

# Anthropometric measurements of the external nose in 18–25-year-old Sistani and Baluch aborigine women in the southeast of Iran

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*The human nose differs in its anatomy and morphology between different racial and ethnic groups. The objective of this survey was to provide data for clinical plastics of the nose, medical aesthetics and cosmetology, anthropology, nationality study, and medical jurisprudence in Sistani (Fars) and Baluch aborigines in the southeast of Iran.*

*The subjects participating in this study were 400 volunteer Baluch and Sistani aborigine women (in both groups the number of subjects was 200) within the age range of 18–25 years. Anthropometric data were obtained from all subjects using standard anthropometric methods with a sliding calliper. The data were analyzed using SPSS 11.0. Values were expressed as mean  $\pm$  standard deviation (SD). Student t-test was used to compare the results. A p value of less than 0.05 was considered significant.*

*The mean total length and height of the nose in the Sistani group was significantly ( $p < 0.001$ ) lower than in the Baluch group ( $46.5 \pm 1.8$  vs.  $53.0 \pm 1.3$ ;  $44.0 \pm 2.2$  vs.  $49.5 \pm 2.0$ ). The mean anatomic width of the nose in the Sistani group was higher than in the Baluch group ( $32.3 \pm 1.3$  vs.  $31.4 \pm 1.5$  mm). The nasal index in the Sistani group was significantly ( $p < 0.001$ ) higher than in the Baluch group ( $69.7 \pm 3.5$  vs.  $59.2 \pm 3.3$ ). The most common type of nose was leptorrhine (fine nose), accounting for 55.5% in the Sistani group and 98.5% in the Baluch group. The most common type of face in both groups was leptoprosopic.*

*In spite of significant differences in measurements of noses in the Sistani and Baluch groups, the most common types of nose and face were similar in these two groups. (Folia Morphol 2009; 68, 2: 88–92)*

**Key words:** anthropometry, nose, women, southeast of Iran

## INTRODUCTION

Anthropometry is the study of the measurements of the human body. By tradition, this has been carried out by taking measurements from body sur-

face landmarks, such as circumference, length and breadth, using simple instruments [26].

The proportions of the so-called ideal nasal shapes and the operations designed to achieve this

have been the subjects of numerous papers [4, 6, 10, 26]. The size, shape, and proportions of the nose provide a visual basis suggesting the character of the person [8, 26].

With the increased interest in cosmetic rhinoplasty in recent decades, much research has been performed to examine and refine the canons by which beauty may be measured. Much of this work has dealt with the facial architecture of the North American white population [5]; in recent years, however, there has been a substantial increase in the number of cosmetic surgical procedures being performed on patients of other racial/ethnic groups. As the human nose differs in anatomy and morphology between racial groups [20, 26], it has become readily apparent to practitioners that most of these patients place great importance on maintaining their core ethnic features while achieving cosmetic enhancement. Applying the traditional white-based concepts of facial beauty to patients of other racial/ethnic groups has limitations [5]. Thus, knowledge of the unique shape, anatomy, and dimensions of the nose would be very useful for surgeons undertaking repair and reconstruction of the nose [1, 2].

To simplify the statistical analyses, numerical classification has been given to the categories of each of the nose features (metrical and morphological). The classification in general use is leptorrhine (fine nose) if the nasal index is  $< 70$ , mesorrhine if it is between 70–85, and platyrrhine (broad-nosed) if it is  $> 85$  [25]. Another classification is (1) narrow  $< 54.9$ , (2) intermediate 55–99.9, and (3) wide  $> 100$  [24].

The characteristics and differences of the nose shapes have been studied in several racial groups [3, 5, 7, 9, 15, 16, 19, 21–24, 26, 27]. However, studies on nasal anthropometry have been poorly carried out in Iran [17], and in particular, there is no nasal anthropometric data from this region. In this study, we measured anthropometric parameters of the external nose, classified the shapes of the nose and face and compared these data in Sistani (Fars) and Baluch aborigines who are resident in Sistan and Baluchestan in the southeast of Iran.

These data can provide useful insights for the fields of cosmetic and reconstructive nasal surgery, anthropology, and forensic medicine.

## MATERIAL AND METHODS

The subjects participating in this study were 400 volunteer Baluch and Sistani aborigine women

(in both groups the number of subjects was 200) within the age range 18–25 years. The term Sistani or Baluch was attributed to those who were born from inhabitants of the Sistan or Baluchestan provinces for 3 generations and had had intra-group marriages. The subjects were selected from 38 health centres in Zahedan. They had no previous nasal or facial plastic or reconstructive surgery, no major nasal or facial trauma, no noticeable nasal or facial disfigurement, no respiratory disease or common cold, and were not pregnant. Anthropometric data were obtained using standard anthropometric methods with a sliding calliper at a precision level of 0.1 mm.

Anthropometric measurements were done under the guidance of Farkas [7].

The landmarks of the measurement points were as follows: nasion (n), the point in the midline of both the nasal root and the nasofrontal suture; subnasale (sn), the midpoint of the columella base; pronasale (prn), the most prominent point on the nasal tip; and alar curvature (ac), the most lateral point in the curved base line of each ala.

In the investigation presented here, the following parameters were measured and noted [9]:

- 1 — nose height (n-sn): from soft tissue nasion to subnasale.
- 2 — nose length (n-prn): from soft tissue nasion to pronasale.
- 3 — anatomic width of the nose (width nose) (acr-acl): from right to left nasal alae.
- 4 — anatomic nasal index (acr-acl/n-sn): the ratio of nose width to nose height  $\times 100$ .
- 5 — nasal volume: this was approximated from the volumes of two tetrahedra. The first tetrahedron had the plane acr-acl-prn as its base and its vertex was n. The second tetrahedron had the same base and its vertex was sn.
- 6 — external nasal surface: the sum of the surfaces defined by points, n-prn-acr, n-prn-acl, prn-sn-acr, and prn-sn-acl.
- 7 — maximum face length (nasion to gnathion).
- 8 — maximum face breadth (bizygomatic).
- 9 — nose-face width index (width nose/zy-zy).
- 10 — nasofacial index (n-sn/n-gn)
- 11 — prosopic index = (maximum face length / maximum face breadth)  $\times 100$ .

Surface landmarks were noted on the face before taking standard anthropometric measurements.

As anthropometric data are sensitive to the distribution of age, race, and occupation [28], we measured anthropometric parameters of the noses of

**Table 1.** Anthropometric nasal measurements in Sistani and Baluch groups

Parameters	Sistani (n = 200)	Baluch (n = 200)	T-test analysis results (p)
Nose length (n-sn)	46.5 ± 1.8	53.0 ± 1.3	< 0.001
Nose height (n-prn)	44.0 ± 2.2	49.5 ± 2.0	< 0.001
Nose width (ac-ac)	32.3 ± 1.3	31.4 ± 1.5	< 0.001
Nasal index	69.7 ± 3.5	59.2 ± 3.3	< 0.001
Nose surface	1752.0 ± 212.8	1894.7 ± 166.5	< 0.001
Nose volume	4790.6 ± 359.4	5233.8 ± 452.6	< 0.001
Face length (n-gn)	117.5 ± 4.2	117.5 ± 3.8	> 0.05
Face width (zy-zy)	109.2 ± 4.7	110.3 ± 4.1	< 0.05
Nose- face width index (width nose/zy-zy)	29.7 ± 1.7	28.3 ± 1.2	< 0.001
Nasofacial index (n-sn/n-gn)	39.6 ± 1.7	45.6 ± 1.5	< 0.001
Prosopic index	92.9 ± 3.2	93.9 ± 2.6	< 0.001

18–25-year-old women from two aborigine groups, Sistani and Baluch, who were residents of Sistan and Baluchestan in the southeast of Iran.

The measurements were calculated in millimetres in a normal anatomic position and the Frankfurt horizontal plane by the same author (T.K.). The data were analyzed using the Statistical Package for Social Sciences (SPSS Version 11.0). Values were expressed as mean ± standard deviation (SD). Student t-test was used to compare the results. The p value of less than 0.05 was considered significant.

## RESULTS

The mean total length of the nose in the Sistani group was significantly ( $p < 0.001$ ) lower than in the Baluch group. The mean width of the anatomic nose in the Sistani group was higher than in the Baluch group ( $p < 0.001$ ). The nasal index in the Sistani group was significantly ( $p < 0.001$ ) higher than in the Baluch group. The face length was similar in both groups, but the face width in the Sistani group was significantly lower than in the Baluch group ( $p < 0.05$ ) (Table 1).

The most common type of nose in the studied population was leptorrhine (fine nose), with 55.5% and 98.5% in the Sistani and Baluch groups, respectively. The rarest type was platyrrhine (broad nose) with 0% in both groups. The most common type of face for the study population was leptoprosopic in both groups. The most common nasofacial index in both groups was intermediate type. The most common nose-face width index was narrow type (Table 2).

**Table 2.** The frequency (and %) of anthropological parameters of nose phenotypes, facial phenotypes, nasofacial index, and nose-face width index among the women plotted by ethnicity

Anthropological parameters	Sistani	Baluch
Nose phenotypes:		
Leptorrhine (fine nose)	112 (55.5%)	197 (98.5%)
Mesorrhine	87 (44.5%)	3 (1.5%)
Facial phenotypes:		
Mesoprosopic	29 (14.5%)	21 (10.5%)
Leptoprosopic	113 (56.5%)	106 (53%)
Hyperleptoprosopic	58 (29%)	73 (36.5%)
Nasofacial index:		
Short	24 (12%)	0 (0%)
Intermediate	176 (88%)	157 (78.5%)
Long	0 (0%)	43 (21.5%)
Nose-face width index:		
Narrow	182 (91%)	198 (99%)
Intermediate	18 (9%)	2 (1%)
Wide	0 (0%)	0 (0%)
<b>Total</b>	<b>200 (100%)</b>	<b>200 (100%)</b>

## DISCUSSION

The normal individuals included in this study were inhabitants of a particular geographical region of Iran (in the southeast of Iran) and from two aboriginal groups, Sistani and Baluch. The present study estab-

lishes the basal values for various parameters of the external nose of the local population of this region. Anthropometric measurements of the nose in these groups were significantly different with regard to many parameters, but the most common type of nose (leptorrhine) and the most common type of face (leptoprosopic) were similar in both groups.

Racial and ethnic morphometric differences in nasal complexes in world populations have been the focus of numerous investigations [1–3, 7, 11, 12, 15–17, 19, 20–23, 26, 27].

The anthropometric differences between black and white Americans in the nasal area, compared to overall facial areas, can also be found in previous studies [9, 23, 28].

The mean nose lengths (n-sn) in our series were  $46.5 \pm 1.8$  and  $53.0 \pm 1.3$  mm in Sistani and Baluch, respectively. In the Baluch group it was similar to the Chinese mean nose length [2] (53.50 mm), Caucasian [21] mean (53.00 mm), Afro-American mean values (52.4 mm), white northern Italian (54.33) [9], and Afro-Indian [22] mean (54.7 mm) values. In the Turkish population, the mean value was 56.92 mm [26] and 55.15 mm [3]. Thus, the Sistani nose is significantly shorter than the Baluch and all of the abovementioned ethnic groups, but is longer than in the Jingpo people of China (41.99 mm) [16].

The mean anatomical nose width (ac-ac) in our study was  $32.3 \pm 1.3$  and  $31.4 \pm 1.5$  in Sistani and Baluch, respectively. These values are less than those of Canadian-Caucasians [7] (35.0 mm), white northern Italians ( $35.31 \pm 2.57$ ) [9], and the Jingpo people of China (36.44 mm) [16], but greater than Turkish (23.14 mm) [26] and Indian women ( $30.5 \pm 0.8$ ) [15]. The mean anatomical nose width values are not available in literature. The reported nasal width (al-al) were as follows: Korean American [5] ( $35.5 \pm 3.4$ ) and white women ( $31.4 \pm 2.0$ ), Afro-American [21] (43.5 mm), Chinese [2] (39.20 mm), Japanese [20] (36.3 mm), Canadian-Caucasian [7] (36.9 mm), African [22] (45.9 mm), Afro-Caucasian (39.6 mm), Afro-Indian (42.7 mm) noses [22], and in young Turkish people (33.63 mm) [26].

The mean nasal index in our series was  $69.7 \pm 3.5$  and  $59.2 \pm 3.3$  in the Sistani and Baluch groups, respectively. In the Baluch group, it is similar to young Turkish ( $59.40 \pm 6.44$ ) [26] but lower than the Sistani group, the Jingpo people of China [16] (74.93), Afro-Americans [22] ( $83.8 \pm 11.9$ , in 28 men), Sudroid (100) [25], and Caucasian (65.8, in 52 men) [22]. In the Sistani group it is almost similar to Caucasian

(65.8, in 52 men) [22] and white northern Italian women ( $65.34 \pm 6.49$ ) [9]. It has been shown that the gender difference pertains to both nasal size and shape [9].

In the present study, the nose height was  $44.0 \pm 2.2$  in the Sistani group, which was significantly lower than in the Baluch group ( $49.5 \pm 2.0$ ) but similar to that seen in Korean American women ( $43.5 \pm 3.9$ ) and white women ( $44.7 \pm 3.4$ ) [5]. In white northern Italians it was  $46.37 \pm 4.04$  [9].

In this study, the most common nose phenotype in both ethnic groups was leptorrhine (fine nose) (55.5% in the Sistani group and 98.5% in the Baluch group). The type of the nose in young Turkish [26], Caucasian [22], white northern Italian [9], and Finns and Swedes of southwestern Finland [18] were also leptorrhine. The Indo-Aryan is also very similar to the European, possessing a fine nose [25].

In Jingpo people in China [16] it was mesorrhine (70.0–84.9), and in Indo-African [25] and Afro-American [22], Platyrrhine (broad-nosed).

Based on this study, the most common type of face in both ethnic groups was leptoprosopic. In our previous study during the winter of 2003, the dominant face type among Sistani and Baluch women was euryprosopic (50.8% vs. 37%) and the rarest type was hyperleptoprosopic (0.5% vs. 2.5%) [14]. In Sistani and Baluch newborns, the dominant facial type was euryprosopic [13]. Normally, various facial types are encountered in every population so a certain number of people have thin, broad, or small faces. It must be noted that the prosopic index changes over time. The prosopic index of children is lower than that of adults and while growing up they gain a longer and narrower face [13, 14]. Furthermore, since the sample size of our study was 400 (200 in each group), it is quite possible that not all of the human variation seen in Sistani or Baluch women is represented in this group, and the database should be expanded.

A successful outcome in rhinoplasty requires thorough and accurate preoperative planning, and this can only be made possible if one has an objective in mind. The results of this study may be used as a landmark for guidance to plan corrective surgery of the nose. Since each racial group and ethnic population has their own nasal character and anatomical structure, the mean nasal values should be comprehensively understood for each ethnic and racial group [26].

Anthropological studies suggest that climatologically influenced selection acts increase the efficiency of

the nose in both warming and moistening of inspired air. As such, in colder and drier climates, the length of the nasal passage is increased and the base is narrowed, thus increasing the surface area and the period of time over which the inspired air is warmed and moistened [12]. For this reason, we speculate that the shape of the nose in this region of Iran and for both ethnicities has been adapted to the environment in such a way.

## CONCLUSIONS

In the present study, we measured the average nasal parameters of young Sistani and Baluch aborigine women from the southeast of Iran and compared them with each other and with the results found in the literature. We believe that the average parameters of the nose in this population may contribute to satisfactory results of cosmetic and reconstructive nasal surgery, anthropology, and forensic medicine.

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