.4161^{**}	0.4240^{**}	0.5400^{***}	0.3515^{*}	0.4491^{**}	0.3744^{*}	0.6299^{***}	0.7831^{***}	0.6159^{***}	0.5882^{***}	-0.5074^{***}	-0.3511^{*}	0.7602^{***}	0.5668^{***}
EBII			1.0000	-0.4454^{**}	-0.3875^{*}	-0.1276^{ns}	-0.0519^{ns}	0.0626^{ns}	-0.1299^{ns}	0.0218^{ns}	-0.0964^{ns}	-0.1495^{ns}	-0.0618^{ns}	0.0321^{ns}	0.1172^{ns}	0.1149^{ns}	-0.1658^{ns}	-0.0310^{ns}
RII				1.0000	0.9239^{***}	0.1108^{ns}	0.1358^{ns}	0.1400^{ns}	0.3102^{*}	0.0583^{ns}	0.4081^{**}	0.5322^{***}	0.2961^{ns}	0.3071^{*}	-0.2483^{ns}	-0.4034^{**}	0.4454^{**}	0.2721^{ns}
LII					1.0000	0.0708^{ns}	0.1384^{ns}	0.1266^{ns}	0.3425^{*}	0.0741^{ns}	0.4286^{**}	0.5251^{***}	0.3432^{*}	0.2391^{ns}	-0.3199^{*}	-0.4156^{**}	0.4223^{**}	0.2989^{ns}
TC						1.0000	0.7443^{***}	0.6295^{***}	0.4180^{**}	0.2677^{ns}	0.3500^{*}	0.4325^{**}	0.5985^{****}	0.3699^{*}	-0.2623^{ns}	-0.1620^{ns}	0.7444^{***}	0.6879^{***}
DC							1.0000	0.7574^{***}	0.6731^{***}	0.5304^{***}	0.5984^{***}	0.6131^{***}	0.6852^{***}	0.3559^{*}	-0.2839^{ns}	-0.1533^{ns}	0.76836	0.7834^{***}
V								1.0000	0.7599^{***}	0.4420^{**}	0.4314^{**}	0.4541^{**}	0.5800^{***}	0.2830^{ns}	-0.0116^{ns}	-0.0847^{ns}	0.5974^{***}	0.7991^{***}
SC									1.0000	0.7316^{***}	0.6105^{***}	0.5563^{***}	0.6851^{***}	0.2151^{ns}	-0.3006^{ns}	0.0201^{ns}	0.5885^{***}	0.7867^{***}
SG										1.0000	0.4930^{***}	0.3966^{**}	0.4534^{**}	0.3689^{*}	-0.2361^{ns}	0.4022^{**}	0.4061^{**}	0.4948^{***}
CT											1.0000	0.7807^{***}	0.7708^{***}	0.5732^{***}	-0.6646^{***}	-0.5804^{***}	0.7205^{***}	0.7111^{***}
UBII												1.0000	0.7211^{***}	0.5929^{***}	-0.5732^{***}	-0.4796^{**}	0.9227^{***}	0.6833^{***}
LBII													1.0000	0.4166^{**}	-0.8135^{***}	-0.4040^{**}	0.7930^{***}	0.9505^{***}

BII	1.0000	-0.3429*	-0.3026*	0.5821***	0.3961**
V/LBII		1.0000	0.4729**	-0.5428**	-0.5975**
SG/CT			1.0000	-0.4165**	-0.3138*
IPA				1.0000	0.8011***
OPA					1.0000

Subtitle: BIL – External biiliac; EBII – External biischiatic; RII - Right ilioischiatic; LII – Left ilioischiatic; TC - True conjugate; DC – Diagonal conjugate; V – Vertical; SC – Sacral; SG – Sagittal; CT – Coxal tuberosity; UBII – Upper biiliac; LBII – Lower biiliac; BII – Biischiatic; V/LBII e SG/CT – Height / width ratio; IPA – Inlet pelvic area; OPA – Outlet pelvic área. * P < 0,05; ** P < 0,01; *** P < 0,001.

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