

# QUALITY OF LIFE ASSESSMENT IN PATIENTS UNDERGOING SEPTOPLASTY USING NOSE AND RHINOQOL QUESTIONNAIRES

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## Abstract

**Objective:** The purpose of the study was to assess the quality of life before and after nasal septal corrective surgery using the NOSE and RHINOQOL questionnaires .

**Materials and Methods:** Over a period of 18 months, thirty patients between the age of 17 to 65 years who underwent nasal septal corrective surgery and met the criterion of the study were included. The NOSE and RHINOQOL questionnaire scores were taken before surgery and at 1 and 3 months after surgery.

**Results:** Thirty patients were included in the study. The mean age was 23.2 years. There was significant improvement in the mean NOSE score by 35 points by 1 month after surgery and 51.17 points by 3 months after surgery. Among the RhinoQOL scores the symptom bothersomeness and impact improved at both 1 and 3 months post surgery while all symptom frequency improved at 3 months post surgery.

**Conclusion:** As assessed by the NOSE and RhinoQOL questionnaires,there was asignificant improvement in the disease specific quality of life in patients of symptomatic nasal obstruction after undergoing septal corrective surgery.

## Keywords

Quality of life, septoplasty, NOSE, RhinoQOL

## Introduction

Chronic nasal obstruction is a one of the commonest complaints of patients visiting an otorhinolaryngologist<sup>1</sup>.

The most important cause of nasal obstruction is septal deviation. Septoplasty is a commonly performed surgical procedure by otorhinolaryngologists and is generally performed to improve quality of life<sup>2</sup>.

Patients with deviated nasal septum not only have nasal symptoms but also features like anosmia, facial pain, difficulty in falling asleep, fatigue, reduced concentration, with possible psychological effects (frustration, restlessness, irritability etc.)<sup>3</sup>.

NOSE score is used to measure Quality of Life (QOL) for septoplasty. Patients are made to rate on a scale of 0 to 4, over a month their perceptions of 5 different questions, like nasal congestion. The total score is multiplied by 5 for a score out of 100, where 0 is asymptomatic and 100 is worst-case scenario.<sup>4,5</sup>

During the last decade, disease-specific instruments that measure nasal obstruction and health-related quality of life (QOL) have been validated to assess the impact of septoplasty.

These tools are reliable, reproducible, sensitive to change and have an excellent clinical correlation<sup>4-7</sup>.

A new Health Related Quality of Life (HRQL) the Rhinosinusitis Quality of Life survey (RhinoQOL), is a short, relevant, psychometrically sound measure of the severity of sinusitis symptoms (frequency and bothersomeness) and their functional impact.<sup>8</sup>

The aim of this study was to assess quality of life using NOSE and RhinoQOL questionnaires in patients undergoing corrective nasal septal surgery pre and post operatively.

The hypothesis was that the Quality of life improves in Indian patients undergoing corrective nasal septal surgery as assessed by NOSE and RhinoQOL questionnaires.

## Materials and methods

The study was held over a period of 18 months in our Hospital, a tertiary care hospital, after being approved by the institutional ethical committee and having taken due informed consent from the patients.

Patients between the age of 17 to 65 years of age having symptomatic deviated nasal septum requiring Septoplasty the primary mode of treatment were enrolled for the study.

We excluded patients requiring septal surgery for reasons other than deviated nasal septum, undergoing septal surgery combined with lateral wall of nose surgery, having medical contraindication for surgery, undergoing aesthetic nasal surgery, revision surgery, with acute nasal trauma, with adenoid hypertrophy or having uncontrolled asthma/nasal allergy.

For paired t-tests ( where significance level  $\alpha = 0.05$  and Power  $1-\beta = 0.80$  ) the formula for sample size is :  $2 + \{ \text{standard deviation} * (z_{\alpha/2} + z_{1-\beta}) / ( \text{mean}_1 - \text{mean}_2 ) \}^2$

The statistically significant sample size was found to be 22, hence 30 patients were enrolled for this study

All enrolled patients underwent routine blood investigations and diagnostic nasal endoscopy before surgery. Pre-operative NOSE and RhinoQOL scores were taken.

Under Local Anaesthesia and aseptic precautions, hemitransfixion incision applied. Mucoperichondrial and mucoperiosteal flaps raised till bony cartilagenous junction posteriorly following which mucoperiosteal and mucoperichondrial flaps were raised on the opposite side. All deviated parts of the

cartilagenous septum removed preserving the dorsal strut. Maxillary crest and the deviated parts of bony septum were removed. Nasal cavities were packing with medicated Merocel packs, which were removed after 48 hours of surgery.

In subsequent followups after one and three months of surgery, the NOSE and RHINOQOL questionnaire scores were again taken.

Pre-operative and post-operative NOSE and RhinoQol scores were taken using the English version of the questionnaires, which were translated to Hindi by the examining specialist doctor.

The pre and post- operative scores were then correlated to derive the results.

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean  $\pm$  SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non parametric test was used.

Statistical tests were applied as follows-

1. Quantitative variables were compared using Wilcoxon signed rank test between pre and postoperative.
2. Qualitative variables were correlated using Chi-Square test.

A p value of  $<0.05$  was considered statistically significant.

The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 25.0.

## Results

All the 30 patients who were enrolled in the study returned at 1 month and 3 months post operative period for the respective postoperative nose and RhinoQOL scores and the values were considered for the statistical analysis. The mean age was 23.2 with a range between 17 to 38 years (Table 1).

Table 1

Out of the 30 patients 2 were females and rest were males. 13 patients had right sided Deviated nasal septum, 16 patients had left sided deviated nasal septum while 1 patient had ‘S’ shaped deviated nasal septum. 16 patients had Deviated nasal septum only. Of the remaining patients, 9 had spur, 2 had buckling and 3 had caudal deviation.

Following septoplasty there was significant improvement scores, both at 1 and 3 months of followup.

A p value of  $<0.05$  was considered statistically significant.

The baseline NOSE score out of 100 was 62.5 with a standard deviation of  $\pm 16.3$ , while the score at 1 month after surgery was 27.5 with a standard deviation of  $\pm 17.7$  and at 3 months after surgery was 11.33 with a standard deviation of  $\pm 11.59$  (Table 2 and Figure 1).

Table 2: Comparison of pre op nasal score with post-operative 1 and 3 months.

Nasal Score	Mean $\pm$ Stdev	Median(IQR)	P value(comparison with pre op)
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<b>Pre op</b>	62.5 ± 16.23	65(50 - 75)	
<b>Post-operative 1 month</b>	27.5 ± 17.7	30(15 - 40)	<.0001
<b>Post-operative 3 months</b>	11.33 ± 11.59	10(0 - 15)	<.0001

Figure 1 :Comparison of pre op nasal score with post-operative 1 and 3 months.

All of the five Items on NOSE score improved after surgery.

There was statistically significant improvement in the first 4 items of the NOSE score (i.e Nasal congestion or stuffiness, Nasal blockage or obstruction, Trouble breathing through nose and Trouble sleeping) in the 1 month post operative score, and statistically significant improvement in all the 5 items (above mentioned 4 along with inability to get enough air through the nose during exercise or exertion) in the 3 months post operative score as can be seen from the increasing number and percentage of patients selecting lower scores with successive evaluations (Table 3).

Table 3 : Number (and percentage) of total patients selecting a certain answer for each of the 5 items of NOSE score.

As per the RhinoQOL questionnaire, of the symptom frequency scale blocked/stuffy nose, thick nasal discharge and runny nose showed significant improvement by the first month after surgery. In the 3 months post operative scores all the frequency items showed statistically significant improvement (Table 4).

Table 4 : Number (and percentage) of total patients selecting a certain answer for each of the 5 items of symptom frequency scale of RhinoQoL questionnaire.

All the items on symptom bothersomeness scale showed statistically significant improvement in the scores at both 1 and 3 months after surgery (Table 5).

Table 5 : Comparison of Mean +/- standard deviation and median scores of symptom bothersomeness scale of RhinoQol questionnaire.

Among the items in symptom impact scale, all showed statistically significant improvement in the scores at both 1 and 3 months after surgery (Table 6).

Table 6 : Number (and percentage) of total patients selecting a certain answer for each of the 9 items of symptom impact scale of RhinoQoL questionnaire.

## Discussion

Nasal obstruction is the most common symptom requiring septal surgery. We wanted to assess the outcome of the surgery on the quality of life in an Indian setup.<sup>9</sup>

Various studies have been conducted in the past to assess the outcome of nasal septal surgery, and mostly results have been similar with significant improvement in symptoms. However many of these include studies that were retrospective<sup>10,11,12,13</sup>, chart reviews, telephone surveys<sup>12</sup> and studies utilizing tools not specific to nasal obstruction (Glasgow Benefit Inventory)<sup>11</sup>. In our prospective interventional study we have used 2 scoring systems targeting symptoms of nasal obstruction and taken scores at 1 and 3 months into the post operative period.

Stewart MG et al had established NOSE scale as a valid tool to assess the effect of septoplasty<sup>4</sup>.

Atlas SJ et al used the RhinoQoL score with its symptom impact assessment to help observe the improvement of the non nasal / general physical outcomes of nasal obstruction and thus get a better idea of the overall quality of life of the individual<sup>6</sup>.

Hence we chose these two questionnaires as the NOSE score was specifically made to assess the quality of life in patients undergoing septoplasty, and the items in the RhinoQoL questionnaire closely related to the complaints and their impact on life of the patients presenting to us for symptomatic nasal obstruction due to nasal septal deviation.

No problems were encountered while using these two questionnaires in the Indian setup and could be easily translated to the patient by the specialist doctor.

We not only found that the symptoms had improved at the 1 month post operative period but also sustained or improved further in majority of the patients at 3 months post operative period. The trend was similar irrespective of the age, gender or other deformities of the nasal septum.

The RhinoQoL score with its symptom impact assessment helped us observe the improvement of the non nasal / general physical outcomes of nasal obstruction and thus get a better idea of the overall quality of life of the individual

A study was conducted by Mondina et al in 2012 for the assessment of nasal septoplasty using NOSE and RhinoQoL questionnaires. 100 patients met the inclusion criteria. Patients who returned the questionnaires after surgery were considered for statistical analysis. 64% were male and 36% were female. BMI was  $\geq 25$  kg/m<sup>2</sup> in 40%; 26% were smokers and 28% had allergic rhinitis treated by only oral antihistaminics of which 60% were permanent and moderate.

The mean NOSE and RhinoQoL scores at baseline and those at 6 months after were considered. There was a highly significant improvement in each score after septoplasty at 6 months ( $p < 0.00001$ ).

All NOSE components were improved after treatment ( $p < 0.00001$ ).

The frequency of nasal obstruction, rhinorrhea and facial pain was significantly reduced ( $p < 0.00001$ – $0.004$  and  $0.01$ , respectively). On the bothersomeness score, only nasal obstruction and rhinorrhea were improved with a statistically significant difference ( $p < 0.00001$  and  $0.0005$ , respectively). This was not the case for facial pain ( $p > 0.05$ ). All items on the impact score were significantly improved showing that septoplasty had a meaningful physical, cognitive, mood, sleep and social impact ( $p < 0.00001$ ).<sup>14</sup>

Another study conducted by Bezerra et al in 2012, used NOSE questionnaire, before and 3 months after nasal septal surgery, showed that septoplasty results in a statistically significant improvement in quality of life.<sup>15</sup>

In 2019 Grant & Gillman et al conducted a prospective observational cohort study to assess outcome of septoplasty 3 and 6 months after surgery using NOSE scale and Ease-of-breathing (EOB) likert scale. Statistically significant ( $p < 0.0001$ ) in scores were seen again at 3 and 6 months post operative evaluations as compared to baseline.<sup>16</sup>

In our study we documented the NOSE and RhinoQoL scores before and at 1 and 3 months after surgery and arrived at the results as discussed earlier, i.e. significant improvement in symptoms as per both scores after septoplasty.

Other scales like SNOT-22 questionnaire have also been used to assess the quality of life following septoplasty, but in our setup the complaints and symptoms of the patients related more closely to the items on RhinoQoL questionnaire. The advantage of the RhinoQoL questionnaire also lies in the fact that it can be used to assess both the nasal as well as the general health symptoms without the requirement of a separate questionnaire (eg. General Health Questionnaire) for the assessment of the latter.

The strengths of our study are the prospective design, use of two validated scoring systems for assessment of outcome, follow-up scores being obtained at 2 points of time in the post-operative period, was a single center study leading to not much variation in surgical skills and techniques and majority of the subjects enrolled showed significant improvement in symptoms after septoplasty.

Not having a control group can be considered a weakness of the study, however, the treatment of such symptomatic deviated nasal septum is surgical correction itself.

## **Conclusion**

With this study we can conclude that there is a significant improvement in the disease specific quality of life after undergoing septal corrective surgery as assessed by the NOSE and RhinoQoL questionnaires in patients of symptomatic nasal obstruction due to septal deformities.

## **Conflict of Interest**

None.

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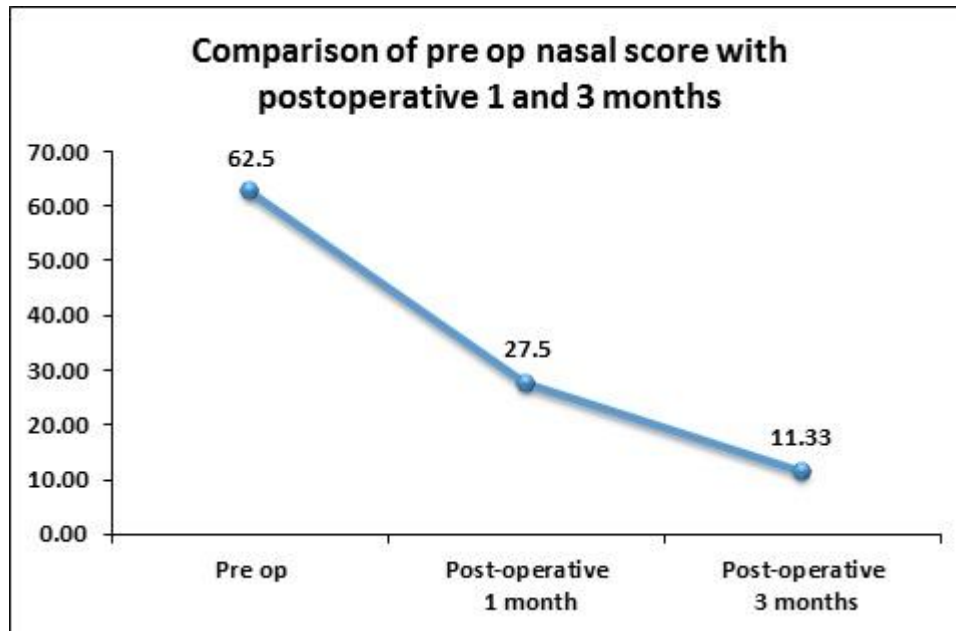


Figure -1

	Sample size	Mean $\pm$ Stdev	Median	Min-Max	Inter quartile Range
AGE	30	23.2 $\pm$ 5.85	21	17-38	19 - 25

Table -1



NOSE score	Pre op	Post-operative 1 month	Post-operative 3 months
<b>N1 - Nasal congestion or stuffiness</b>			
No problem	1(3.33%)	8(26.67%)	18(60.00%)
Very mild problem	2(6.67%)	7(23.33%)	5(16.67%)
Mild to moderate problem	10(33.33%)	9(30.00%)	6(20.00%)
Moderate problem	12(40.00%)	3(10.00%)	1(3.33%)
Severe problem	5(16.67%)	3(10.00%)	0(0.00%)
P value (comparison with pre op)		0.007	<.0001
<b>N2 - Nasal blockage or obstruction</b>			
No problem	0(0.00%)	7(23.33%)	17(56.67%)
Very mild problem	0(0.00%)	9(30.00%)	9(30.00%)
Mild to moderate problem	7(23.33%)	5(16.67%)	3(10.00%)
Moderate problem	10(33.33%)	9(30.00%)	1(3.33%)
Severe problem	13(43.33%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>N3- Trouble breathing through my nose</b>			
No problem	2(6.67%)	13(43.33%)	25(83.33%)
Very mild problem	1(3.33%)	11(36.67%)	3(10.00%)
Mild to moderate problem	7(23.33%)	3(10.00%)	1(3.33%)
Moderate problem	14(46.67%)	3(10.00%)	1(3.33%)
Severe problem	6(20.00%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>N4 -Trouble sleeping</b>			
No problem	4(13.33%)	16(53.33%)	23(76.67%)
Very mild problem	5(16.67%)	10(33.33%)	6(20.00%)
Mild to moderate problem	9(30.00%)	3(10.00%)	1(3.33%)
Moderate problem	7(23.33%)	1(3.33%)	0(0.00%)
Severe problem	5(16.67%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		0.0003	<.0001
<b>N5 - Unable to get enough air through my nose during exercise or exertion</b>			
No problem	4(13.33%)	13(43.33%)	21(70.00%)
Very mild problem	10(33.33%)	9(30.00%)	7(23.33%)
Mild to moderate problem	7(23.33%)	6(20.00%)	0(0.00%)
Moderate problem	4(13.33%)	1(3.33%)	1(3.33%)
Severe problem	5(16.67%)	1(3.33%)	1(3.33%)
P value (comparison with pre op)		0.053	0.0001

Table -3

	Pre op	Post-operative 1 month	Post-operative 3 month
<b>R1 - How much of the time did you have sinus, headaches, facial pain or facial pressure?</b>			
None of the time	2(6.67%)	9(30.00%)	14(46.67%)
A little of the time	5(16.67%)	5(16.67%)	4(13.33%)
Some of the time	5(16.67%)	6(20.00%)	7(23.33%)
Most of the time	9(30.00%)	3(10.00%)	1(3.33%)
All of the time	9(30.00%)	7(23.33%)	4(13.33%)
Total	30(100.00%)	30(100.00%)	30(100.00%)
P value (comparison with pre op)		0.099	0.001
<b>R2 - How much of the time did you have a blocked or stuffy nose?</b>			
None of the time	0(0.00%)	7(23.33%)	18(60.00%)
A little of the time	1(3.33%)	9(30.00%)	7(23.33%)
Some of the time	1(3.33%)	8(26.67%)	4(13.33%)
Most of the time	11(36.67%)	3(10.00%)	0(0.00%)
All of the time	17(56.67%)	3(10.00%)	1(3.33%)
Total	30(100.00%)	30(100.00%)	30(100.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R3 - How much of the time did you have post nasal drip?</b>			
None of the time	5(16.67%)	14(46.67%)	18(60.00%)
A little of the time	4(13.33%)	5(16.67%)	6(20.00%)
Some of the time	5(16.67%)	5(16.67%)	5(16.67%)
Most of the time	4(13.33%)	2(6.67%)	0(0.00%)
All of the time	12(40.00%)	4(13.33%)	1(3.33%)
Total	30(100.00%)	30(100.00%)	30(100.00%)
P value (comparison with pre op)		0.06	0.0003
<b>R4 - How much of the time did you have thick nasal discharge?</b>			
None of the time	1(3.33%)	23(76.67%)	27(90.00%)
A little of the time	5(16.67%)	4(13.33%)	1(3.33%)
Some of the time	6(20.00%)	1(3.33%)	1(3.33%)
Most of the time	7(23.33%)	0(0.00%)	1(3.33%)
All of the time	11(36.67%)	2(6.67%)	0(0.00%)
Total	30(100.00%)	30(100.00%)	30(100.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R5 - How much of the time did you have a runny nose?</b>			
None of the time	1(3.33%)	10(33.33%)	17(56.67%)
A little of the time	2(6.67%)	5(16.67%)	2(6.67%)
Some of the time	7(23.33%)	8(26.67%)	6(20.00%)
Most of the time	5(16.67%)	1(3.33%)	2(6.67%)
All of the time	15(50.00%)	6(20.00%)	3(10.00%)
Total	30(100.00%)	30(100.00%)	30(100.00%)
P value (comparison with pre op)		0.004	0.0001

Table -4

	Pre op	Post-operative 1 month	Post-operative 3 months
<b>R1a - How much were you bothered by the sinus, headaches, facial pain or facial pressure?</b>			
Mean ± Stdev	6.27 ± 2.91	3.43 ± 2.97	2.33 ± 2.98
Median(IQR)	6(4 - 8)	4(0 - 6)	1(0 - 4)
P value (comparison with pre op)		0.0004	<.0001
<b>R2a - How much were you bothered by having a blocked or stuffy nose?</b>			
Mean ± Stdev	7.93 ± 1.34	1.9 ± 2.2	1.07 ± 2.02
Median(IQR)	8(8 - 8)	0.5(0 - 4)	0(0 - 2)
P value (comparison with pre op)		<.0001	<.0001
<b>R3a - How much were you bothered by this post nasal drip?</b>			
Mean ± Stdev	4.73 ± 3.46	1.97 ± 2.44	1.3 ± 1.99
Median(IQR)	4(2 - 8)	0(0 - 4)	0(0 - 2)
P value (comparison with pre op)		0.0003	0.0001

Table -5

	Pre op	Post-operative 1 month	Post-operative 3 months
<b>R6 - How much of the time did you feel tired or fatigued because of your nasal symptoms?</b>			
None of the time	0(0.00%)	15(50.00%)	22(73.33%)
A little of the time	2(6.67%)	3(10.00%)	3(10.00%)
Some of the time	2(6.67%)	6(20.00%)	2(6.67%)
Most of the time	5(16.67%)	6(20.00%)	2(6.67%)
All of the time	21(70.00%)	0(0.00%)	1(3.33%)
P value (comparison with pre op)		<.0001	<.0001
<b>R7 -How much of the time did you have trouble sleeping because of your nasal symptoms?</b>			
None of the time	2(6.67%)	20(66.67%)	26(86.67%)
A little of the time	4(13.33%)	6(20.00%)	1(3.33%)
Some of the time	3(10.00%)	3(10.00%)	2(6.67%)
Most of the time	6(20.00%)	1(3.33%)	1(3.33%)
All of the time	15(50.00%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R8 - How much of the time did you feel it was harder to concentrate because of your nasal symptoms?</b>			
None of the time	0(0.00%)	21(70.00%)	25(83.33%)
A little of the time	5(16.67%)	3(10.00%)	3(10.00%)
Some of the time	2(6.67%)	5(16.67%)	1(3.33%)
Most of the time	7(23.33%)	1(3.33%)	1(3.33%)
All of the time	16(53.33%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R9 - How much of the time did you feel it was harder to do the things you normally do because of your nasal symptoms?</b>			
None of the time	0(0.00%)	19(63.33%)	27(90.00%)
A little of the time	3(10.00%)	3(10.00%)	0(0.00%)
Some of the time	4(13.33%)	5(16.67%)	2(6.67%)
Most of the time	5(16.67%)	3(10.00%)	1(3.33%)
All of the time	18(60.00%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R10 - How much of the time did you feel embarrassed because of your nasal symptoms?</b>			
None of the time	1(3.33%)	23(76.67%)	26(86.67%)
A little of the time	4(13.33%)	3(10.00%)	3(10.00%)
Some of the time	4(13.33%)	2(6.67%)	0(0.00%)
Most of the time	3(10.00%)	2(6.67%)	1(3.33%)
All of the time	18(60.00%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R11 - How much of the time did you feel frustrated because of your nasal symptoms?</b>			
None of the time	1(3.33%)	18(60.00%)	23(76.67%)
A little of the time	0(0.00%)	6(20.00%)	4(13.33%)
Some of the time	1(3.33%)	4(13.33%)	1(3.33%)
Most of the time	3(10.00%)	2(6.67%)	2(6.67%)
All of the time	25(83.33%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001
<b>R12 - How much of the time did you feel irritable because of your nasal symptoms?</b>			
None of the time	1(3.33%)	18(60.00%)	19(63.33%)
A little of the time	1(3.33%)	2(6.67%)	7(23.33%)
Some of the time	1(3.33%)	6(20.00%)	0(0.00%)
Most of the time	6(20.00%)	4(13.33%)	3(10.00%)
All of the time	21(70.00%)	0(0.00%)	1(3.33%)
P value (comparison with pre op)		<.0001	<.0001
<b>R13- How much of the time did you feel sad or depressed because of your nasal symptoms?</b>			
None of the time	2(6.67%)	18(60.00%)	22(73.33%)
A little of the time	3(10.00%)	7(23.33%)	4(13.33%)
Some of the time	2(6.67%)	4(13.33%)	2(6.67%)
Most of the time	4(13.33%)	1(3.33%)	1(3.33%)
All of the time	19(63.33%)	0(0.00%)	1(3.33%)
P value (comparison with pre op)		<.0001	<.0001
<b>R14 - How much of the time did you think about your nasal symptoms?</b>			
None of the time	2(6.67%)	18(60.00%)	20(66.67%)
A little of the time	2(6.67%)	4(13.33%)	5(16.67%)
Some of the time	2(6.67%)	5(16.67%)	3(10.00%)
Most of the time	5(16.67%)	3(10.00%)	2(6.67%)
All of the time	19(63.33%)	0(0.00%)	0(0.00%)
P value (comparison with pre op)		<.0001	<.0001

Table -6