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Anthropometric Indices of Orang Asli in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Nooriman Soleha Mohamad Zaidi[1], Siti Fazlina Abdul Samad[2], Harris Kamal Kamaruddin[3], Al-Hafiz Abu Bakar[4], Zulkifli Ismail[5], Suekori Ahmad[6], Ahmad Dzulkarnain Ismail[7*]

[1,3,4,5,6,7]Faculty of Sports Science and Recreation Universiti Teknologi MARA, Cawangan Perlis, Kampus Arau, 02600 Arau, Perlis, Malaysia

[2]Yayasan Food Bank Malaysia, Bukit Angkat, 43000 Kajang, Selangor, Malaysia

*Author's email address: [1]imanzaidi1702@gmail.com, [2] fazlinarex@gmail.com, [3]harris540@uitm.edu.my [4]alhafizab@uitm.edu.my, [5]zulkifliismail@uitm.edu.my, [6]suekori@gmail.com, *[7]ahmad409@uitm.edu.my*

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*Corresponding Author

ABSTRACT

Negrito is the ethnic of the Bateq tribe which are easily identifiable by their facial characteristics of dark-coloured, woolly hair, dark skin, small stature, rounded face, and wide nose. Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang, consisted of 35 families. This study aims to describe the anthropometric indices of the Orang Asli Bateq in Kampung Cangkung and aims to examine the correlation between these indices and body fat percentage. The selection criteria studies involved Orang Asli Bateq populations, specifically focusing on body mass index (BMI), waist-hip circumference, biceps, triceps, and body fat. Participants consisted of n=25 Orang Asli individuals from Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang, including n=9 adults and n=16 children. The result for adults indicated significant weight (r = 0.73), hip circumference (r = 0.78), mid-upper arm circumference (MUAC) (r = 0.86), biceps circumference (r = 0.65), and subscapular skinfold thickness (r = 0.69) which are significantly correlated with body fat percentage. For children indicated significant values in these measurements of BMI (r =.817) hip circumference (r =.966), and mid-upper arm circumference (MUAC) (r=0.80), subscapular skinfold thickness (r =.943), weight (r =.786), waist circumference (r =.766), biceps circumference (r =.802), triceps skinfold thickness (r =.801), and height (r =.667). The study concludes that Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang has a Lean Body Composition (42.3%, n=11), Very Lean (7.6%, n=1), Fit (15.4%, n=4) and soft (34.6%, n=9)

Keywords: *anthropometric, body composition, body fat percentage, orang asli Bateq.*

INTRODUCTION

Indigenous individuals in Peninsular Malaysia are known as "Orang Asli," meaning "original people" or "first people." Malays, Chinese, and Indians arrived later, preserving a rich cultural heritage. The Orang Asli people in Malaysia have three main tribal divisions: Senoi, Proto Malay, and Semang (Negrito). These tribes have 19 ethnicities, including Temiar, Semai, Mah Meri, Che Wong, Jah Hut,

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Semak Beri, Temoq, Orang Selatar, Jakun, Kuala Laut, Kanaq, Temuan, and Semelai. A factor about Orang Asli according to Masron et al., n.d, dark skin and curly hair distinguish the Negrito people, which is Bateq, the first to colonize South-East Asia. They are also known for their hunter-gatherer lifestyle. Proto-Malay farmer-traders had straight hair and epicanthal folds. Their skin was unusually light. Some say the Senoi are a mix of Negrito and East Asian ancestry. They are hunters, gatherers, and sellers with wavy hair and a variety of skin hues. According to *National Health and Nutrition Examination Survey III Body Measurements (Anthropometry*), 1988, measurement of the human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue is the subject of the study of anthropometry, which is the study of the human body. There will be a collection of actual stature, weight, and body measurements. These measurements will include skinfolds, girths, and breadths. The goal of this collection is to evaluate the growth and distribution of body fat, as well as to provide reference data. Certain measures have been added to provide further information on body frame size and fat distribution.

LITERATURE REVIEW

Demographic of Orang Asli in Malaysia

The Orang Asli, Malaysia's indigenous peoples, encompass diverse ethnic groups with unique cultural traditions and socio-economic characteristics. As of 2023, the Orang Asli population is estimated at approximately 215215, distributed across Peninsular Malaysia. The population comprises three main ethnic groups: Negrito, Senoi, and Proto-Malay, each contributing distinct cultural elements to Malaysia's multicultural landscape. Negrito was an ethic for the subgroup of Bateq. In Pahang, as 2023 data Jabatan Kemajuan Orang Asli, 2023 by JAKOA shows, the men are approximately 41,545 and women are 39,075 which in a total is 80,620 Orang Asli. For the Bateq tribe in Pahang, approximately there were 1260 Bateq tribes.

Fat Percentage of Orang Asli

Body fat percentage (BFP) is a commonly established biomarker of total body fat; however, it has not been extensively employed in research conducted among the Orang Asli in Peninsular Malaysia. These studies have been conducted in Peninsular Malaysia. According to Azuwani et al., 2013, the average body fat percentage (BFP) of females was greater than that of males, and individuals with abdominal obesity exhibited higher average BFP in comparison to those with a normal waist circumference. Women typically possess a greater amount of overall body fat than men, and this distinction persists throughout their adult years. The study also emphasizes the correlation between BMI and body fat percentage, whereby an elevation in BMI results in a corresponding rise in body fat. The increase in overweight and obesity among the Aborigines can be linked to their proximity to urban areas and the adoption of new dietary patterns that are rich in sweets and animal fats, coupled with a lack of physical exercise.

Body Mass Index of Orang Asli

According to the findings by Yusof and Ibrahim (2007), the Body Mass Index (BMI) of Orang Asli who smoke was lower compared to non-smokers. This is one of the causes why Orang Asli and normal Malaysians have different physical measurements. Before collecting BMI, there was a requirement to measure their height and weight first. Body Mass Index is collected through their height and weight. In this study, the researcher used the bathroom scale to collect Orang Asli's weight whereas Orang Asli's height was measured by a measuring tape and ruler. Orang Asli was required not to wear any shoes, the researchers stamped the measuring tape on the wall and the measurements were recorded and calculated using the formula (kg)/height (m2) (Yusof & Ibrahim, 2007). According to other findings

Tay et al., 2022 in Orang Asli Nutritional Status and Dietary Intake of Semai Indigenous Children Below Five Years in Perak, Malaysia, measurement of height involved the use of a measuring pad to determine the reclined length or standing height of individuals. For infants and early children, the recumbent length was measured to the nearest 0.1 cm, while the standing height was assessed for young children. An electronic infant scale was utilized to measure the weight of the infants and the body weight of youngsters, with a precision of 0.1kg.

METHODS

Study Design

The research design used in this study is descriptive cross- sectional research. The study aimed to describe Orang Asli Bateq anthropometric including (Weight, Height, BMI, Waist Hip circumferences, MUAC (Biceps, Triceps, Sub-scapular, Supra-iliac), and body fat composition (fat mass and Fat free mass) among adults and children in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang. This study also aimed to examine the correlation between anthropometric measurements (Weight, Height, BMI, Waist Hip circumferences, and MUAC (Biceps, Triceps, Sub-scapular, Supra-iliac) and body fat percentage. This study employed simple random sampling, consistent with the assumptions underlying the Krejcie and Morgan (1970) sample size determination table. Participants were selected randomly from the identified population frame. The inclusion criteria for this study were individuals from the Orang Asli Bateq tribe, aged 5 years and above, who have been living in Kampung Cangkung, Taman Negara Kuala Tahan, Pahang, for more than five years. The exclusion criteria included any individuals who did not agree to participate in the body measurement process or whose parents or guardians did not provide consent on behalf of their children or family members. When approaching the community in the village, participants were clearly informed about the purpose of the study and assured that their participation was entirely voluntary, with no coercion involved. Those who were willing to take part were encouraged to bring their family members to participate as well. This study has obtained ethical approval from the Ethics Committee (ERC) of Universiti Teknologi MARA (UiTM), Perlis Branch, under the Research Ethics Committee (REC), with the reference number REC-ERC/16/2024.

Subject

This study consisted of adults and children in a total of 25 subjects of the Bateq tribe from Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang. There are 16 children aged 8-17 and 9 adults aged 18-52.

Camry Body Fat/Hydration Monitor Scale: EF973

Body weight is the collective mass or weight of an individual's body. The measurement is commonly expressed in units such as kilograms or pounds. Body weight is determined by a multitude of characteristics, such as bone density, muscle mass, fat content, and general body composition. It is a significant measure in health and fitness evaluations and can be utilized to monitor alterations in body composition over a period (Jéquier & Tappy, 1999). In this health screening the Camry Body Fat/Hydration Monitor Scale: EF973 was used to measure the weight of the Orang Asli participants.

Portable Wall Height Stick Measurement

Height refers to the vertical measurement of a person's body, extending from the soles of the feet to the highest point of the head while maintaining an upright position. Typically, it is quantified using units such as centimeters or inches. Height is a significant anthropometric measurement that plays

a crucial role in evaluating an individual's growth, development, and general physical traits (Steele et al., 2016). Height was measured using a portable wall stick height measurement.

Body Fat Measurement

Body Fat Percentage was measured using the Durnin and Womersley four-site skinfold method, which involves taking skinfold measurements at Biceps, Triceps, Suprailiac and Subscapular sites sing a skinfold caliper and measuring tape. Mid-Upper Arm Circumference was measured using measuring tape.

DATA ANALYSIS

The statistical data of these studies were analyzed using SPSS v. 29 (Field, 2013). There was a correlation made between anthropometric indices and the body fat percentage of both adults and children of Orang Asli Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang. The correlation between anthropometric indices and body fat percentage was determined by the Spearman test which was used to calculate adults. For normally distributed data, Pearson Correlation was used to determine the correlation between anthropometric indices with body fat percentage. In all cases, a value for $p< 0.05$ was taken to indicate statistical significance.

RESULTS

Demographic Characteristics of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

This study involved 25 subjects which include 9 adults and 16 children. Their ethnic groups in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang are 100% Bateq tribe. For the age of children from 8-12 years old has 8 subjects, from age 13-17 years old there were 8 subjects, from age 18-23 years old there were 3 subjects, from age 24-29 years old there were 2 subjects, from age 40-45 there were 2 subjects, and above 46 years old there were 2 subjects.

Table 1: Demographic Characteristics of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Characteristics	Number Of Respondents (N=25)	Percentage (%)
Adult	9	36
Children	16	64
Ethnic:		
Bateq	25	100
Age:		
8-12	8	32
13-17	8	32
18-23	3	12
24-29	2	8
40-45	2	8
>46	2	8

Adult Anthropometric Analysis of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Table 2 describes the anthropometric indices or analysis of adult subject n=9 Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang. The mean for Body Mass Index was 18.4 ± 1.6, whereas the mean for Body Weight was 44.4 ± 6.3. For Height the mean was 154.4 ± 7.2, whereas for Waist the mean was 62.3 ± 4.3, for Hip the mean was 78.6 ± 3.9 and for Mid Upper Arm Circumferences (MUAC) the mean was 22.2 ± 1.7. Next for the Biceps the mean was 22.8 ± 1.7, whereas Triceps was 1.1 ± 1.3, Sub-scapular mean was 0.7 ± 0.2 and Supra-iliac was 1.2 ± 2.4. Lastly, for Body Fat Percentage the mean was 14.9 ± 4.3, whereas the Fat Mass mean was 6.5 ± 1.2 and Fat Free Mass mean was 37.9 ± 6.7.

Table 2: Adult Anthropometric Analysis of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Variable (N=7)	Mean	Standard Deviation
Body Mass Index (kg/m^2)	18.4	1.6
Weight (kg)	44.4	6.3
Height (cm)	154.4	7.2
Waist (cm)	62.3	4.3
Hip (cm)	78.6	3.9
Mid Upper Arm Circumferences (cm)	22.2	1.7
Biceps (cm)	22.8	1.7
Triceps (mm)	1.1	1.3
Sub-scapular (mm)	0.7	0.2
Supra-iliac (mm)	1.2	2.4
Body Fat Percentage (%)	14.9	4.3
Fat mass (kg)	6.5	1.2
Fat free mass (kg)	37.9	6.7

Children Anthropometric Analysis of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Table 3 describes the Children n=16 Anthropometric Analysis of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang where for the Body Mass Index the mean was 17 ± 2.3, for Weight the mean was 32.3 ± 9.7, and for Height the mean was 135.3 ± 14.0. Next for Waist the mean was 56.7 ± 6.3, for Hip the mean was 70.6 ± 11.1, and for Mid Upper Arm Circumference (MUAC) was 18.4 ± 3.6. Biceps mean was 18.7 ± 4.4, and Triceps mean was 0.7 ± 0.2. For Sub-scapular the mean was 0.7 ± 0.3, for Supra-iliac the mean was 0.6 ± 0.3. Lastly for Body Fat Percentage mean was 17.5 ± 5.9, Fat Mass was 6.1 ± 3.5 and Fat Free Mass was 26.1 ± 6.6.

Table 3: Children Anthropometric Analysis of Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Variables (N=13)	Mean	Standard Deviation
Body Mass Index (kg/m^2)	17.0	2.3
Weight (kg)	32.3	9.7
Height (cm)	135.3	14.0
Waist (cm)	56.7	6.3
Hip (cm)	70.6	11.1
Mid Upper Arm Circumference (cm)	18.4	3.6

Biceps (cm)	18.7	4.4
Triceps (mm)	0.7	0.2
Sub-scapular (mm)	0.7	0.3
Supra-iliac (mm)	0.6	0.3
Body Fat Percentage (%)	17.5	5.9
Fat Mass (kg)	6.1	3.5
Fat Free mass (kg)	26.1	6.6

Correlation Anthropometric Variable with Body Fat Percentage of Adult Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Table 4 shows the Spearman correlation analysis shows significant associations between several anthropometric measurements and body fat percentage in Orang Asli individuals. Weight (r = 0.73, p = .01), hip circumference (r = 0.78, p = .00), mid-upper arm circumference (MUAC) (r = 0.86, p = .00), biceps circumference (r = 0.65, p = .02), and subscapular skinfold thickness (r = 0.69, p = .01) are strongly and statistically significantly positively correlated with body fat percentage. These data suggest that there is a positive correlation between higher values in these categories and higher body fat percentages. For example, MUAC exhibits the highest correlation (r = 0.86), indicating that it is an especially dependable predictor of body fat percentage in this specific group. In contrast, the connection between height (r = 0.08), p = .81) and triceps skin fold thickness (r = -0.10), p = .77) with body fat % is very weak and not statistically significant. This suggests that they are not dependable predictors of body fat in this situation. Waist circumference (r = 0.47), p = .15) and supra-iliac skinfold thickness (r = 0.52), p = .10) have moderate positive associations with body fat%, although these associations are not statistically significant. In summary, the study emphasizes the significance of weight, hip circumference, MUAC (mid-upper arm circumference), biceps circumference, and sub-scapular skin fold thickness in determining body fat% among Orang Asli people. On the other hand, height and triceps skin fold thickness are not significant in the present study.

Table 4: Correlation Anthropometric Variable with Body Fat Percentage of Adult Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Variable	R	P-Value
Body Mass Index (kg/m2)	1.00	.0
Weight (kg)	0.73	.01
Height (cm)	0.08	.81
Waist (cm)	0.47	.15
Hip (cm)	0.78	.00
Mid Upper Arm Circumference MUAC (cm)	0.86	.00
Biceps (cm)	0.65	.02
Triceps (mm)	-0.10	.77
Supra-iliac (mm)	0.52	.10
Sub-scapular (mm)	0.69	.01

Correlation Anthropometric Variable with Body Fat Percentage of Children Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Table 5 shows Pearson Correlation Children with Body Fat Percentage of Children Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang below, there are strong to moderately positive relationships between several anthropometric parameters and body fat% have been shown by the analysis. Higher values in these measurements are mostly strongly correlated with higher body fat percentages; BMI (r =.817, p =.001), hip circumference (r =.966, p =.001), subscapular skinfold thickness (r =.943, p =.001). Strongly positive associations also reveal weight (r =.786, p =.001), waist circumference (r =.766, p =.002), mid-upper arm circumference (MUAC), biceps circumference (r =.802, p =.001), and triceps skinfold thickness (r =.801, p =.001). Height (r =.667, p =.013) shows a

somewhat positive connection. These results indicated that highly reliable indicators of Body Fat Percentage are these measurements.

Table 5: Correlation Anthropometric Variable with Body Fat Percentage of Children Orang Asli Bateq in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang

Variable	R	P-Value
Body Mass Index (kg/m2)	0.82	< .001
Weight (kg)	0.79	.001
Height (cm)	0.67	.013
Waist (cm)	0.77	.002
Hip (cm)	0.87	< .001
Mid Upper Arm Circumference MUAC (cm)	0.80	.001
Biceps (cm)	0.80	.001
Triceps (mm)	0.80	.001
Subscapular (mm)	0.90	< .001
Supra-iliac (mm)	0.92	< .001

DISCUSSION

This study found that 88.5% of Orang Asli children from the Bateq ethnic group in Kampung Cangkung, Taman Negara, were underweight, while only 7.7% had a normal Body Mass Index (BMI). These results are consistent with earlier studies that reported high levels of undernutrition among Indigenous children in rural Malaysia (Tay et al., 2022), reflecting ongoing challenges related to poverty, limited access to nutritious food, and healthcare disparities. The study also found strong positive correlations between body fat percentage and several anthropometric measures, including BMI, mid-upper arm circumference (MUAC), waist circumference, and biceps circumference. These findings support the work of Bener et al. (2013), who identified waist circumference as a useful measure of fat levels and overall body composition. The high correlation between MUAC and BMI ($r = .887$, $p < .001$) confirms MUAC's usefulness as a practical tool for assessing nutrition in community settings, as suggested by Wong et al. (2017). Similarly, the strong link between biceps circumference and body fat ($r = .868$, $p < .001$) is in line with findings by Rahman et al. (2019), though the associations in this study were stronger, possibly due to differences in lifestyle, environment, or genetics among the Orang Asli.

CONCLUSION

In conclusion, the present study describes the Orang Asli of ethnic Bateq. The study shows that Orang Asli in Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang are mostly fit and lean. None of the Orang Asli Bateq Kampung Cangkung, Taman Negara, Kuala Tahan, Pahang are overweight or obese. The correlation states that a few anthropometric indices correlate with body fat percentage, such as weight, hip circumference, mid-upper arm circumference (MUAC), biceps circumference, and subscapular skinfold thickness. The recommendation is that a larger sample size is needed in assessing anthropometric measurement analysis and with fewer outliers. Pilot tests and practice in measurement should occur often to avoid inaccuracies in measurement.

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AUTHORS' CONTRIBUTION

Nooriman Soleha and Ahmad Dzulkarnain, conceived and planned the experiments. Nooriman Soleha and Ahmad Dzulkarnain carried out the experiments and data preparation. Harris Kamal, Suekori Ahmad, Al-Hafiz & Siti Fazlina planned and carried out the simulations. Ahmad Dzulkarnain contributed to the interpretation of the results. Nooriman Soleha took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis, and manuscript.

CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

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