Estimating Age From Fetal and Young Nonadults from Basilar Portions at Umm an-Nar Tombs from the UAE

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Background

The Umm an-Nar period (ca. 2700-2000 BCE) in the United Arab Emirates (UAE) was a scene of dramatic change, beginning with the introduction of oasis agriculture (Cleuziou, 1982; Al-Jahwari, 2009). Skeletal assemblages from this period are commingled and sometimes cremated (Benton, 2006), providing challenges for modern bioarchaeological researchers, but also allowing for a greater understanding of a period of importance to Arabian prehistory. In particular, Umm an-Nar tombs Unar 1 and 2 (**Figure 1**) at the Shimal Necropolis in the Emirate of Ras al-Khaimah (**Figure 2**) present an opportunity to examine the age distributions of those interred there. Both tombs date to the latter portion of the third millennium BCE and contain the commingled bones of approximately 200 and 400 people, respectively (Ullinger et al., 2020).

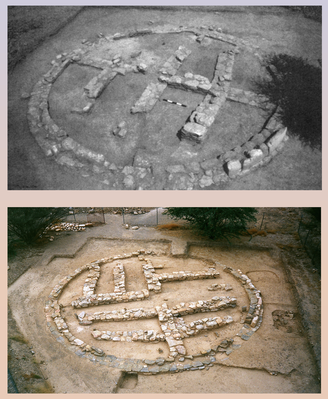

Figure 1: Umm an-Nar tombs Unar 1 (top) & 2 (bottom), post-excavation.

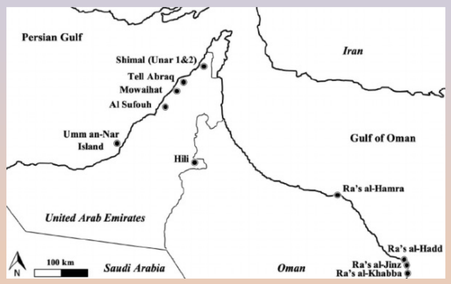

Figure 2: Map showing the location of tombs Unar 1 & 2 and other regional sites in the UAE (Gregoricka et al., Early view).

Hypotheses

Using unfused basilar portions from these tombs, this project sought to estimate age at death using metric analysis to better understand tomb membership. We hypothesized that because of potentially earlier dates associated with Unar 2, the proportion of fetuses to nonadult skeletons would be higher than those from Unar 1, due to higher fertility rates stemming from greater access to more diverse nutrients prior to agricultural intensification. We also hypothesized that fetuses were allowed in both tombs, due to their inclusion in other tombs throughout the region.

Materials and Methods

Measurements of the basilar portions (n=11) of the occipital were taken using osteometric points outlined by Fazekas and Kósa (1978), Nagaoka et al. (2012), and Olivares and Aguilera (2017). Many basilar portions could not be measured due to taphonomic damage (**Figure 3**). Using digital calipers, sagittal length (SL) and maximum width (MW) were taken, as well as additional measurements outlined by Olivares and Aguilera (2017). Inter-observer error was not significant ($p>0.05$). Using regression formulae and published data tables, age was estimated from the measurements (**Figure 4**).

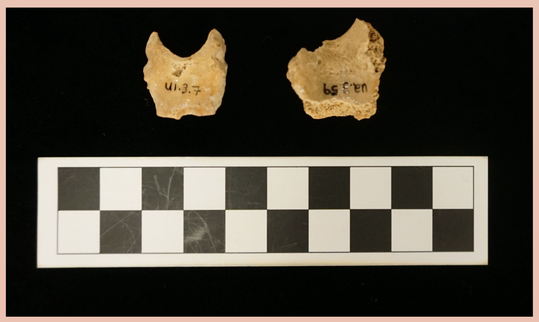

Figure 3: Measurable basilar portion (left) compared to taphonomic damage on a non-measurable basilar portion (right).

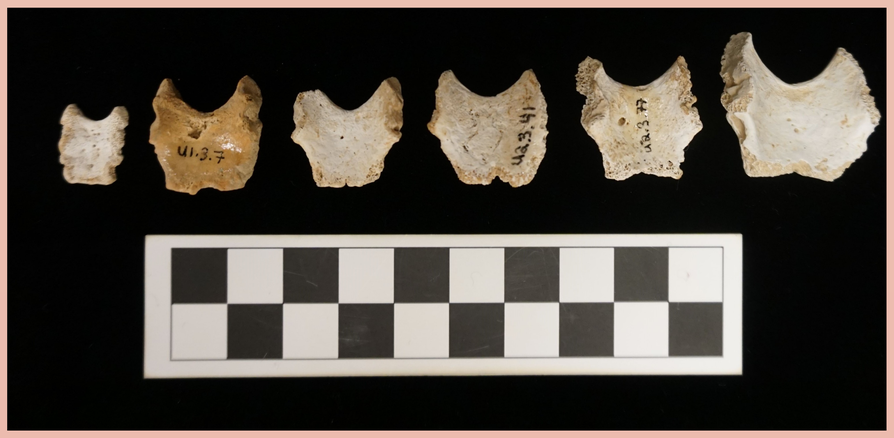

Figure 4: Seriation of unfused basilar portions from youngest (left) to oldest (right).

Fisher's Exact probability tests and Chi-Square tests were used to compare the frequency of fetal skeletons at Unar 1 and 2 to other sites around south-eastern Arabia (**Figure 7**).

Results and Discussion

The three methods we employed produced different age ranges for basilar portions, with estimates indicating that between 20-50% were fetal (**Figure 5**). The greatest age estimate differences were found between Nagaoka et al. (2012) and Olivares & Aguilera (2017) (**Figure 6**), with no overlap in the ranges/ages obtained (**Table 1**). However, we were unable to statistically compare fetal membership between the tombs due to small sample sizes. Overall, however, it appears that fetuses were permitted access within both tombs alongside older nonadults and adults, highlighting the importance of these individuals to their communities.

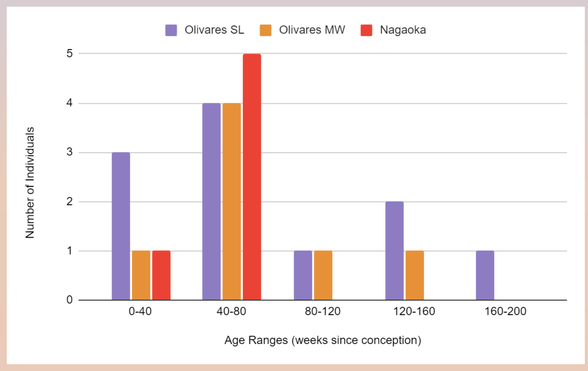

Figure 5: Estimates of individual ages between Olivares and Aguilera (2017) and Nagaoka et al. (2012) within Unar 1 and Unar 2.

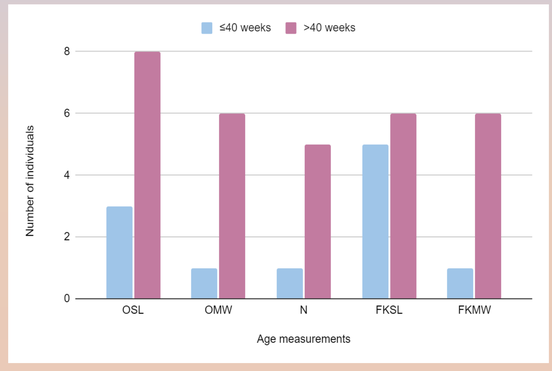

Figure 6: Variable age estimates produced for Unar 1 and 2 basilar portions by Olivares & Aguilera (2017) (OSL & OMW), Nagaoka et al. (2012) (N), and Fazekas & Kósa (1978) (FKSL & FKMW) .

Table 1: Lack of agreement between Nagaoka et al. (2012) (N) and Olivares and Aguilera (2017) (O) maximum width age estimation.

Tomb	Element ID	Individual ID	OMW Min (weeks)	OMW Max (weeks)	N (weeks)	Agreement
U1	3	7	48.57	82.34	47.47	N
U2	3	44	16.93	23.05	32.43	N
U2	3	52	44.75	75.17	44.71	N
U2	3	77	63.67	110.63	52.67	N
U2	3	127	56.20	96.63	52.53	N
U2	3	128	54.14	92.77	48.74	N

When compared to other tombs in the region, the proportion of fetal to other young adults under the ages of 3-9 was relatively similar (**Figure 7**). Age estimates generated from Fazekas' and Kósa's (1978) SL measurements were the only method to show statistically significant differences (Fisher's Exact, $p<0.05$) between Unar 1/2 (combined) from this study when compared to other tombs in the region, including Al Sufouh, Sharm, Shimal 602, and previous data collected from Unar 2 (Blau 1998). Every other measurement showed statistical similarities with all comparative populations, including with nearby Tell Abraq.

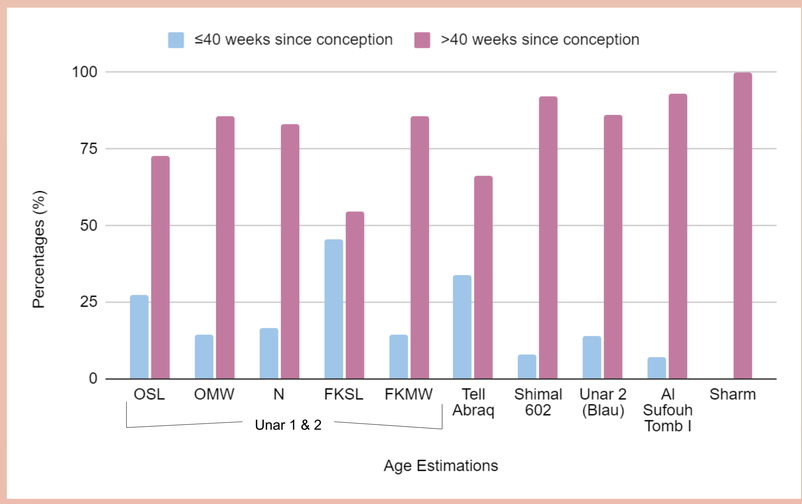

Figure 7: Comparing fetal to nonadult age estimates among tombs in the region.

Due to the significant difference in age estimates between all three methods applied to the Unar 1 and 2 fetal and nonadult basilar portions, we suggest that more research is needed on the application of such age estimation methods in bioarchaeological settings.

Acknowledgments: We would like to thank the people who made this project possible through consistent support and guidance at every turn: Dr. Sharon DeWitte, Dr. Dwayne Boucaud, Dr. Tomohiko Nagaoka, and Dr. Javier Irurita Olivares. Many thanks to the National Science Foundation (Award #1852426) for funding this research.