

Transition from Tradition: Employing TA3 and Traditional Age & Sex Estimation Methods to Study Paleodemography in Umm an-Nar Arabia

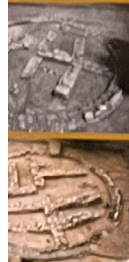


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Introduction



Tombs Unar 1 and Unar 2 (Figure 1), located at the Shimal Necropolis in the Emirate of Ras al-Khaimah, United Arab Emirates (Figure 2), date to the Umm an-Nar period (2700-2000 BCE) in southeastern Arabia. The Umm an-Nar saw increasing sedentism due to the emergence of oasis agriculture, and this transition from an earlier, more nomadic lifestyle to semi-sedentary settlements brought about changes in monument building and mortuary practices (Williams & Gregoricka 2019).

Unar 2 may have been used throughout the third millennium and contained roughly 400 individuals, while Unar 1 was used in the latter half of the millennium and held about 200 individuals (Ullinger et al. 2020). These remains underwent extensive cremation and commingling, which is not uncommon for this period (Williams and Gregoricka 2019).

1. Tomb of Unar 1 (bottom left)



Figure 4: Percent scorable fragments



Figure 5: Serial SB / Harvett Phases

From L to R: Phase 1, 3, 5, 7 (billowing difficult to see in photos of cremated remains)

TA3 Estimates: 22.7, 27.9, 33.1, 60 years

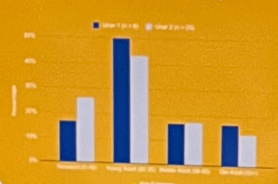


Figure 6: Suchey Brooks Age Estimates (Right side)

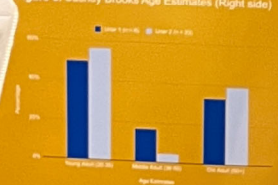


Figure 7: Pubic Symphysis by TA3 Age Estimate (Right side)



Figure 8: Femora scored with TA3.



Figure 9: Femora by TA3 Age Estimate (Right side)

Results

Table 1: Mean TA3 age estimates by bone fragment.

Element	Scorable n	Total n	Mean Age at Death (TA3)
Pubic Symphysis	51	78	40.398 years
Proximal Humerus	18	214	47.824 years
Distal Humerus	67	903	42.733 years
Proximal Femur	194	697	47.799 years

Discussion

PUBIC SYMPHYSIS (Figure 5): TA3 appears to tackle concerns over age mimicry in SB scoring; the mean age estimate using TA3 was about 10 years higher than in SB (Figure 6). However, the actual age distribution between the two was not statistically significant. Unar 2 right sides (Fisher's Exact: $p=0.008$, $df=2$). While we cannot be sure whether the TA3 reference sample and our fragments occurred, the age estimate does not directly reflect the SB reference sample. There were also significantly more in Unar 2 than males (aged with TA3) (FE: $p=0.000$, $df=3$), although overall, it appeared to be no sex-based differences in interment between tombs Unar 1 and 2 ($p>0.05$ between tombs).

HUMERUS: While the proximal and distal humerus appeared to be a promising of estimation, the low number of scorable features (3 for proximal, 2 for distal) and presence/absence scoring meant the specificity of age estimation was limited in a collection. The majority of individual age estimates were technically middle-aged (ranging typically stretched from nonadult or young adult (<25) to the old adult category selected to not include humeral age estimates in statistical testing but recorded the death estimates).

FEMUR (Figures 8-9): There were no significant differences between Unar 1 and 2 distributions (FE: $p=0.469$, $df=2$, for R sides). This does not align with our hypothesis. A small sample size ($n=13$) for Unar 1 may be the cause.

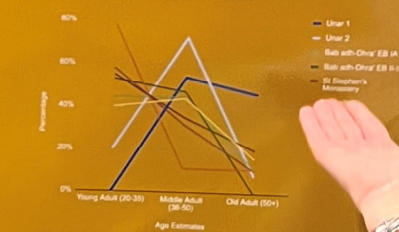


Figure 10: Age distributions in tombs Unar 1 & 2 by TA3 femora estimates, compared to other archaeological sites in the Near East.

COMPARATIVE: For the pubic symphysis, there were no significant differences between estimated age distributions and other archaeological sites in Arabia and the Near East ($p>0.05$ for 6 sites, $df=2$). Overall, using TA3, Unar 1 was similar to the comparative sites. Unar 2 had several statistically significant differences (more OAI). The femur provided several significant findings. TA3 age distributions (Figure 9) were significantly different than most comparative sites (Figure 10) for both Unar 1 (FE: $p=0.05$ for 7 sites, $df=2$) and Unar 2 (FE: $p=0.05$ for 4 sites, $df=2$), with more individuals in the old age category.

Conclusions

This study highlighted the potential applications of TA3 for commingled, fragmented collections. Previously, reconstructing a statistically-based age distribution for individual features, as therefore for individuals, was restricted to few, often fragile, bony elements. TA3 provided a framework for combining these data; for the distant past, this is highly valuable.

Future directions could include a study of non-metric traits on the proximal femur and (e.g., septal apertures) to examine relatedness within and between Unar 1 & 2.

Acknowledgments

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