

Textile tools from Tell Mardikh/Ebla

A total number of 141 objects were recorded in the database (figure 1). All the objects are dated to different contexts and periods ranging from 2600-1400 B.C. The majority of the textile tools are dated to three periods of which two, 2000-1600 B.C. (MB I-II) and 1800-1600 B.C (MB II) are partially overlapping. During 2400-2300 B.C (EB IV A) a majority of the objects are from the royal palace and “other contexts”. In the context description “other contexts” are described as the acropolis, the lower town and the rampart. During 2000-1600 B.C. (MB I-II) the majority of the tools are from these other contexts. Finally, during MB II 12 objects are found in palatial buildings described as the Northern palace and Western palace.

	spindle whorl			loom weight			needle		other textile tools	
	royal palace	palatial buildings	other	royal palace	palatial buildings	other	royal palace	other	royal palace	other
2600-2400 B.C.	1									
2400-2300 B.C.	26 (27)		11				2	4	11	15
2300-2000 B.C.			3					1		
2300-1900 B.C.										1
2000-1800 B.C.		1								
2000-1600 B.C.			20 (21)							
1900-1700 B.C.					2					
1800-1600 B.C.		12	24 (26)							2
1550-1400 B.C.			1							

Figure 1. Chronological distribution of all the objects recorded.

SPINNING AND SPINDLE WHORLS

103 objects from Ebla have been recorded as spindle whorls. In this analysis, 4 have been excluded (T.M.66.E.176; TM 79.G.445; TM 90.G.475; TM 06.B.992, please see database for comments). As can be seen in figure 1, the majority of the spindle whorls are dated to three periods of which two, 2000-1600 B.C. and 1800-1600 B.C., are overlapping. 37 whorls are dated to 2400-2300 B.C., 20 to 2000-1600 B.C. and 35 to 1800-1600 B.C. In the following analysis we will focus on two groups: the objects dated to 2400-2300 B.C. and the objects dated to 2000-1600 B.C. and 1800-1600 B.C. which we have considered as one coherent group in the analysis.

Material and shape

The majority of the spindle whorls are made of stone and are generally convex in shape (figure 2).

	Bone	Clay	Stone	Other	Not available
Biconical		1			
Conical		2	15	1	
Convex	19	3	45		2
Cylindrical		1	4		
Discoid		2	2		
Spherical			1		
Various shapes with hollow top			1		
Total	19	9	68	1	2

Figure 2. The relationship between material and shape.

Spindle whorls made of bone are frequently found in the later period (MB I-II) and, as demonstrated in figure 4, spindle whorls made of bone are generally lighter than spindle whorls made of stone. All spindle whorls made of bone are also convex in shape (figure 3).

2400-2300 B.C. EB IV A	Royal palace				Other			
	Bone	Clay	Stone	Not available	Bone	Clay	Stone	Not available
Biconical								
Conical			5				1	1
Convex	1		14		1	1	7	
Cylindrical		1	3					
Discoid			1					
Spherical			1					
Various shapes with hollow top								
2000-1600 B.C. MBI-II	Palatial Buildings				Other			
	Bone	Clay	Stone	Not available	Bone	Clay	Stone	Not available
Biconical								
Conical			1				7	
Convex	6		4		11	1	19	2
Cylindrical			1					
Discoid						2	1	
Spherical								
Various shapes with hollow top							1	

Figure 3. Chronological distribution of spindle whorls according to shape and material. Please note, that EBL-TM.79.Q.149, a complete spindle whorl made of stone and with a convex shape from a tomb dated to 1800-1600 B.C., is included in ‘Other’.

Weight and diameter

72 spindle whorls with intact weight and diameter are recorded in the database. As can be seen in figure 5 the whorls vary in weight between 1g and 53g and the diameter varies from 19 mm – 59 mm.

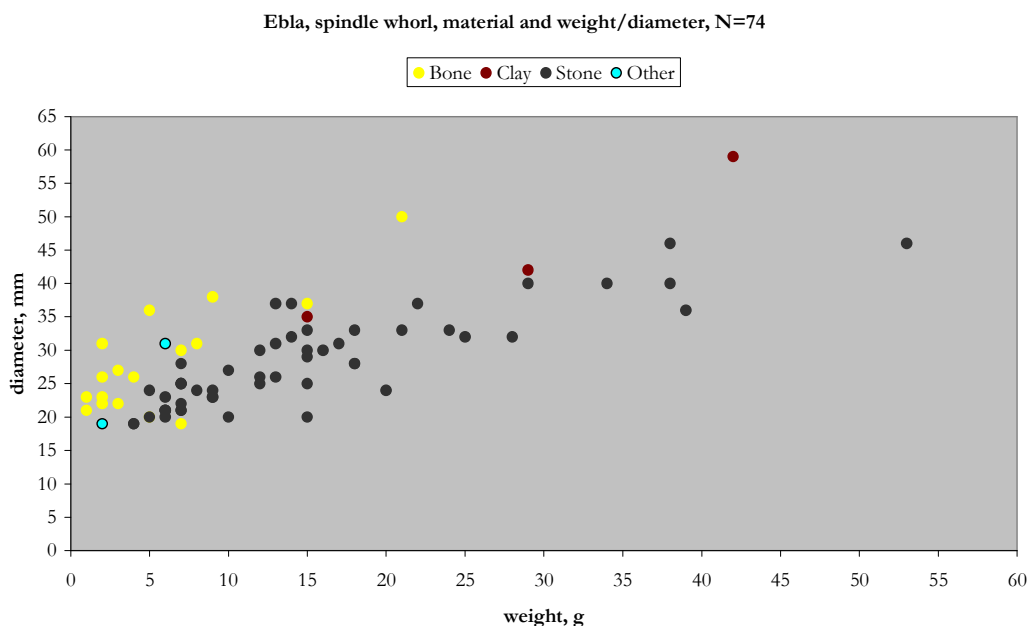


Figure 4. The relationship between material and weight/diameter.

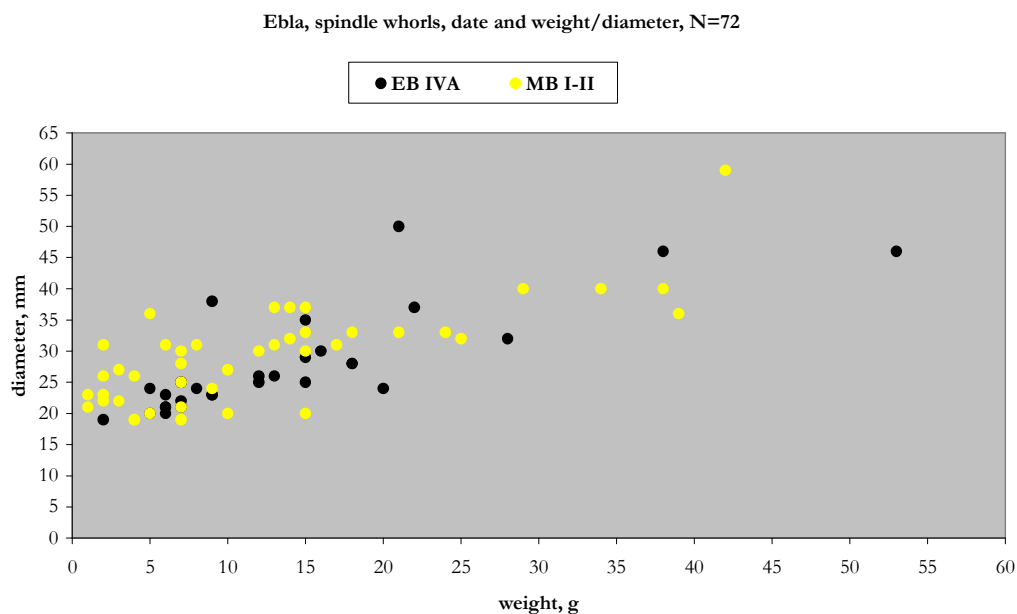


Figure 5. The relationship between date and weight/diameter.

The recordings demonstrate a wide variation in weight and diameter in the spindle whorls from 2400-2300 B.C. which indicates a production of many types of yarn from very fine to coarse. The spindle whorls dated to 2000-1600 B.C. also demonstrate a production of many types of yarn, but the majority of these whorls are weighing under 10g indicating a larger production of very fine spun yarn.

Contexts

The number of spindle whorls found together in the same context is small, and it does not seem worthwhile to make comparisons between spindle whorls found in different contexts as the groups of spindle whorls is too small to make any secure interpretations. We have therefore, in this analysis, only compared the whorls from EB IV A found in royal palace with spindle whorls from “the other contexts”. The spindle whorls from MB I-II have also been divided in two contexts groups, “palatial buildings” and “others”:

EB IV A - 2400-2300 B.C.

The majority of the spindle whorls dated from 2400-2300 B.C. are from the royal palace context (27 spindle whorls) while 11 are from other contexts. 31 of these spindle whorls have an intact weight and diameter. However, as can be seen in figure 6, the variations in weight and diameter are larger within the group of spindle whorls from the royal palace than the group of spindle whorls from other contexts. The same conclusion can be reached when excluding the two +35g whorls. This suggests that the production of yarn in the Royal Palace during this period was more varied than in the other contexts.

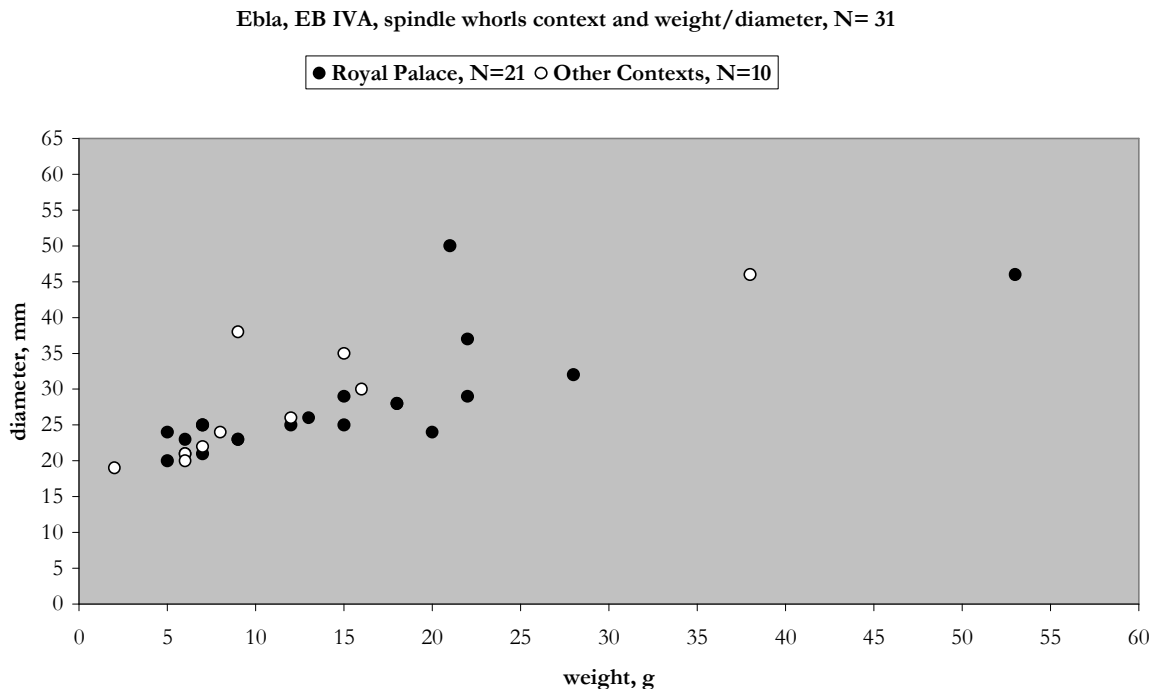


Figure 6. The relationship between context and weight/diameter.

MB I-II - 2000-1600 B.C.

The majority (33 objects) of the completely preserved spindle whorls dated to 2000-1600 B.C. are from other contexts and just 6 are from palatial buildings. 1 spindle whorl is from a tomb. As can be seen in figure 7 the variation in weight and diameter is larger within the group of spindle whorls from the other contexts than in the group of spindle

whorls from palatial buildings contexts. This indicates that the production of yarn in the other contexts during this period is more varied than in the palatial buildings.

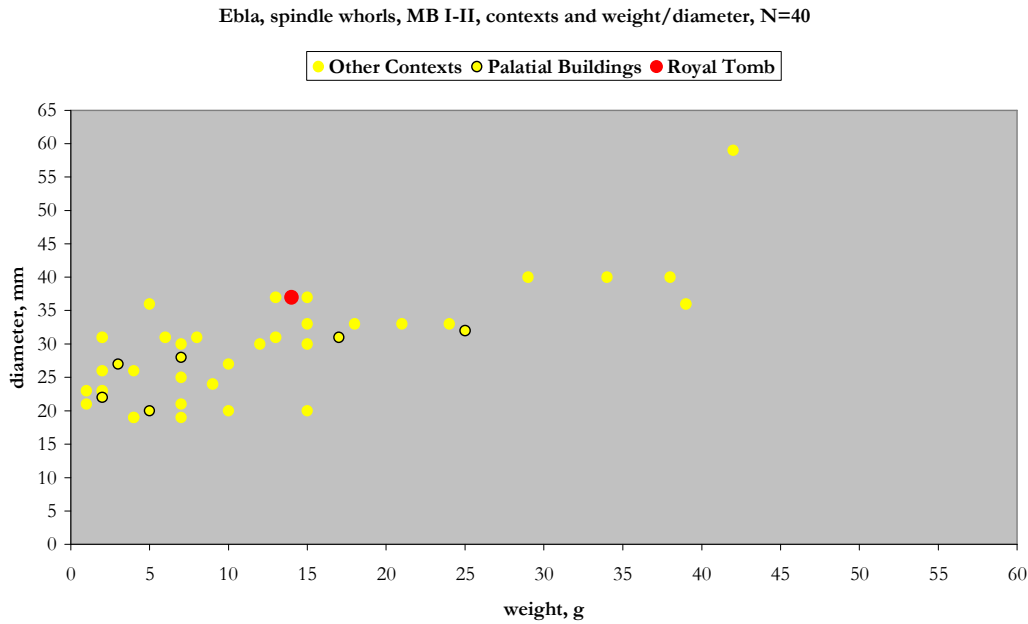


Figure 7. The relationship between context and weight/diameter.

As mentioned above this group consists of spindle whorls dated to partially overlapping periods, MB I-II and MB II (figure 1). A comparison between the complete spindle whorls from these two groups demonstrates an interesting difference (figure 8). There are fewer whorls from MB I-II than from MB II but the whorls from the earlier period indicate a varied production of several types of yarn from thin to thick. The spindle whorls from the latter period on the other hand suggest a production of primarily very fine spun yarn.

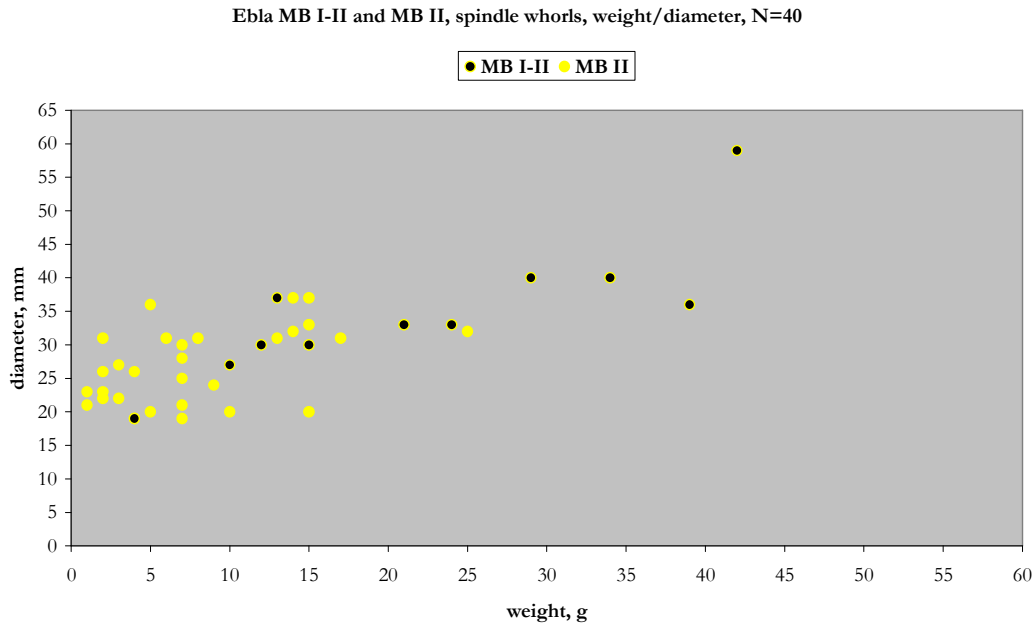


Figure 8 The relationship in weight/diameter between MB I-II and MB I

Summary

The number of spindle whorls is relatively small, and the analysis cannot be considered completely statistically representative. However, the analysis demonstrates a small but significant difference between the spindle whorls from EB IV A and MB I-II. The spindle whorls from the latter period are generally smaller indicating a more specialized production of fine spun yarn. The analysis also indicates that this change can have had taken place in MB II.

In MB I-II the greatest variation is attested in the tools from the “other contexts”, while the few tools from the palace suggest less variations in thread types. In contrast, the finds from the Royal Palace EB IV A indicate a more varied production with several qualities of yarn. The tools from the EB IV A Royal palace, even attest a larger variation than the tools from the other contexts.

LOOM WEIGHTS AND WEAVING

Only two loom weights have been found in Ebla. They are both from palatial buildings dating to 1900-1700 B.C. EBL-TM.94.P.461 is from the Western Palace and EBL-TM.93.P.607 is from the Northern Palace. The two weights have a conical shape and are made of fired clay. They also have more or less the same weight: 303g and 322g and have a thickness of 55 mm and 54 mm, respectively. The weights are not completely intact but only small fragments are missing.

Since no other loom weights have been found, it must be assumed that the warp weighted loom was not the only loom type in use (please see the discussion in the introduction p. XX)

Even if the loom weights are from different contexts it is worth noticing that these two weights would function well in the same setup. To elucidate our interpretation of the loom weights we have calculated possible loom setups on the basis of one loom weight and suggested which fabrics we consider the most likely result. Please note, that these suggestions are based on our experience and experiments but are on the other hand conjectural as to what is optimal.

Loom Weight EBL-TM.93.P.607 , weight 303 g, thickness 55 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Number of threads per loom weight	30	15	10	7-8
Number of threads per two weights (one in front layer one in back layer)	60	30	20	14-16
Warp threads per cm	11	5-6	4	3
Our evaluation of tools suitability	TTTC choice	TTTC choice	Possible	Unlikely

Figure 9. Calculation of possible loom setups with loom weight **EBL-TM.93.P.607**.

The calculation demonstrates that a warp thread of 10g or 20g tension would function well with loom weight EBL-TM.93.P.607 (figure 9). The types of fabrics that could have been produced with these two types of yarn would be of fine quality. However, the two fabrics would visually be completely different. The first fabric, woven with 10g warp tension, would be quite dense with 11 threads per cm in warp and weft. The second fabric, woven with 20g warp tension, would be more open with 5-6 threads in warp and weft. If the fabrics were weft faced they would also differ visually (figure 10).

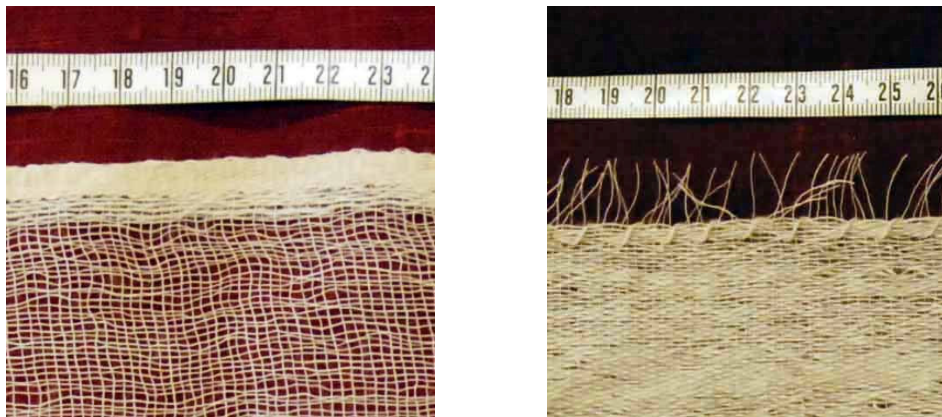


Figure 10. Two fabrics, both woven with threads requiring 10g warp tension. Left: a tabby with app. 5 warp threads per cm and 8 weft threads per cm. Right: a weft faced tabby with app. 6 warp threads per cm and 15 weft threads per cm.

When focusing on TTTC choice A, (figure 9) we suggest the following loom setup:

Loom setup (EBL-TM.93.P.607) calculated on 10 g warp tension

- Starting border (width of the fabric): 100 cm
- Number of loom weights needed: 40
- Numbers of warp threads: 1100 threads 2 m each= 2200 m
- Weft 1: if a balanced tabby =2200 m
- Weft 2: if a weft faced tabby = 4400 m
- Total amount of yarn with weft 1 (+ 2%) = 4488 m
- Total amount of yarn with weft 2 (+ 2%) = 6732 m

The calculations also demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 128-192 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

OTHER TEXTILE TOOLS

As can be seen in figure 11, 7 objects are recorded as needles in the database. The length varies from 54 mm to 105 mm and the thickness at mid-shaft varies from 3 mm to 5mm. All objects could function well as sewing needles for sewing in different qualities of fabrics.

26 objects are recorded as punches and 1 object is recorded as a bone. They vary in length from 59 mm to 90 mm. These tools could have had several functions but they would, according to our experience, function well as so-called pin beaters. A pin beater is a multifunctional weaving tool. It was thrust up between the warp threads at regular intervals in order to drive the weft home, and it was also used for pushing up the weft after changing the shed (Hoffmann 1964, 135). Furthermore, these tools could also have been used when manufacturing different types of baskets.

	needles		pinbeaters		spindles	
	royal palace	other	royal palace	other	royal palace	other
2600-2400 B.C.						
2400-2300 B.C.	2	4	12	15		
2300-2000 B.C.		1				
2300-1900 B.C.						
2000-1800 B.C.						
2000-1600 B.C.						
1900-1700 B.C.						
1800-1600 B.C.						2
1550-1400 B.C.						

Figure 11. Chronological distribution on the total number of *other textile tools*.

Finally, 2 spindles made of bronze are recorded in the database. They are both dated to period 1800-1600 B.C. and found in the non palatial contexts. The spindles are 128 mm and 166 mm long and their maximum diameter is 6 mm and 7 mm respectively. On one spindle, EBL-TM.94.P.565, the minimum diameter is 4 mm.

Both spindles could have functioned as spindles together with a spindle whorl. As can be seen in figure 12, several spindle whorls could have been used together with these spindles. In fact the diameter of the hole on several of these spindle whorls corresponds well to the diameter of the spindle whorls.

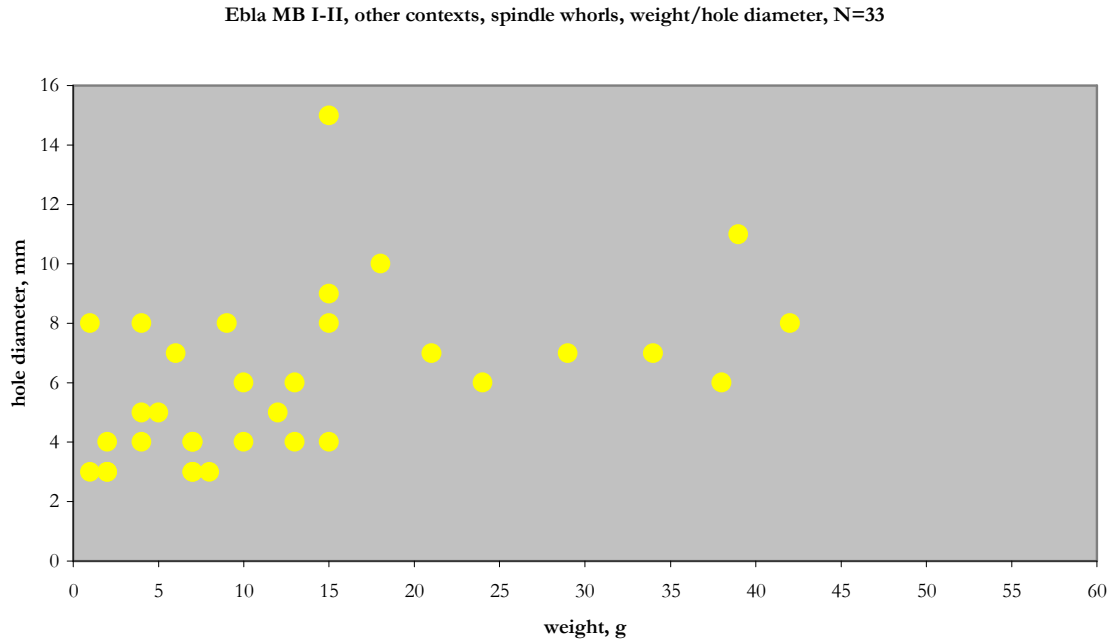


Figure 12. The relationship between weight and maximum hole diameter.

DISCUSSION

The number of textile tools is relatively small, and the analysis cannot be considered completely statistically representative. The spindle whorls from both EB IV A and MB I-II demonstrate a varied production of many different types of yarn. However, the spindle whorls from the later period, MB II, are in general smaller and lighter, indicating a larger production of very fine spun yarn. Furthermore, the majority of the spindle whorls during EB IV A are from the royal palace and that a majority of the spindles whorls from MB I-II are from other contexts.

The lack of loom weights indicates that other types of looms have been used and on the basis of archaeological evidence alone it is almost impossible to give an evaluation of the type of fabrics produced in Ebla. On the other hand the variation of different yarns during both EB IV A and MB I-II indicates a production of fabrics in many different qualities, from fine to coarse. During the later period, it is likely that Ebla had a production of high quality textiles with very thin threads. The production of these fabrics would have taken a considerable period of time to make and demand well prepared raw materials, even-spun threads and a developed knowledge on weaving techniques.

The majority of the tools from EB IV A both from the Royal Palace and from other contexts are considered to have been made in a medium production quality. During MB I-II all tools from the palatial building are made in a medium production quality. Also the majority of the tools from non palatial contexts are made in a medium production quality in MB I-II contexts we find 7 spindle whorls which are considered to be of a good production quality.

To conclude, the analysis has demonstrated a change in the textile production from EB IV A to MB I-II. Furthermore, the analysis also indicates that the textile production in general have moved from the Royal Palace to other contexts.