The Ritualistic Nature of the Juvenile Interments of the Cosma Archaeological Complex, Ancash, Perú

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INTRODUCTION
Research exploring mortuary treatments, morbidity, and trauma among juveniles has largely been left out of bioarchaeological discussions due to the difficulties subadult skeletal remains present to archaeological investigations. Despite these limitations, analysis of juvenile burials and skeletal remains has the potential to improve our understanding of the physical and social lives of children in the past. This study aims to analyze the skeletal remains of the subadults buried in the Karecoto temple mound dating to the Early Horizon (800-200 BC) at the Cosma Archaeological Complex, located in the Nepeña Valley of north-central Peru. Cosma is a multi-component complex that includes three platform temple mounds, a domestic area, agricultural terraces, all of which was constructed during the Early Horizon, though there is evidence of occupation in the area beginning in the Late Initial Period (1300-1 BC) and possibly the Preceramic (Munro, 2015). The site of Cosma is particular well situated to exploit natural coast-highland routes and networks of exchange (Lau, 2011), and may have served as a regional ceremonial center (Munro, 2015). Excavations conducted by Proyecto Investigación Arqueológico Distrito del Cáceres Ancash (PIADCA) during the 2014 and 2015 seasons uncovered a total of 10 juvenile interments on the main temple platform Karecoto. Systematic analysis of the mortuary patterns and skeletal remains demonstrate that the juvenile interments are primary and secondary burials that may have served as ritual immolations. The skeletal sample is also of paleopathological interest as several individuals exhibit possible systemic infections, traumatic injuries, and abnormal dental conditions. Bioarchaeological investigations of this particular sample have the potential to contribute to our knowledge of juvenile health and demonstrate that subadults were participating and active agents in Peruvian prehistory.

OBJECTIVE AND METHODS
Burial Contexts
My research uses a bio-cultural approach that views the archaeological body as a biological entity and cultural reservoir that records both social histories and lived experiences. I view the human interments as cultural artifacts to document the location of the burials in relation to features; placement of the skeletal remains, specifically whether or not the elements are anatomically articulated, comingled, or a mixture of both; and post-mortem damage and taphonomic changes to the external bone surfaces. These lines of evidence are necessary to determine whether or not the interment is a primary burial or secondary burial. I combine these observations to identify the mortuary patterns to investigate the manner in which these juveniles were integrated into the ritual systems at Karecoto. Second, I construct a biological profile of the juvenile skeletal sample through systematic analysis of human skeletal remains documenting: age-at-death, morbidity, traumatic injuries, and dental anomalies.

Age-at-Death
Estimating age-at-death of juveniles is necessary in bioarchaeological studies of life expectancy, growth and growth disruption, ecological settings, maternal health, and human behaviors. My age-at-death results are biological age estimations and social age, or the culturally constructed norms of appropriate behavior and status of an individual within a society for a given age (Lewis, 2006). I will consider the social age of the entire juvenile sample because they are all buried in a ritual context. I use the terms “juveniles” and “subadults” interchangeably to refer to individuals who have not reached adulthood.
Complete skeletal elements were measured using sliding calipers. Measurements were compared to age estimates provided by Fazekas and Kósa (1978). Observation of the appearance, morphology and size, and fusion of ossification centers skeletal remains excavated when available were also compared to illustrations and descriptions provided by Schaefer, et al. (2009). Dental age using eruption rates set by Ubelaker (1979) was estimated when enamel caps and complete deciduous teeth were present in the crypts of the maxilla and/or mandible. Relative age-at-death estimates among individuals without any complete skeletal remains and skeletal remains with post-mortem damage were compared to the actual size at approximate age illustrations provided by Baker et al. (2005).

Age categories were designed with reference to age-at-death standards set in Schaefer et al. (2009), Baker et al. (2005), and Lewis (2007). Juvenile age ranges are the following: Fetus (less than 37 weeks in utero); Perinate shortly before or after birth (38-41 weeks in utero), Infant (birth to 1 year), and Early Childhood (or “young children,” older than 1 year - 5 years).

**Morbidity: Skeletal Indicators of Physiological Stress**

Documenting the frequency of disease in subadults serves to broaden our knowledge of disease prevalence, transmission, susceptibility, and age-of-onset (Baker et al., 2005). For this study, I conducted macroscopic analysis of the external bone surfaces to document the location and frequency of non-specific indicators of stress, paying close attention to periosteal inflammation of all external bone surfaces and expanded diploe of the cranial bones.

**Traumatic Injuries**

Juvenile trauma relays information about susceptibility to accidental trauma, warfare, physical abuse, sacrifice, and birth trauma (Lewis, 2007) to elucidate the risks of childhood in the past (Baker et al., 2005; Walker, 1997). All bone fractures were categorized as ante-mortem (healed) and peri-mortem (around the time of death). Ante-mortem wounds were differentiated based on presence of bone calluses. Peri-mortem wounds identified based on homogeneity in bone color, presence of radiating fracture lines, and bone warping. Wound location and the patterning of injuries were also examined to determine causation.

**Dental anomalies**

Nonmetric dental traits and anomalies are useful for investigating the relatedness or divergence between populations or subgroups within populations, or bio-distance (biological distance) analyses (Alt and Turp, 1998, Duncan, 2009). For this study, I describe any non-metric and/or abnormal dental traits by number of teeth present, morphology, and location in the maxilla and mandible. Terminology used to describe dental morphology and location is based on descriptions by Fernández Montenegro et al. (2006) and Gervey et al. (1999).

Together, these data will be useful to assess whether or not juveniles had a unique ceremonial role at Karecoto. Additionally, the demographic profile, health status, pattern of traumatic injuries, and dental anomalies together will shed light on childhood experiences during the Early Horizon.
RESULTS
Burial Contexts
Location (Table 1)
Eight juveniles (Entierros 1, 3, 4, 5, 6, 8, 9, and 10, Map 1 and 2) were excavated from on top of the Karecoto platform mound and two juveniles (Entierros 2 and 7, Map 1) were excavated from the base of the mound. Three individuals (Enterrios 6, 8, and 9) were all placed within a large ceramic vessel (Feature 4) measuring 110 centimeters in diameter. Two individuals (Entierros 1 and 4) were dug into Karecoto’s prepared clay floor. Two individuals (Entierros 5 and 10) were placed on the floor of the Karecoto platform mound outside Feature 4 (large ceramic vessel). Entierro 3 and Entierro 7 were excavated from small crypts. The Entierrio 3 crypt was on the platform mound while the Entierrio 7 crypt was found at the base of the mound.

Placement of Skeletal Remains (Comingled verses Anatomically Articulated)
Seven out of 10 entierros had varying degrees of disarticulated and comingled skeletal remains. Entierros 7 and 8 contained the most articulated individuals, yet not all bones were in correct anatomical positions. The individual in Entierro 9 had articulated skeletal remains that were not in correct anatomical position. The upper body (the upper limbs, ribs, vertebra, and thorax) of the individual from Entierro 9 was anatomically correct, indicating that the upper body was in an extended “back down” position. However, the lower limbs did not articulate correctly with the upper body. The femurs, for example, were not only upside down (indicating that they had been placed in the vessel “face down”), but the distal ends of the femurs were positioned inferiorly to the ribs and vertebral column. Individuals from Entierros 2 and 9 did not have any cranial bones, mandibles, or dentition.

Human Skeletal Remains Associated with Entierros
Juvenile and adult human remains were comingled with 6 out of 11 entierros. Isolated juvenile remains were found associated with Entierros 1 and 3. Based on comparisons of the size and measurements of the long bones and articulating fragments of the cranial bones, these associated remains belong to the individuals buried in Entierros 1 and 3. Isolated juvenile human remains were also recovered outside the burial contexts.

Age-at-Death Assessment (Table 1)
No entierros with adults are present in sample, though individual adult bones and dentition were comingled with entierros. Highest percentage of individuals was perinates, followed by infants. The youngest individual is a fetus (estimated age range 28-32 weeks in utero) and the oldest individuals are two young children (estimated around 2 years).

Morbidity: Non-specific Systemic Infection
Formation of new bone with a porous texture underneath the periostum and bone resorption visible on the vertebral lamina of the neural arches, body of rib, diaphysis and metaphysis of the ulna, radius, femur, tibia, and cranial bones. Concurrent periosteal inflammation and resorption is present on two perinates (Entierros 5 and 6) and one infant (Entierro 10), making up than one-third (3/10, 30%) of the individuals.

Trauma
Two out of 10 individuals exhibit traumatic injuries.
**Entierro 2**
Individual exhibits possible peri-mortem fracture to the axis (second cervical vertebra). The right radius exhibits a peri-mortem “greenstick” fracture on diaphysis. The ulna has "crushed" break that may be peri-mortem, most likely post-mortem.

**Entierro 7**
The individual has five separate fractures on the right ribs. There are four ante-mortem fractures on four separate ribs. One rib has a perimortem “greenstick” fracture.

The young child from Entierro 9 does not exhibit any clear indicators of trauma; however, the burial did not have any cranial bones, a mandible, or dentition. There was not a complete cervical vertebra 1 (atlas) or 2 (axis) in the burial.

**Dental anomalies**
The individual from Entierro 7 has one supernumerary tooth, a condition known as hyperdontia. The enamel has heteromorphic conical morphology. The tooth does not resemble any morphological characteristics typical of deciduous or permanent dentition, but it has a conical shape. The tooth located between two deciduous teeth: the left lateral maxillary incisor and left maxillary canine.

**DISCUSSION**

**Burial Contexts**

**Delayed Interment or Secondary Burial**
The skeletal remains of eight individuals were comingled to varying degrees: the individuals had completely skeletonized or were in the process of decomposing when buried at Karecoto, indicating burial of the individual was delayed and did not occur immediately after death. Two juveniles have full-body post-mortem damage and taphonomic changes to the external surfaces of their bones, implying that the subadults were exposed to external elements for a period of time before their final interment. Skeletal remains of Entierro 7 and 8 are overall anatomically correct, indicating that the crypt and Feature 4 (large ceramic vessel) may have served as the primary burial.

**Accidental Scattering of Skeletal Remains**
Individuals may have been transported from a location in which bones were already comingled (e.g. *machay* tombs in which human skeletal remains are often comingled due to multiple burial episodes), individual skeletal elements may have dislodged themselves and fallen onto the mound’s floor.

**Intentional Post-Mortem Manipulation of Skeletal Remains**
The living may have intentionally mixed remains of several individuals by placing isolated skeletal elements with burials. Skeletal remains found outside Entierros 1 and 3 belong to individuals buried in those *entierros*, indicating that the bones were either accidental dropped during transport to the final burial, or the skeletal remains were intentionally removed from the individuals and placed outside their final interments. Position of the individual from Entierro 9 suggests that the living intentionally manipulated the remains by separating the upper and lower body.
Age-at-Death

Biological Estimates: Physiological Risks for Neonates in the Past
Fetal mortality is attributed to genetic and maternal influences such as congenital, chromosomal, or uterine anomalies as well as premature birth, low birth weight, and birth trauma (Lewis, 2007). Perinatal mortality is frequently due to obstetric deaths from puerperal fever, dystocic presentation, obstructed labor due to a malformed pelvis, breach birth or an oversized fetus, hemorrhage or premature detachment of the placenta (Lewis, 2007). Mortality among infant and young children is due to the external environment or exogenous factors such as infectious diseases, poor nutrition, poisonings, or accidents (Wiley and Pike, 1998; Scott and Duncan, 1999), as well as lactation during the first year of life and weaning during early childhood (Scott and Duncan, 1998).

Social Age-at-Death: Actors in Ritual Systems at Karecoto
There is no standard mortuary treatment of fetus, perinates, or infants as specific age-groups; yet as a whole sub-adult category the Karecoto was a ritual context exclusively for juveniles.

Periosteal Inflammation and Resorption: Possible Systemic Infection
The periosteum responds to inflammation by laying down patches of new bone, but appositional bone growth is difficult to distinguish from fiber bone deposited during an infection (Lewis, 2007). Either the lesions are the result of an unknown systemic infection that affected multiple bones, or the new bone formation is due to appositional juvenile bone growth and development.

Trauma
Ritual Treatment
Patterns of osteological injuries and bodily placements in archaeological contexts typical of ritual treatment in the Andes (see Verano, 2001) are present at Karecoto. Disarticulated or partial human remains are found disassociated with the entierros at Karecoto. The isolated skulls, teeth, and long bones may have been occasionally collected and modified for ritual use. Two individuals do not have any skull bones possibly indicating forced dismemberment, but only one out of the two individuals has a possibly peri-mortem fracture of the second cervical vertebrae, which is typical of decapitations (Tung and Knudson, 2008).

Accidental Falls or Child Abuse
Two young children have perimortem wounds of the radius and ribs, and one young child has an ante-mortem rib wound. Modern clinical studies show that the most common fractures associated with child abuse are of the ribs (Lewis, 2007). Fractures of the arms are also common in modern child abuse cases (Kleinman et al., 1995).

Dental Anomalies: Hyperdontia
Hyperdontia is a dental anomaly that is most often associated with pathological conditions, primarily syndromes (Duncan, 2009) and may have a genetic component (Alt and Turp 1998). Prevalence of a particular dental trait such as hyperdontia in a population may be useful for establishing ancestry (Duncan, 2011); however, identifying geographic affiliations based on skeletal traits of infants and children is problematic because many nonmetric traits in the skull
are secondary sexual characteristics that develop after puberty (Briggs, 1998). Also few samples of known ancestry of subadult material exist for us to develop criteria (St. Hoyme and Iscan, 1989).

CONCLUSION

Juvenile Burials as Ritual Immolations

The placement of the burials on Karecoto platform suggests that the juveniles had a prominent role in the ceremonial systems of Karecoto. Biocultural analyses of the burial contexts and osteological remains suggest that the juveniles may have died from natural causes and then served as dedicatory offerings. It is also possible that the young children in the sample were victims of ritual killings. There exists several examples of juveniles burials in ceremonial mounds and structures or ritual contexts in the Andes from the Preceramic to the colonial period. For example, a Preceramic mound at Aspero in the Supe Valley has one infant interment (Feldman, 1980) and isolated child skeletal remains from Middle Horizon Wari ritual structures in Conchopata were transformed into trophy-heads (Tung and Knudson, 2008). In the colonial period, aborted fetuses were considered minor idols and offerings to the Lightning, Sun, or Evening Star deities. Miscarried fetuses and infants who had died shortly after birth were presented as offerings to fertility shrines (Silverblatt, 1987). Infants were perceived as sacred objects relating to the household (conopas) and received the same veneration as the bodies of ancestors (malquis) (Hernández Príncipe, 1986[1622]: 487, 490, 497).

Using large vessels, or ollas, for interments is also common in Peruvian pre-history and during the colonial period. Cooking ollas were used for child burials during Early Intermediate Period at Nasca sites in the Nasca Drainage and Ocucaje oasis (Carmichael, 1988). The priest Arriaga noted in Extirpación de la Idolatria del Perú (Arriaga 1968 [1621]: 203-205, 215) that bodies of infants who had died shortly after an unusual birth such as twins or born feet first were considered sacred objects and were placed in ollas for burial.

Juveniles at Karecoto may not have been simply passive actors in society; instead they may have had an active role as sacred objects for fertility immolations or even victims of ritual violence. Juvenile osteological remains also afford osteologists an opportunity to investigate the physiological stresses specific to fetuses, infants, and children during Peruvian pre-history. Dental anomalies in deciduous teeth are rare, yet have the potential to contribute to bio-distance analyses, which are particularly important as Cosma may have served as a pilgrimage site or center along a highland-coast trade route (Munro, 2015). Ultimately, bioarchaeological analysis of juvenile osteological remains has the potential to illuminate the life histories of children in the past.

References:


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**PHOTOS, MAPS, FIGURES, TABLES**

Karecoto platform mound of the Cosma Archaeological Complex, in the Nepeña Valley, Perú

Map 1: *Entierros at Karecoto* (map courtesy of Kimberly Munro)
Entierro 8 in Feature 4 (large vessel)

Entierro 6 in Feature 4 (large vessel), and Chavín circle-and-dot rim sherd
<table>
<thead>
<tr>
<th>Burial</th>
<th>Age Range</th>
<th>&quot;Average&quot; Age</th>
<th>Age Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entierro 1</td>
<td>38-40 weeks in utero</td>
<td>39 weeks</td>
<td>Perinate</td>
</tr>
<tr>
<td>Entierro 2</td>
<td>1-3 years</td>
<td>2 years</td>
<td>Early childhood</td>
</tr>
<tr>
<td>Entierro 3</td>
<td>6 months - 18 months</td>
<td>1 year</td>
<td>Infant</td>
</tr>
<tr>
<td>Entierro 4</td>
<td>40 weeks in utero</td>
<td>40 weeks</td>
<td>Perinate</td>
</tr>
<tr>
<td>Entierro 5</td>
<td>37-41 weeks in utero</td>
<td>40 weeks</td>
<td>Perinate</td>
</tr>
<tr>
<td>Entierro 6</td>
<td>38-41 weeks in utero*</td>
<td>40 weeks</td>
<td>Perinate</td>
</tr>
<tr>
<td>Entierro 7</td>
<td>1- 2 years</td>
<td>18 months</td>
<td>Early childhood</td>
</tr>
<tr>
<td>Entierro 8</td>
<td>28-32 weeks in utero</td>
<td>30 weeks</td>
<td>Fetus</td>
</tr>
<tr>
<td>Entierro 9</td>
<td>1.5 to 2 years</td>
<td>21 months</td>
<td>Early childhood</td>
</tr>
<tr>
<td>Entierro 10</td>
<td>40 weeks - 1 year*</td>
<td>6 months</td>
<td>Infant</td>
</tr>
</tbody>
</table>

*Post-mortem damage to long bones limit number of measurements taken to estimate age

Lower limbs of young child from Entierro 9
Upper body (vertebral column and ribs) of young child from Entierro 9 (photos courtesy of Kimberly Munro)

Map 2: Entierros on top of Karecoto (map courtesy of Kimberly Munro)
Pin-point porosity with formation of new bone on right orbit, perinate from Entierro 5

Cervical neural arch of perinate from Entierro 5 with formation of new bone and bone resorption
Proximal end of the right radius of perinate from Entierro 5 with bone resorption and new bone formation

Horizontal bone resorption on the right frontal, perinate from Entierro 5
Bone resorption on the left temporal, perinate from Entierro 5

Second cervical vertebra (axis) with peri-mortem fracture, young child from Entierro 2
Right rib with ante-mortem fracture, young child from Entierro 7

Right radius with peri-mortem “greenstick” fracture, young child from Entierro 2

Right rib with peri-mortam “greenstick” fracture, young child from Entierro 7
Occlusal view of maxilla and supernumerary tooth, young child from Entierro 7