RESEARCH PAPERS

Morphology and Morphometry of prehistoric skeletal remains found in Potana, Sigiriya, Sri Lanka

Chandimal, K.M.[1], Adikari, G.[2], and Yasawardene, S.G.[3]

[1]*Department of Anatomy, Faculty of Medicine, Wayamba University of Sri Lanka,* [2]*Postgraduate Institute of Archaeology, University of Kelaniya, Sri Lanka,* [3]*Department of*

Anatomy, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka

Abstract

This study explores morphology, morphometry of prehistoric skeletal remains found at *Potana*, Sigiriya, Sri Lanka that has been radio carbon dated as 4,000 years before present (YBP). The gender, age, stature, cause of death, health status, food habits and the way of life of *Potana* population have been explored by following the methods described in slandered text. One skeleton unearthed from context no 10 of the excavation presently displayed at National Museum, Colombo is of female sex and age at death is around 25-35 years. The calculated stature of the individual is 170 cm. Other skeleton found at the same context presently displayed at Sigiriya Museum is of male sex and determined age at death is around 25-30 years. The calculated stature of the male is 173.61cm. The skeleton excavated in context no 03 presently stored at Osteology Laboratory, Postgraduate Institute of Archaeology, University of Kelaniya is determined as female and age at death is around 35-40 years. In general, the prehistoric population that lived in *Potana* is further identified as a hunter gatherer population that shared many biometrics and socioeconomic characteristics among contemporary prehistoric populations that lived in Sri Lanka such as Bellan bandi Palassa, Batadomba lena, Beli lena, Fa Hien lena etc.

Keywords - Morphology, Morphometry, Prehistoric skeletal remains, Potana Sigiriya

Running Title - Prehistoric skeletal remains of Potana, Sigiriya, Sri Lanka

Introduction

The prehistory of Sri Lanka dates back to about 125,000 YBP (years before present) and possibly goes even as further as 500,000 YBP covering the Palaeolithic, Mesolithic and early Iron Age (Deraniyagala, 1992). The chronology of prehistoric human skeletal remains of Sri Lanka ranges around 40,000 YBP though prehistoric human skeletal remains of around 34,000 YBP onwards stand in a more complete form providing better and more informative evidence. *Fa-Hien* lena at Bulathsinghala (34,000 ± 5,400 C^{14} YBP), *Batadomba lena* near Kuruwita (28,500- 11,500 C^{14}Y BP), *Beli lena* at Kitulgala (27,000 - 35,000 C^{14} YBP), *Alu lena* at Attangoda - Kegalle (10,500

C^{14} YBP) and *Bellan bandi palassa* at Balangoda (6,500 C^{14} YBP) etc mainly situated in the low country wet zone of the island have yielded human skeletal remains belonging to Sri Lankan prehistory (Kennedy, 1993).

Literature suggests that Sigiriya situated in the intermediate climatic zone in Matale district may have been occupied by *Homo sapiens* as far back as Mesolithic period of Sri Lanka (Adikari, 1998). There is evidence to suggest that Sigiriya had been continuously occupied by *Homo sapiens* during the prehistoric, protohistoric and historic eras (Adikari, 2008). Prehistoric cave site of *Potana* at Sigiriya has yielded human skeletal remains dating back to 4,000 C^{14} YBP and as such, is in agreement with the prehistoric human habitat at Sigiriya (Adikari, 1998). The two excavated human skeletons found in context No 10 from *Potana* are presently displayed at the Sigiriya Museum (human skeleton 1 / SK_1) and the National Museum of Sri Lanka (human skeleton 2 / SK_2). The base of skull with a few postcranial bones (human skeleton 3 / SK_3) excavated from context No 03 is presently stored at the Osteology Laboratory, Postgraduate Institute of Archaeology (PGIAR), University of Kelaniya.

The skeletal remains play a significant role in reconstructing the extinct past. The gender, age, stature, life style, dental health, cause of death etc would be determined by the detailed study of human skeletal remains (Bass, 2005). The prehistoric skeletal remains found in *Potana* have unique importance as the only specimens currently available in Sri Lanka belonging to the intermediate climatic zone. Initially, in the year 1994, excavated skeletal remains from *Potana* were identified as human and as dating back to 4,000 C^{14}YBP (Adikari, 1998). There are no reported detailed studies done on the prehistoric skeletal remains found in *Potana*, Thus, the study of morphology and morphomerty of available prehistoric skeletal remains at *Potana*, has its unique significance in view of obtaining a detailed description of our ancestors who had lived in the intermediate climatic zone at Matale district in the Mesolithic period of Sri Lanka.

The detailed study of morphology and morphometry of the prehistoric skeletal remains of *Potana* addresses the gender, age, stature, life style, health status etc.

Materials and Methods

The two excavated human skeletons found in context No 10 from *Potana* presently displayed at the Sigiriya Museum (human skeleton 1 / SK_1) and the National Museum of Sri Lanka (human skeleton 2 / SK_2) and the base of skull with a few postcranial bones (human skeleton 3 / SK_3) excavated from context No 03 presently stored at the Osteology Laboratory, Postgraduate Institute of Archaeology (PGIAR), University of Kelaniya were studied in detail. The purification and restoration of excavated bones were done following the methods described by Hillson (2002) and Bass (2005). The morphology and morphometry of the available fragmented cranial & postcranial bones were studied by following the methods described by

Bass (2005), Mays (1998), Brothwell (1981) and Williams et al. (1995). The detailed morphology and morphometry of permanent dentition were made by following the methods described in Hillson (2002).

According to the morphological features studied, the gender and the age at death of each skeleton were determined. Available fragmented pelvic, skull and long bones were used to determine the gender in the study (Bass 2005; Williams et al. 1995; Ubalaker and Buikstra 1994). Age of the skeletal remain has been determined by observing epiphyseal union of long bones, suture fusion of skull fragments, tooth eruption and wear on teeth (Hillson (2002) and Bass (2005). The stature calculation was done by using full long bones such as femur, tibia, humerus, ulna and radius based on regression formula derived by Trotter & Glesser (1952) for American Whites when full bone were available. The formulae described by Trotter & Glesser (1952) could not be applied directly because most of the long bones of skeletal remain were fragmented.
Initially, reconstruction of the full length of the long bone: humeri and tibiae were carried out by using long bone fragments following the methods described by Krogman (1962).

Ethical clearance for the morphometrical & morphological study of skeletal remains excavated from Sigiriya *Potana* has been granted by the Ethics Review Committee of Faculty of Medical Sciences, University Sri Jayewardenepura, Sri Lanka (Ref No: 370 / 7)

Results and Analysis

Morphological analysis of prehistoric skeletal remains

The level of preservation of the three available prehistoric skeletons excavated from prehistoric site *Potana* was satisfactory to study the morphology and morphometry. The prehistoric skeleton (SK_1) presently displayed at Sigiriya museum, Sigiriya, prehistoric skeleton (SK_2) presently displayed at National Museum, Colombo and the prehistoric skeletal remains (SK_3) presently relocated at Osteology Laboratory, PGIAR were studied in detail. The morphological analysis was based upon the standards established by Bass (2005), Brothwell (1981), Mays (1998) and Williams et al. (1995).

Prehistoric skeleton (SK_1) presently displayed at Sigiriya museum.

The skeleton was found to be in resting on the right lateral aspect and double up sleeping position with knees flexed (Fig.1). The specimens were sub fossils with incomplete mineralization.

a. The Cranium

The cranium was resting on its right lateral aspect. The cranial vault has been severely fragmented and the left side of the cranium was exposed. The fragmented temporal, parietal and occipital bones have been preserved. The rectangular shaped left parietal bone fragment anteroposteriorly extended from coronal suture to lamboid suture. Laterally, it extended to the point of articulation with the

squamousal part of the temporal bone. The coronal suture was preserved for its medial 2/3 and lamboid suture was preserved for its medial 1/3. The appearance of the suture lines were serrated and closed. The thickness of parietal bone varied from its medial to lateral and ranged from 6 mm to 3 mm. The fragment of posteriorinferior part of right parietal bone was preserved.

The occipital bone was severely fragmented. The basilar and lateral parts were missing. The medium sized external occipital protuberance was restored and the nuchal lines were prominent in the occipital bone. Right lamboid suture was preserved for its lateral 1/3 while the left side was not found. The internal occipital crest was prominent on the endocranial surface of the mended occipital bone. The occipital bone was thick, attaining dimensions of 7.18mm at certain points.

Fragmented mastoid, petrous, squamous and the proximal part of zygomatic process of right temporal bone and mastoid, petrous and squamous parts of left temporal bone had been preserved. A decayed small part of the left petrous bone was found attached to sphenoid bone. A zygomatic process of temporal bone was clearly identified as it was extending above to the external auditory meatus. The mastoid processes were large in sizes, scored as type 4 according to the scoring system given by Ubelaker and Buikstra (1994) and were comparable with the male sex. The rectangular shaped bone fragment represented the middle part of the frontal bone was preserved. The identified fragment was found to be extended from coronal suture to orbital margin.

When considering the bones of the face, the maxilla was preserved. It was small to moderate in size. Intact eight permanent teeth, which were central & lateral incisors, canine, first and second premolars, first, second and third molars have been preserved at the left alveolar region. The anterior portion of right alveolar region bearing central & lateral incisors, canine, first and second premolars has been preserved as well.

b. The mandible

Two mandibular fragments have been preserved. An intact ramus and the distal fragment (5 cm) of the body of left fragment were available. The distal fragment of the body retained second premolar, first, second and third molars in their alveolar processes. The head and coronoid process were missing from the ramus. The available fragmented body and ramus was extremely robust. The available gonion was well developed and everted. The bony ridges and surfaces for the attachments of muscles such as masseter, temporalis and pterygoids have been well marked over the available fragmented ramus and body.

The right fragmented mandible was represented by the intact ramus with head and coronoid process and the fragmented body (2.5 cm) attached to ramus. The available fragments were robust. The body retained right third molar teeth in their alveolar process. The myolohyoid groove of the ramus was well marked in the right mandible.

c. Dental remains

Totally nineteen permanent teeth have been preserved and out of them fourteen were maxillary teeth or upper teeth. Intact right and left central and lateral incisors, left and right canines, left and right first and second premolars and the left first molar (M_1), left second molar (M_2) and left third molar (M_3) molars of upper teeth in their alveolar processes of maxilla have been identified. The right third molar tooth was preserved and it was found to be not within the alveoli.

The upper teeth were moderate in size. The central incisors were larger than the lateral incisors and out of them the largest incisor was the left central. Incisors and canines were highly wornout in condition. The cutting edges of the four incisors have been severely wornout. In addition, shovel shaped incisors have been not found. The size of buccal cusps of first and second premolar was larger than lingual cusps on both sides. Attrition (wear) was not observable among the lingual and buccal cusps of all premolars. The size of the teeth reduced from second premolar to first premolar on both sides. The first and second molar showed four cusp pattern and "+" shaped grove pattern, while the third molar showed five cusp patterns. Although the dental wear was absent on the occlusal surfaces of second and third molars, the right first molar showed slight attrition over the lingual cusp. Dental dimensions have been observed to be high in the order of molar size as $M_1 > M_2 > M_3$ of the preserved upper teeth. There was no evidences of dental crowding, supernumerary teeth, shovel shaped incisors, artificial deformations, periodontal diseases and caries.

Intact lower teeth or mandibular teeth were the second right premolar, first, second and third right molars and left third molar. Their sizes were moderate to large. Attrition (wear) was not observable among the molars except the first right molar teeth which showed slight attrition over the lingual surface. Carious decay, periodontal diseases and artificial deformations have been not found. Dental dimensions have been reduced with molar size being $M_1 > M_2 > M_3$ for preserved lower teeth (Table 1 and
Table 2)

d. Bones of the pelvic girdle

The pelvic bone has been severely fragmented. The identification of most of the individual bone fragments of the pelvic girdle was not possible. A bone fragment of right iliac bone with greater sciatic notch and small part of acetabulum has been preserved. A small part of left iliac bone with greater sciatic notch and auricular surface has been preserved. The greater sciatic notches were deep and narrow scored as 4 according to the scoring system given by Ubelaker and Buikstra (1994) and it was comparable with the male sex.

Prehistoric skeleton (SK_2) presently displayed at National Museum, Colombo.

The skeleton has been found to be in resting on right lateral aspect and double up sleeping position with knees flexed (Fig.2). The skeleton has been sub fossil in nature and severely fragmented. Handling of skeletal material for osteological analyses was

not an easy task as most of the bones were fragile. Therefore the morphology was mostly recorded by looking at the

a. Cranium

The cranium has been found in resting on its right lateral aspect in the soil matrix. The left side of the cranium has been exposed and most of the available cranial bones such as left temporal, parietal and occipital bones have been severely fragmented and some fragments were found to be missing. As the cranium has been severely fragmented its reconstruction was not possible. The left fragmented frontal bone has been preserved to some extent. The supraorbital ridge of the available frontal bone was poorly developed and compared with the female sex.

A few fragments of parietal bones have been preserved. The existed rectangular shaped right parietal bone fragment extended anteroposteriorly from coronal suture to the point of articulation with the lamboid suture. The left parietal bone has been fragmented into more than four pieces. All the identified fragments have been robust and thick.

The occipital bone has been severely fragmented. The inter-parietal part of left squamous part of the occipital bone with condyles has been preserved. Slightly developed fragmented external occipital protuberance and superior and inferior nuchal lines have been identified and these were comparable with the female sex.

The mastoid, squamous and petrous parts of left temporal bone have been preserved. The zygomatic process has been broken from its origin. The mastoid process with small to moderate in size was broken from its base and scored as type 2 according to scoring system given by Ubelaker and Buikstra (1994). The petrous part of the temporal bone has been preserved except the area in between internal auditory meatus and medial portion of the petrous part was decayed.

When considering the facial skeleton, the alveolar portion of maxilla has been preserved. Thirteen permanent teeth which were in their alveoli processes have been preserved. They were the central and lateral left incisors, central right incisors, left canine, first, second left and right premolars, first, second and third right molar and first, second left molar teeth.

b. Mandible

The state of preservation of mandible was poor and it was partially mineralized. Two mandibular fragments have been preserved. The ramus and the body of left mandible has been preserved. The fragmented body contained central and lateral incisors, second premolar, first, second and third molar teeth. The fragmented ramus was represented by lower part which was about 2 cm in length. The gonion was slightly developed and slightly everted. Other fragment was represented by right body which extended from symphysis menti anteriorly to second molar teeth level posteriorly. The fragment was heavily mineralized. The restored chin of the mandible was medium in size and pointed.

c. Dental remains

Thirteen maxillary (upper) permanent teeth have been preserved. They were

central and lateral left incisors, central right incisors, left canine, first and second left and right premolars, first, second and third right molar and first, second left molar teeth within their alveolar processes. The upper teeth were moderate to large in size. Generally, anterior upper teeth showed pronounced attritions and the cutting blades have been severely worn out in all the upper incisors. The available right canine was highly worn out up to pulp cavity. The lingual and buccal cusps of first and second left premolars have been severely worn out. The attrition of right premolars was poor compared to left. Molars have been severely attrited and the level of attrition decreased from first molar to third in both sides. The identification of cusp pattern and grove patterns of molar teeth was not possible due to high dental attrition. Dental dimensions were high and the order of molar size has been $M_1 > M_2 > M_3$ for preserved upper teeth (Table 3.) There was no evidences of carious decays, periodental diseases, crowding, shovel shaped incisors, artificial deformations.

Ten mandibular (lower) teeth have been preserved. They were central and lateral left incisors, first right premolar, second left and right premolar, first, second, left and right molars and left third molar teeth within their alveolar processes. The first, second right incisors and left and right canines were broken from their roots. The lower teeth were moderate to large in size (Table 4.). In general, the lower teeth showed high attritions and anterior teeth (incisors) showed pronounced attritions. The lingual and buccal cusps of available premolars showed higher degree of attritions. The dental wear was high in the first, second left and right molars and the level of dental wear was decreased from first molar to third. The cusp pattern and grove patterns of molar teeth were not able to observe due to high dental attrition except left third molar tooth which showed 5+ cusp pattern. There was no evidence of crowding, supernumerary teeth, artificial deformations or caries.

d. Long bones

The long bones of upper and lower limb were severely fragmented. The available upper limb bones were fragmented at shafts of humeri, radi. and ulnae. The proximal end of the right humerus, with 1/3 of shaft intact and distal end of radii and ulnae were preserved. The left and right femora were severely fragmented. The bones of the leg were represented by left tibia broken into two fragments and the length of the restored bone was 36.3cm.

Prehistoric skeletal remains (SK_3) at Osteology Laboratory PGIAR

The skeletal remains (SK3) found in context no 03 of excavation of Potana cave site has been presently stored at Osteology Laboratory PGIAR. The skeletal remain consisted of fragmented cranium and a few post cranial bones. The vault of the cranium was missing and the cranial fossa was exposed. The preservation of available bones was poor and they were sub fossils. The mineralization process of bones was very high compared to other skeletal remains found in the excavation (Fig. 3.)

a. Cranium

The cranium was severely fragmented and the vault of the cranium was missing.

The fragmented occipital, temporal and parietal bones of cranium have been preserved. Two rectangular fragments of the parietal bone which represented the posterior inferior aspect have been preserved. It was robust and heavy and was 15 mm in thickness. The superior margin of restored fragment showed sharp cut.

Intact supraoccipital and squamous part of occipital bone was preserved. The most posterior aspect of foramen magnum was preserved and it was small to moderate in size. The internal occipital crest and internal occipital protuberance were slightly marked.

The left fragment of temporal bone was heavily mineralized and it represented the petrous and mastoid part. The external auditory meatus was broken vertically in midline and ear canal was exposed. The fragmented squamous, petrous and mastoid part of right temporal bone was found. The petrous part was highly mineralized. The external auditory meatus and the tympanic plate were fragmented and external ear canal was exposed. The styloid process was broken down from its base. Left and right mastoid processes showing posteromedially curved tips were small and were scored as type 02 according to scoring system given by Ubelaker and Buikstra (1994).

The alveolar portion of right maxilla was preserved. The most anterior part distal to the canine teeth was broken. Intact canine, first and second premolars, first and second molars within the alveolar process have been preserved and they were highly mineralized.

b. The mandible

The left and right mandibular fragments have been preserved. The right fragment was medium in size and extremely mineralized. The preserved ramus of right fragment which formed a fairly obtuse angle with the place of the corpus was short and moderate width. Gonion was inverted. The head was broken from the neck and the coronoid process was preserved. The body was thick and represented the small distal fragment (3 cm) attached to ramus. The alveolar margin of body was heavily mineralized and it contained third molar teeth. The space posterior to the alveolus of the right third molar was extensive.

The left half of the mandibular fragment was broken into three. It contained the ramus, base of the coronoid process and fragmented body attached to ramus. The body was small in size. The alveolar margin and mandibular teeth were not able to observe as alveolar margin of the body was highly mineralized.

c. Dental remains

A total of six teeth have been preserved. Out of them five were maxillary teeth. The upper right canine, first and second right premolars, first and second right molars have been preserved. Due to high attrition and heavy mineralization, the identification & evaluation of the general morphology of cusp patterns, groove patterns, wear on teeth etc and morphomerty (mesio-distal and

buccolingual diameter) of upper teeth were not possible. The intact lower right third molar was large in size and was highly mineralized.

Reconstruction of full lengths from fragmented long bones

Reconstructed full lengths of right and left humerii and left tibia of SK1 and left humerus and tibia of SK2 are shown in Table 5 & 6. Distances (a-b, b-c, c-d, d-e, e-f, f-g) of humerus and tibia are shown in Bass (2005)

Reconstruction of stature

The stature of SK_1 and SK_2 was reconstructed by using measured full lengths and reconstructed full lengths of the long bones based on regression formula derived by Trotter & Glesser (1952) for American Whites. The estimated height of SK_1 is 173.32 cm and SK_2 is 170.03 cm (Table 7.)

Discussion

Prehistoric skeletal remains excavated from the *Potana* cave were found to be severely fragmented and fragile in nature which hindered the morphological and morphometric analyses. Human skeletal remains had to be differentiated from animal bones and this was done mostly by observing the anatomical features of the bones and overall size of the bones (Bass, 2005). However a proper separation could not be carried out at times due to smaller fragment size. In such instances, one way of differentiating human and animal bones is by the microscopic identification as documented by Mays (1998).

The determination of the age at death of the skeletal remains was done by observing the teeth eruption pattern and attrition of the available teeth. Mean life expectancy of *Potana* population could not be determined from this study due to the small sample size. However the calculated age at death of *Potana* male (SK_1) being 25 - 30 years, female (SK_2) being 25 - 35 years and female (SK_3) being 35 - 40 years were within the range of age at death of contemporary prehistoric population that lived in Sri Lanka (Hawkey, 2002; Kennedy, 1965). It is also in keeping with the recorded age for prehistoric world population (25 - 40 years).

Under normal circumstances, pelvic bones give the best evidence for gender determination (Bass, 2005; Williams et al. 1995). Therefore although fragmented, the pelvic bones and cranial bones were used to determine the gender. Although molecular methods of gender determination based on the presence of different sized alleles of the amelogenin gene on nuclear chromosomes X and Y could be used to determine gender more accurately than the conventional osteology method (Hummel and
Herrmann, 1991; Schultes et al. 1997; Michaela and Eva Drozdová, 2008), for this it is necessary to extract ancient DNA from the fossil remain as the first step to confirm the gender of the individual determined by the study based on conventional morphology and morphometry.

The estimated height of *Potana* male (SK_1) (173.32 cm) and female (SK_2) (170 cm) was higher than the reconstructed documented height of

Balangoda male (165.2 cm) and reconstructed height of *Balangoda* female (152.2 cm) (Deraniyagala, 1992). The average stature reported for the historic male who lived in *Naipena Guhava* (Cobra hood cave) at Sigiriya being 152 cm (n=5) (Chandrasekara and Wikramanayake, 1992) and the reported mean height for *Vedda* male being 156.62 cm ± 5.59 (n = 12) (Wikramanayake and Wikramanayake, 1992) is shorter than that of *Potana* male. Kennedy (1965) has reported that *Balangodese* group of people (Sri Lankan prehistoric population) was taller in height [(males: 5 feet 11 inches (164.7 cm); females 5 feet 5 inches (164.0 cm)] than the present Sri Lankans. This is comparable with the male and female of *Potana* prehistoric population who were taller than the present-day Sri Lankans:- male: 163.6 cm ± 6.9; female: 151.4 cm ± 6.4 (Ranasinghe et al. 2011). Findings of stone tools, bone tools and large amount of mollusca shells and bones of fish, reptiles, birds and mammals at the excavation in context no 3 and 10 support that the prehistoric population at *Potana* might have practiced carnivorous food habits with high amount of protein intake (Ranasinghe, 2009). The high animal protein intake may have influenced the increased height of *Potana* population.

Since there were no cranial bones with preserved landmarks in the collection, it was not possible to calculate cephalic index, nasal index, prosopic (facial) index etc. However certain measurements such as palatal and mandibular measurements could be obtained from the available mandible and palate. The measured palatal metrics (palatal length and breadth) of *Potana* population was within the range of the reported metrics of Balangoda population (Kanthilatha, 2012; Hawkey, 2002) and these measurements were larger than the reported measurements of modern Sri Lankans (Kanthilatha, 2012).

In case of metrical data of the dentition, an important character of all the measured molar teeth was that the buccolingual diameter of the occlusal surface exceeded the mesio-distal diameter (Table 4.3, 4.4, 4.5 and 4.6). This contrasts with the specimens of *Batadomba lena* and *Beli lena* where mesio-distal diameter of the molar was longer than the bucco-lingual diameter (Kennedy et al., 1971). However the molar measurements of *Balangoda* dentition are similar to the present study (Kennedy et al., 1971). The order of molar size reduction from first molar (M_1) > second molar (M_2) > to third molar (M_3) observed in *Potana* specimens in this study is similar to the molar size reduction seen in *Batadomba lena* and *Beli lena* specimens (Kennedy et al., 1971). However, the order of molar size reduction in the *Balangoda* series is recorded as $M_2 > M_1 > M_3$ (Kennedy et al., 1971).

When molar crown area of *Potana* specimens is compared with the reported numbers of Lukacs (1984) and Kennedy et al., (1971), values of *Potana* specimens could be placed near the values of *Batadomba lena*, *Beli lena* and *Bellan bandi Palassa* series. *Potana* dental measurements further support that Sri Lanka's Pleistocene hominids share features of large teeth

(megadont) as stated by Hawkey (2002).

In *Potana* dental remains, the attrition of the incisors and canines was higher than the attrition in molar and premolar teeth. Similar type of attrition pattern was recorded in anterior teeth (incisors and canines) of dental remains found in *Pomparippu* and *Balangoda* populations (Lukacs, 1973; Kennedy et al., 1987).

Generally, this evidence indicates that the anterior teeth have been used more than the posterior dentition. The cause for the pronounced wear on anterior teeth might be due to their food habits or that the incisors and canines were used as tools to manipulate and hold various objects.

Kennedy et al., (1987) reported that pathological condition of dental remains such as carious decay and periodontal diseases were absent in *Balangoda* population. Similar observations were made by me in *Potana* specimens. Higher incidence of dental caries and periodontal disease of *Popmparippu* and *Pellemalala* populations revealed that these populations had poor dental health than the *Potana* and *Banlangoda* populations (Lukacs, 1973; Ranaweera, 1992).

The dental evidence of *Bellan bandi Palassa* (Kennedy, 1965; Kanthilatha, 2012), *Batadomba lena* (Kennedy et al., 1971), *Beli lena* (Kennedy et al., 1971) and *Pellamalala* (Ranaweera, 1992) showed various discolourations similar to the present study. Discolouration pattern seen as uniform pale brown color at the neck of the teeth and dark brown or black pigments over the crown could be due to soil conditions in the burial site (Mays, 1998).

The dry climatic condition that had being existing at *Potana* may have been unfavorable for the vegetation. They may have had to find their daily food from the alternative sources such as animal flesh including small mammals (hare, monkey and wild boar) and large mammals (gaur, deer etc) (Adikari, 1998). The faunal evidence of fresh water crab (Paradoxrus spp.), snails (Acavus spp., Paludomus spp. and Pila spp.), the bivalve (Anodon spp.) and remains of fresh water fish revealed that the fresh water invertebrates and vertebrates too were included into their diet (Ranasinghe, 2009). All the above evidence points to the subsistence pattern of *Potana* man as hunting, gathering and fishing which had been the way of life of other prehistoric populations that lived in Sri Lanka such as *Bellan bandi Palassa* (Kennedy 1965; Kanthilatha, 2012), *Batadomba lena* (Kennedy et al., 1971), *Beli lena* (Kennedy et al., 1971) *Pellamalala* (Ranaweera, 1992) and *Miniethiliya* (Kulatilake, 2012).

The age at death, height, food habits, life style, health status and such other characters of the prehistoric population of *Potana* were able to be discovered by detailed study of morphology and morphometry of skeletal remains (Bass 2005; Brothwell, 1981; Mays, 1998). The genomic study using ancient skeletal remains revealed genetic information that can be used to explore population affinities which cannot be achieved by the conventional study of morphometry and morphology of skeletal remains.

Dr. Chandimal, K. M. (PhD)
Department of Anatomy,
Faculty of Medicine,
Wayamba University,
Sri Lanka

Tel: +94-711141591
E-mail: kmchandimal@wyb.ac.lk

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Tables

Table 1. The dental measurements of upper teeth of SK_1

Teeth Type	Mesio-distal diameter (mm)	Bucco – lingual diameter (mm)	Crown index (MD/BLX 100)	Crown module (MDXBL)	Robustness value (MD+BL/2)
Left upper incisor 1	8.16	2.6	313.8	21.2	5.4
Right upper incisor 1	8.06	2.64	305.3	21.3	5.4
Left upper incisor 2	5.31	2.43	218.5	12.9	3.9
Right upper incisor 2	5.75	2.18	263.8	12.5	4.0
Left upper canine	9.04	2.61	346.4	23.6	5.8
Right upper canine	7.39	3.75	197.1	27.7	5.6
Left upper premolar 1	6.4	9.28	69.0	59.4	7.8
Right upper premolar 1	6.47	8.86	73.0	57.3	7.7
Left upper premolar 2	6.62	9.58	69.1	63.4	8.1
Right upper premolar 2	6.03	9.65	62.5	58.2	7.8
Left upper molar 1	NA	NA	NA	NA	NA
Right upper molar 1	10.61	11.68	90.8	123.9	11.1
Left upper molar 2	NA	NA	NA	NA	NA
Right upper molar 2	9.49	10.89	87.1	103.3	10.2
Left upper molar 3	8.76	10.1	86.7	88.5	9.4
Right upper molar 3	9.06	10.5	86.3	95.1	9.8

NA - not available

Table 2. The dental measurements of lower teeth of SK 1

Teeth Type	Mesiodistal diameter (mm)	Bucco – lingual diameter (mm)	Crown index (MD/BLX 100)	Crown module (MDXBL)	Robustness value (MD+BL/2)
Right lower molar 1	10.05	11.24	89.4	113.0	10.6
Right lower molar 2	9.84	10.77	91.4	106.0	10.3
Right lower molar 3	9.68	10.55	91.8	102.1	10.1

Table 3. The dental measurements of upper teeth of SK_2

Teeth Type	Mesio-distal diameter (mm)	Bucco – lingual diameter (mm)	Crown index (MD/BL X100)	Crown module (MDXBL)	Robustness value (MD+BL/2)
Left upper incisor 1	8.11	2.64	307.2	21.4	5.4
Right upper incisor 1	8.23	2.16	381.0	17.8	5.2
Left upper incisor 2	6.55	2.6	251.9	17.0	4.6
Right upper incisor 2	NA	NA	NA	NA	NA
Left upper canine	7.52	5.52	136.2	41.5	6.5
Right upper canine	NA	NA	NA	NA	NA
Left upper premolar 1	6.56	8.52	77.0	55.9	7.5
Right upper premolar 1	6.67	9.3	71.7	62.0	8.0
Left upper premolar 2	4.94	9.01	54.8	44.5	7.0
Right upper premolar 2	6.41	9.65	66.4	61.9	8.0
Left upper molar 1	10.74	11.19	96.0	120.2	11.0
Right upper molar 1	10.56	10.81	97.7	114.2	10.7
Left upper molar 2	10.16	11.07	91.8	112.5	10.6
Right upper molar 2	10.36	11.69	88.6	121.1	11.0
Left upper molar 3	NA	NA	NA	NA	NA
Right upper molar 3	8.33	12.26	67.9	102.1	10.3

NA - not available

Table 4a. The dental measurements of lower teeth of SK2

Teeth Type	Mesio-distal diameter (mm)	Bucco – lingual diameter (mm)	Crown index (MD/BLX100)	Crown module (MDXBL)	Robustness value(MD+BL/2)
Left lower incisor 1	7.1	2.64	269	18.7	4.9
Right lower incisor 1	NA	NA	NA	NA	NA
Left lower incisor 2	6.87	2.6	264	17.9	4.7
Right lower incisor 2	NA	NA	NA	NA	NA
Left lower canine	NA	NA	NA	NA	NA
Right lower canine	NA	NA	NA	NA	NA
Left lower premolar 1	NA	NA	NA	NA	NA
Right lower premolar 1	5.15	6.07	85	31.3	5.6
Left lower premolar 2	8.14	7.2	113	58.6	7.7

Right lower premolar 2	8.06	7.25	111	58.4	7.7
Left lower molar 1	10.17	10.54	96	107.2	10.4
Right lower molar 1	10.15	11.34	90	115.1	10.7

NA - not available

Table 4b. The dental measurements of lower teeth of SK_2

Teeth Type	Mesio-distal diameter (mm)	Bucco – lingual diameter (mm)	Crown index (MD/BLX100)	Crown module (MDXBL)	Robustness value (MD+BL/2)
Left lower molar 2	9.74	10.67	91	103.9	10.2
Right lower molar 2	9.56	10.7	89	102.3	10.1
Left lower molar 3	9.68	10.51	92	101.7	10.1
Right lower molar 3	NA	NA	NA	NA	NA

NA - not available

Table 5. Reconstructed long bone lengths of SK_1

Long bone fragment	Measured distance of the bone (mm)	Total length of the bone (cm)
Proximal end of left humerus	a-b = 36.72	32.09
Proximal end of left humerus	b-c = 24.90	32.05
Distal end of left humerus	d-e = 20.46	32.17
Distal end of left humerus	e-f = 17.60	32.13
Distal end of right humerus	d-e = 20.56	32.07
Distal end of right humerus	e-f = 17.50	32.45

Proximal end of left tibia	a-b = 27.05	34.32
Distal end of left tibia	f-g = 11.35	34.40

Table.6 Reconstructed long bone lengths of SK_2

Long bone fragment	Measured distance of the bone (mm)	Total length of bone (cm)
Proximal end of left humerus	a-b = 37.05	32.3
Proximal end of left humerus	b-c = 23.7	31.1
Proximal end of left tibia	a-b = 27.5	36.2
Distal end of left tibia	f-g = 18.3	36.3

Table 7. Estimated stature of SK_1 and SK_2

Specimen	Long bone	Total length of the bone (cm)	Reconstructed stature (cm)
SK1	Left femur	46.0	172.25
	Right radius	27.8	184.78
	Left radius	27.3	182.88
	Right humerus	32.2	171.33
	Left humerus	32.1	170.51
	Left ulna	27.6 (approxi)	179.10
	Right ulna	28.0 (approxi)	180.83
	Left tibia	34.4	165.83
Average stature of SK1			**173.32**
SK2	Left humerus	31.7	169.50
	Left tibia	36.3	168.46
	Right tibia	38.5	175.10
Average stature of SK2			**170.03**

Figures

Fig. 1. Prehistoric skeleton (SK_1) presently displayed at Sigiriya museum

Fig. 2. Prehistoric skeleton (SK_2) presently displayed at National Museum, Colombo

Fig.3. Prehistoric skeletal remains (SK_3) at Ostoeology Laboratory, PGIAR