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Human Skeletal Remains from Late Roman Tombs on Ṣallaḥ ed-Din Street, Jerusalem

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Poorly preserved human skeletal remains were recovered from a Late Roman cemetery on Ṣallaḥ ed-Din Street (see Avni and Adawi, this volume), in Burial Cave I in the northern area, and in 43 rock-cut cist tombs in the northern and southern areas (Table 1). The remains from Burial Cave I were the best preserved, although collapse of the cave roof had fragmented most of the bones.

The bones were examined on-site, then transferred to the Ministry of Religious Affairs for reburial. The poor state of preservation and the immediate reburial restricted our ability to fully reconstruct the anthropological parameters. However, on-site examination enabled estimation of the age and sex of most of the individuals, and the recording of epigenetic traits and the presence of pathologies.

Burial Practices

Burial Cave I included three troughs, although human remains were only found in two of them. While the bones were not anatomically articulated, they were not arbitrarily scattered: long bones were roughly arranged according to the long axis of the troughs (east–west), and the skull vaults were concentrated in the western end of each trough, representing disturbed primary burials. No bones were recovered in the central trough (L104).

In the rock-cut cist tombs, the bones were found in anatomical articulation, representing primary burial oriented to the long axis of the graves. In 37 of the 43 graves, only one individual was interred. However, in six graves, two to three individuals were interred together (Table 1).

Palaeodemography

The age and sex of the individuals in the articulated burials in the cist tombs were estimated using as many parameters as possible. For sex estimation, these included mainly morphological characteristics of the skull and relevant measurements of the long bones (Bass 1987:82, 151, 219). For the estimation of age at death, parameters included mainly tooth development or attrition stages (Hillson 1986:176–201) and closure of epiphyses (Johnston and Zimmer 1989). When the state of preservation enabled, age at death estimations were aided by other methodologies, which are specified for each skeleton in the anthropological report (in the IAA archives).

Sex estimation of the individuals in the troughs of the burial cave was based upon measurement of the long bones (Bass 1987:151, 219). For age-at-death estimation, tooth development or attrition stages were determined for each of the lower jaws in the troughs (Hillson 1986:176–201). In cases of both scattered bones and articulated skeletons, when the age at death could not be determined to an accuracy of ±10 years, only a minimum age was given.

The results of the age and sex estimations for a total of 77 individuals are summarized in Table 1. These results were used to reconstruct the life expectancy of the population, by means

Table 1. Age and Sex Estimations in the Ṣallaḥ ed-Din Street Population

Locus/ Tomb	No. of Individuals	Sex Estimation	Age at Death (years)							Adults of Undetermined Age
			NB–9	10–19	20–29	30–39	40–49	50–59	>60	
Northern Area										
Cave I, L103	9	2 males, 3 females	4		1	1		1	1	1 (>40)
Cave I, L105	18	3 males, 4 females	4	1	3	3	2	1		4 (>15, >15, >15, >30)
T111	2		1							1 (>20)
T106	1			1						
Southern Area										
T100	1				1					
T200	2			1						1 (>30)
T300	1	Female			1					
T400	2		2							
T500	1									1 (>20)
T600	1									1 (>15)
T700	1									1 (>15)
T1100	1									1 (>15)
T1300	1									1 (>15)
T1400	1	Male								1 (>40)
T1500	1	Female			1					
T1600	1	Male							1	
T1700	1	Female						1		
T2000	1									1 (>40)
T2100	1						1			
T2200	1			1						
T2300	1									1 (>20)
T2400	1	Female				1				
T2500	1		1							
T2600	1	Male								1 (>20)
T2700	1									1 (>30)
T2800	1					1				
T3000	1									1 (>15)
T3100	1									1 (>20)
T3200	1					1				
T3300	1	Female			1					
T3500	1			1						
T3550	1				1					
T3600	2	Male		1					1	
T3700	1									1 (>15)
T3800	3		1	1		1				
T3900	1			1						
T4000	1				1					

Table 1. (cont.)

Locus/ Tomb	No. of Individuals	Sex Estimation	Age at Death (years)							Adults of Undetermined Age
			NB–9	10–19	20–29	30–39	40–49	50–59	>60	
T4100	1						1			
T4200	1			1						
T4300	1						1			
T4400	1									1 (>20)
T4600	1				1					
T4700	1					1				
T4900	1							1		
T5000	2	Male		1		1				
Total	*77*	*10 males 12 females*	*13*	*10*	*11*	*10*	*5*	*3*	*3*	*22*

Table 2. 'Life Table' of the Ṣallaḥ ed-Din Street Population

Age Interval (years)	No. of Deaths	% of Deaths	Survivors Entering	Probability of Death	Total Years Lived between X and X+5	Total Years lived after Lifetime	Life Expectancy
(X)	(Dx)	(dx)	(lx)	(qx)	(Lx)	(Tx)	(e0x)
0–9	43[i]	39.8	100.0	0.4	800.9	2398.1	24
10–19	10	9.3	60.2	0.2	555.6	1597.2	27
20–29	15	13.9	50.9	0.3	439.8	1041.7	21
30–39	16	14.8	37.0	0.4	296.3	601.9	16
40–49	10	9.3	22.2	0.4	175.9	305.6	14
50–59	7	6.5	13.0	0.5	97.2	129.6	10
>60	7	6.5	6.5	1.0	32.4	32.4	5
Total	*108*				*2398.1*		

[i] Artificial figure, standardized as 40% (see text for explanation).

of a 'life table' methodology (Ubelaker 1974). The calculation was made using ten-year intervals (Table 2). However, as the age at death of some adults was only estimated to its minimum limit, these individuals were sorted proportionally into the relevant age cohorts (for discussion and details of this calculation, see Nagar 2013; Ubelaker 2001). Since infants and small children may be underrepresented in the sample, the percentage of death was standardized as 40% by the age of 10 (as found in other historical populations in Israel) for the sake of comparison. The calculation resulted in a relatively low life expectancy for the population, of 24 years at birth, and 27 by the age of 10. A 'death curve' of the population was created following the revised age distribution data (Fig. 1).

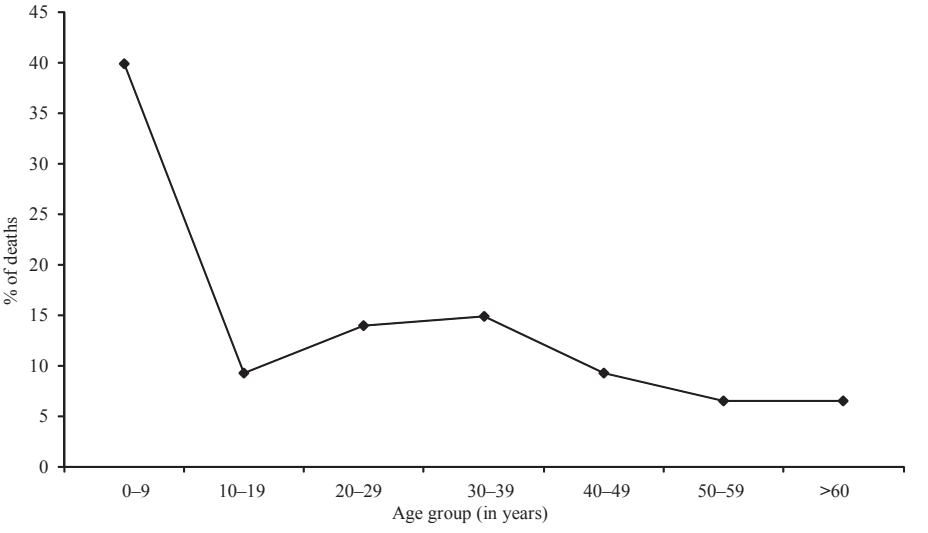

Fig. 1. Mortality curve of the Ṣallaḥ ed-Din population.

Fig. 2. Fracture in a femur.

Fig. 3. Mushroom-shaped femoral head.

PATHOLOGY

The bones were visually examined on-site to detect pathologies. Arthritic lesions in the vertebrae and long bones, and common dental pathology (especially caries and tooth loss), were noticed in several individuals (anthropololical report, IAA archives); however, the poor state of preservation and the necessity for immediate reburial of the bones did not allow for reliable calculation of the frequencies of these traits. Other noticeable pathologies include the following:

Fracture in a Femur (Burial Cave 1). Fracture in the neck of the left femur of an adult individual. While healing, it caused a change in the neck-shaft angle resulting in dislocation of the head (Fig. 2).

Fracture in a Rib (Burial Cave 1). Fracture in the posterior third of the rib of an adult individual. However, it was not possible to determine whether it belonged to a different individual than that represented by the long bones.

Fracture in a Humerus (T1700). Fracture in the proximal third of the left humerus of an adult female.

Lesion in a Hip Joint (Burial Cave 1). A mushroom-shaped deformation in the proximal head of a left adult femur (Fig. 3), with

Table 3. Epigenetic Traits in the Ṣallaḥ ed-Din Street Skeletal Population

Trait	Sample Size	Trait Expression	Frequency (%)
Metopic suture	18	0	0.0
Supraorbital foramen	24	10	41.7
Supratrochlear notch	12	2	16.7
Accessory infraorbital foramen	23	2	8.7
Parietal foramen	7	6	85.7
Frontotemporal articulation	8	0	0.0
Ossicle at lambda	8	0	0.0
Inca bone	11	1	9.1
Condylar canal	7	5	71.4
Foramen of Huschke	26	3	11.5
Mandibular torus	8	0	0.0
Mylohyoid bridge	21	2	9.5
Humerus, septal apperture	30	4	13.3
Suprascapular foramen	5	2[i]	40.0
Tibia, squatting facet	3	0	0.0
Atlas, posterior bridge	13	0	0.0
Atlas, lateral bridge	14	0	0.0
Atlas, spina bifida occulta	5	0	0.0
Atlas, incomplete fusion of the costal element of the trans. proc.	14	0	0.0
Axis, incomplete fusion of the costal element of the trans. proc.	8	0	0.0
Sacrum, spina bifida	12	0	0.0
Mandible, M3 agenesis	8	0	0.0
Maxilla, M3 agenesis	6	0	0.0

[i] Suprascapular foramen was found in two scapulae of the same person.

noticeable remodeling of the corresponding acetabulum. Such a lesion is characteristic of Perthes' disease (Ortner and Putschar 1985:238), which is usually caused by trauma during childhood; however, other causes have been suggested (Beeson and McDermott 1975:1839–1840).

MORPHOLOGY

Only two skulls were available for measurement in the Ṣallaḥ ed-Din Street sample, insufficient for comparative morphological analysis of the population. However, epigenetic traits were recorded from skeletal elements whenever possible. Due to the fragmentary nature of the material, bilateral traits were counted from both sides independently. The results and calculated frequencies are presented in Table 3.

Femoral bones were measured following common methodologies (Bass 1987:219), and the stature of each individual was estimated using a conversion formula based upon the oblique length of the bones (Table 4; see Feldesman, Kleckner and Lundy 1990).

Table 4. Femur Measurements: Oblique Length and Stature Estimations

	Right				Left			
	Sample Size	Average Length	Standard Deviation	Stature Estimation	Sample Size	Average Length	Standard Deviation	Stature Estimation
Males	2	452 mm	1.4	169 cm	4	442 mm	15.5	165 cm
Females	3	394 mm	8.5	147 cm	4	389 mm	6.5	145 cm

DISCUSSION AND CONCLUSIONS

Human skeletal remains recovered from the Ṣallaḥ ed-Din Street cemetery of the Late Roman period represent at least 77 individuals from articulated burials in cist tombs and one burial cave. Most of the cist tombs contained a single primary burial, while in 13% of them, two to three individuals were interred together. In Burial Cave I, at least 27 individuals were counted in two troughs. Although the bones in the burial cave were not anatomically articulated, their position indicated that the dead in the two troughs were primarily buried in a general east–west orientation, facing north, although the bones were later moved from their original posture.

The age-at-death and sex estimations attest to a regular civilian population. Individuals from both sexes were almost equally represented, although infants were underrepresented—only one infant of less than 2 years was found. This could be the result of a burial practice in which infants were buried in a specific section of the cemetery. The 'life table' (Table 2) presents the life expectancy of the population, calculated on the basis of the age distribution. The percent of death was standardized as 40% by the age of 10, to overcome the bias caused by infant under-representation. Life expectancy of about 27 years by the age of 10 resembles that found in several other Roman-period populations in Israel, as at Tel Ḥadid and Ḥorbat Qasṭra (Nagar and Torgë 2003; Nagar and Eshed, in prep.), where calculations were made using the same methodology. The shape of the death curve (Fig. 1) is also typical of regular historical populations.

Table 3 records the presence of 23 epigenetic traits. The results reveal no significant difference from frequencies reported for other Roman-Byzantine populations excavated in Israel (Nagar 1999), suggesting the heterogeneity of the Ṣallaḥ ed-Din Street urban population.

Femoral measurements yield an average stature of 166 cm for males and 146 cm for females (right and left sides considered together). Although the sample is very small, it can be concluded that the average stature of females in the Ṣallaḥ ed-Din Street population was less than that of the general population in this period. A low average stature, based upon femoral length, has been attributed by several authors to a relatively low socio-economic level (Powell 1988; Matt 2005).

Pathologies in the sample include three traumatic lesions (in a rib, a humerus and a femur), which are relatively common in skeletal populations. In addition, an individual suffering from Perthes' disease was discerned. This disease usually occurs in childhood, and its cause in this case is unknown. Tooth loss due to caries, and arthritic lesions in the vertebral column and long bones were also noticed, but not systematically recorded.

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