Preliminary Findings on Human Skeletal Remains from Harappan Site of Farmana

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(Received: 21/ 04/ 2012 ; Received in Revised form: 12/ 05/ 2012; Accepted: 05/ 07/ 2012)

The present paper deals with the primary observations conducted on human skeletal remains excavated at Harappan site of Farmana. The site (29°02'22"N and 76°18'21"E) in the jurisdiction of Meham block of Rohtak district, Haryana, is locally known as Daksh Kheda. Three cultural phases have been identified; Early Harappan, Mature Harappan and Late Harappan, dating back to 2500 BC. In all 70 burial pits were demarked, out of that 59 were excavated and skeletal remains of 35 individuals have been identified. Primary, secondary and symbolic burials were found within the site.

Standard methods are used for the skeletal analysis. Detailed inventory is prepared for each individual. Observations are made which includes age estimation, sex determination, stature estimation, morpho-metry and pathology. Taphonomical changes are also noted.

Unfortunately not many pathologies could be identified on these specimens, as the preservation of skeletal elements is far from satisfactory. There are 11 males and 15 females and sex identification of one individual is not possible. Other than these adults, 4 children and 5 adolescents are also present. Apart from attrition, in dental pathology, only one case of enamel hypoplasia is encountered and few teeth with caries have been found. Dental fluorosis is also seen on one individual. Vertebral pathology indentified on single specimen though confirmation is not possible due to the weathering of bones.

Interestingly one individual (39 B) has provided evidence of trauma which shows the beginning stages of healing. Only the skull of this individual has been preserved and therefore no comment can be made about post-cranial changes. Overall, it looks like the Farmana individuals were quite healthy.

Keywords: *Indus; Farmana; Human Burials; Pathology; Trauma*

Introduction

The accidental discovery of the Harappan culture in Indian sub-continent in the 1920s has changed perspective in which Indian history was thought to be. The earliest date of this civilisation goes back to 3500 BC. And the beginning of the culture can be dated as back as early as 5000 BC. Sites like Harappa, Mohenjodaro in Pakistan and Rakhigarhi, Kalibangan, Dholavira, Lothal, etc gives extensive evidence of their spread and civilisation. Newly discovered sites like Sanuali, Rakhigarhi and Farmana have potential to understand this culture in further detail.

The ancient site Farmana (29°02'22"N and 76°18'21"E) is located in the jurisdiction of three different villages- Farmana, Seman and Bhaini Chandrapal (Badi Bahen), all in the jurisdiction of Meham block of Rohtak district in the state of Haryana (fig. 1). The site is 4 km to the west of Farmana on the metal road between Farmana and Seman. It is 2.5 km to the east of the village Seman. The site is in the Chautang river basin, but roughly 30 km away from the river. There are lakes in the vicinity of the site. The Harappans may have relied on such lakes for their water necessity (Shinde 2008). The site was excavated by Deccan College Post Graduate and Research Institute, Pune and Maharshi Dayanand University, Rohtak, (under the aegis of the Archaeological Survey of India). Site divided in two parts 1. habitation site and 2. burial site, which is separated by a distance of 1 km. (fig. 2)

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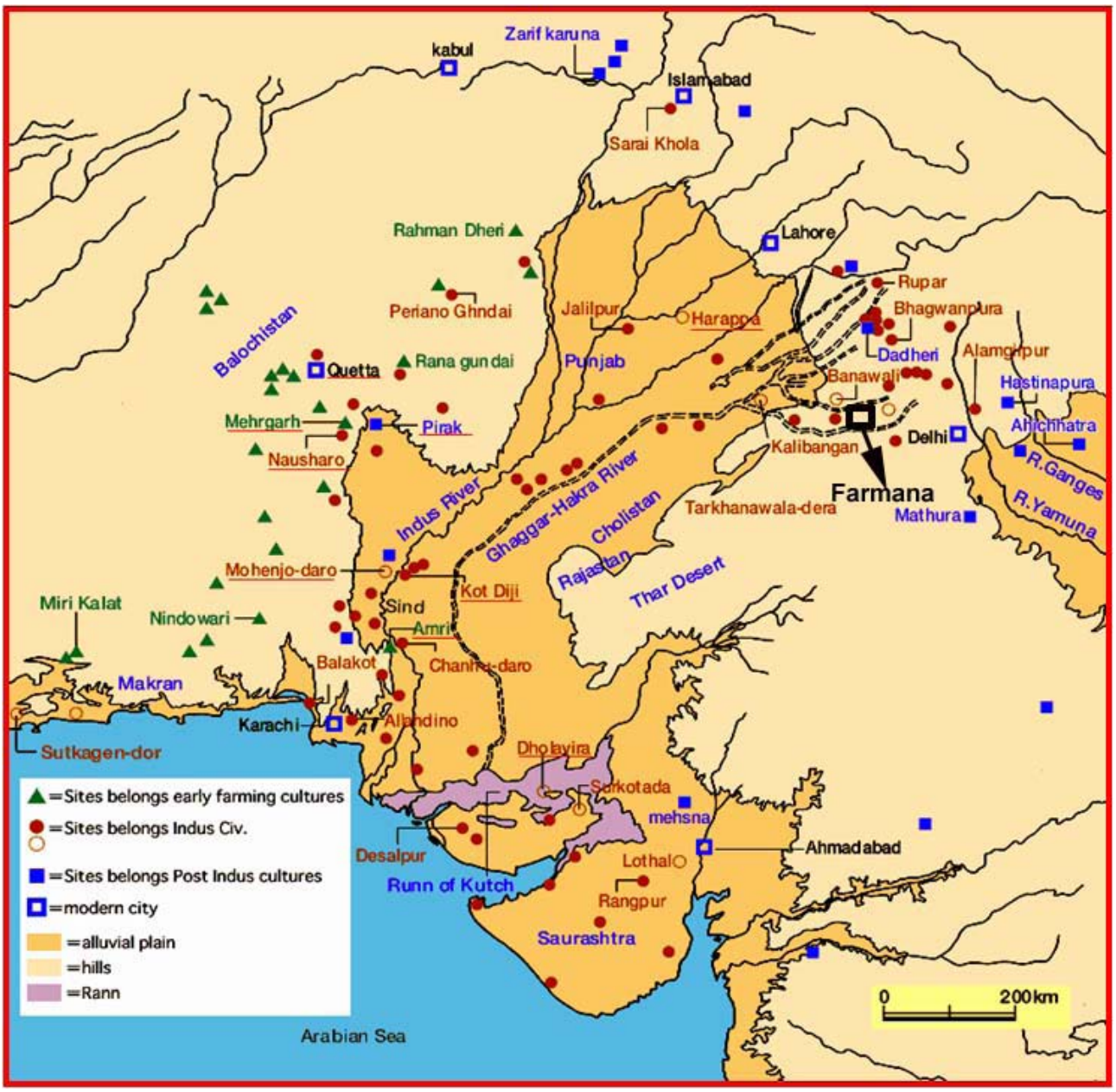


Fig.1: *Map showing approximate location of the site.*

The site of Farmana is one of the few Harappan sites in the subcontinent that has Mature Harappan cemetery located in its vicinity. Farmana people used the natural field for burials. The pits were dug in the natural alluvium soil, which is brownish/ yellowish in colour. The dead bodies were placed in pits dug to varied depth. It is observed that some dead bodies were placed in clay box (coffin), the traces of which have survived in many cases. Remains of seventy burials were uncovered in the area spread over 35 m by 21 m, of which Nos. 1-7 were excavated in the second season (2007-08). Also there are a few burials, the pit-lines of which have been traced and numbered, but not excavated. In the year of 2008-09, 63 burials were marked, out of that 52 were excavated. The burial pits have three different orientations- northwest-southeast, north-south and northeast-southwest. Burials belongs to the mature Harappan period on the basis of the pottery and ornaments, which is further divided into three different sub-phases; Period-IIA, Period- IIB and Period-IIC based on pottery type. The pottery



Fig.2: *Cemetery at Farmana.*

and ornaments found in burials clearly indicate that these burials are comparable with cemetery R-37 found at Harappa.

The burials found at Farmana can be divided into three categories, i.e. primary, secondary and symbolic. In case of the primary burial (fig. 3), the dead body was placed in a pit in a supine position with head towards the north and the legs towards the south. The primary burial therefore contains full skeleton in situ. The secondary burial usually contains a few bones or teeth (fig. 4)**.** It is quite likely that the dead body was kept in open for some time and later the surviving bones were collected and buried in a pit ceremoniously. There are some burials which are devoid of any skeletal remains but contained pottery and ornaments (fig. 5). Such burials have been termed as symbolic burial. It is quite likely that the body of the person was not retrieved but they thought it befitting to give ceremonious burial without the dead body.

Some of the burials are disturbed by the later burial activity. Burial number 21 is disturbed by burial 20 and same case has seen in 23 and 24. Certain burials are interesting to note. In burial number 25 only leg bones i.e. femur and tibia from both sides are present and rest of bones are missing. It is very difficult to explain the absence of rest of bones from the burial pit. They are kept in proper anatomical position in grave pit and almost in the middle of pit. Probably this person was buried somewhere and then later buried in the cemetery. Interestingly this individual is tallest (187.44 cm) male in given population (fig. 6). For burial number 39, two skulls were kept with 12 harappan potteries. The detail report of the skulls and its context is given in later paragraphs. It is fascinating to observe diverse methods are applied for different individuals, probably representing various groups within Farmana town.



Fig. 3: *Primary burial from Farmana.*



Fig. 4: *secondary burial from Farmana.*



Fig. 5: *Symbolic Burial from Farmana.*



Fig. 6: *Burial number 25: Only lower leg big bones are found in pit.*

Material

In total 70 burial pits were marked in the site which was excavated consecutively for two years, 2007-08, 2008-2009 seasons. In 2007-08 in total 7 pits were excavated and the skeletal remains from 5 pits are present in the lab. Next year 2008-09, in total 52 pits were excavated and the skeletal remains from 28 pits are present in the lab. These 28 pits, two are having two individuals (burial nos. 50 and 39) is yielding 30 individuals and 5 pits from 2007-08 is yielding 5 individuals. In total skeletal remains of 35 individuals have reached and studied in the lab (Table. 1).

Methodology

The study is conducted following the standard and universally accepted methodologies. As different references are used for different observations, the major book references are given below. For very specific observations or studies the methodologies is given at that point.

Determination of age and sex: Brothwell (1981); Olivier (1969); Stewart (1979); Buikstra and Ubelaker (1994) and Louise Scheuer and Sue Black OBE (2004).

Assessment of morphological features: Buikstra and Ubelakar (1994); Steckel and Rose (2002).

Metric analysis: Martin and Saller (1957).

Stature estimation: Trotter (1970) formulae for White populations.

Odontometry: Moorrees (1957a; 1957b); Wolpoff (1971); Potter *et al*. (1981); Dahlberg (1963).

Dental morphology: Turner II *et al*. (1991).

Pathological observations and interpretation: Larsen (1997); Ortner and Putschar (2003); Roberts and Manchester (1995) and Lukacs (1989).

Burial no	Age	Sex	Burial type	Period	Orientation	Pathology apart from attrition
1	18- 20y	Male	P	-	N-S	-
2	50+ y	Female	P	-	NW-SE	-
3	-	Late adolescent	Se	-	N-S	-
5	3.5-4y	Child	Se	-	NW-SE	-
6	40-45y	Female	Se	-	NW-SE	
8	Adult	Male	P	IIC	NW-SE	
10	Adult	Female	P	IIC	NE-SW	
11	Around 45±5 y	Female (?)	P	IIC	NW-SE	
14	20- 25 y	Male	P	IIB	NW-SE	Dental fluorosis
15	Around 2 y	Child	SE	IIC	NW-SE	
18	40-45y	Female	P	IIC	N-S	Dental Caries
20	35- 40y	Female	P	IIC	NE-SW	
23	18-20y	Female	P	IIB	N-S	Enamel hypoplasia
25	Adult	Male	SE	IIC	N-S	
26	40-45y	Female	P	IIC	NW-SE	
28	Around 5y	Child	P	IIA	NW-SE	
32	18-19y	Female	P	IIA	N-S	
34	adult	Female?	SE	IIC	N-S	
39A	Around 45 y	Female?	SE	IIB	N-S	
39B	45-50y	Male?	SE	IIB	N-S	Trauma on skull in healing in process
41	7-8y	early adolescent	P	IIC	N-S	
45	13-15y	Adolescent	P	IIB	NW-SE	Dental fluorosis
47	7-8y	early adolescent	SE	IIC	N-S	
48	20±5y	Male	P	IIB	NW-SE	
50A	25y	Male	P	IIB	N-S	
50b	Adult around 30-35	Female	P	IIB	NW-SE	
52	3.5y	Child	SE	IIC	NW-SE	
53	30y	Female	P	IIC	NW-SE	
54	30-35y	Male?	P	IIB	NW-SE	Dental Caries
58	Around 20y	Unidentified	SE (clay coffin)	IIB	N-S	
62	15y	Female?	P	IIC	N-S	
64	20±5y	Male	P	IIC	NW-SE	Vertebral lipping, Dental Caries
65	30y	Female?	P	IIC	NE-SW	
66	Around 50y	Male	SE	IIC	N-S	Thick cranial bones
67	35y	Male	P	IIC	NW-SE	

Table. 1: *Individuals from Farmana with Age, Sex and pathology observed.*

Observations

Various types of observations carried out on the skeletal assemblage from Farmana. Although there are 35 individuals available for study, the preservation of these elements are far from satisfactory. The skeletal remains from Farmana, has suffered from pre-burial environment and post-burial handling. At the same time there was big gap of exposure of skeletons and packing them for laboratory analysis. Most of the bones bear cracks with complete damage of the outer surface of the bones.



Fig. 7: *Crania of spe. No. 23 only clay mould of crania.*

In some cases the crania is represented only as clay mould with tiny cranial pieces to attach with it (fig. 7). Even the dentition has suffered from post-mortem damage. Some of the bones in the primary burials are missing, probably due to the rodent activities as the holes are seen inside the burial pits. Similarly as the grave yard had cultivation on the top many on the surface burials shows modern furrow marking where the bones are crushed or misplaced in the burial pits (fig. 8). The alkaline nature of the soil has hampered further. Some of individuals were not picked from the site as they were not possible due to fragmented and fragile conditions. The possible documentation of these burials was done in the field.

As bones came to the lab, the first thing was to clean it with maximum care and with minimum damage. The coat of dissolve adhesive (Fevicol) was used to keep damaged bone pieces together. For that solution was made using half water and half adhesive.



Fig. 8: *Furrow marks: Disturbance by agriculture activities: Burial 49.*

Craniaometry

The craniometry was conducted on 15 skulls which are partial to almost complete. Although the sub-adults are not used for any cranial comparison, some measurements were carried out for sub-adults also. Not all the measurements were possible for every skull. The measurements were taken with minimum error but fragile and incomplete preservation has restricted the exact measurements. There are 12 adults (4 males and 8 females) and 2 late adolescent and one child. In total there are five crania (spe. No. 2, 14, 18, 20 and 67) preserved in better condition (fig. 9). Out of these specimens 2, 18 and 20 are females and 14 and 67 are male individuals**.** The cranial index (I1) was possible for 9 individuals and out of them, 2 females (53 and 62) are ultradolichocranial, 2 (1 male (14) and 1 female (18) hyperdolichocranial, 4 females (2, 20, 26, 32) are dolichocranial and 1 male (66) mesocranial. Total facial index was calculated only for specimen no 20, indicating leptoprosopic (91.6). The orbital index shows two types, one hypsiconch and other mesoconch. Specimen nos. 2, 23 and 62 has broad nose as chamaerhin for 3 individuals (18, 20, 26). Specimen no 14 has leptorhine and spe. No 67 has very broad nose.



Fig. 9: *Norma lateralis: Individual 18.*

Dentition

Two basic measurements have been carried out for each tooth following the Moorrees' (1957a, 1957b) technique. These consists of maximum crown length (mesio-distal diameter) and maximum crown breadth (bucco-lingual diameter). The mesio-distal diameter (MD) is the maximum dimension of the tooth crown in the mesio-distal direction, parallel to the occlusal and the labial surface. The bucco-lingual crown diameter (BL) is defined as the greatest distance between the buccal and the lingual surface of tooth crown in a plane perpendicular to that of the mesio-distal diameter. The crown measurements are carried out with electronic MAX-CAL digital caliper with an accuracy of 0.01 mm.

The primary comparative standard in the analysis of tooth size is the crown area (CA) or the cross-sectional area of the tooth. This figure of crown size is obtained by multiplying mesio-distal diameter by bucco-lingual diameter. The crown index (CI), a measure of crown shape is the ratio of mesio-distal and bucco-lingual diameter expressed in terms of percentage, as suggested by Wolpoff (1971). The measure of crown bulk, crown module (CM), is the average of mesio-distal and bucco-lingual values. The formulae used for calculating crown area, crown index and crown module are summarized below.

$$CA = MD \times BL$$

$$CI = MD \times 100 / BL$$

$$CM = (MD + BL) / 2$$

The measurements of crown size and bulk (CA and CM) reflect the adaptive strategies of a population in response to it's subsistence pattern and the level of food processing technique achieved by them. The crown index (CI) is used for inter and intra-group comparisons. The incisor breadth index, molarisation index and step index were not possible for Farmana individual as the measurements required for it, is not possible.

The preservation of dental elements from the site is not good. There are many teeth which has lost its crowns. Some are damaged in pre and post burial treatments. Odontomery and morphology

of available teeth is conducted. All together there are 214 teeth available for study; out of that 11 are deciduous from 2 individuals (spe. 5 and 52). Out of 203 per. teeth 126 are from maxilla and 88 from mandible. Out of 11 dec. teeth 7 from maxilla and 4 are from mandible. Following is the table stating dental inventory from Farmana (Table.2).

Spe. No.	Total	Maxillary teeth	Mandibular teeth
1	1	1	-
2	32	16	16
5	2	2	-
6	5	-	5
11	2	-	2
14	24	13	11
15	2	2	-
18	21	14	7
20	30	14	16
23	22	14	8
26	2	2	-
41	5	4	1
45	11	5	6
47	6	5	1
52	11 (9 dec.)	5	4 + 2 (per.)
54	1	-	1
58	1	-	1
62	10	10	-
65	4	2	2
66	5	5	-
67	17	12	5
21 individuals	214 (11 dec. + 203 per.)	126	88

Table. 2: *Dental inventory from Farmana .*

Farmana sample is very poor for metric and morphological observations. There are many limitations encountered while doing the work. Some teeth are unaccessable for visual or metric analysis as they are inside the skull adhered with mandible. Some time teeth are only represented by few fragments or half crown. Some teeth are used for isotopic analysis and not present in collection. Some teeth are warned due to attrition as well as the post mortem damage.

Out of 11 deciduous teeth 6 are from maxilla and 3 from mandible provided metric assessment. And from permanent dentition out of 126 teeth, only 40 provided MD and BL and 12 only MD measurements. Out of 88 mandibular teeth 38 have complete measurements. It is evident that 40.65% of sample can be used for metric analysis.

The morphological observations are possible only for 36 teeth, which includes shovelling and winged central incisors on anterior teeth. Dental Shovelling is seen on burial no 14: Maxillary LI2 indicating shovelling grade 2, Burial no 41: mandibular RI2 showing grade 2 on the lingual side and Burial no 47: mandibular LI2 showing a grade 4 shovelling on the lingual side.

Wing formation is seen on two individuals; Burial no 23: medial wing formation is present heavily of RI2 and comparatively less on LI1.

Accessory capsule is seen on maxillary RLdm2 on the mesial side between cusp 1 and cusp 2 and visible on both sides, but prominent on right side for burial no 52.

On maxillary molars hypocone, metacone, Metaconule and caraballi's cusp and on mandibular molars cusp number and groove pattern was observed. Carabelli's cusp is found only on one individual (burial no. 14).

Stature Estimation

As it is said earlier, Farmana material is badly preserved and none of the long bones have been preserved with extremities. But the long bone lengths were possible in most of time as approximate and some time field notes were referred for the lengths before lifting the bone from *in situ*. The stature estimation was calculated for 17 individuals including male and female.

For male individual average height (8 individuals) is 171.27 cm (Range 157.22 to 187.44). Out of nine females, average height is 167.18 cm (Range 151.53 to 177.63). The tallest male individual is specimen no. 25 having 187.44 cm and for female individual specimen No. 11 having 177.63 cm.

Demography

Farmana specimens are divided into children (2 to 12 years), adolescent (13 -17 years) and adult (18 years onwards). Out of 35 specimens there are 27 adults (Male – 11, Female – 15, Unidentified sex - 1), 4 adolescents and 4 children. The youngest individual is around 2 year (skeletal No. 15). Graph 1 illustrates the percentage of these categories (fig.10). As it shows in the chart the female individuals are more than males within excavated cemetery area. At the same time, it is interesting to note the age wise distribution of the skeletal series, where maximum number of individuals is coming from young adult (18-25 y) category (graph. 2), which is followed by the 30s and 40s. It will be really interesting to know the reason behind this distribution (fig. 11).

Pathology

Very few skeletal and dental pathologies identified on this skeletal assemblage. The preservation of the skeletal material is so poor that the original bone surface is either covered with soil or it is been washed out by weathering. There are only two incidences, one is the doubtful vertebral lipping seen on the lumbar region of specimen no 64, male, around 20-25 year old (fig. 12). Lipping is generally considered as degenerative pathology and it occurs on the later age after 30s and 40s most of time. If the lipping is present, it is interesting to note that, it has occurred in very young age. In this case it is probably belong to some occupational activity. Unfortunately other bone joints for this individual are not preserved in good condition to know the extent of the bone changes.

There is one case of cranial trauma observed on the specimen no 39 B, male individual aged 45-50 years of age (fig. 13). There are two skulls placed in

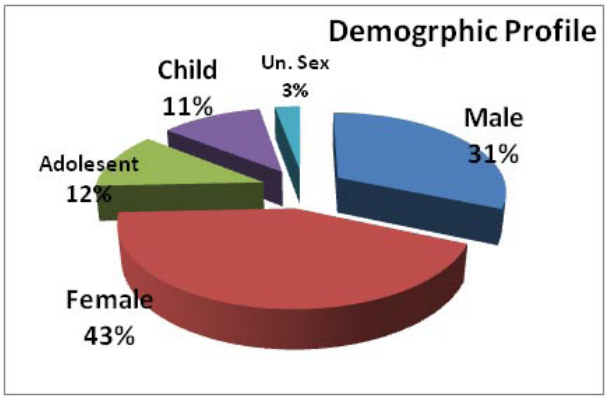


Fig. 10: *Demographic profile of the Farmana skeletal assemblages.*

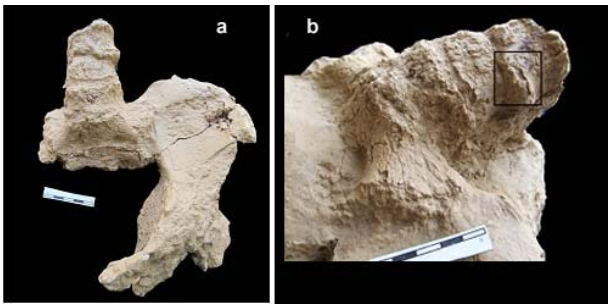


Fig. 12: *Vertebral lipping on lumber: Individual 64 Pelvis with lumber,* ***b:*** *Close of lipping.*

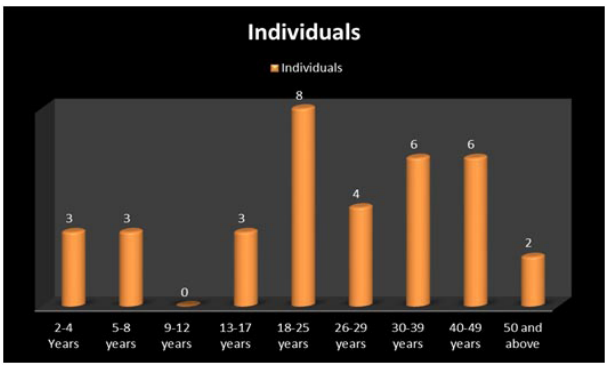


Fig. 11: *Age distribution among Farmana population.*

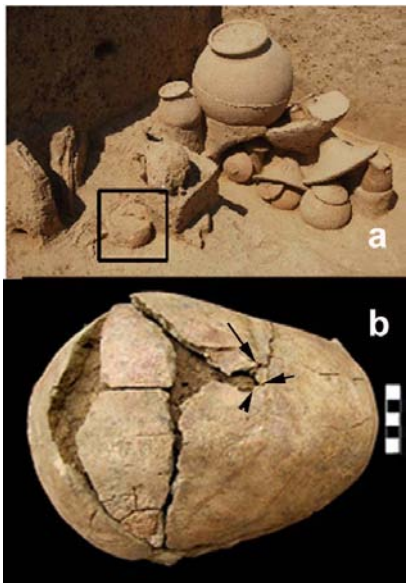


Fig. 13: *Cranial trauma: Burial 39 B. a. skull in situ, b. Trauma.*

the pit with few scattered bones near the same area, but it is very difficult to say with whom they belong. The skull named 39 B, which is around 15 cm below the 39 A has found in upside down position. On the left side near coronal suture there is evidence of trauma, in healing process. The trauma is visible as hole with rounded edges. At the same time near a periphery there is cracking pattern seen as radiating circular lines and a depression in the middle area. This is typical trauma occurred by blunt object. The affected area is 5 x 5 cm. The bone is thin in the middle, where secondary bone is forming. It is notable that, the trauma is not the immediate cause of death. The person was alive may be for a month or so after the injury and died due to secondary bone infection. The reason behind the trauma is uncertain as none of other bones present in the collection.

The context of the skull is also noticeable. Burial 39 is the largest in terms of size at the Farmana cemetery. It is located 65 cm to the north of southern section and 2.20 m to the east of the western section of Tr. CH4. The pit is oriented N-S direction and measures 3.10 m in length (N-S) and its average width varies from 1.50 m towards southern end to 1.70 m towards northern end. It is survived to a maximum depth of 90 cm.This burial has numerous classical Harappan potteries (12 in number) which is indicative of higher socio-economic status of the person. The context and presence of the second (39A) skull is ambiguous in nature.

Dental pathologies include attrition, few cases of caries (spe. No. 18, 54 and 64) observed. One case of enamel hypoplasia (fig. 14) indicator or growth disturbance episodes in childhood is seen and one questionable case of dental fluorosis has been identified. The attrition on maxillary and mandibular available teeth have been graded. (fig. 15)

Discussion and Comments

The Harappan phase from the Indian sub-continent represented by large human skeletal series. Some of these skeletal series, esp. Harappa and Mohenjo-daro have been rigorously examined for Craniometric variables (Guha and Basu 1938; MacKay 1938; Marshall 1931). On the basis of certain cranial measurements it has been shown that despite the skeletal material coming from three different deposits at Harappa, the skeletons belong to a single morphologically homogeneous series. Assessment of a biological continuum and affinities of the Pre-Harappan and Harappan population have always been a matter of prime interest to archaeologists as well as skeletal biologists (Kennedy 1982; Kennedy 1984a). Harappan skeletal



Fig. 14: *Enamel hypoplasia on spe. No. 23.*



Fig. 15: *Dental attrition and caries on maxillary teeth on spe. 18.*

remains also in focused to describe the mythical massacre of the people commonly described as 'Aryan invasion'. After restudying the skeletal material from Mohenjodaro Kennedy (1995) came to the conclusion that there is not much evidence to prove the foreign element in Harappa. Kennedy (1995: 54) mentions that "our multivariate approach does not define the biological identity of an ancient Aryan population, but it does indicate that the Indus Valley and Gandhara peoples shared a number of craniometric, odontometric and discrete traits that point to a high degree of biological affinity", thus completely denying the theory of 'Aryan invasion' (Kennedy 1984b; Kennedy 1995; Walimbe 1993).

A study based on cranial non-metric morphological traits (Hemphill *et al.* 1991) suggests that there existed two phases of biological discontinuity within the Indus valley from the Neolithic times to the Christian era. The first is said to occur between 6000 and 4500 B.C. which is reflected in the strong differences irrespective of the occupational continuity between the Neolithic and Chalcolithic inhabitants of Mehrgarh. The second discontinuity exists between the inhabitants of Harappa, Chalcolithic Mehrgarh and post-Harappan Timargarha on the one hand, and the Early Iron Age (better known as the Gandhara Grave culture) inhabitants of Sarai Khola, on the other, between 800 and 200 B.C.

It is to be noted that, in archaeological context 'racial' similarities or differences in two skeletal populations were used to emphasize either cultural contact or changes in the material culture. This was the trend of the early 20th century when theories of invasion, migration and 'mixing of blood' were the answers to diversities or 'discrepancies' noted in the skeletal record. In other words, anthropological research was guided by archaeological needs and the anthropological evidence was used primarily to complement archaeological hypotheses of cultural migration or diffusion. The recent approach in human skeletal biology envisages the skeletal variations as the net result of a highly complex process of genetic and non-genetic factors. This conceptual change necessitates re-evaluation of the skeletal data and the earlier hypotheses needs to be reframed. The earlier approach, which was descriptive and limited to racial classification, was inadequate to deal with the questions related to human adaptation. Skeletal remains are now looked not as isolated pieces of evidence, but by placing the skeletal material into an assigned cultural context, anthropologists attempt to trace the evolutionary routes of the human form in time and also establish the movement of populations from different areas with improvements in technology. The fresh studies, carried with this perspective, led to a better understanding of the ability of the humans to adapt to new environments by adopting appropriate cultural strategies and responding biologically within the plausible phenotypic range, as determined by genotype.

The skeletal series unearthed from Farmana is important in this regard. Although the preservation of 35 individuals from cemetery is far from satisfactory, these remains have provided some clues about the bygone population. Dental isotope analysis conducted by B. Valentine (2013, unpublished doctoral dissertation) from these skeletal series has provided wonderful data on migration of young individuals from distance places to the town. At the same time there are certain explanations are needed to understand the morphological traits and pathological lesions. Some attempt has been made to compare the populations of Farmana to other Harappan site. At the same time analysis of skeletal remains from other recently excavated sites Harappan sites like Rakhigarhi, Sanouli etc will provide better understanding of the Harappan population.

Acknowledgements

Authors like to acknowledge the University Grant Commission for funding the research on the skeletal studies from Farmana. We also like to acknowledge the editors of the Journal for accepting our paper for publication.

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