

ORIGINAL ARTICLE

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Comparison of sexual behaviours and libido changes in septorhinoplasty patients with vomeronasal organ dissection by gender: A clinical study

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Abstract

Animals use the vomeronasal organ for interactions, including sexual intercourse, with conspecifics. Whether this orientation exists in humans is not yet fully understood. In this study, we aimed to compare the sexual behavior and libido changes of septorhinoplasty patients who underwent vomeronasal organ dissection according to gender. This is a cross-sectional descriptive study. The study sample included n=63 septorhinoplasty patients with vomeronasal organ dissection (31 females and 32 males). The data were collected using a personal and clinical characteristics form, the Arizona Sexual Experiences Scale (ASES) and the Libido Scoring System (LSS). The homogeneity test conducted for the personal characteristics of female and male septorhinoplasty patients did not reveal statistical significance, indicating homogeneity of the distribution. Both female and male patients had sexual dysfunction. The females had low libido, while the males had high libido, whereby the difference between them was statistically significant ($p < 0.01$). Based on the results of this study, dissection of the vomeronasal organ does not affect the development of sexual dysfunction or decreased libido in septorhinoplasty patients. This study did not compare septorhinoplasty patients with healthy controls. Future studies are recommended to compare septorhinoplasty patients with healthy controls in this field.

Keywords: Libido, septorhinoplasty, sexual dysfunction, sexuality, vomeronasal organ

Introduction

The main olfactory system (MOS) consists of olfactory sensory neurons (OSNs) located in the dome of the nasal cavity, which are positioned towards the glomerular neuropil in the olfactory bulb [1]. The olfactory epithelium (OE) is composed of numerous laminar neuroepithelium folds, and during inhalation and exhalation, odoriferous particles come into contact with the olfactory epithelium. OSNs extend many cilia in the olfactory epithelium, and the olfactory receptor gene becomes activated in response. In the olfactory epithelium, there are millions of OSNs, which combine with approximately a thousand odor receptor genes and the OSNs that activate these receptors. The activation of cilia in the olfactory epithelium stimulates the cAMP cascade, calcium-activated chloride channels, and cyclic nucleotide-gated

channels. These processes occur entirely in the olfactory cortex and spontaneously during both active and passive respiration [2-4]. There are primarily two regions in the OE associated with olfaction, known as the Gruneberg ganglion and the septal organ. The vomeronasal organ (VNO) is tubular, positioned bilaterally in the lower part of the nasal septum, opening into the mouth and nose, allowing the inflow of fluids containing pheromones, thanks to a vascular pumping mechanism [5].

The microvilli of vomeronasal sensory neurons (VSNs) are located in the lumen of the VNO, where they project odor to the olfactory bulb as a result of the expression of a distinct subset of G-protein coupled receptors associated with Gai2 (Gao) proteins [6-8]. The aforementioned sensory coding follows a series of complex processes within the framework of various rules. VSNs

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synaptically connect to various receptors, and it is a prevalent view in the literature that the discrimination of pheromones occurs through these synapses [9-11].

Most animals use their VNOs to interact with conspecifics by releasing chemicals in biological fluids. These chemicals signal the physiological state of the creature to which they belong, such as sexual desire, and socialize the creature. VNO is considered active in both stimulus input and output. In this context, the VNO has been reported as the main chemosensory organ for pheromones that mediate reproductive status and trigger sexual behavior in mammals [12]. The possible defined localization of the VNO is a region encountered by many plastic surgeons and otolaryngologists in rhinology practices. In most septal surgeries, this region is dissected bilaterally in the subperichondrial plane. In some cases, excisions are made from septal cartilage and vomer in this localization. Detailed clinical data on how the VNO, whose neuroendocrine effects in humans have not been fully elucidated, is affected by these surgical interventions have not been reported previously. The aim of this clinical study was to compare sexual behavior and libido changes in septorhinoplasty patients who underwent VNO dissection according to gender.

Material and Methods

This descriptive cross-sectional study was conducted to examine sexual behaviors and libido changes in septorhinoplasty patients with vomeronasal organ dissection according to gender.

Research questions

- What are the sexual behaviors of septorhinoplasty patients who underwent vomeronasal organ dissection according to gender?
- What are the libido changes according to gender in septorhinoplasty patients who underwent vomeronasal organ dissection?

Study design and participants

After obtaining an ethical approval, this study was conducted in the Plastic, Reconstructive and Aesthetic Surgery Clinic of a hospital in western Türkiye with the participation of patients who underwent septorhinoplasty including vomeronasal organ dissection. A power analysis was performed for sample calculation and according to the test result, n=41 patients (0.05 margin of error, 95% confidence interval) had to be included in the sample. The sample of this study consisted of n=63 patients who met the inclusion criteria.

Inclusion and exclusion criteria

The inclusion criteria for this study were (i) having undergone septorhinoplasty including vomeronasal organ dissection at least 6 months ago in the clinic where the study was conducted (ii) being 18 years of age or older, (iii) having no communication problems, (iv) having a regular relationship for at least 6 months (v) agreeing to participate in the study, (vi) having no preoperative sexual dysfunction or sexuality-related disease

(vii) having no postoperative complications and/or comorbid diseases. The opposite of the inclusion criteria was determined as the exclusion criteria for this study.

Data collection and data collection tools

In this study, data collection was performed prospectively by the researchers between September 22 and October 2, 2023. Data were collected by the researchers during routine health check-ups of the patients through face-to-face interviews. The patients in the sample were taken one by one to a private interview room, the data collection forms were presented to them after obtaining their informed consent, and then they completed the by themselves within 30 minutes. The data were collected using a personal and clinical characteristics form, the Arizona Sexual Experiences Scale (ASES) and the Libido Scoring System (LSS).

Personal characteristics form

The personal characteristics form is an information form in which age, gender, marital status, marital status, educational and economic status, and time of surgery are recorded for individuals who have undergone septorhinoplasty including vomeronasal organ dissection.

Arizona sexual experiences scale (ASES)

The Arizona Sexual Experiences Scale (ASES) has separate male and female versions, and we used both of them in this study. The ASES was first developed by McGahuey et al. [13] (2000). The Turkish validity and reliability analyses of the scale were conducted by Soykan [14] (2004). The Cronbach's α coefficient of the scale was found to be 0.90. The ASES is a 5-point Likert-type scale, scoring from 1 to 6. The total score ranges between 5 and 30. A higher score indicates greater sexual dysfunction. The ACAS includes items about sexual desire, arousal, penile erection/vaginal lubrication, orgasm and satisfaction with orgasm. In this study, we found the Cronbach's α value of the scale as 0.81.

Libido scoring system (LSS)

The Libido Scoring System (LSS) is a 4-item scale, where the scoring is based on 12 points. The LSS includes items about masturbation, frequency of libido, initiator of sexual intercourse and sexual satisfaction. The responses are scored between 0 and 3. For the total score, 0-2 points represent very low libido, 3-4 points represent low libido, 5-7 points represent good libido and 8-12 points represent high libido. The LSS was first developed by Api et al. (2005) [15], who reported the Cronbach's α coefficient of the scale as 0.83 [16]. In this study, we found the Cronbach's α coefficient as 0.71.

Statistical analysis

The data were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) 25.0 IBM (Armonk, NY) program. Frequency analyzes (percentage, number) and descriptive statistics (mean, standard deviation, minimum and maximum value) were performed to define sociodemographic variables

and average scores of the scales. Before the analysis, normal distribution of the data was examined using the Kolmogorov-Smirnov test. Independent samples t test, one-way analysis of variance, chi-square test were used for the data analysis. The reliability coefficient of the ASES was calculated using Cronbach's α coefficient. For evaluating the results of the study, 95% confidence interval and $p<0.05$ error level were considered.

Ethical considerations

Before collecting data, an institutional review board's approval was obtained by the researchers from a private plastic, reconstructive and aesthetic surgery clinic in Istanbul. Then, an ethics committee permission was obtained from İstanbul Arel University Human Research Ethics Committee by the researchers (Date: 22.09.2023, Decision No: 2023/19/04). The steps of the study were followed in accordance with the Declaration of Helsinki, and informed verbal and written consent was obtained from all septorhinoplasty patients.

Results

Totally 62.54 (mean age 58.6 ± 17.0 , years) patients who admitted Table 1 shows the personal characteristics of patients who underwent septorhinoplasty including vomeronasal organ dissection. The sample included 31 female and 32 male patients. The mean age of the female patients was 28.32 ± 6.81 years, 41.9% of them were high school graduates, 48.4% were married and had good economic status, and 48.4% had undergone septorhinoplasty between 1 and 2 years ago. The mean age of male patients was 29.65 ± 5.78 years, 46.9% of them were high school graduates, married and had a moderate economic status,

and 46.9% had undergone septorhinoplasty between 1 and 2 years ago. The homogeneity test between the personal characteristics of male and female septorhinoplasty patients showed no statistical significance and the distribution was homogeneous.

Table 2 and Figure 1 shows the ASES and LSS mean scores of patients who underwent septorhinoplasty involving vomeronasal organ dissection. The ASES mean score of the females was 18.51 ± 3.27 ; their mean scores on the ASES subscales were 4.09 ± 1.22 for sex drive, 3.51 ± 1.38 for psychological arousal, 3.93 ± 1.48 for vaginal lubrication, 4.03 ± 1.22 for orgasm and 2.93 ± 1.31 for satisfaction with orgasm. The ASES mean score of the males was 17.78 ± 2.36 , and their mean scores on the ASES subscales were 3.96 ± 1.42 for sex drive, 3.68 ± 1.46 for psychological arousal, 3.34 ± 1.38 for penile erection, 3.31 ± 1.61 for orgasm and 3.46 ± 1.54 for satisfaction with orgasm. The LSS mean scores of the males and females were 8.25 ± 1.95 and 4.19 ± 2.15 , respectively.

Table 3 compares the ASES and LSS mean scores of male and female patients who underwent septorhinoplasty involving vomeronasal organ dissection. There was no statistically significant difference between the sexual function (LSS scores) of male and female patients. The males had higher libido (LSS scores) than the females and this difference was statistically significant ($p<0.01$).

In Table 3 schematizes the scores of male and female patients who underwent septorhinoplasty including vomeronasal organ dissection. Accordingly, the majority of male patients had good and high levels of libido, while the females had various levels of libido.

Table 1. Personal characteristics of septorhinoplasty patients with vomeronasal organ dissection (N=63)

Personal characteristics	Female (n=31)	Male (n=32)	Homogeneity test
	($\bar{x}\pm Sd$) (Min, Max)	($\bar{x}\pm Sd$) (Min, Max)	
Age	28.32 $\pm$ 6.81 (19, 43)	29.65 $\pm$ 5.78 (19, 41)	F=0.145 p=0.811
	n (%)	n (%)	
Education level			
Primary school	9 (29)	4 (12.5)	χ^2 =0.711 p=0.312
High school	13 (41.9)	15 (46.9)	
University and above	9 (29)	13 (40.6)	
Marital status			
Married	15 (48.4)	15 (46.9)	χ^2 = 1.673 p=0.456
In a relationship	16 (51.6)	17 (53.1)	
Economic status			
Moderate	16 (51.6)	15 (46.9)	χ^2 =0.888 p=0.097
Good	15 (48.4)	17 (53.1)	
Time to undergo septorhinoplasty			
6 months to 1 year	9 (29)	10 (31.3)	χ^2 =1.123 p=0.900
1 to 2 years	15 (48.4)	15 (46.9)	
More than 2 years	7 (22.6)	7 (21.9)	

$\bar{x}$: mean, Sd: standard deviation, * $p<0.05$, F=ANOVA, one-way analysis of variance, χ^2 =Chi-square test

Table 2. The ASES and LSS mean scores of patients who underwent septorhinoplasty involving vomeronasal organ dissection (N=63)

Total and subscales	Items	Score range	$\bar{x}\pm Sd$
ASES (Female) (n=31)	Items 1-5	5-30	18.51±3.27 (Min 10, max 24)
Sex drive	Item 1	1-6	4.09±1.22 (Min 1, max 6)
Psychological arousal	Item 2	1-6	3.51±1.38 (Min 1, max 6)
Vaginal lubrication	Item 3	1-6	3.93±1.48 (Min 1, max 6)
Orgasm	Item 4	1-6	4.03±1.22 (Min 1, max 6)
Satisfaction with orgasm	Item 5	1-6	2.93±1.31 (Min 1, max 6)
ASES (Male) (n=32)	Items 1-5	5-30	17.78±2.36 (Min 14, max 24)
Sex drive	Item 1	1-6	3.96±1.42 (Min 1, max 6)
Psychological arousal	Item 2	1-6	3.68±1.46 (Min 1, max 6)
Penile erection	Item 3	1-6	3.34±1.38 (Min 1, max 6)
Orgasm	Item 4	1-6	3.31±1.61 (Min 1, max 6)
Satisfaction with orgasm	Item 5	1-6	3.46±1.54 (Min 1, max 6)
LSS (Female)	Items 1-4	0-12	4.19±2.15 (Min 0, max9)
LSS (Male)	Items 1-4	0-12	8.25±1.95 (Min 4, max 12)

$\bar{x}$: mean, Sd: standard deviation

Table 3. Comparison of the ASES and LSS scores of male and female patients who underwent septorhinoplasty involving vomeronasal organ dissection (N=63)

		t-test for equality of means						
							95% confidence interval of the difference	
		t	df	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
ASES	Equal variances assumed	1.023	61	.310	.73488	.71803	-.70092	2.17068
	Equal variances not assumed	1.018	54.514	.313	.73488	.72168	-.71170	2.18145
LSS	Equal variances assumed	-7.845	61	.000**	-4.05645	.51711	-5.09047	-3.02243
	Equal variances not assumed	-7.832	59.994	.000	-4.05645	.51792	-5.09245	-3.02046

t=Independent sample t test, **p<0.01

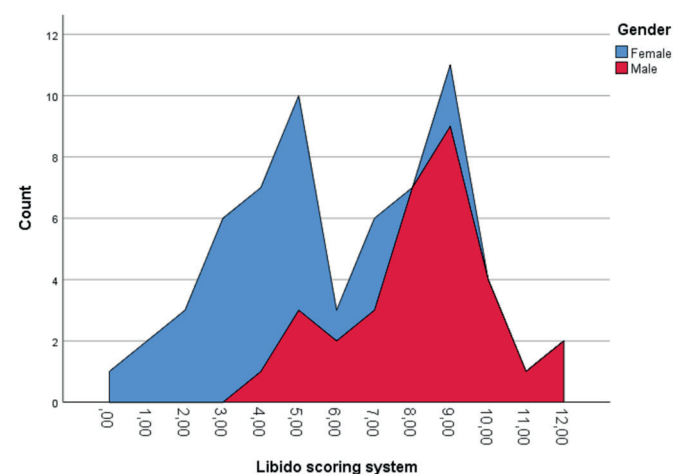


Figure 1. The ASES and LSS scores of male and female patients who underwent septorhinoplasty involving vomeronasal organ dissection

Discussion

Pheromones are complex, volatile and chemical signals. The sensing mechanism is mediated by VSNS-mediated MOS and is an important tool in the socialization of animals with their

conspecifics, generating behavioral and hormonal responses in the conspecifics of the secreting animal [17-19]. Body fluids containing pheromones are urine, feces, saliva and other secretions [20]. Pheromones are a means of communication among animals in general. This situation emerged for the first time when French scientist Jean-Henri Fabre (in 1870) identified them as sex attractant pheromone (*Bombyx mori*) in female peacocks. Sex attractant pheromones can regulate socio-sexual behaviors and physiology of the opposite sex. Unlike hormones, pheromones are secreted externally and regulate reproductive activity [21]. In this study, we focused on the sex attractant aspect of pheromones in humans, but pheromones are also involved in auditory, visual, contact and olfactory stimuli.

Sex-attractant pheromones may not always be "attracting", on the contrary, they may be "repellent". At this point, while stimulating pheromones increase physiological events, libido and sexual functioning, suppressive pheromones function in the opposite way [22]. Attractant/preparatory pheromones are secreted from the male (in mammals), initiating puberty, ovarian activity and estrus. Pheromones released from the male possum trigger follicular development and body growth in young females [23]. In pig, ram, cattle and buffalo, VNO is highly developed,

MOS functions in active olfaction and reproduction occurs in the Hypothalamic-Pituitary-Gonadal axis [21].

Considering the attractant and repellent properties of pheromones, they may cause libido changes. Such changes in animals are accepted in the scientific community as mentioned in the previous paragraphs. However, studies of human subjects are controversial in this regard. An advanced histomorphometric examination of the VNO removed during nasal surgery reported that terminated neural tubes associated with submucosal glands covered with pseudostratified epithelium were found on both sides [24-26]. Although it is difficult to prove histomorphometrically, there are physiologic interactions via VNO in humans [27-30]. A previous study emphasized that the VNO is atrophied in humans and that there is no need to preserve the VNO in septal operations [31]. The existence of VNO in humans is generally controversial [30,32,33]. In our study, the males had higher libido than the females. This may be because the women in our study may have concealed their true feelings in their responses due to traditional societal norms regarding female interest in sexuality or the stigma associated with high libido for women in Turkish society. In the Turkish society, the pressure associated with the stigma of having a high libido is undoubtedly greater on the female gender. Therefore, the males may have responded more freely and their LSS mean score was high. Our results suggest that dissection of the vomeronasal organ in septorhinoplasty patients does not damage the anatomical locations of the VNO.

Sexual dysfunction may occur due to several health issues such as major surgeries [34], diseases of vital organs (kidney, lung, liver, heart, etc.) and various comorbidities [35-37], depression and various psychiatric diseases [38,39], low self-esteem and body image [40]. Sexual dysfunction can be improved with aesthetic surgeries to provide a better body image. Septorhinoplasty improves facial appearance and enhances beauty. Thanks to septorhinoplasty, self-confidence may increase, sexual dysfunction may improve as well as libido may increase. In our study, there was no statistically significant difference between the male and female patients in terms of sexual function. Both genders scored above the average on the ASES. This may be because most of the patients had undergone septorhinoplasty less than 2 years ago. Complete recovery of patients in the postoperative period varies between 6 months and 2 years. This may have affected their responses to the ASES items.

Limitations

This is a single centered and a descriptive clinical study, it did not measure preoperative sexual function and libido. Social pressure due to traditional practices may have influenced the responses of female and male patients in the study. Complete recovery after septorhinoplasty was not considered in the study. In addition, the study did not examine the emotional bond between the patients and their partners, which may have affected their libido and sexual functions. These issues were considered as limitations of the present study.

Conclusion

Sexual dysfunction and libido are influenced by various factors, including social, psychological, and physiological ones. In our study, there was a significant increase in the level of libido in the males and a slight decrease in the females. Sexual dysfunction, on the other hand, was slightly higher than the average for both genders. Our study suggests that dissection of the vomeronasal organ does not play an effective role in increasing sexual dysfunction or decreasing libido in septorhinoplasty patients for both female and male. However, in this field, we recommend that future researchers plan new studies comparing with healthy controls.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

Before collecting data, an institutional review board's approval was obtained by the researchers from a private plastic, reconstructive and aesthetic surgery clinic in Istanbul. Then, an ethics committee permission was obtained from Istanbul Arel University Human Research Ethics Committee by the researchers (Date: 22.09.2023, Decision No: 2023/19/04). The steps of the study were followed in accordance with the Declaration of Helsinki, and informed verbal and written consent was obtained from all septorhinoplasty patients.

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