University of
Sistan and Baluchestan

Iranian Journal of Archaeological Studies

Print ISSN: 2251-743X Online ISSN: 2676-2919

Archaeological Sciences
Research Centre

An Ethno-Archaeological Study on the Thin-Walled Ceramics based on the Production Techniques of the Contemporary "Jahleh" Wares in Minab, Hormozgan, Iran

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Received:14/ 07/ 2019; Received in Revised form:29/ 11/ 2019; Accepted: 29/ 12/ 2019

Abstract

Some production techniques of prehistoric ceramics are still continuing in the South and Southeast of Iran. One of these production techniques is common in the traditional workshops in the Shahvar and Hakami – Minab - for produc-ing "Jahleh" as a thin-walled ceramic. We can compare Jahleh with prehistoric wares. The question is, how do the ethno-archaeological studies on Jahleh, help us to understand the production techniques of the prehistoric ceramics? The research method includes interviews with potters in Shahvar and Hakami in 2019, the survey in some prehistoric sites, and the studies on prehistoric thin-walled ceramics. The analysis was done using analogy, and deductive rea-soning. Results show similarities between Jahleh and some of the prehistoric wares in Iran and Mesopotamia. If we pay attention to the "similarity between the tools", "the pottery methods in Shahvar and Hakami", and "some of the archaeological findings", we can accept that the production method of prehis-toric thin-walled ceramics is similar to the method of producing Jahleh. There-fore, the study on the Jahleh in a contemporary context helps us to understand the processes of producing prehistoric ceramics.

Keywords: Ethno-Archaeology, Shahvar and Hakami Villages, Minab, Jahleh Ceramics, Prehistoric Ceramics.

Article Type: Research Article

Introduction

Ceramic artifacts are still prevalent in some cultures, even with the industrial progress of the modern world. One of these types of ceramics is a thin-walled ware, Jahleh, which is produced in exactly the same method in two villages, Shahvar and Hakami, in the Hormozgan province of Iran. Jahleh is made by men because it takes a lot of physical strength, while women in these regions often weave mats. The production process of the Jahleh pottery is more diffi-cult and takes longer than making other ceramics. Some steps of production are done on a potter's wheel and others are done by hand. But at the same time, the characteristic feature of this type of ceramic is the use of simple tools and instruments. Since the formal and technical features, tools and workshops of these wares are simple, they may have been practiced in prehistoric times based on anthropological analogy and an

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DOI: 10.22111/IJAS.2020.6628

Publisher: University of Sistan and Baluchestan

ethno-archaeological approach. Ac-cordingly, one can present models for the interpretation of archaeological evi-dence in prehistoric sites. The question is: "how do the ethno-archaeological studies of Jahleh wares help us to understand the ceramic production tech-niques in the prehistoric cultures of Iran?" The first aim of this article is to ex-plain the production technique of prehistoric thin-walled ceramics and the sec-ond one is to interpret some archaeological data from the prehistoric sites based on the ethno-archaeological studies. Accordingly, we try to explain the similarities and relationships between the ceramic productions in prehistoric societies and the contemporary traditional workshops in Shahvar and Hakami, in Minab, based on ethno-archaeology. We also interpret the techniques of ce-ramic production and the function of some archaeological evidence in prehis-toric sites, according to field studies in contemporary traditional contexts.

Geolocation Information

The two main centers for pottery production are Shahvar and Hakami, both are located 1100 m west, and 3 km west of the city of Minab (Figure. 1). Based on the UTM system, the geographic coordinate of the Hakami village is 40 R 501725 m E 3005899, and the geographic coordinate of the Shahvar vil-lage is 40 R 506170 m E 3006824. These two villages are 25-40 meters above the main sea level. The distance from Shahvar to the northeastern coast of the Strait of Hormuz is 27 kilometers, the distance from Hakami to the Strait of Hormuz is 25 kilometers. Historically, the life of these two villages has been dependent on the river of Minab, which passes 2 kilometers east of Hakami and 3 kilometers south of Shahvar. For this reason, the type of soil around the eastern and southern region of villages is alluvium, and it is suitable for pottery production.



Figure. 1: *The location of Minab as a contemporary center of pottery and the prehistoric sites in Iran and Iraq (https://www.mapsland.com/asia/middle-east/large-political-map-of-the-middle-east-with-relief-major-cities-and-capitals-2004; Redesigned and edited by the Authors)*

Materials and Methods

Research Method

The data has been collected in the "field" and "documentary" methods. The research method is "descriptive-analytical" research. The analysis was done using an ethno-archaeology approach, analogy, and deductive reasoning. Giv-en the subject, the basic information on the steps of pottery production was collected in a field study in the Minab district and the Shahvar and Hakami village. Two traditional pottery workshops in Shahvar and Hakami were visit-ed in the spring of 2019 for a week. Currently, only a potter, Ali Habib Fakha-ri, lives in Hakami, and another one, Ali Rahimi, lives in Shahvar village. The field survey was conducted by the first and third authors in these two villages. The production process, materials, and tools were then recorded. The entire production process was documented from beginning to end. Supplementary data were obtained through an interview with two potters named Ali Rahimi and Ali Habib. In addition, the technical characteristics of the prehistoric thin-walled ceramics of Iran and Mesopotamia were studied using field and docu-mentary techniques. After evaluating the differences and similarities between the Jahleh wares and prehistoric ceramics, the relationship between the produc-tion processes of both assemblages is explained.

The Technique of Production of Jahleh Ceramics in Minab

Preparation of Clay and Techniques for Kneading Clay

The potters in Minab obtain the clay and materials from sources around this city. First, they sift the soil, and separate the impurities, before mixing the clay and water in the pit near the workshop. Afterward, they knead the raw materi-al and leave it in the pit for 24 hours before removing it. Again, the potters knead the lump of clay in several stages and spread it in the sun to evaporate the excess water (Figure. 2). The potters then store the clay lump in wooden con-tainers or under a dense nylon, so that it does not dry. In this condition, they regularly spray it with water, before they knead a portion of the clay again. They prepare this lump of clay on a grindstone or flat surface in the form of "egg-shaped clay lumps" similar to those of prehistoric sling bullets (Figure. 3). This process usually causes fingerprints to remain on the surface of the clay lumps. Next, the potters combine all the lumps together, before separating a piece of clay for use depending on what jug shape is to be made.



Figure. 2: *Preparing the clay in the workshops of Minab by Ali Habib*



Figure. 3: *The pottery wheel and the sample of kneaded clay lump in the form of an egg; ready for the production of Jahleh ware by Ali Rahimi*

Tools for the Production of Jahleh Wares

The most essential tools for the production of Jahleh wares are a cotton string, a brush (made out of palm leaf or thorns of palm) (Figure. 4), a needle, a Sondeh (pit with ash[1]) (Figure. 5), the Jahleh "stone" or anvil (Figure. 6), and a small wooden paddle (Figure. 7).



Figure. 4*: The decoration with brush or Khar (After: Kamali 2006)*

The Production Process

The Jahleh wares are generally made in two main steps. In the first step, the initial form is made on the potters' wheel and is called "Engareh" (Figure. 8). In

[1]The ash prevents the adhesion of the ceramic to the stones and paddles. It repairs the surface cracks of the ware that arose due to blows. Also, ash is effective in strengthening the body of the ceramic, due to the presence of carbon.



Figure. 5: *The potter makes and measures the Sondeh*



Figure. 6*: The Jahleh "stone"; unlike its name, is made of fired clay*



Figure. 7*: The wooden paddle (After: Kamali 2006)*



Figure. 8: *The Jahleh ware in the first step – Engareh (After: Kamali 2006)*

the second step, performed by hand, the potter uses a traditional wheel to turn the egg-shaped clay lump into a tall pitcher. This traditional wheel consists of three parts: a wheel plate, a wooden vertical axis (Tej in the local term), and a stick made from palm tree. The wheel plate was made of donkey feces and clay.

The mouth of the pitcher is so small that you can only insert one hand into it. Then, the potter detaches the piece from the wheel with a piece of thin yarn and paints the neck of the pitcher. After that, the pitcher has placed out-side the workshop to partially dry before the next stage of work.

Next, the walls of Jahleh ware are manually tapped with various tools and thinned as far as possible. The simple tools include a small wooden

pad-dle, Jahleh "stone" or anvil, and the Sondeh. Wooden paddles, are called Ko-tak, Chapa, Vager, and Matom according to size (Figure. 7). To make a high-quality Jahleh ware you first use a heavy paddle, Kotak and Matom, and ash. The blows of these two heavy paddles cause the ash to penetrate into the body of the ware. The two lightweight paddles, Vager and Chapa, are used later in the joining stage of work.

The Jahleh "stone" or anvil is a piece made from fired clay. The potter dips it into ash and inserts it into the pitcher and holds it against the wall to be striking it with the wooden paddle. The lower diameter of the Jahleh "stone" is about four centimeters and the upper part is about six (Figure. 6). Sondeh is a semi-circular pit in the earth with a diameter of approximately 16-20 centime-ters and a depth of about 10 centimeters. The Jahleh is rounded inside of the Sondeh. The pit contains ash from the previous kiln firing (Figures.5 & 9).

Decoration on the Jahleh After Working with the Wheel

The potters use a small comb-like tool called the "paint thorn" (Khar in the lo-cal term) or brush made from a piece of clay and a number of palm leaves or thorns. It is used to create striped and wavy lines and motifs on the Jahleh which appear as "carved motifs" (Figure. 4). Sometimes, a sharp tool (usually palm leaf) is used to decorate the Jahleh. Added motifs can be created on the shoulder of the pitcher. The potter adds 4-6 small pieces of clay on the surface, in the form of a cone (in the local language-Pestoon). The motifs on the shoul-der and neck are usually different. But all of them repeat in a decussate form, and only in rare cases – like the motif of the sun – which appear on the shoulder.

The ware is placed outdoors to dry slightly after it is decorated. Then the potters cover the surface of the Jahleh ware and the wooden paddle with ash. The potter inserts the Jahleh "stone" into the jug with some ash, and be-gins to strike the wall of the ware with a wooden paddle and right hand against the Jahleh "stone" (Figure. 10). The potter rotates the Jahleh ware inside the Sondeh pit while they hit it with the wooden paddle. The jug body gradu-ally becomes spherical (Figures. 9 & 10) and the ash causes the body to become stiff, lightweight, and thin. The thinning of the body of the Jahleh depends on the potter's skill.



Figure. 9: *The potter drops the Jahleh in the ash pit*



Figure. 10: *Potter Ali Habib thins the jug base*



Figure. 11: *Placing the jugs inverted into the kiln*

The Features of Jahleh After Firing

The potter places between 20 and 30 jugs into the simple hemispherical open kiln, depending on the amount of local and non-local customers (Figure. 11). He uses the wood and twigs of local palms and the thorn bushes as fuel. Then he covers the top of the kiln. Firing the jugs requires five to seven hours. The pot-ter then stops feeding the fire until the fire is extinguished and he waits a day for the kiln to cool slowly. Each potter produces once a month due to the de-crease in the number of customers of Jahleh. While in the past, they produced Jahleh once or twice a week. In addition to local customers, large

numbers of buyers from Arab lands on the southern coasts of the Persian Gulf also came to Minab and bought these jugs, before water cooler devices became common.

The paste of Jahleh ware is usually free of large rock fragments and particles, due to the sifting and screening. It looks very homogeneous after firing. Also, due to the blows of the paddle and Jahleh "stone", the body is compact, very rigid, lightweight, thin, and it has a reflexive loud and beautiful sound. The exterior surface is usually smoothed and polished with wet hands prior to firing. Sometimes polishing is done with grass. But, the effect of the blows of Jahleh "Stone" and the use of hands is often visible on the interior surface, in addition to the wheel's effects. Therefore, when we see a broken piece of Jahleh, we can't recognize that they are made by hand or by a wheel.

Types of Jahleh

Jahleh wares have different sizes, forms, and functions, but they are all some kind of jugs (Figure. 12). The Gardan Ghazali (Ghazal's neck) has a tall and cy-lindrical neck. Boko has no neck. Gadok has a flat base (floor). Yatimak is very small. A Jahleh with a short neck is called a Merk. The largest Jahleh is the Jamali. It is made by the most experienced potters, sometimes has an oblique edge. Furthermore, the most important difference between Jahleh wares in Shahvar and Hakami is in the size of their necks, the Hakami Jahleh wares have a shorter neck than those of Shahvar.

The Function of Jahleh Wares

The two main uses of the Jahleh wares are for water cooling and as a percus-sion instrument. The surface of the new Jahleh wares is covered by a layer of soft ash. These ashes are removed after washing. Therefore, very tiny pores remain on the surface of the jug. Due to the presence of these pores, the water inside the container cools down. But over time, these pores fill up and the con-tainer can't cool the water. For this reason, the new Jahleh wares are usually used to keep cool water, the older Jahleh wares have other functions such as carrying liquid, storing legumes and dates.

Another use of Jahleh wares is the performance of the music. Since ancient times, Jahleh wares have also been used as a percussion instrument, due to the shape of the pitcher and its very thin wall. When we hit the body of the Jahleh, it has a very loud and beautiful reflective sound. "The sound of the largest Jahleh – Jamali – is similar to Timpani, and the young women were car-rying it in the past. The other Jahleh wares, based on their size, have different sounds, treble, and bass. They are played along with other instruments. Jahleh is usually played as a group, and some believe that it is similar to that of Afri-can music" (Valizadeh 2009: 90).



Figure. 12: *Types of Jahleh; 1. Gardan Ghazali 2. Gadok 3. Boko 4. Jamali*

Geographical Dispersion of Jahleh Outside Iran (in the Contem-Porary Contexts)

A production technique of Jahleh ware is used to make the thin-walled ceram-ic in some parts of Africa, South Asia, and India. For example, the thin-walled ceramics are produced in Biyagama - Southern Sri Lanka (Anjum 2013: 17), and in the villages of Khavda, Lodai, and the city of Bhuj in Kutch – India (Anjum 2013: 25). In these regions two kinds of tools are needed; the wooden paddle and stone anvil/support, along with a lot of wood ash (Anjum 2013: 54). A comparison between the materials and techniques of Jahleh pro-duction (from the initial preparation step to the final production) with the thin-walled ceramics such as bowls and pitchers in the above regions shows that all employ a roughly identical technique to thin the walls and strengthens them. The strength and elegance of the body of these wares are achieved by striking the walls and using the ash simultaneously (Figure. 13).

Discussion: Comparison between the Production Evidence and Thin-Walled Ceramics of Minab with the Archaeological Finding

The Egg-Shell Wares of Ubaid and Susiana

In the Susiana period, 5th millennium BC, the production of the light-buff egg-shell ware was common, especially in Jafarabad, Bandbal, and Tall-e Ba-kun Southwest Iran (Figure. 1). The clay used in these ceramics was well sifted, and it was free of large gravels and impurities. The body of these ceramics was quite uniform, and their exterior surface was very smooth and polished. Their body had a reflexive sound, due to the proper firing and the high quality of the body and the elegance of the body. Most of these ceramics were made in the form of conical cupcakes, with a rounded and circular bases. Bowls were few (see, Dolfus 1997: 28-29; Sumner 1994).



Figure. 13: *An Indian potter and his wooden paddles for thinning the body (After: Anjum 2013: 127)*

On the other hand, the ceramics in the Halaf culture in Mesopotamia (6th millennium BC) were hand-made, and they were made with very fine clay made of iron particles. The colors of these ceramics are usually light-buff and in some cases yellow, light brown, or pink. The clay is often well-kneaded, especially during the late Halaf period. The coating on them was the slip, and most of them were polished. The kiln heating was sufficient. Their wall is of-ten skinny, and their shapes are various and exquisite. The main forms include: Rounded small jugs with irregular and a wide mouth, pitchers with a crooked mouth, Jars with a spherical body and a bowed-out neck, bowls with a flat base and a concave body, ewers, a kind of pitcher with a flat base and a tall neck and a shorter body (Farno 2005: 15). In the following Ubaid era, one in-novation was a bell-shaped bowl with very thin walls and skillfull motifs (Far-no 2005: 154). It was reported from some sites in Iraq, such as Eridu (Safar et al. 1981: 156; Majidzadeh 2009: 51) (Figure. 1).

The Thin-Walled Ceramics from Qazvin Plain and the Discovered Tools in Tapeh Qabristan

Thin-walled wares and evidence of their production were discovered in the 3rd season of excavations at the Tapeh Qabristan in Qazvin, Iran. The pottery includes nine groups: delicately painted ware, coarsely painted ware, gray ware of 4th millennium BC, plain buff ware, beveled rim bowl, and some wares from the historic period. The delicately painted wares at the site belong to the middle Chalcolithic age. These kinds of wares have an inorganic temper and very soft clay, and they are well-fired. The section of the ware is perfectly uniform. The colors of these wares are in a wide range of light red to buff and ochre. The glaze and cover of these wares are diluted. Their surface is smooth and polished. The motifs of them include geometric, plant, and animal. These wares were produced in the following forms: the tall bowl with a wide mouth and small concave base, skillet bowls with horn-shaped bases and in the form of a cup, and the short bowls with the wide mouth (see, Fazeli 2007: 131-134). The thickness of these wares is various, from 1 to 6 mm (Fazeli 2007: 170-175). It is noteworthy that kiln no.1 is intended for the production of the thin-walled wares, and there is not any evidence of the coarse ware in this kiln. It is a rectangular kiln with two parts, the north and the south. The size of this kiln is estimated to be 20.5×3 meters, and its direction is towards the north and the south. The Southeastern part of the kiln has introduced as its entrance, on the floor of the South part of kiln no. 1, there are three similar small circular pits. Similar samples of these three pits have also found in kiln no.2, the maxi-mum depth of each of these pits is nine centimeters, and the diameter is 17.

Archaeologists have argued that the function of all the pits is related to the pottery tradition before firing, and then they report that all the pits are filled with ash (see, Fazeli 2007: 81-83). As previously mentioned, potters in Shahvar and Hakami both need such pits for rotating the clay of the thin-walled Jahleh. They dig the pits in an approximate diameter of 16-17 centime-ters and a depth of approximately nine centimeters in the ground, in Minab. Then they fill all these pits with ash, which comes from the kiln, to complete the process of production of the wares – the hitting with the paddle and Jahleh "stone" and shaping step. Accordingly, it may be assumed that the ash pits found from Tapeh Qabristan had a similar function to the Sondeh pits in the Shahvar and Hakami. This similarity becomes clearer when we compare the size of these pits with each other, and we study their relationships with other production evidence of the thin-walled wares.

In the excavation in the Tapeh Qabristan, an unknown object has found that the archaeologists did not explain its function (see Fazeli 2007). This piece of clay is so large that can be taken in one hand. It is similar to the Jahleh "stone" as described in the production process of Jahleh wares in Min-ab. It is used as an anvil that is held inside a jug to thin the wall by pounding it with wooden paddles.

29 pieces of egg-shaped clay lumps are also found from the Tapeh Qabristan. Fazeli has introduced these clays as "sling bullets" (Fazeli 2007: 38), but to this day, comparable egg-shaped clay lumps are used in the villages of the Shahvar and Hakami, for the production of thin-walled ceramics. It is a possibility that the egg-shaped pieces found in the Tapeh Qabristan along with the thin-walled ceramics and unknown clay pieces and ash pits,

originally have used in the production process of the thin-walled ce-ramics.

The imprint of the potter's fingerprint remains on the surface of the clay lumps in the Tapeh Qabristan (see, Fazeli 2007: 41). In Minab, these circu-lar clay lumps are made at kneading step, and as mentioned earlier, the finger-prints remain on the surface of them in the workshops of Minab. Therefore, the tools used to produce the thin-walled ceramics in Shahvar and Hakami resemble the findings from the Tepe Qabristan along with the thin-walled ce-ramics (Figures. 14, 15, 16).

The Thin-Walled Ceramics from South East of Iran

The thin-walled ceramics from the South East of Iran identified in Tapeh Yahya reveal that they appeared at "Yahya VC" for the first time, and then their number increased at VB and VA (Lamberg-Karlovsky 2009: 229). Mutin reported that high-quality clay "bullets" were found during the excavation of Tapeh Yahya. (Mutin 2013: 156). Furthermore, comb-like clay objects have been excavated from Tapeh Yahya, in which there is a row of holes on one side (Mutin 2013: 156). These bullets and comb-like tools are very similar to the



Figure. 14: *Egg-shaped clay lumps from Qazvin (After: Fazeli 2007: 119)*

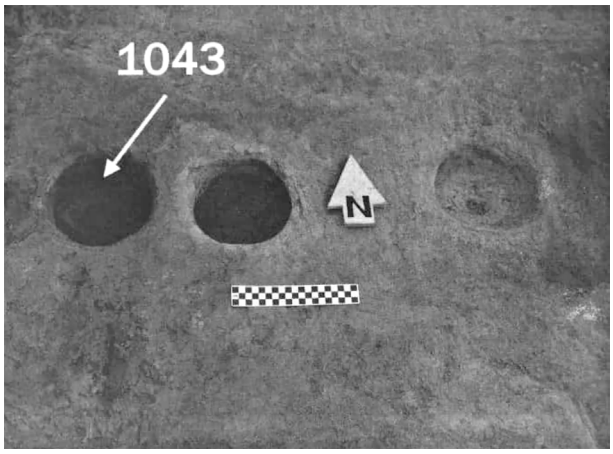


Figure. 15*: The ash pits in Qazvin (After: Fazeli 2007: 77-78)*



Figure. 16: *An unknown object from Qazvin (After: Fazeli 2007: 128)*

ones used in the production of Jahleh.

Furthermore, the most important and most common type of thin-walled ceramics in Southeast Iran is the Namord type. Seyed Sajjadi introduced the Namord wares as a fine type of ceramics in the South East of Iran in the his-torical era. The body of Namord is a very delicate and a fine one, and it usual-ly is red or orange. The clay of these wares is soft, and the tempers are sand. The potters typically polished the surface of the wares by hand, and we can't see fingerprints as parallel lines. Although the Namord type has been frequently found in the South East of Iran, the dispersion of it also reported in more than 490 sites of the Parthian and Sasanian eras in the tropical regions around the Persian Gulf and 370 sites in the cold regions around it. Further-more, Namord type has found in other sites such as Islamic sites in Rishehr, Parthian and Sasanian layers in Tapeh Yahya in Kerman, Sasanian port in Ghanam, the Parthian and Sasanian layers in four sites in Roodbar at the South of Kerman, include Tomb-e-Kharg, Ghal'eh Anooshirvan, Ghal'eh Dokhtar, and Ghal'eh Jamshid. This dispersion shows the breadth of production and function of these types of ceramics in the northern and Southern coasts of the Persian Gulf (Seyyed Sajjadi 1991: 41-42). The thin-walled ceramics from the 3rd millennium BC have also reported in the excavations at Tom-e-Maroon in Minab (See, Sarlak 2009: 38-40).

This type of thin-walled wares has continued in the Islamic era at Hormozgan (north coasts of Persian Gulf) as a new type called Gambroon. "The Gambroon is most probably the finest wares that were produced in Iran, and it was exported to Europe by British East India Company, from Gambroon port" (Mohammadifar and Balmaki 2008: 97).

Some evidence was discovered in the Konar Sandal site in Jiroft, Southeast Iran, that there could possibly be a significant relationship between some of these evidence with the evidence of the production of Jahleh. Among the evidence, there are the pits with a diameter of 10-17 centimeters, these pits have filled with ash. Mjidzadeh has introduced them as the fire pits (Majidza-deh 2004). But they probably were not fire pits, because the diameter of their neck is low. They are similar to the ash pits that use in producing the thin-walled Jahleh ware, in shape and size. Also, samples of egg-shaped clay bullets have found along with the red thin-walled painted wares in this excavation. The size of these bullets is 4-5.5 centimeters. Majidzadeh has introduced them as the "sling bullet" (Majidzadeh 2004: 54) (Figure. 17). But that is debatable because



Figure. 17: *The clay bullets of Konar Sandal, Jiroft, Iran (After: Majidzadeh 2004: fig. 19).*

the soil does not usually sift for making the sling bullet. In other words, impurities and coarse particles in the sling bullet are more than the body of ceramics. Therefore, we can propose another function for them, when we consider the smooth and homogeneous body of these bullets and the simi-larities between these bullets and egg-shaped clay-lumps in the workshops of Jahleh. Probably, the egg-shaped bullets of Konar Sandal were used for the production of thin-walled ceramics. As mentioned above, the egg-shaped clay lumps are made in different sizes (according to the size of the ware) and then they are formed by the potter. Furthermore, Majidzadeh has pointed to the carving ornaments on the exterior surface of the thin-walled ceramics of Konar Sandal, he has written that these ornaments were probably executed by a "comb-like" tool, due to the wavy and horizontal parallel grooves in these mo-tifs (Majidzadeh 2004: 71). Based on the ethno-archaeological studies on the Jahleh ware, there is probably a relationship between the brushes in Minab workshops and decorating tools of the thin-walled ceramics of Konar Sandal. Therefore, the egg-shaped clay lumps, ash pits (or Sondeh), and the brushes in the pottery workshops of Minab

can help us to interpret the excavated material from the Konar Sandal; such as the egg-shaped bullets, the ash pits, the paral-lel carving lines, and a large number of the thin-walled painted wares.

In addition, the impacts of indentations and bulges remain on the interior surface of some thin-walled ceramics in the Southern region of Ker-man (such as Tapeh Varamin, Tapeh Yahya) and Minab, while the exterior sur-face of wares is entirely flat and uniform (Figures. 18-19). The ceramic sherds of the early Bronze Age in Saeed Abad site in Roodbar – south of Kerman - have such a situation (see. Dehghani 2003) (Figure. 20). It seems that the indent and bulge on the interior surface of the ceramics of Saeed Abad are reflections of a tool that is similar to the Jahleh "stone".

Maybe we can recognize these indents and bulges on the interior sur-face of these wares as a reflection of the use of a tool like Jahleh "stone". That means the technique of the production of prehistoric and historic wares in Halil Rud basin, using the paddle-and-anvil technique, is similar to the production of Jahleh. Therefore, the rippling on the interior surface of those wares is created due to the blows of the tool like Jahleh "stone".



Figure. 18: *The ceramics from Yahya VA and other wares that have made in two steps, with hand and wheel, simultaneously (Photographed by Mahboubeh Naseri Tehrani)*



***Figure. 19**: The ceramics from Yahya VA founded in excavations at Tepe Vakil Abad in Orzuiyeh, Kerman (Photographed by Mozhgan Shafiee)*



***Figure. 20:** The effect of Jahleh "stone" on the interior surface, and flat exterior surface due to the use of the wooden paddles, Saeed Abad Olya, Roodbar Jonoub, Kerman, Early Bronze Age (After: Dehghani 2003).*

Conclusion

The studies on the thin-walled ceramics, tools, and archaeological evidence from the sites of Qazvin plain, Susiana, Mesopotamia, Southeast Iran, North-ern, and Southern coasts of Persian Gulf show the similarities between the technique and tools for the production of wares in these regions with Jahleh wares in Minab. The tools found from settlements in the Qazvin plain along with the thin-walled ceramics are among these similarities, and this evidence is similar to the pottery tools in Shahvar and Hakami. Also, the egg-shaped clay lumps found in the excavations at Tepe Qabristan in the Qazvin plain are very similar to clay lumps in Jahleh wares workshops. Although these egg-shaped clay lumps have introduced as sling bullets in the report of excavation in Tepe Qabristan, we can probably assume that these pieces were the lumps that were used in the production process of thin-walled ceramics. Furthermore, the filled pits with ash and the unknown clay tool found in Tepe Qabristan along with the thin-walled wares are probably related with Sondeh (ash pits) in the Jahleh workshops and Jahleh "stone". There are similarities between rippling caused by Jahleh "stone" blows on the interior surface of wares and the uneven sur-face of the wares in South East sites of Iran. Accordingly, we can interpret these archaeological findings based on the thin-walled ceramics production process.

On the other hand, if we consider the similarities between the production tools of Jahleh and the roughness of the Jahleh "stone" on the interior surface of wares, we can interpret these similarities by using an analogical approach and explaining their relations with thin-walled ceramics in historical sites of Southeast Iran (Halil Rud basin). It means that the roughness on the interior surface of the wares in the Southeastern sites of Iran may have appeared due to the knocks of the stone, like Jahleh "stone". Therefore, it is difficult to re-pair these roughnesses due to the closed mouth.

Therefore, it is recommended to consider two issues to understand this technique in the ancient sites: First, the characteristics of Jahleh ware such as smooth and soft clay, elegance and thinness, hardness, and reflection response. Second, the tools that do not merely disappear; such as egg-shaped clay lumps and the filled pits with ash in roughly identical size. Therefore, it is possible to interpret such archaeological evidence and its relationship with the process of thin-walled ceramics production. These wares seem to have been produced and distributed across areas near the Persian Gulf coast and other districts. Although we can propose the various functions for these wares, probably they have been used for cooling water at the sites across the Persian Gulf from the prehistoric era to the Islamic period, based on the range of dispersion and den-sity of them.

Furthermore, there are evidence about the use of wheel and hand to produce the Jahleh, simultaneously. The lines – as the finger impact - remain on the neck and rim of the Jahleh wares, due to the use of the wheel. While there is not any impact of the wheel on the exterior and interior surface of the body due to the blows of wooden paddle and Jahleh "stone", and the surface of the body is similar to the handmade wares. Therefore, it is recommended to pay attention to the simultaneous use of the wheel and hands in the ceramic production processes in archaeological surveys, and in the registration of the thin-walled ceramics. The opinions should not be based solely on the pieces of the body or the part of the rim of the wares.

Acknowledgment

The authors would like to thank the two anonymous reviewers for their helpful comments. Both reviewers raised concerns regarding the use of correlated variables in the multiple regression.

This research was supported by the administration of cultural heritage in Kerman Province. The authors would like to acknowledge the head and experts of this administration, Fereydoun Fa'ali, Farnaz Farahi Moghaddam, and Nader Alidadi Soleymani for their support. The authors also thank Nasir Eskandari for his advice, Mahboubeh Naseri Tehrani and Mozhgan Shafiee for providing photos.

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