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ORIGINAL RESEARCH

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Anthropometry of the nose pre- and post-photogrammetric adjustments in a sample of Syrian medical students. A cross-sectional study

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Abstract

Background and Aims: The individual's perceived beauty, sense of identity, and general well-being are all influenced by the social implications of the esthetics of their facial appearance. One of the major indicators of one's facial beauty is anthropometric proportions. This study was conducted to measure and evaluate the anthropometric proportions in a Syrian population, and to determine their desired nasal shape.

Methods: A cross-sectional study was conducted on Syrian university students. Lateral and frontal pictures of the participants were taken using Canon EOS 250D from a standard distance of 100 cm. These pictures were analyzed, then nasal measurements were adjusted according to the participants' desire using Adobe Photoshop 2020. All anthropometric measurements were conducted on AutoCAD® 2019 software before and after the adjustments. Data was analyzed using the SPSS-25 using paired samples *T* test to compare the means.

Results: The study included 53 females and 47 males. The mean age was 22.25. The mean unadjusted nasofrontal angle, nasolabial angle, nasomental angle, nasofacial angle, nasal index, Byrd and Hobar ratio, and Powell-modified Baum ratio were 141.80, 102.18, 129.21, 34.60, 71.71, 0.62, and 3.08 in the rhinoplasty-negative participants, and 145.89, 102.03, 130.20, 32.44, 67.96, 0.64, and 3.06 in the rhinoplasty-positive participants, respectively. While the mean of the adjusted previously mentioned angles were 144.59, 106.32, 131.19, 31.15, 62.91, 0.60, and 3.19 in the rhinoplasty-negative participants, and 146.31, 102, 130.20, 31, 62.55, 0.62, and 3.08 in the rhinoplasty-positive participants, respectively.

Conclusion: In contrast to other populations, our study concluded that Syrians had unique anthropometric measurements and facial esthetics preferences. Moreover,

André Torbey and Elian Mdawr have both contributed equally to all aspects of this study and are considered joint first authors.

the local plastic surgeons were able to identify most of the preferred nasal measurements for rhinoplasty in this ethnic group. It is advisable to use photogrammetry before rhinoplasty to identify the preferred nasal measurements of each individual to ensure the patient's satisfaction with the outcome of the surgery.

Level of Evidence: Level IV, cross-sectional study.

KEYWORDS
photogrammetric analysis, rhinoplasty, soft tissue profile

1 | INTRODUCTION

The esthetics of the individual's facial appearance have consequential social implications, which will in turn take effect on their perceived attractiveness, sense of identity, and their well-being in general. Anthropometric proportions are one of the strong predictors of one's facial attractiveness.[1] The appropriate proportion indices are thought to assist in achieving facial harmony and balance.[2] Therefore, the nose being the centerpiece of the face plays a vital role in the evaluation of facial symmetry. Modifying the angle located between the nasal tip and the lip is one of the primary motivators for patients undergoing rhinoplasty. This angle called the "nasolabial angle" is the result of the intersection of a line traversing across most anterior and posterior edges of the nostril and a plumb line perpendicular to the horizontal facial plane. It is a valuable soft-tissue cephalometric parameter, in determining the nasal tip esthetics. There are numerous methods used to measure the l rotation documented in the literature and educational texts, and it is worth noting that the ideal nasolabial angles for men and women have been cited to span from 90° to 120°.[3–7] Therefore, plastic surgeons often find it imperial to assess both hard tissue and soft tissue profiles while diagnosing, treatment planning, and evaluating posttreatment and postoperative outcomes. The establishment of surgical and aesthetical desires by both the patient and the plastic surgeon will have a great effect on the postoperative result, and a highly anticipated outcome, which will ensure satisfaction and contentment.

Assessing hard tissue is often achieved by using plain radiography and/or computed tomography, however, evaluating soft tissue is more demanding.[8,9] As often, plastic surgeons start with examining and measuring linear and angular indices clinically[10]; it is then followed by the use of digitized and computerized photography and laser scanning[11]; and finally, medical photographs,[12–14] that are the base on which traditional anthropometric measurements are established.[15,16]

Considering the wide variations in anthropometric parameters that depend heavily on age, sex, and ethnicity, several authors have aimed to document standardizing values that may serve as references. This study was conducted to measure and evaluate the anthropometric proportions in a population of the Middle Eastern (Syrian) ethnic group. It also aims to determine the desired nasal shape and measurements in this population, as well as their deviation from the original measurements.

2 | MATERIALS AND METHODS

This is a cross-sectional study. It was conducted at the Faculty of Medicine, Syrian Private University, Damascus, Syria between April 2021 and November 2021. A universal sampling was used in this study, as we included all medical students from the above-mentioned university, with the total number of medical students attending the faculty of medicine being approximately 670. Members of our team had set up stands next to lecture halls and labs at the university, and all medical students were invited to participate. Our team members would take numerous photographs from different angles of the participating students' faces after having obtained verbal and written consent from them. Subsequently, participants were required to complete a paper-based questionnaire that included demographic questions, questions about prior facial surgeries, inquiries regarding the number of prior facial operations, if any, and questions regarding prior Botox and prior Filler injections. Furthermore, we asked the participants if they had nasal septal deviation, nasal obstruction, rhinorrhea, or headaches.

2.1 | Subjects

A universal sampling was used in this study, as we accepted all the medical students from the Syrian Private University (SPU), provided they met our inclusion and exclusion criteria. One hundred and twenty-two (122) students agreed to participate, from which 100 were included in this study after meeting our inclusion and exclusion criteria. Regarding the inclusion criteria, we included all medical students enrolled at the university after getting their verbal and written consent. Participants who had congenital facial or cranial malformations, a history of facial trauma, had facial procedures other than rhinoplasty, were wearing dental braces (orthodontics), or had previously worn dental braces were excluded from our study sample.

Participants were divided into two groups: rhinoplasty-negative ($N = 71$) and rhinoplasty-positive ($N = 29$).

2.2 | Instrumentation and procedure

Using the Canon EOS 250D camera (Figure 1), experienced members of our team took several photographs of the participants' frontal and lateral perspectives of the face from a fixed distance of 100 cm (a total of two photographs). They then carefully selected the most appropriate photographs so that the face is parallel to the horizontal plane without any expressive features that could alter its shape or dimensions (Figures 2 and 3). The photographs were then subjected to adjustments, mainly in the clinical dimensions of the nose, using Adobe Photoshop (Adobe Systems, Inc.) according to the participant's desires, and in accordance with the expected results of a surgical procedure (Figure 3). Subsequently, these modified angles and clinical dimensions of the nose and face were studied using the AutoCAD® 2019 software, which is a commercial computer-aided design and drafting software (Figure 3).

To make these adjustments, we uploaded the digital images of the participants' faces to Adobe Photoshop 2020, then specified the area that we wanted to modify (the nose), by shading the surrounding areas so that they would not be affected by the changes of the nose during the modification procedure.

FIGURE 1 Camera model and specs.

Using the AutoCAD® software, the picture analysis, linear measurements, and angle measurements were achieved, and the process was broken down into five stages (Figure 4). First stage: To correctly match the participants' actual proportions, the image must be calibrated. This was accomplished by using a special measuring device (The Vernier scale) to measure the distance between a number of anatomical reference points on the participant's face, and then modifying the digital images to match these measurements to achieve a 1:1 magnification ratio, making these images exactly identical to the participants' accurate measurements. Second stage: Precise definition of the anatomical landmarks of the nose and face by using AutoCAD. Third stage: Geometric line drawing of the nose for subsequent measurements. Fourth stage; Conduction of the linear and angular measurements on the previous lines, as we measured the length of the nose (between the nasion and the subnasale), prominence of the nose (the length of the line connecting the tip of the nose and the alar crease point), the width of the wings of the nose (the distance between the two alar crease points), the distance between trichion and glabella, the distance between glabella and subnasale, the distance between subnasale and menton, the distance between subnasale and stomion, and the distance between stomion and menton. Subsequently, the Nasal Index was calculated (Nasal Index = nasal width/nasal height × 100).[17] Fifth stage: Line drawing to evaluate the equations of the nasal tip protrusions (Powel-modified Baum ratio – Byrd and Hobar ratio) and taking their measurements. Byrd and Hobar's ratio method quantifies the extent of nasal tip projection as a percentage relative to the upper lip line. This method involves the following steps: 1—Point Marking: Subnasale (Sn), Alar crease (AC), Nasal tip (NT), Dorsal starting point (DS); 2—Line Drawing: Upper Lip Line (ULL), Nasal Projection Line (NPL). Calculation of Byrd and Hobar Ratio: (Distance between Sn and NPL/Distance between Sn and ULL) × 100.[18]

2.3 | Data analysis

After completing the sample collection and modifications using AutoCAD and Adobe Photoshop, the variables and data were entered and encoded in Excel, then entered and decoded in

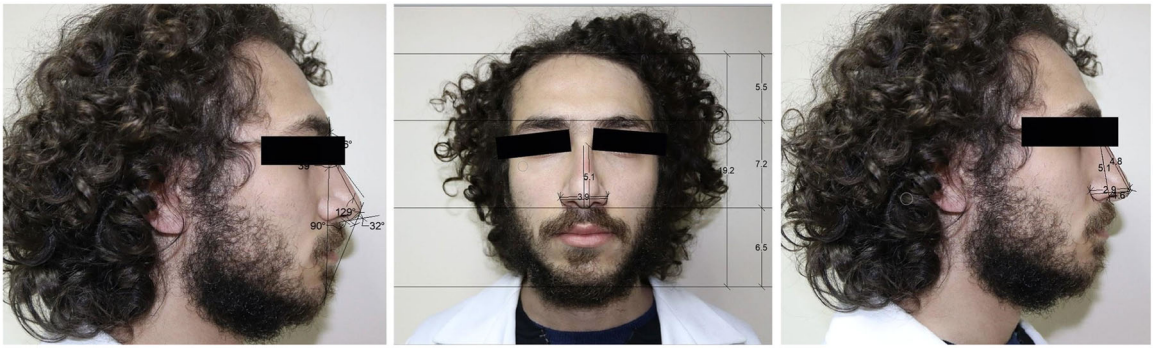

FIGURE 2 Lateral and frontal photographs of a male participant, and measurements taken on AutoCAD® 2019 software.

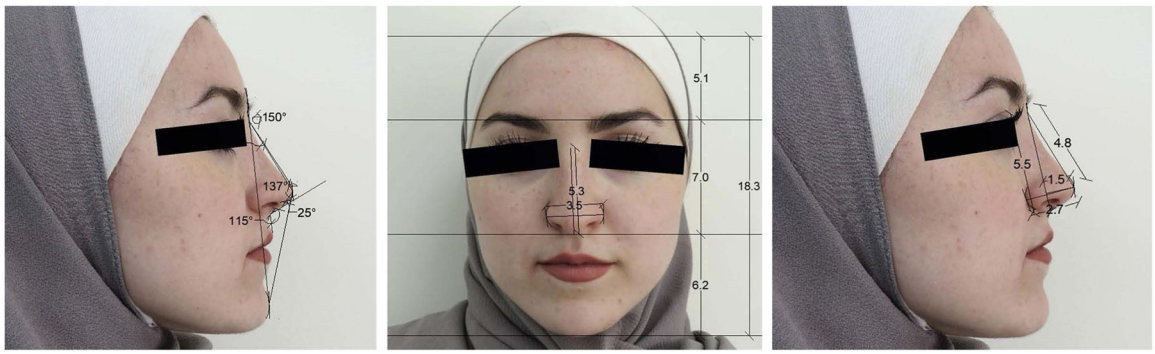

FIGURE 3 Lateral and frontal photographs of a female participant, with the result of the angle adjustments using Adobe Photoshop 2020, and measurements taken on AutoCAD® 2019 software.

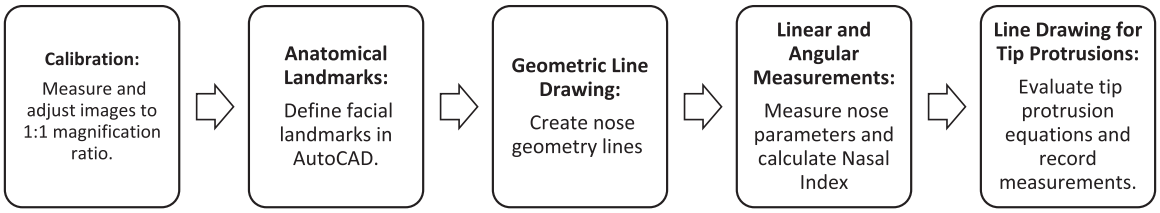

FIGURE 4 Facial analysis and measurement process in AutoCAD®.

SPSS-25 to analyze relationships, graphs, and statistical tables. The paired samples *T* test was used. p Value < 0.05 was considered significant.

2.4 | Ethical considerations

Ethical approval was obtained from the Institutional Review Board (IRB) Faculty of Medicine, Syrian Private University before starting to collect samples, and written informed consent was taken from each student individually before having been photographed. Written consent was also obtained from the students who had their photographs displayed for demonstration in this study (Figures 2 and 3).

3 | RESULTS

Out of 122 participants, 100 agreed to participate and fulfilled the inclusion criteria (response rate = 81.9%), of which 47% were males, and 53% were females. Participants' age ranged between 18 and 26 years old, with a mean of 22.25 years, and the most frequent value was 23 years. The participants' demographic characteristics are in Table 1. Regarding cosmetic surgeries, 29% (17 females and 12 males) of participants had rhinoplasty. The facial measurement values are in Tables 2 and 3.

A statistically significant difference was found in the nasofrontal angle, nasolabial angle, nasomental angle, nasofacial angle, nasal tip projection (Byrd and Hobar ratio), and nasal index between the unadjusted and adjusted angles in both males and females of the rhinoplasty negative group (Tables 1 and 2).

In the males of the rhinoplasty-positive group, a statistically significant difference was found in nasofacial angle, and nasal index only with a p value of 0.018 and 0.000, respectively. In the females, a statistical significance was found in Byrd and Hobar ratio, and nasal index only with a p value of 0.003 and 0.002, respectively (Tables 2 and 3).

Powell-modified Baum ratio had a statistically significant difference in the females of the rhinoplasty-negative group with a p value of 0.043 (Table 3).

4 | DISCUSSION

As the centerpiece of the face, the nose plays an essential role when evaluating facial symmetry. There are many methods to evaluate the shape and symmetry of the nose objectively. Direct anthropometry is simple, accurate, and a low-cost method, but it requires training and experience to perform accurately.[19] Photogrammetry is an alternative method that depends on photograph analysis. This method is not only useful for determining nasal measurements but can also provide a permanent record that can be verified or replicated by other examiners. Furthermore, photogrammetry could be used on the patients' photos after they have been digitally adjusted to fit the patient's expectations and can consequently be documented for informed consent before a surgical procedure. In addition, it can be used in studies to determine esthetic standards in a certain population. The cost-effectiveness of photogrammetry in rhinoplasty

TABLE 1 Participants' demographics.

Age	
Mean (SD)	22.25 (±1.88)
Gender	
Male	47 (47)
Female	53 (53)
Previous facial surgery	
Yes	29 (29)
No	71 (71)
Numbers of cosmetic surgeries on the nose	
0	72 (72)
1	23 (23)
2	2 (2)
3	2 (2)
6	1 (1)
Previous Botox injections	
Yes	3 (3)
No	97 (97)
Previous filler injections	
Yes	5 (5)
No	95 (95)
Experiencing nasal obstruction	
Yes	13 (13)
No	87 (87)
Experiencing rhinorrhea	
Yes	8 (8)
No	92 (92)
Experiencing headaches	
Yes	1 (1)
No	99 (99)
Having septal deviation	
Yes	10 (10)
No	90 (90)

depends on several factors, including the quality of the equipment, the requirement for training, and the potential time it requires to be performed. This method was used in this study to define the average values of photogrammetric measurements in a population of Syrian adult students and define the esthetic preferences of the participants.

In our study, the average nasofrontal angle in the rhinoplasty negative group before adjustment was 141.80°, while it was 144.59° after adjustment. A study in the United Kingdom found that a nasofrontal angle with the range of 127°–142° is considered acceptable among their population.[20] This wasn't consistent with our findings, as our participants' nasofrontal angle fell in this range before the adjustment but not after it. Regarding the nasofacial angle, a study on the Caucasian white European population found that the nasofacial angle with the range of 27°–36° was deemed acceptable, which was consistent with our findings, as the adjusted angle in the rhinoplasty negative group was 31.15° and 31° in the rhinoplasty positive group.[21]

One study on the Caucasian white population suggested that the ideal nasolabial angle ranged between 100.9° and 108.9° in the female nose and 90.7° to 103.3° in the male nose.[22] In our study, the preferred nasolabial angle degree of the rhinoplasty-negative females, and both genders of the rhinoplasty-positive group fell in the ideal range proposed by the previously mentioned study, whereas it was 106.89° in the males of the rhinoplasty-negative group which is not consistent with the previously mentioned study.

In a study conducted on Anatolian Turkish adults, the nasomental angle was 128.6 ± 3.4° in the males and 129.5 ± 3.2° in the females.[23] In another study conducted on Saudi Arabian adults, the previously mentioned angle was 130.8 ± 4.9° in the males, and 128.9 ± 6.5° in the females.[24] While the nasomental angle in a study conducted on Iranian adults was 125 ± 6° in the males, and 124 ± 4° in the females.[25] In our study, the previously mentioned angle was 128.54 ± 6.8° in the males, and 129.86 ± 4.2° in the females indicating that our findings were closer to the Turkish and Saudi Arabian study's findings compared to the Iranian study's findings.

By comparing the relationship of Byrd and Hobar in Tamer Erdrem's study, the mean was 0.668 ± 0.039.[26] While it was 0.60 ± 0.05 and 0.62 ± 0.06 after adjustment in rhinoplasty-negative and rhinoplasty-positive participants of our study respectively.

Regarding the Powell-modified Baum relationship, the mean was 2.96 ± 0.25 in the study of Devcic et al.[27] However, in our study, it was 3.08 ± 0.34 and 3.06 ± 0.37 before adjustment in rhinoplasty-negative and rhinoplasty-positive participants respectively. When comparing the nose index, it was 70.4 ± 7.2 in males, and 70.2 ± 8.7 in females in the study of Al-Qattan et al.[24] While it was 73.31 ± 6.457 in males and 70.17 ± 6.670 in females before adjustment in rhinoplasty-negative participants in our study.

All the measurements in our study (except for the Powell-modified Baum ratio) conducted on the rhinoplasty negative participants group were found to have a statistically significant difference between the before and after adjustments, in contrast to the rhinoplasty positive participants group where the statistically significant difference was found in Byrd and Hobar ratio, nasal index, and nasofacial angle. This implies that both genders are satisfied with their rhinoplasty operation regarding the nasofrontal, nasolabial, and nasomental angles. But not regarding their nasal tip projection.

TABLE 2 Participants' nasal angles ($N = 100$).

1—Nasofrontal angle		Mean		SD	*p* Value	Smallest value	Greatest value
All sample	Rhinoplasty negative	Unadjusted	141.80	7.97	**<0.001**	120	157
		Adjusted	144.59	7.89		121	162
	Rhinoplasty positive	Unadjusted	145.89	7.81	0.586	124	162
		Adjusted	146.31	6.10		127	156
Males	Rhinoplasty negative	Unadjusted	138.74	8.661	**<0.001**	120	157
		Adjusted	141.71	8.969		121	162
	Rhinoplasty positive	Unadjusted	144.17	9.815	0.122	124	162
		Adjusted	146.58	7.597		127	156
Females	Rhinoplasty negative	Unadjusted	144.78	5.996	**<0.001**	125	157
		Adjusted	147.39	5.484		129	159
	Rhinoplasty positive	Unadjusted	147.12	6.061	0.122	133	156
		Adjusted	146.12	5.048		137	156
2—Nasolabial angle		**Mean**		**SD**	***p* Value**	**Smallest value**	**Greatest value**
All sample	Rhinoplasty negative	Unadjusted	102.18	11.22	**<0.001**	75	126
		Adjusted	106.32	9.52		90	131
	Rhinoplasty positive	Unadjusted	102.03	11.75	0.973	76	124
		Adjusted	102	9.58		82	121
Males	Rhinoplasty negative	Unadjusted	103.46	12.308	**<0.001**	75	124
		Adjusted	106.89	10.707		90	131
	Rhinoplasty positive	Unadjusted	96.92	12.132	0.194	76	116
		Adjusted	99.08	9.501		82	112
Females	Rhinoplasty negative	Unadjusted	100.94	10.074	<0.001	82	126
		Adjusted	105.78	8.336		90	127
	Rhinoplasty positive	Unadjusted	105.65	10.356	0.239	84	124
		Adjusted	104.06	9.377		89	121
3—Nasomental angle		**Mean**		**SD**	***p* Value**	**Smallest value**	**Greatest value**
All sample	Rhinoplasty negative	Unadjusted	129.21	5.69	**<0.001**	102	145
		Adjusted	131.19	4.71		122	144
	Rhinoplasty positive	Unadjusted	130.20	4.83	**1.000**	121	143
		Adjusted	130.20	4.65		121	143
Males	Rhinoplasty negative	Unadjusted	128.54	6.849	0.009	102	145
		Adjusted	130.77	5.042		125	144
	Rhinoplasty positive	Unadjusted	133.25	4.309	0.845	128	143
		Adjusted	133.42	4.481		128	143
Females	Rhinoplasty negative	Unadjusted	129.86	4.284	0.001	121	139
		Adjusted	131.61	4.403		122	141
	Rhinoplasty positive	Unadjusted	128.06	4.038	0.817	121	137
		Adjusted	127.94	3.307		121	133

4—Nasofacial angle		Mean		SD	*p* Value	Smallest value	Greatest value
All sample	Rhinoplasty negative	Unadjusted	34.60	3.88	<0.001	27	42
		Adjusted	31.15	3.47		24	39
	Rhinoplasty positive	Unadjusted	32.44	3.23	0.0215	25	38
		Adjusted	31	3.13		24	38
Males	Rhinoplasty negative	Unadjusted	35.86	4.436	<0.001	27	42
		Adjusted	31.74	3.543		24	39
	Rhinoplasty positive	Unadjusted	31.92	3.679	0.018	25	38
		Adjusted	28.92	2.875		24	33
Females	Rhinoplasty negative	Unadjusted	33.39	2.960	<0.001	27	38
		Adjusted	30.58	3.350		24	39
	Rhinoplasty positive	Unadjusted	32.82	2.942	0.534	26	36
		Adjusted	32.47	2.452		29	38

Our study is the first of its kind in the Syrian population, as it defined the values of anthropometric measurements among a Syrian population of young adult males and females. It also provided reference measurements that can be used before surgical procedures in this ethnical group. Given the dissatisfaction reported by individuals of both genders following rhinoplasty procedures concerning nasal tip projection, it is recommended that further studies be conducted on a broader scale within Syria to ascertain the extent of this issue. Subsequently, the resultant findings should be disseminated to plastic surgeons and otorhinolaryngologists across the nation to facilitate the development and implementation of efficacious interventions aimed at addressing this concern. These same studies could also provide a deeper understanding of facial esthetic preferences in this ethnic group, which could increase the satisfactory outcomes of surgical procedures.

Nevertheless, it is still advisable to use photogrammetry before undergoing surgery, as our results demonstrated that each individual has their own preferred measurements, and by using photogrammetry, we can ensure the patient's satisfaction with the outcome of the surgery.

4.1 | Limitation

We agree that the study has several limitations, primarily due to the small sample size. Many students declined to participate when told that doing so would include having their images taken and utilized in the research. Additionally, the Covid-19 restrictions at the time of conducting the study limited the amount of interaction between the authors and the students. Another drawback was the time some of the authors spent learning how to use the software required to carry out this study, as they were not familiar with them before doing so. As a result, the study's sample had to be kept to a size that was consistent with the authors' humble level of skills in using these sophisticated software programs.

5 | CONCLUSION

Our study showed that the Syrian population had different facial esthetic preferences when compared to other neighboring populations as well as overseas populations regarding ideal anthropometric measurements. All measurements used in our study on the rhinoplasty-negative participant group, aside from the Powell-modified Baum ratio, were found to have a difference between the before and after adjustments. In contrast, the rhinoplasty-positive participant group exhibited statistically significant differences only in the Byrd and Hobar ratio, nasal index, and nasofacial angle before and after adjustments. These findings imply that the majority of the participants who had not undergone rhinoplasty expressed a desire to modify various aspects of their nasal measurements, with the exception of their nasal tip projection. Additionally, it suggests that plastic surgeons in the region have been successful in identifying the most preferred nasal measurements for rhinoplasty among this specific ethnic group.

Embracing photogrammetry benefits rhinoplasty surgeons by aiding discussions with patients before surgery, improving communication, and aligning expectations with achievable results. This approach enhances patient satisfaction and underscores ethical responsibilities.

Acknowledging previous studies is crucial, allowing us to respectfully build on their groundwork. Ultimately, our research bridges cultural influences, patient preferences, and surgical expertise, deepening our understanding of facial esthetics and rhinoplasty.

TABLE 3 Participants' Nasal Index and ratios ($n = 100$).

1—Nasal Index		Mean		SD	*p* Value	Smallest value	Greatest value
All sample	Rhinoplasty negative	Unadjusted	71.71	6.70	**<0.001**	58	87
		Adjusted	62.91	6.27		50	77
	Rhinoplasty positive	Unadjusted	67.96	7.48	**<0.001**	56	81
		Adjusted	62.55	5.49		50	72
males	Rhinoplasty negative	Unadjusted	73.31	6.457	**<0.001**	61	87
		Adjusted	64.20	5.759		51	75
	Rhinoplasty positive	Unadjusted	74.25	5.956	**<0.001**	62	81
		Adjusted	66.08	3.988		59	72
females	Rhinoplasty negative	Unadjusted	70.17	6.670	**<0.001**	58	86
		Adjusted	61.67	6.581		50	77
	Rhinoplasty positive	Unadjusted	63.53	4.797	0.002	56	72
		Adjusted	60.06	5.093		50	72
2—Nasal tip projection (Byrd and Hobar ratio)		**Mean**		**SD**	***p* Value**	**Smallest value**	**Greatest value**
All sample	Rhinoplasty negative	Unadjusted	0.62	0.06	**<0.001**	0.48	0.75
		Adjusted	0.60	0.05		0.46	0.72
	Rhinoplasty positive	Unadjusted	0.64	0.07	0.0139	0.5	0.83
		Adjusted	0.62	0.06		0.53	0.83
Males	Rhinoplasty negative	Unadjusted	0.6400	0.06073	0.001	0.51	0.75
		Adjusted	0.6156	0.05256		0.50	0.72
	Rhinoplasty positive	Unadjusted	0.6433	0.08228	0.572	0.54	0.83
		Adjusted	0.6348	0.08098		0.55	0.83
Females	Rhinoplasty negative	Unadjusted	0.6122	0.05871	0.007	0.48	0.72
		Adjusted	0.5880	0.05571		0.46	0.68
	Rhinoplasty positive	Unadjusted	0.6406	0.06740	0.003	0.50	0.75
		Adjusted	0.6147	0.05200		0.53	0.70
3—Nasal tip projection (Powell-modified Baum ratio)		**Mean**		**SD**	***p* Value**	**Smallest value**	**Greatest value**
All sample	Rhinoplasty negative	Unadjusted	3.08	0.34	0.0160	2.47	4.14
		Adjusted	3.19	0.33		2.14	4.18
	Rhinoplasty positive	Unadjusted	3.06	0.37	0.609	2.33	3.93
		Adjusted	3.08	0.28		2.45	3.71
Males	Rhinoplasty negative	Unadjusted	3.0757	0.34881	0.132	2.50	4.14
		Adjusted	3.1937	0.36313		2.14	4.15
	Rhinoplasty positive	Unadjusted	3.1017	0.38328	0.223	2.33	3.60
		Adjusted	3.1892	0.34087		2.45	3.71
Females	Rhinoplasty negative	Unadjusted	3.0956	0.34473	0.043	2.47	4.07
		Adjusted	3.2006	0.31691		2.68	4.18
	Rhinoplasty positive	Unadjusted	3.0394	0.38158	0.603	2.50	3.93
		Adjusted	3.0135	0.21760		2.61	3.53

AUTHOR CONTRIBUTIONS

André Torbey: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; software; supervision; validation; visualization; writing—original draft; writing—review and editing. **Elian Mdawr**: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; software; supervision; validation; visualization; writing—original draft; writing—review and editing. **Fares Kahal**: Validation; writing—original draft; writing—review and editing. **Mohammad Rmman**: Data curation. **Abdullah Omar**: Software. **Mhd Amin Alzabibi**: Writing—original draft. **Saeed A Kadri**: Validation. **Enaam Tawahri**: Visualization. **Louei Darjazini Nahas**: Supervision.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data sets and pictures used and/or analyzed during the current study are available upon a reasonable request. Requests for access to the data and materials can be directed to fareskahal@hotmail.com. The authors are committed to facilitating transparency and reproducibility and will provide the requested information promptly.

ETHICS STATEMENT

The Research Ethics Committee in the Syrian Private University and the ethical committees in the concerned hospitals approved the study protocol. Written informed consent was obtained from every participant before participation. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

TRANSPARENCY STATEMENT

The lead author Fares Kahal affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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