

Review Article

Are rhinoplasty patients satisfied if the anthropometric parameters of their nose are essentially in normal range after the surgery?

Ramin Foroughi^a, Alireza Babaei Darzi^{a*}, Karimollah Hajian-Tilaki^b,
Mohammad khakzad^c and Ali Shabani^d

^aDepartment of Oral and Maxillofacial Surgery, Faculty of Dentistry,

^bDepartment of Biostatistics and Epidemiology,

^cAssistant of plastic surgery, ^dAssistant of ENT surgery,

Babol University of Medical Sciences, Babol, Iran

*Corresponding Author:Email : dr_alireza_da@yahoo.com

ABSTRACT

Objective: Rhinoplasty is the most common cosmetic surgical procedure in Iran. Although assessment of surgical outcomes by patients has an effective role in success of the treatment plan, objective analysis seems to be important. In this study, we tried to compare some of the anthropometry criteria (including angles, proportions and distances) with some subjective items to realize how far they are coincident.

Materials and methods: This cross-sectional study was conducted on 80 patients aged between 19 and 55 years old who were undergone primary rhinoplasty. Patients' photographs were evaluated in terms of some criteria including nasolabial angle, nasofrontal angle, tip projection and length of nose pre and post operatively. Ultimately, patients' satisfaction was assessed using Rhinoplasty Outcome Evaluation (ROE) questionnaire and compared with normal range of previously mentioned objective criteria according to what has been published in the literature.

Result: Of 80 participants (21 men, 59 women) with a mean age 28.9 ± 7.3 years (19-55 years). About 61.3% of these patients were single, and 32.5% were engaged. Nose hump was chief complaint for 43(53.8%) of patients and 10(12.5%) main problem with tip drooping nose. 87% of patients (100% of men) wished natural nose. Evaluation of anthropometric criteria in patients' pre and post operatively shows that nasal length in 60% and 6.3% were not in normal range respectively. Tip projection in 68.8% and 11.3% were not in normal range before and after rhinoplasty.

Conclusion: Patients with lower nasal length and higher nasolabial angle were more satisfied after the surgery and there were no correlation between satisfaction and clinical criteria.

Keywords: cosmetic surgery, rhinoplasty, satisfaction, nasolabial angle, nasofrontal angle, tip projection.

1. INTRODUCTION

Anthropometry is the science that defines the measurements of the size, forms and proportions of the human body. Today, anthropometry plays an important role in cosmetic surgery [1]. Rhinoplasty or nose reshaping has been considered as one of the most common cosmetic surgeries with over than 225,000 cases performed in 2009 in the United States [2]. Iran has the highest rate of rhinoplasty in the world which is 7 times of the United States[3]. The high rate of rhinoplasty in Iran may be caused

by several factors such as, progression in surgical techniques, inexpensive cost and the national regulations [4]. Body image is a personal perception of someone's own body[5]. Different cultures may influence on perception of physical appearance[6, 7]. Aesthetic criteria and nasal characteristics are unique for each ethnic group. Hence, the surgeons need to know anthropometric norms of each population [8]. Successful rhinoplasty outcomes mainly depend on patient's report, quality of life and

satisfaction [9]. Whilst the subjective assessment is important to understand outcomes of surgery, objective analysis and defined aesthetic criteria have paramount importance in ongoing planning of rhinoplasty surgeries and choosing the best surgical techniques[10]. Most published researches have concentrated upon improving the rhinoplasty techniques but there are few researches focusing on association between patient's satisfaction (subjective outcome) and aesthetic improvement (objective outcome). Therefore, the current study was conducted to compare the postoperative clinical outcomes and satisfaction of rhinoplasty patients in an Iranian population.

2. MATERIAL AND METHOD

Patients and setting

In this cross-sectional study implemented in Mazandaran province of Iran, 80 patients participated who had undergone primary rhinoplasty six months or more before the surgery. The exclusion criteria consisted of previously performed rhinoplasty, existence of congenital nasal deformity and also having a history of psychological problems.

The study was approved by the Ethic Committee of Babol University of medical sciences. In all patients, nasolabial angle, nasofrontal angle, nasal tip projection and length of nose were measured using standardized digital

photographs. Nasolabial angle is being defined as an angle between the line drawn through the midpoint of nostril and the upper lip. nasofrontal angle was assessed on profile view. Defining as an angle between the dorsum of the nose and the glabella, the nasofrontal angle was assessed on profile view (fig.1). To evaluate tip projection, a line was drawn from alar-cheek junction to the tip of the nose. Then, a vertical line was drawn passing the most projection point of the upper lip. Tip projection was considered adequate if at least 50% of the horizontal line was anterior to the vertical line. The tip was defined as over projection when the amount was greater than 60%. The nasal length was assessed by a line draw from nasion to subnasale, the ratio of which to tip projection should be approximately 1.5: 1.0 (Fig.2)[11].The rhinoplasty outcomes evaluation (ROE) questionnaire, consisting of questions to evaluate patients' opinion about their nose, was used pre and post operatively to assess the nasal state. Patients satisfaction were graded on a 1-4 scale (1 = not satisfied; 2 = slightly satisfied; 3 = satisfied; 4 = very satisfied). Ultimately, the sum of scores was divided in 16 and multiplied by 100 and the result was reported as the satisfaction percentage. Ultimately, the correlation between each of the studied anthropometric items and patient-satisfaction was separately evaluated for all the participants.

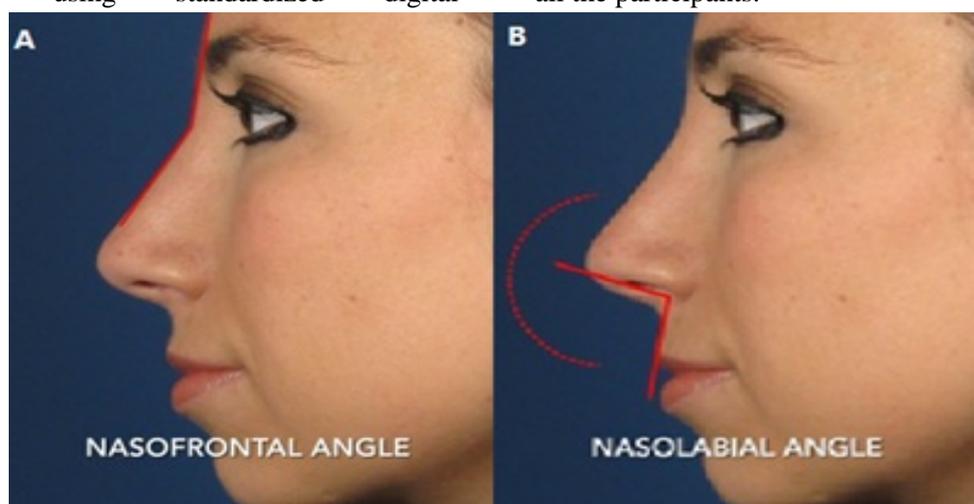


Fig 1. Lateral index. A, indicate nasofrontal angle; B,nasolabial angle

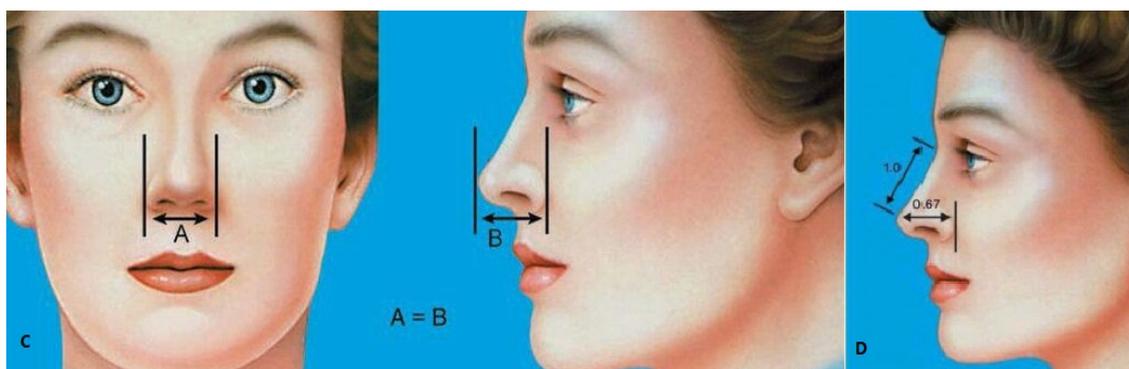


Fig 2. Lateral index. C, tip projection; D, nasal length [11]

Statistical analysis

The statistical analysis was performed by using SPSS version 18. Data is expressed as frequency (percentage) and mean \pm standard deviation. Statistical correlation was evaluated using the Spearman’s correlation test. Comparison between groups was analyzed using Chi-Squared and KruskalWallis tests for non-parametric data and unpaired t-test for parametric data. The level of statistical significance was set at p value of <0.05 .

3. RESULT

The study population included a total of 80 patients, (21 men and 59 women) with a mean age of 28.9 ± 7.3 years (19-55 years). About 61.3% of these patients were single, and 32.5% were married and others were divorced. 60% had academic education. All patients had undergone a primary rhinoplasty and their chief complaint included 43(53.8%) humpy nose, 10(12.5%) tip drooping, 8(10%) nasal deviation, 6(7.5%) big tip of the nose, 6(7.5%) alar wideness, 4(5%) over projection, 3(3.8%) wide dorsum. All male demanded natural nose whereas 83.1% of females made such request. Table 1 shows that the overall satisfaction rate in males, the following results were obtained: satisfied 12(57.1%), highly satisfied 5(23.8%), slightly satisfied 3(14.3%), not satisfied 1(4.8) and in females the result were as follows: 28(47.5%) were satisfied, 15(25.4%) were highly satisfied, 15(25.4%) were

slightly satisfied and 1(1.7%) was not satisfied. About 64 patients (80.1%) were satisfied or highly satisfied with their nasal length after rhinoplasty. 36 Patients (45%) were satisfied with postoperative nasolabial angle, whereas 21(26.3%) were slightly satisfied, 19(23.8%) were highly satisfied and 4(5%) were not satisfied. Evaluation of the patients` satisfaction in relation with the postoperative tip projection showed that 34 Patients (42.5%) were satisfied, 23(28.8%) were highly satisfied, 17(21.3%) were slightly satisfied and 6(7.5%) were not satisfied.

Pre-operative evaluation of anthropometric criteria in patients showed that nasal lengths in 13(61.9%) of male and 35(59.3%) of female were not in normal range. Likewise, tip projection in 18(85.7%) of male and 37(62.7%) of female were not in normal range before rhinoplasty. Pre-operatively, nasolabial angle in 14(66.7%) of male, 44(74.6%) of female and nasofrontal angle in 9(42.9%) of male, 42(71.2%) in female were abnormal, respectively.

Post-operative data analysis showed that nasal length in 20(95.4%) of males and 55(93.2%) of females and also tip projection in 19(90.5%) of males, 52(88.4%) of females were in normal range. On the other hand, nasolabial angle in 11(52.4%) of males, 40(67.8%) of females and nasofrontal angle in 9 (42.9%) of males and 11 (18.6%) of females were in normal range.

Table 1. Patients` satisfaction rate after rhinoplasty with respect to anthropometric criteria.

Anthropometric criteria		Highly satisfied	Satisfied	Slightly satisfied	Not satisfied
Nasolabial angle	me =	5(23.8%)	10(47.6%)	5(23.8%)	1(4.8%)

Tip projection		6(28.6%)	9(42.9%)	6(28.6%)	(0.00%)
Nasal length		8(38.1%)	9(41.9%)	4(19%)	0(0.00%)
Nasolabial angle	women	14(23.7%)	26(44.1)	16(27.1%)	3(5.1%)
Tip projection		17(28.8%)	25(42.4%)	11(18.6%)	6(10.2%)
Nasal length		17(28.8%)	30(50.8%)	12(20.3%)	0(0.00%)

Table2. The clinical accordance of anthropometric criteria before and after rhinoplasty.

Anthropometric criteria		Before		After		p-valu
		No	Yes	No	Yes	
Nasolabial angle	men	14(66.7%)	7(33.3%)	10(47.6%)	11(52.4%)	0.03
Nasofrontal angle		9(42.9%)	12(57.1%)	12(57.1%)	9(42.9%)	0.08
Tip projection		18(85.7%)	3(14.3%)	2(9.5%)	19(90.5%)	0.001
Nasal length		13(61.9%)	8(38.1%)	1(4.8%)	20(95.2)	0.001
Nasolabial angle	women	44(74.6%)	15(25.4%)	19(32.2%)	40(67.8%)	0.04
Nasofrontal angle		19(32.2%)	40(67.8%)	48(81.4%)	11(18.6%)	0.1
Tip projection		37(62.7%)	22(37.3%)	7(11.9%)	52(88.1%)	0.04
Nasal length		35(59.3%)	24(40.7%)	4(6.8%)	55(93.2%)	0.02

The average of total satisfaction and also clinical criteria compliance with normal values, based on 12 questions in the patients' satisfaction questionnaire, were 74.84% and 78.97%, respectively. Therefore the difference between these two items which was about 4.1% was statistically considered to be significant ($p=0.016$).

The average of clinical criteria compliance with normal values before and after the surgery was 62.95% and 78.97% respectively, the difference of which was 16%. So, it represented an improvement of post-operative clinical criteria ($p=0.001$).

Table3. Comparison percentage of total score of patients' satisfaction and clinical assessments.

Total score	Mean \pm SD	p-valu
Total score 3 patients' satisfaction	74.8437 \pm 13.55	0.016 _a
Total score 5- clinical assessment after surgery	78.9773 \pm 7.45	
Total score 4- clinical assessment before surgery	62.9545 \pm 8.68	0.001 _b

a. patients' satisfaction compare with accordance of clinical criteria post operatively.

b. comparing clinical evaluation before and after rhinoplasty

DISCUSSION

Rhinoplasty is one of the widely performed operations in cosmetic surgery. The history of modern rhinoplasty goes nearly as far back as 200 years [12]. Iran has the highest rate of rhinoplasty in the world which is 7 times of the United States. The high rate of rhinoplasty in Iran may be caused by several factors such as, progression in surgical techniques, low expenses of the surgery and also the national regulations concerning clothing especially for women [4]. Since women care more about their appearance,

the rate of rhinoplasty are more common in them [4]. Patients' satisfaction has not been studied in Iranian rhinoplasty population, paying meticulous attention to his or her statement as a personal judgment. Sex distribution was 73.7% females and 26.3% males. We did our study using normal range values published in other references for the lack of such data declared in Iranian population [13]. The most difficult kind of nose to get the acceptable outcome after rhinoplasty belongs to the Middle East population [14]. The main cause of this

difficulty is possibly related to thicker overlying skin compared to European or American population. Most Iranian rhinoplasty patients often complain of a large dorsal hump [15]. In this study humpy nose was chief complaint in 57% of patients, whereas 96% were not in normal range based on anthropometric criteria. Although aesthetic and functional outcomes following rhinoplasty have been reported previously [16, 17], but there are few researches focusing on correlation between patients' satisfaction and aesthetic improvement. In this study, we aimed to compare the postoperative clinical outcomes and patients' satisfaction in the Iranian population. In addition, our aim was to assess whether a positive aesthetic outcome would influence patients' satisfaction level or not. Hence, using standard frontal and lateral photographs, aesthetic outcome was assessed by measuring four prominent clinical criteria which was ultimately compared with the results taken from an appropriate questionnaire. The mean satisfaction rate in our investigation was 75%, which was the same as what reported by Hens, G. et al and Meningaud, J.P, et al [18, 19]. This high satisfaction role maybe partly attributed to improved rhinoplasty techniques that are widely used by the surgeons around the world. On the other hand, we think that the expectations of Iranian rhinoplasty patients to obtain optimal outcomes are not so high.

Although the mean nasolabial angle increased from 89° before the surgery to 109° post operatively, it was significantly greater than the normal range values, however, the related patients' satisfaction rate increased to 68.3%. In other words, there was a significant correlation between the patients' satisfaction and increasing nasolabial angle. Since no preoperatively reported nasolabial angle could be found in the literature, the result of our study was partially similar to those presented only the postoperative values of the nasolabial angle. In this study, the patients' request to have natural appearing nose (87.5%) was in contrast with being satisfied with nasolabial angle more than normal values (63.75%). So, it seems that our patients were not aware of the features of a natural appearing nose which should be defined for them meticulously

before the surgery to decrease the possibility of postoperative medico legal problems. We found no correlation between satisfaction and nasofrontal angle. Albeit the mean of nasofrontal angle was greater than normal values after the surgery, its rise was not significant ($p=0.09$). However, increase of patients' satisfaction rate was significant. These results showed that we did not succeed in correction of nasofrontal angle, though it was not chief complaint of the patients. Accordingly, our study was similar to Graber's research [20]. In this study, 31.2% of patients had normal tip projection before rhinoplasty but it was significantly improved to 75% after the surgery ($p=0.001$) which increased satisfaction rate significantly in the patients ($p=0.4$). So our results were different from those of Werther, J. R. et al [21]. Who reported that tip projection was post operatively in normal range in 40% of their patients, unfortunately they did not declare the number or percentage of the patients whose nasal tip projection were in normal range, therefore, it is comparable with our survey [21]. Nasal length was in normal range in 40% of the patients before surgery and 93% of them after the operation. This showed that significant change in nasal length occurred ($p=0.001$) which gave rise to increased postoperative satisfaction rate in 81.1% of the patients.

4. CONCLUSION

The mean of nasolabial and nasofrontal angle was greater than normal values after the surgery but patients' satisfaction rate increased significantly. Shortening the nasal length increased patients' satisfaction. So patients with lower nasal length and higher nasolabial angle were more satisfied after the surgery.

Conflict of interest

The authors declare that they have no conflict of interest.

REFERENCES

1. Farkas, L.G., M.J. Katic, and C.R. Forrest, *Comparison of craniofacial measurements of young adult African-American and North*

- American white males and females.* Ann Plast Surg, 2007. **59**(6): p. 692-8.
2. Rohrich, R.J. and J. Ahmad, *Rhinoplasty.* Plast Reconstr Surg, 2011. **128**(2): p. 49e-73e.
 3. Akbari Sari, A., et al., *Estimating the frequency and rate of first 50 common types of invasive procedures in iran healthcare system.* Iran J Public Health, 2012. **41**(10): p. 60-4.
 4. Arabi Mianroodi, A., M. Eslami, and N. Khanjani, *Interest in Rhinoplasty and Awareness about its Postoperative Complications Among Female high School Students.* Iran J Otorhinolaryngol, 2012. **24**(68): p. 135-42.
 5. Byrne, M., J.C. Chan, and E. O'Broin, *Perceptions and satisfaction of aesthetic outcome following secondary cleft rhinoplasty: evaluation by patients versus health professionals.* J Craniomaxillofac Surg, 2014. **42**(7): p. 1062-70.
 6. Sousa, A.D., S. Devare, and J. Ghanshani, *Psychological issues in cleft lip and cleft palate.* J Indian Assoc Pediatr Surg, 2009. **14**(2): p. 55-8.
 7. Daniel, R.K., *Middle Eastern rhinoplasty in the United States: Part I. Primary rhinoplasty.* Plast Reconstr Surg, 2009. **124**(5): p. 1630-9.
 8. Sepehr, A., et al., *The Persian woman's face: a photogrammetric analysis.* Aesthetic Plast Surg, 2012. **36**(3): p. 687-91.
 9. Most, S.P., R. Alsarraf, and W.F. Larrabee, Jr., *Outcomes of facial cosmetic procedures.* Facial Plast Surg, 2002. **18**(2): p. 119-24.
 10. Pawar, S.S., et al., *Objective measures in aesthetic and functional nasal surgery: perspectives on nasal form and function.* Facial Plast Surg, 2010. **26**(4): p. 320-7.
 11. Gunter J, R.R., *Dalas rhinoplasty.* quality medical, 2007.
 12. Pourdanesh, F., et al., *Ethnic rhinoplasty in Iranians: the oral and maxillofacial surgery experience.* J Oral Maxillofac Surg, 2014. **72**(12): p. 2568 e1-7.
 13. Moss, J.P., et al., *Three-dimensional visualization of the face and skull using computerized tomography and laser scanning techniques.* Eur J Orthod, 1987. **9**(4): p. 247-53.
 14. Rohrich, R.J. and A. Ghavami, *Rhinoplasty for Middle Eastern noses.* Plast Reconstr Surg, 2009. **123**(4): p. 1343-54.
 15. Rohrich, R.J., A.R. Muzaffar, and J.E. Janis, *Component dorsal hump reduction: the importance of maintaining dorsal aesthetic lines in rhinoplasty.* Plast Reconstr Surg, 2004. **114**(5): p. 1298-308; discussion 1309-12.
 16. Anastassov, Y. and C. Chipkov, *Analysis of nasal and labial deformities in cleft lip, alveolus and palate patients by a new rating scale: preliminary report.* J Craniomaxillofac Surg, 2003. **31**(5): p. 299-303.
 17. Gurley, J.M., et al., *Long-term outcome of autogenous rib graft nasal reconstruction.* Plast Reconstr Surg, 2001. **108**(7): p. 1895-905; discussion 1906-7.
 18. Hens, G., et al., *High patient satisfaction after secondary rhinoplasty in cleft lip patients.* Int Forum Allergy Rhinol, 2011. **1**(3): p. 167-72.
 19. Meningaud, J.P., L. Lantieri, and J.C. Bertrand, *Rhinoplasty: an outcome research.* Plast Reconstr Surg, 2008. **121**(1): p. 251-7.
 20. Graber, I., S. Jovanovic, and A. Berghaus, *[Subjective and objective evaluation of the outcome of rhinoplasty. A retrospective study].* Laryngorhinootologie, 1995. **74**(8): p. 495-9.
 21. Werther, J.R. and J.P. Freeman, *Changes in nasal tip projection and rotation after septorhinoplasty: a cephalometric analysis.* J Oral Maxillofac Surg, 1998. **56**(6): p. 728-32; discussion 733.