

Secular trends in the physical anthropology of the Veddas of Sri Lanka

T. W. Wikramanayake¹ and E. R. Wikramanayake²

The Ceylon Journal of Medical Science 1992; 35: 23-28

Summary

Total height (TH), biacromial diameter (BA), bizygomatic diameter (BZ), head circumference (HC), chest circumference (CC), chest breadth (CB), chest depth (CD), forearm circumference (FAC), wrist circumference (WC) and calf circumference (CAC) of 23 adult male Veddas living in Kandeganvila in 1971/73 have been measured. These measurements and the indices SH/TH, CC/TH, BA/TH, Span/TH, CD/CB and CB/SH, have been compared with measurements made by Hill in 1932 and by Marett in 1937/39, to look for secular changes.

There are considerable differences between the Hill Vedda and the Marett Vedda, the two being similar only in TH and BA. The Vedda in the present study is significantly smaller than the Marett Vedda in SH, BA, Span, CC, SH/TH, CC/TH and BA/TH. It is postulated that Marett's Wellassa Veddas had an admixture from a group with a larger physique than that of the Veddas.

The present Vedda is similar to the Hill Vedda in TH, SH, BA, CD, CB, FAC, CAC, SH/TH, CC/TH, CD/CB and CB/SH, being bigger than the Hill Vedda only in CC and BZ. The absence of a positive secular change indicates that the improvements in health, educational and other socioeconomic conditions, that have produced significant changes in the Sinhalese and the Tamils, have had no impact on the Vedda.

Key words: Vedda, anthropometry, secular trends

Introduction

During historical times the Veddas have accounted for only a small proportion of the

inhabitants of Sri Lanka. However this aboriginal group has attracted the attention of visitors to the island since their existence was first recorded by Knox in 1681 (1). Only a few of the many accounts that have been published since then report on the physical anthropology of the Vedda. These have been reviewed by Hill (2). The majority of these studies deal with measurements on skulls and skeletons purported to be from Veddas whose authenticity has sometimes been in doubt (3). A significant contribution to the study of the physical anthropology of the Vedda in the field, at Maha Oya, was made by the Sarasins in 1886 (3). At the turn of the century the Veddas were in three geographical habitats, Tamankaduwa, Uva Bintenne and Wellassa. The Mahiyangana - Padiyapellalla road built in the 1960s passing through Bibile and Maya Oya separate the Veddas of Uva Bintenne from those of Wellassa. Within each of these geographical areas the Veddas are found in small breeding isolates. Even as late as the 1970s the Manampitiya Veddas were unaware of the existence of the Dimbulagala Veddas living across the river. (Ellepol, personal communication).

In 1932 Hill measured a group of Veddas the majority of whom were from Wellassa (2). About five years later (1937/1939) Marett collected anthropological data on all ethnic groups from all parts of Sri Lanka. Marett's data were analysed and published by Stoudt in 1961 (4).

In 1964 and again in 1968 the World Health Organisation made a plea that studies be carried out on primitive communities of the world who face imminent threat of extinction as a consequence of their contact with the more advanced communities (5, 6). In response, a

1 Department of Biochemistry, 2 Department of Anatomy, Faculty of Medicine, University of Peradeniya, Peradeniya.
1 Present address: 40, Welikadawatte, Rajagiriya.

team of investigators from the University of Peradeniya and the District Hospital, Badulla decided to make a comprehensive biometric study of the Veddas.

The Kandeganvila Veddas were chosen for study due to the ease of access for field visits from Peradeniya and Badulla, and the interest of the administrative officers of the region in the work. Stouidt has considered the Veddas together with the Sinhalese and Sri Lankan Tamils as the primary ethnic groups in Sri Lanka. Secular changes in the physical anthropology of both the Sinhalese and Tamils have been reported (7, 8, 9). This paper attempts to look for secular trends in the physical anthropology of the Veddas.

Population and Methods

Weekend field visits were made in the dry season during the period 1971 - 1973. During the early familiarisation visits both the Veddas and Sinhalese living in the area were treated for minor ailments and counselled, so that the temptation for a Sinhalese to pose off as a Vedita was removed. After obtaining their trust and cooperation the Vedita households of Kandeganvila were identified. For each individual the clan name, given name, gender and age were recorded. Pedigrees of the different families of the different clans were drawn.

Only those from Vedita matings for at least three generations were included in the study. A dental and oral health survey was done in the field. Dental casts were taken for study in the laboratory. Samples of blood were taken with informed consent for the study of genetic markers. The results of the latter study have been published (10). The anthropometric measurements of 23 adult male Veddas are presented here.

The height measuring anthropometer and calipers used were manufactured by Sieber Hegner, Zurich. Circumferences and lengths were measured with a steel tape, and head, chest and biacromial measurements with

calipers. Total height (TH), span, biacromial diameter (BA), bizygomatic diameter (BZ), head circumference (HC), chest circumference (CC), chest breadth (CB) and chest depth (CD) were measured. All the measurements were expressed in centimetres.

The upper arm circumference (UAC) was measured at the midpoint between the acromion and olecranon and the forearm circumference (FAC) at the midpoint between olecranon and lower end of ulna. The calf circumference (CAC) was taken at the widest part of the calf and the wrist circumference (WC) at the proximal crease. All measurements were made by one investigator (TWW). Six indices SH/TH, CC/TH, Span/TH, BA/TH, CD/CB, and CB/SH were calculated.

Results

The names, the ages as stated at interview and pedigree number assigned to each of the 23 Veddas in the study are given in Table 1. Table 2 gives the analysis of the results of the measurements of 21 adult male Veddas, 17 from Wellassa and 4 from Uva Bintenne made by Hill, of the 114 Wellassa Veddas of Marett and of those in the present study. Statistical analyses of all three sets of data for inter-group variability are included. Table 3 gives the results and statistical analyses, similarly, for the six indices calculated.

Discussion

Fig. 1 gives a map of the Vedita country. Of the seventeen Wellassa Veddas from Hill's study considered in this paper 12 were from Danigala, 4 from Henebedda and 1 recorded as from the Wellassa division. Of the Uva Bintenne Veddas in Hill's study three were from Bulugahadena and one from Dambana. The 114 Wellassa Veddas of Marett's study were from Bingoda, Henebedde, Danigala and Bintenne North respectively. Hill has not recorded the Wariges (Warige = clan). 52% of Marett's Veddas were of the Uruwarige, 13% of Unapane Warige, 6% of Tala Warige, 3% of Morane Warige and 27% from the Bandara Warige. The Uva Bintenne

Table 1 – Names, pedigree numbers and ages in years (as stated at interview) of the Veddas of present study

| NAME | PEDIGREE NO. | AGE |
|------------------------------|--------------|-----|
| Uruwarige Alakola Tisa | UBII3 | 40 |
| Uruwarige Alakola Heen Banda | UBII1 | 50 |
| Uruwarige Appuwa | UUII1 | 35 |
| Uruwarige Kira | UKI1 | 65 |
| Uruwarige Sudu Banda | UUII5 | 38 |
| Talawarige Tisa | TKII5 | 22 |
| Guna Bandiya | TKII1 | 35 |
| Uruwarige Kaluwa | UWI1 | 45 |
| Unapanawarige Ratna | UPWaI | 65 |
| Unapanawarige Appuweleththo | UPWbI | 50 |
| Uruwarige Burunda | UWI | 60 |
| Uruwarige Ulapanwela | - | 55 |
| Uruwarige Appuweleththo | - | 45 |
| Uruwarige Bandi | UAI2 | - |
| Uruwarige Puncha | UAI3 | 40 |
| Moranawarige Tisahamy | - | 70 |
| Uruwarige Heen Bandiya | UWII1 | 25 |
| Uruwarige Appaaleththo | - | 40 |
| Uruwarige Tisalee | - | 35 |
| Uruwarige Puncha | UAI3 | 40 |
| Uruwarige Appuwa | UAI1 | 50 |
| Alakola Bandiya | UBI2 | 50 |
| Talawarige Guna Banda | TKII | 35 |

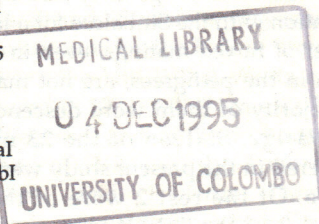


Table 2 – Comparison of 11 anthropometric measurements of present study with those reported by Hill and by Marett

| | | TH | SH | BA | Span | CD | CB | CC | FAC | WC | CAC | BZ |
|----------------|------|--------|--------|--------|--------|-------|-------|---------|-------|-------|-------|---------|
| Hill | N | 21 | 21 | 20 | | 21 | 21 | 20 | 20 | 20 | 20 | 20 |
| | Mean | 153.42 | 74.26 | 33.84 | | 16.62 | 22.85 | 73.9 | 21.25 | 13.80 | 29.34 | 11.75 |
| | SE | 1.65 | 0.66 | 0.54 | | 0.40 | 0.41 | 1.16 | 0.47 | 0.30 | 0.65 | 0.17 |
| | SD | 7.57 | 3.04 | 2.40 | | 1.82 | 1.89 | 5.20 | 2.12 | 1.33 | 2.90 | 0.75 |
| | SE | 1.17 | 0.47 | 0.38 | | 0.28 | 0.29 | 0.82 | 0.33 | 0.21 | 0.46 | 0.12 |
| Marett | N | 114 | 114 | 114 | 114 | | | 114 | | | | 114 |
| | Mean | 156.32 | 78.04 | 34.85 | 166.93 | | | 80.01 | | | | 12.81 |
| | SE | 0.59 | 0.35 | 0.22 | 0.76 | | | 0.42 | | | | 0.50 |
| | SD | 6.32 | 3.76 | 2.31 | 8.13 | | | 4.51 | | | | 5.31 |
| | SE | 0.42 | 0.25 | 0.16 | 0.54 | | | 0.30 | | | | 0.35 |
| Present study | N | 23 | 23 | 21 | 8 | 8 | 13 | 23 | 23 | 23 | 23 | 23 |
| | Mean | 156.62 | 75.46 | 32.54 | 162.31 | 17.35 | 22.65 | 77.17 | 20.14 | 13.86 | 27.97 | 12.86 |
| | SE | 1.17 | 0.68 | 0.57 | 2.07 | 0.37 | 0.39 | 0.75 | 0.47 | 0.16 | 0.54 | 0.11 |
| | SD | 5.59 | 3.25 | 2.62 | 5.86 | 1.03 | 1.41 | 3.60 | 2.25 | 0.76 | 2.60 | 0.53 |
| | SE | 0.82 | 0.48 | 0.40 | 1.46 | 0.26 | 0.28 | 0.53 | 0.34 | 0.11 | 0.38 | 0.08 |
| Present/Hill | | ns | ns | ns | | ns | ns | p .05 | ns | ns | ns | p .0001 |
| Hill/Marett | | ns | p.0001 | ns | | | | p .0001 | | | | p .05 |
| Present/Marett | | ns | p .001 | p .001 | p .05 | | | p .001 | | | | ns |

ns - not significant
 TH - total height
 SH - sitting height
 BA - biacromial diameter
 CD - chest depth
 CB - chest breadth
 CC - chest circumference
 FAC - forearm circumference
 WC - wrist circumference
 CAC - calf circumference
 BZ - bizygomatic diameter

Veddas of Kandeganvila correspond to the village Veddas of the Sarasin's classification and have taken to a more settled way of life, including chena cultivation. In 1958 the state had built 27 houses for them in an attempt at colonisation. Although they had lived in close association with the Sinhalese for a long time the number of mixed matings, even in the 1970s as shown in the pedigrees, are not many. Further, the majority of them were descendants of the Uru Warige. Sixteen of the 23 males (74%) considered in the present study were of the Uru Warige. Of the rest 2 were of the Unapane Warige, 2 of the Tala Warige and one of the Morane Warige. The Warige of two have not been recorded. The Bandara Warige constituting 27% of Marett's Veddas, was not found in Kandeganvila. The Veddas of Kandeganvila, belonging geographically to Uva Bintenne, represent therefore a more or less homogenous group, practising clan effective endogamy, whilst living in close proximity to the Sinhalese.

The results of some anthropometric data from the Veddas of Kandeganvila collected in 1971 -

1973 are compared with the published results of Hill 1932 and Marett 1937 - 1939 to establish secular trends if any. Hill's measurements of mainly Wellassa Veddas and Marett's measurements of the Wellassa Veddas were made forty years and thirty five years respectively previous to the measurements of the Uva Bintenne Veddas of the present study. However, although studied at approximately the same time, there are significant differences between Hill's Vedda and Marett's Vedda, as seen in Tables 2 and 3. In SH and CC, Marett's Vedda has been significantly bigger ($p < 0.0001$) than Hill's Vedda. BZ of the Marett's Vedda is also significantly greater ($p < 0.05$). Of the indices, SH/TH is greater at $p < 0.001$ and CC/TH at $p < 0.0001$ in Marett's Vedda. Thus, of the measurements available for comparison, the Hill Vedda and the Marett Vedda have been similar only in total height and shoulder width. That Marett's Vedda probably has an admixture from a group with generally larger physique is borne out by the finding that even after 35 years the Veddas of the present study are significantly smaller than the Marett Vedda in SH ($p < 0.001$),

Table 3 - Comparison of 6 indices calculated from the present study with those of Hill and Marett

| | | SH/TH | CC/TH | BA/TH | Span/TH | CD/CB | CB/SH |
|----------------|------|---------|---------|---------|---------|--------|--------|
| Hill | N | 21 | 20 | 20 | | 21 | 21 |
| | Mean | 0.4846 | 0.4832 | 0.2209 | | 0.7278 | 0.3078 |
| | SE | 0.0047 | 0.0073 | 0.0024 | | 0.0127 | 0.0054 |
| | SD | 0.0217 | 0.0329 | 0.0111 | | 0.0582 | 0.0251 |
| | SE | 0.0033 | 0.0052 | 0.0017 | | 0.0089 | .0038 |
| Marett | N | 114 | 114 | 114 | 114 | | |
| | Mean | 0.5014 | 0.5139 | .2240 | 1.0679 | | |
| | SE | 0.0015 | 0.0022 | 0.0011 | 0.0023 | | |
| | SD | 0.0160 | .0231 | 0.0177 | 0.0250 | | |
| | SE | 0.0011 | .0016 | 0.0008 | 0.0016 | | |
| Present study | N | 23 | 23 | 21 | 8 | 8 | 13 |
| | Mean | 0.4822 | 0.4930 | 0.2085 | 1.0326 | 0.7425 | 0.2994 |
| | SE | 0.0042 | 0.0050 | 0.0039 | 0.0033 | 0.0187 | 0.0055 |
| | SD | 0.0203 | 0.0242 | 0.0183 | 0.0096 | 0.0531 | 0.0198 |
| | SE | 0.0029 | 0.0035 | 0.0028 | 0.0022 | 0.0075 | 0.0038 |
| Present/Hill | | ns | ns | p .01 | | ns | ns |
| Hill/Marett | | p .001 | p .0001 | ns | | | |
| Present/Marett | | p .0001 | p .0001 | p .0001 | p .0001 | | |

ns - not significant
TH - total height
CB - chest breadth

CC - chest circumference
BA - biacromial diameter

SH - sitting height
CD - chest depth

BA ($p < 0.001$), span ($p < 0.001$), CC ($p < 0.01$), SH/TH ($p < 0.0001$), CC/TH ($p < 0.0001$) and BA/TH ($p < 0.0001$). The Vedda of the present study is similar to the Marett Vedda only in total height and facial width.

Could the difference between the Hill Vedda and the Marett Vedda be due to the fact that 27% of Marett's population of 114 were of the Bandara Warige? Bandara is not a name found among the Kandeganvila Veddas. Nor was the name familiar to them. Bandara does not appear in the clan names listed by the Seligmans (11). Wijesekera, who was closely associated with the ethnological survey of Ceylon conducted by Marett and an active member of the Vedda Development Board in the mid 1940s, lists 13 Wariges (12). "The Bandara clan is unquestionably the most prominent, for the chiefs are said to have been selected from among them. All the other clans must respect and carry out certain duties towards them. It is also a common belief ... that the Bandara groups were superior to the goigama group of Kandyans".

Although no Wariges have been recorded, the 21 adult Veddas selected from the data of 26 Veddas given by Hill (excluding three from Tamankaduwa, two probably Sinhalese and one a 13 year old child) were probably more homogenous than those of Marett. Secular trends generally are towards giving a taller and broader frame. The Veddas of the present are significantly bigger than the Hill Vedda only in CC (0.01) and BZ ($p < 0.0001$). Their BA/TH index is significantly less ($p < 0.01$). They are similar in TH, SH, BA, CD, CB, FAC, WC, CAC, SH/TH, CC/TH, CD/CB and CB/SH. The measurements were made with the same instruments as used by Hill for his study and all measurements in the present study have been taken by the same investigator. When compared with Hill's study therefore there is no secular trend over a span of forty years for increase in size.

Anthropometric measurements are usually taken on young adults. The average age of Marett's Vedda was estimated to be 29 years.

The ages of the Veddas in Hill's study have not been recorded. The average age of the Vedda of the present study is 45 years, with a range 22 and 70 years. It is known that anthropometric measurements tend to decrease with increasing age after adulthood. The decrease in height between ages 20 and 45 years is very small and is unlikely to account for the lack of increase in stature between the Hill (1932) Vedda and the Vedda measured in 1972. All of Marett's Veddas were from Wellassa, and of the 4 Veddas from Uva Bintenne of Hill's study, 3 were from Bulugahadena and 1 from Dambane. Kandeganvila is quite a distance from Dambane and across the river from Bulugahadena. Given the evidence of clan effective endogamy from the pedigrees, it is probable that the Kandeganvila Veddas were generally smaller (except in chest circumference and facial width) than the Veddas measured by Hill in 1932. On the other hand, it is more likely that improvements in the health and educational services and socioeconomic conditions which have taken place in Sri Lanka since the 1940s, and which have resulted in positive secular changes in the Sinhalese and Tamils (7, 8, 9) have had no impact on the Veddas.

The Veddas of Kandeganvila were relocated at Hennanigala in Mahaweli System C in 1980. Twenty years have elapsed since the measurements of the present study were made. Conclusive evidence for or against secular trends for increase in size of the Veddas must be sought by initiating a longitudinal biometric study of these same Veddas, using the pedigrees already compiled.

Acknowledgements

We wish to thank Prof. S. B. Ellepola and Dr. R. Sri Pathmanathan for assistance as members of the team investigating the Veddas of Kandeganvila. We thank Gihan Wikramanayake of the Institute of Computer Science, University of Colombo and R. M. C. Ekanayake and S. R. Masakorale, Staff Technicians, Department of Anatomy, Peradeniya, for assistance with the statistical analyses and Chitrangani de Silva for typing the script.

References

1. Knox Robert. *An historical relation of Ceylon*. Dehiwela: Sri Lanka: Tisara Prakasakayo Ltd. 1981; 194-199.
2. Hill WCO. The physical anthropology of the existing Veddahs in Ceylon, Part I. *Ceylon Journal of Science (G)* 1941; 3(2): 25-144.
3. Sarasin CF, Sarasin PB. Outline of two years' research in Ceylon. *Journal of the Royal Asiatic Society (Ceylon Branch)* 1886; 9(32): 289-305.
4. Stoudt HW. *The Physical Anthropology of Ceylon*. Ceylon National Museum Ethnographic Series, Publication No. 2. Colombo: National Museum, 1961.
5. WHO. *Research in population genetics of primitive groups*. Technical Report Series No. 279. Geneva; World Health Organization, 1964.
6. WHO. *Research on human population genetics*. Technical Report Series No. 387. Geneva: World Health Organization, 1968.
7. Balasuriya P. Anthropometric study of medical students. *Ceylon Journal of Medical Science* 1988; 31: 19-24.
8. Amerasinghe S, Wikramanayake TW. Auxology of Sri Lankan children, age 5 to 18 years. 1. Heights and Weights and Growth Increments. *Ceylon Journal of Medical Science* 1989; 32(2): 59-84.
9. Wikramanayake TW, Amerasinghe S. Auxology of Sri Lankan children, age 5 to 18 years. 2. Quetelet's body mass index. *Ceylon Journal of Medical Science* 1990; 33 (1): 1-14.
10. Ellepola SB, Wikramanayake ER. A genetic study of the Veddas. *Ceylon Journal of Medical Science* 1986; 29: 1-21.
11. Seligmann CG, Seligmann BZ. *The Veddas*. The Netherlands: Oosterhout N.B. Anthropological Publications 1969; p. 30.
12. Wijesekera N. *Veddahs in Transition*. Colombo: Gunasena and Co. Ltd. 1964; p. 26.

Figure I - Map of Vedda Country

