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The outcomes of adenotonsillectomy vs adenotonsillectomy plus turbinate surgery in children with chronic upper airway obstruction

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Abstract— **Background**: Sleep-disordered breathing is relatively acommon problem in children.Adenotonsillectomyis not sufficient for pediatric obstructive sleep apnea syndrome. **Objectives:**to identify the role of inferior turbinate surgery in improving quality of life (Qol) and sleep disturbance patterns in children with obstructive sleep apnea. **Methods**: Acohort study was carried during the period from March 2021 to August 2021, at a tertiary general hospital in Al- Ahsa city.Sixty children aged 3 to 15 years having obstructive sleep apnea wereenrolled into two groups; each group consisted of 30 children. First group underwentadenotonsillectomyconcurrent with inferior turbinoplasty, while the second group underwentAdenotonsillectomyalone.Subjective outcomes were evaluated using the Obstructive Sleep Apnea -18 qualityoflife questionnaire (OSA-18). **Results**: It can be observed that the overall quality of life of patients was significantly better after the surgery ($p<0.001$), which also mirrored in all QoL domains such as sleep disturbance ($p<0.001$), physical symptoms ($p<0.001$), emotional symptoms ($p<0.001$), daytime function ($p<0.001$), and caregiver concerns ($p<0.001$). Also, the PSQ showed a significantly lower post-test score ($p<0.001$). **Conclusions:** Reduction in volume of the inferior turbinate plays an important role in treating pediatric sleep disorders and improve quality of life rather than adenotonsillectomy alone

Keywords: Adenotonsillectomy, Inferior turbinate,Allergic sleep disorders, Children, Saudi Arabia.

Introduction

Sleep-disordered breathing is a relatively commonproblem in children[1].Notably, obstructive sleep apnea syndrome (OSAS) in children with breathing disorder during sleep is characterized by upperairway obstruction that interferes with sleep and normal respiratory gas exchange [2]. OSAS may be associatedwith behavioral problems, learning disabilities, growth retardation, cor-pulmonale, and failure to thrive ifuntreated [3,4]. Because adeno-tonsillar hypertrophy is the most common etiology of OSAS in children, adenotonsillectomy(AT) is widely utilized as the primary surgical treatment for pediatric OSAS. However, although the cumulativecure rate of pediatric OSAS by AT is around 80%,[5]many children continue to have residual OSASand remain symptomatic after surgery. Factors contributing to residual OSAS after AT include severe OSAS,obese children, positive family history of OSAS, andAfrican American ancestry [6].Allergic rhinitis (AR) has also been recognized as a risk factor for pediatric OSAS in various epidemiologic studies [7]. The incidence of OSAS was reportedlyincreased in children with positive radio allegro sorbent

tests [8]. In children, acute or chronic nasal obstructionleads to mouth breathing, which can induce snoring andincreases apnea-hypopnea severity [9]. Therefore, AR treatment is an integral part of managing pediatric OSASwith persistent severe AR. Clinically, AT is the mostcommon surgical intervention for pediatric OSAS.

Nevertheless, inferior turbinectomy is rarely performedin children due to its high rate of postoperative complications [10]. Whether AT alone is sufficient for treating pediatric OSAS with persistent severe AR or not remainsunclear.Although many attempts have been made to focus on objective outcome measures of following pediatric nasal surgery, quality of life measures have fewer studies to support pediatric nasal surgery.There was significant improvement in quality of life measuresfor pediatric patients with medically refractorynasal congestion after undergoing submucous inferior turbinate reduction (microdebrider) and outfracture. These outcomes strengthen the support for the possibility of not only safe nasal surgery in pediatric populations, but also effective nasal surgery[11].Nasal obstruction in children can lead to symptomaticnasal congestion, sleep-disordered breath, and inland craniofacial deformity. Nasal obstruction and congestion have also been shown to not onlydecrease quality of life, but can also reduce concentration and attention span, and affect quality andquantity of sleep.Although allergic rhinitis is the most common chronic disease in the pediatric patient, medically refractory allergic rhinitis is often secondary tonasal obstructive disorders including septal deviation and inferior turbinate hypertrophy. Surgicalcorrection of coexisting nasal obstructive disordersmay increase successful treatment for allergic rhinitis [12].

We know that inferior turbinate size is a majorcontributing factor to nasal resistance during inspiration. If the inferior turbinate mucosa isengorged bilaterally or unilaterally, decreased airflowresults in subjective experience of nasalobstruction and a ‘stuffed’ or ‘blocked’ nose as reported by children and perceived by parents or caretakers. We know that decreasing the size of the inferior turbinate, via submucous resection,decreases the nasal airway resistance[13].Despite our understanding of improvement in nasal airway resistance via inferior turbinate reduction, practitioners in the past have been reluctant to operate on any portion of a growing nose. It has previously been shown that pediatric otolaryngologists are performing inferior turbinate reduction in children with more frequency than in the previous 2–3 decades [14]. A recent survey of members of the American Society of Pediatric Otolaryngology reported that the decision to perform inferior turbinate reduction in children was inversely related to the extent of adenoid hypertrophy. This may be related to reviews that show little evidence to support inferior turbinate reduction in children as well as a lack of reliable methods to measure inferior turbinate hypertrophy [15]. However, in comparison, documentation of adenoid hypertrophy via radiograph and/or flexible fiberoptic nasopharyngoscopy is more standardized. The decision to operate on inferior turbinate also appears to be related to patient age. In a survey ofpediatric otolaryngologists, 85% of respondents would perform inferior turbinate reduction inpatients 7 years of age or older, whereas only 50% would perform this same procedure in a child of 4 years of age [16]. Now, we do notonly have long-term objective outcome measures to support inferior turbinatereduction and outfracture in pediatric populations, but also recent quality of life data

to help support this decision.Mani et al. describe their experience with 43 children. Among children with nasal obstruction and turbinate hypertrophy refractory to maximum medical therapy including nasal steroid spray and antihistamines, surgical treatment withturbinate reduction and outfracture produced an increased quality of life as measured by the Sinus and Nasal Quality of Life Survey (SN-5) [17].

Although we have had a set of absolute indicationsfor pediatric nasal surgery including septal abscess,septal hematoma, severe deformity secondary toacute trauma, dermoid cyst and cleft lip nasaldeformity, our tendency has been to operate on the pediatric nose as infrequently as possible. More and more evidence has accumulated that traumatic (noniatrogenic trauma) damage to the septal cartilage can cause significant dental, palatal, and facial abnormalities. There are even discretedata that failure to correct septal deviations resulting in obligate mouth breathing can result in facial and dental abnormalities. Conservative management of septal deviations mayactually worsen the nasal morphology because a deviated nasal septum may exert traction during growth to the normal alar and triangular cartilages not involved in previous trauma. There are several studies that have concluded that nasal and facial growth, as well as ultimate facial proportion, are not adversely affected by septoplasty or even more extensive nasal surgery. It is now being shown that elevation of the mucoidperichondrium of the septal cartilage unilaterally or bilaterally does not negatively affect growth of the face. In the review article byCingiet al., seven studies were reviewed.Only one study showed a disruption in nasal proportion during follow-up after pediatric nasal surgery and it was noted that the patients with abnormalities after nasal surgery had all undergone extracorporeal septoplasty prior to adulthood. One study even reported the decreased use of daily medications for allergic rhinitis after surgical intervention for obstructive nasal deformities[18].

Therefore, this study aims to identify the role of inferior turbinate surgery in improving quality of life and sleep disturbance patterns in children with obstructive sleep apnea and to compare between adenotonsillectomy plus inferior turbinoplasty and adenotonsillectomy alone in improving quality of life and treating associated sleep apnea.

Materials and methodology:

A clinical study of case series with planned data collectionwas conducted involving 60 children aged from3 to15 years diagnosed with OSAS from the period betweenmarch2021to August2021 in a tertiary general hospital at Al- Asha city.

Patients were enrolled into two groups; each group consisted of 30 children. First group underwent adenotonsillectomy concurrent with inferior turbinoplasty, while the second group underwent Adenotonsillectomy alone.

Each childhad signs and symptoms of sleep disturbance, including snoring, mouth breathing, and breath holding for at least 3 months. They were diagnosed with OSAS by polysmonography(PSG). The subjects also had documented clinical histories of persistent severe symptoms and nasal obstruction related to the congested inferior turbinate for at least 3 months, and were unresponsive to medical therapy before surgery. Therapybefore surgery

included oral H1-antihistamine, decongestants,and intranasal corticosteroids for more than 4 weeks.

Sleep disturbance, impairment of daily activities as leisure and/orsport, impairment of school or work, and other troublesomesymptoms. All patients underwent a complete workup, includinga thorough history taking, physical examination,radiological examination, acoustic rhinometry, and overnightPSG. Only subjects with hypertrophic tonsils (Friedman's grade2 or higher14) and adenoid vegetation demonstrated on a lateral-view skull x-ray were enrolled.Each child underwent overnight PSG and acoustic rhinometrybefore surgery and at 1 year after surgery.

Sleep study variables were the apnea-hypopnea index (AHI), minimal oxygen saturation (MOS), and snoring index (SI). Apnea was defined as cessation of airflow for at least two respiratory cycles. Hypopnea was defined as reduction of 50% in the baseline ventilator value for >6 seconds associated with adecrease in oxygen saturation of >4%.Apnea-hypopnea index (AHI) was the total number of obstructive apnea and hypopnea episodes per hour of sleep. The SI was the total number of snores per hour of sleep. Although absolute numbers defined in terms of PSG parameters are very helpful in delineating disease severity, intervention with children who have subclinical PSG values, but also have evidence of daytime sequelae, should also be strongly considered. Therefore, we adopted the criterion of AHI >1 as well as clinical signs and symptoms to establish a diagnosis of pediatric OSAS.The effect of topical decongestion on the nasal turbinate was determined by acoustic rhinometry.

Anincrease of <35% in the cross-sectional area in the region of theinferior turbinate indicated structural abnormality such as septaldeformity, conchal hypertrophy, or conchal bullosa; childrenwith these conditions were excluded from this study.

Inclusion criteria: All pediatric patients from 3 to 13 years who underwent adenotonsillectomy plus inferior turbinoplasty.

Exclusion criteria: Children with craniofacial syndromes, neuromusculardiseases, or sinusitis were excluded.Any patients with upper air way disease or any patients lost during follow up were also excluded.

Tonsillectomy was performed with blunt dissection; hemostasiswas achieved using bipolar electrocoagulation.

Adenoidectomy was performed with micro debride under 70endoscopic guidance. The MAIT was performed using a straightmicro debride blade (2.0 mm; Medtronic Xomed, Jacksonville,FL).

Quality of life was determined before surgery and at 1year after surgery using the Obstructive Sleep Apnea (OSA)-18quality of lifequestionnaires (OSA-18), which were completed bycaregivers. The OSA-18 questionnaire is a disease-specific quality-of-life survey comprising 18 items in five domains: sleepdisturbance, physical suffering, emotional distress, daytimeproblems, and caregiver concerns. A scale ranging from 1 for‘‘none of the

time'' to 7 for ''all of the time'' was used to gradethe relative severity of the problem addressed by each item.

Total, domain, and item scores were recorded. Postoperativecomplications were bleeding, nasal synechia, crusting, foul odor,and atrophic change.

Statistical Analysis

Categorical variables were measured as frequency and proportion (%) while continuous variables were expressed as mean and standard deviation. The differences in the quality of life and sleep disorder among patients who underwent adenotonsillectomy vs. patients who underwent adenotonsillectomy + turbinate before and after surgery had been calculated using paired sample t-test or independent sample t-test while the differences in the levels of the quality of life and sleep disorder had been performed using Fischer Exact test. The correlation between PSQ among overall quality of life (QoL) and its domains before and after the surgery has been carried out using the Pearson correlation coefficient. Normality test was performed using Shapiro Wilk test as well as Kolmogorov-Smirnov test. The data follows the normal distribution. Thus, the parametric tests were applied. A P-value of 0.05 was considered statistically significant. All data analyses were carried out using the Statistical Packages for Software Sciences (SPSS) version 26 (Armonk, New York, IBM Corporation, USA.).

Results

Table 1: Paired t-test of QoL and Sleep patterns of children before and after adenotonsillectomy and adenotonsillectomy + turbinate surgery (n=60)

Parameters	Before surgery Mean ± SD	One year after surgery Mean ± SD	Mean Difference	P-value [§]
Overall QoL	99.2 ± 7.35	47.3 ± 12.6	51.9	**<0.001** **
• Sleep disturbance	23.3 ± 2.55	9.60 ± 3.23	13.7	**<0.001** **
• Physical symptoms	23.6 ± 2.17	13.5 ± 4.93	10.1	**<0.001** **
• Emotional symptoms	13.8 ± 2.51	7.48 ± 1.94	6.33	**<0.001** **
• Daytime function	15.3 ± 1.91	7.58 ± 2.26	7.72	**<0.001** **
• Caregiver concerns	23.2 ± 2.93	9.17 ± 3.26	14.0	**<0.001** **
PSQ	12.3 ± 1.83	5.22 ± 1.69	7.08	**<0.001** **

[§] P-value has been calculated using Paired sample t-test.

** Significant at $p<0.05$ level.

Table 1 presented the paired t-test of the quality of life and sleep patterns of patients before and after the surgery. It can be observed that the overall quality of life of patients was significantly better after the surgery ($p<0.001$), which also was reflected in all QoL domains

such as sleep disturbance (p<0.001), physical symptoms (p<0.001), emotional symptoms (p<0.001), daytime function (p<0.001), and caregiver concerns (p<0.001). Also, the PSQ showed a significantly lower post-test score (p<0.001).

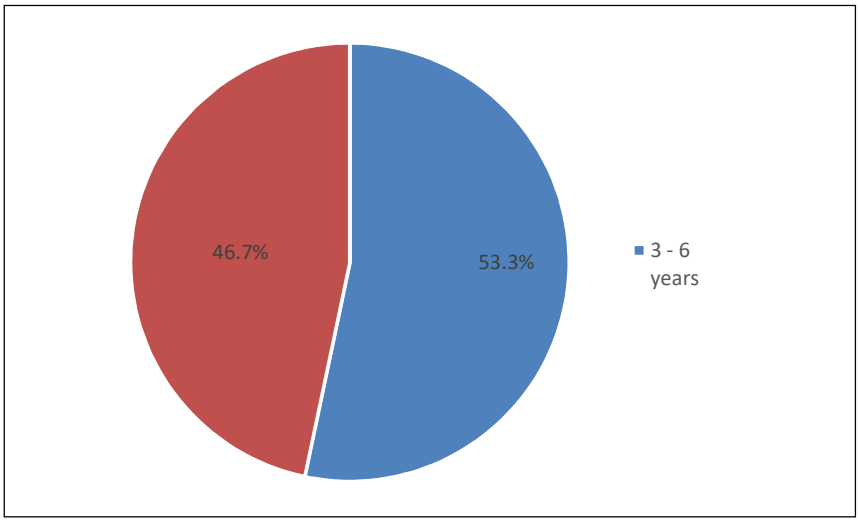

Figure 1: Distribution of age group

In Figure 1, 53.3% of the patients were aged between 3 to 6 years old while 46.7% were aged between 7 to 11 years old.

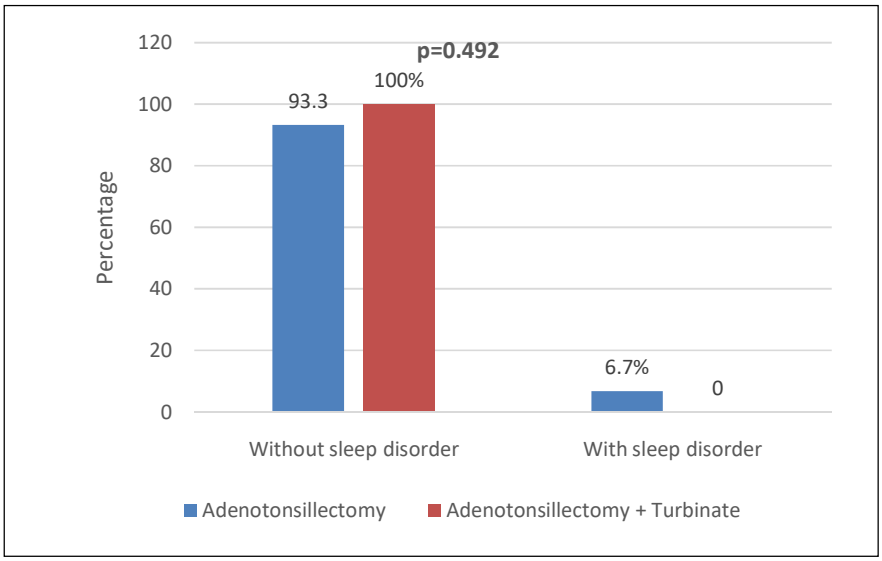

Figure 2: Comparison of the level of sleep disorder between adenotonsillectomy versus adenotonsillectomy + turbinate surgery postoperatively

In Figure 2, there were no significant differences in the comparison of the level of sleep disorder between adenotonsillectomy and adenotonsillectomy + turbinate surgery (p=0.492).

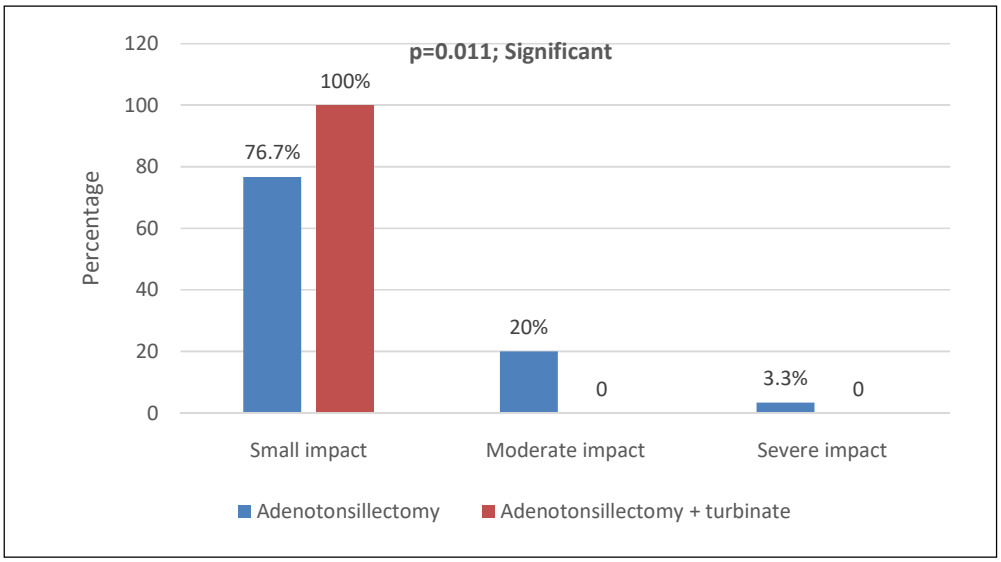

Figure 3: Comparison of the level of quality of life between adenotonsillectomy versus adenotonsillectomy + turbinate postoperatively

In Figure 3, all patients who underwent adenotonsillectomy + turbinate surgery reported a small impact on the quality of life better than the patients who underwent adenotonsillectomy alone (p=0.011).

Table 2: Correlation (Pearson-r) between the quality of life and sleep disorder before undergoing adenotonsillectomy alone (n=30)

QoL Parameters	PSQ	
	R-value	P-value
Overall QoL	0.289	0.121
• Sleep disturbance	0.003	0.988
• Physical symptoms	0.232	0.218
• Emotional symptoms	0.204	0.280
• Daytime function	0.272	0.146
• Caregiver concerns	0.098	0.606

In Table 2, there was no significant correlation between the quality of life and all of its domains according to the patterns of sleep disorder among patients who preferred adenotonsillectomy (p>0.05).

Table 3: Correlation (Pearson-r) between the quality of life and sleep disorder after undergoing adenotonsillectomy alone (n=30)

QoL Parameters	PSQ	
	R-value	P-value
Overall QoL	0.454	**0.012 ****
• Sleep disturbance	0.194	0.304

• Physical symptoms	0.321	0.083
• Emotional symptoms	0.468	**0.009 ** **
• Daytime function	0.249	0.184
• Caregiver concerns	0.329	0.076

** Significant at p<0.05 level.

In Table 3, it was found that there was a positive moderate significant correlation between the PSQ in relation to the overall QoL (r=0.454; p=0.012), and emotional symptoms (r=0.468; p=0.009) among patients who underwent adenotonsillectomy.

Table 4: Correlation (Pearson-r) between the quality of life and sleep disorder before undergoing adenotonsillectomy + turbinate (n=30)

QoL Parameters	PSQ	
	R-value	P-value
Overall QoL	0.150	0.428
• Sleep disturbance	0.195	0.302
• Physical symptoms	-0.029	0.881
• Emotional symptoms	0.188	0.319
• Daytime function	-0.109	0.567
• Caregiver concerns	0.142	0.455

In Table 4, among patients who preferred adenotonsillectomy + turbinate surgery, it was observed that the correlation between PSQ and the overall QoL including its domains was not statistically significant (p>0.05).

Table 5: Correlation (Pearson-r) between the quality of life and sleep disorder after undergoing adenotonsillectomy + turbinate surgery (n=30)

QoL Parameters	PSQ	
	R-value	P-value
Overall QoL	0.288	0.122
• Sleep disturbance	-0.027	0.888
• Physical symptoms	0.275	0.141
• Emotional symptoms	0.228	0.226
• Daytime function	0.272	0.146
• Caregiver concerns	0.094	0.620

In Table 5, it was also observed that there was no significant correlation between PSQ and the overall ol and its domains which was carried out after undergoing adenotonsillectomy + turbinate surgery (p>0.05).

Table 6: Differences in the quality of life and sleep disorder before and after adenotonsillectomy alone (n=30)

Parameters	Before surgery Mean ± SD	One year after surgery Mean ± SD	Mean Difference	P-value §
Overall QoL	95.2 ± 6.77	57.5 ± 8.13	37.667	**<0.001** **
• Sleep disturbance	22.5 ± 2.86	11.7 ± 2.92	10.767	**<0.001** **
• Physical symptoms	23.1 ± 2.43	17.6 ± 2.48	5.500	**<0.001** **
• Emotional symptoms	12.9 ± 2.70	8.23 ± 1.72	4.633	**<0.001** **
• Daytime function	15.1 ± 2.12	8.90 ± 1.83	6.200	**<0.001** **
• Caregiver concerns	21.6 ± 2.62	11.0 ± 3.23	10.567	**<0.001** **
PSQ	11.9 ± 2.11	6.10 ± 1.69	5.800	**<0.001** **

§ P-value has been calculated using Paired sample t-test.
** Significant at p<0.05 level.

In Table 6, there was a significant improvement in the overall QoL of life and all of its domains in patients who underwent adenotonsillectomy procedures (p<0.001). In addition, a significant decrease in the PSQ score had been noted after adenotonsillectomy (p<0.001).

Table 7: Differences in the quality of life and sleep disorder before and after adenotonsillectomy + Turbinate surgery (n=30)

Parameters	Before surgery Mean ± SD	One year after surgery Mean ± SD	Mean Difference	P-value §
Overall QoL	103.2 ± 5.52	37.2 ± 6.46	66.033	**<0.001** **
• Sleep disturbance	24.1 ± 1.95	7.47 ± 1.81	16.600	**<0.001** **
• Physical symptoms	24.1 ± 1.79	9.40 ± 2.86	14.700	**<0.001** **
• Emotional symptoms	14.8 ± 1.92	6.73 ± 1.87	8.033	**<0.001** **
• Daytime function	15.5 ± 1.68	6.27 ± 1.86	9.233	**<0.001** **
• Caregiver concerns	24.8 ± 2.27	7.33 ± 2.06	14.467	**<0.001** **
PSQ	12.7 ± 1.42	4.33 ± 1.18	8.367	**<0.001** **

§ P-value has been calculated using Paired sample t-test.
** Significant at p<0.05 level.

In Table 7, results indicated that there was a significant improvement in the overall QoL along with its domains in patients who underwent adenotonsillectomy + turbinate surgery (p<0.001). Also, a significant decrease in PSQ score had been noted after the combined procedures (p<0.001).

Table 8: Differences in the quality of life and sleep disorder between adenotonsillectomy vs.adenotonsillectomy + turbinate before surgery (n=60)

Parameters	Adenotonsillectomy Mean ± SD	Adenotonsillectomy + Turbinate Mean ± SD	T-test	P-value §
Overall QoL	95.2 ± 6.77	103.2 ± 5.52	5.059	**<0.001****

• Sleep disturbance	22.5 ± 2.86	24.1 ± 1.95	2.479	**0.016** **
• Physical symptoms	23.1 ± 2.43	24.1 ± 1.79	1.754	0.085
• Emotional symptoms	12.9 ± 2.70	14.8 ± 1.92	3.139	**0.003** **
• Daytime function	15.1 ± 2.12	15.5 ± 1.68	0.810	0.421
• Caregiver concerns	21.6 ± 2.62	24.8 ± 2.27	5.111	**<0.001****
PSQ	11.9 ± 2.11	12.7 ± 1.42	1.726	0.090

§ P-value has been calculated using independent sample t-test.

** Significant at p<0.05 level.

In Table 8, before surgery, patients who preferred adenotonsillectomy + turbinate surgery showed significantly poor overall l (p<0.001) and some of its domains such as sleep disturbance (p=0.016), emotional symptoms (p=0.003), and caregiver concerns (p<0.001).

Table 9: Differences in the quality of life and sleep disorder between adenotonsillectomy vs adenotonsillectomy + turbinate after surgery (n=60)

Parameters	Adenotonsillectomy Mean ± SD	Adenotonsillectomy + Turbinate Mean ± SD	T-test	P-value §
Overall QoL	57.5 ± 8.13	37.2 ± 6.46	10.709	**<0.001** **
• Sleep disturbance	11.7 ± 2.92	7.47 ± 1.81	6.792	**<0.001** **
• Physical symptoms	17.6 ± 2.48	9.40 ± 2.86	11.904	**<0.001** **
• Emotional symptoms	8.23 ± 1.72	6.73 ± 1.87	3.233	**<0.001** **
• Daytime function	8.90 ± 1.83	6.27 ± 1.86	5.540	**<0.001** **
• Caregiver concerns	11.0 ± 3.23	7.33 ± 2.06	5.248	**<0.001** **
PSQ	6.10 ± 1.69	4.33 ± 1.18	4.692	**<0.001** **

§ P-value has been calculated using independent sample t-test.

** Significant at p<0.05 level.

In Table 9, compared to patients who underwent adenotonsillectomy alone, patients who underwent adenotonsillectomy + turbinate surgery were more associated with having better overall QoL (p<0.001), including its domains such as sleep disturbance (p<0.001), physical symptoms (p<0.001), emotional symptoms (p<0.001), daytime function (p<0.001), and caregiver concerns (p<0.001), while they also exhibited a significant decrease in sleep disorders after undergoing the combined procedures (p<0.001).

Discussion

This study compares the quality of life and sleeps patterns of 60 children who underwent eitheradenotonsillectomyalone or adenotonsillectomy + turbinate surgery. The overall quality of life of patients was significantly better after the surgery, which also was reflected in all Qol domains such as sleep disturbance, physical symptoms, emotional symptoms, daytime function, and caregiver concerns. Also, the PSQ showed a significantly lower post-test score.

There was a significant improvement in the overall ol of life and all of its domains in patients who underwent adenotonsillectomy procedures. In addition, a significant decrease in the PSQ score had been noted after adenotonsillectomy results indicated that there was a significant improvement in the overall QoL along with its domains in patients who underwent adenotonsillectomy + turbinate surgery. Also, a significant decrease in PSQ score had been noted after the combined procedures. Before surgery, patients who preferred adenotonsillectomy + turbinate surgery showed significantly poor overall QoL and some of its domains such as sleep disturbance, emotional symptoms, and caregiver concerns.Compared to patients who underwent adenotonsillectomy alone, patients who underwent adenotonsillectomy + turbinate surgery were more associated with having better overall QoL, including its domains such as sleep disturbance.While physical symptoms, emotional symptoms, daytime function, and caregiver concerns also exhibited a significant decrease in sleep disorders after undergoing the combined procedures, this resultdisagree with cheng et al.(2012) who found that change in score was 3.7+/-0.7 in adenotonsillectomy + turbinate surgery group and 3.5+/-0.7 in adenotonsillectomy only group as regard sleep disturbance which may be due to low number of samples.

This result agreed with cheng et al 2012 who found that change in score was 2.3+/-0.6 in AT+IT group and 1.7+/-0.3 in AT group as regard physical disturbance with significant P value (<0.01) **This result agreed with** cheng et al 2012 who found that change in score was 2.1+/-0.5 in AT+IT group and 1.3+/-0.5 in AT group as regard Emotional symptoms with significant P value(<0.01).**This result agreed with** cheng et al 2012 who found that change in score was 1.6+/-0.3 in AT+IT group and 1.7+/-0.4 in AT group as regard daytime function with significant P value(<0.01).These resultsagreed with cheng et al 2012 who found that change in score was 3.1+/-0.7 in AT+IT group and 2.6+/-0.8 in AT group as regard care giverConcentra with significant P value(<0.01).This result agreed with cheng et al 2012 who found that Chan Mean overall score(OALS) was 4.3+/-0.7in AT+IT group and was 2.2+/-1.0 in AT group with significant P value(<0.01)[18].

There was no significant correlation between the quality of life and all of its domains according to the patterns of sleep disorder among patients who preferred adenotonsillectomy (p>0.05). Although nasal obstruction can adversely affect breathing during sleep, the outcome of nasal surgery for treating obstructive sleep apnea syndrome is unsatisfactory in adults. Relief from nasal obstruction is markedly less successful in reducing the AHI score in adults [19]. Conversely, this study demonstratedthat children who underwentadenotonsillectomywith concurrentturbinate surgery improved significantly in subjective symptomsand apnea-hypopnea severity compared with those whounderwent adenotonsillectomyalone. These clinical findings may beattributed to upper airway anatomic differences betweenadults and children. The mechanical arrangement of thetongue and velopharynx in adults is unstable, such thatit may result in obstructive sleep apnea syndrome, independent of nasal or nasopharyngealobstruction [20].

However, children haverelatively oblique orientation of the pharynx and a superiorlyplaced hyoid, which enhance airway stability atthe tongue level [21]. That is, when children can revert tonasal breathing with the mouth closed, obstructive sleep apnea syndrome

symptomsvanish. Therefore, correcting nasal airway obstruction ismore crucial for children than for adults when treating.Some hypothetical mechanisms have been proposedto characterize the relationship between nasal obstructionand obstructive sleep apnea syndrome. According to the functional theory,upper airway obstruction can lead to apnea via disturbedreflex mechanisms, likely trigeminal or vitallymediated, that normally act to preserve airway patencyin the presence of negative pressure in the upper airway [22]. Furthermore, recent studies indicated thatreceptors in the nasopharynx-controlled muscle tone inthe oropharynx [16]. Upper airway muscle tone is highwith nasal breathing; therefore, mouth breathinginduced by allergic symptoms compromises upper airway muscle toneand respiratory drive during sleep [23].

All indices for patients in theAdenotonsillectomy alone and Adenotonsillectomyand inferior turbinectomy groups improved significantly. However,the decrease in the Adenotonsillectomy+ inferior turbinectomy group for physical symptoms, emotional symptoms, daytime function, and caregiver concerns at 1 year postoperatively was significantly larger than those inthe Adenotonsillectomy alone group.Therefore, relief of nasal congestion by, inferior turbinectomy improves objective outcomes and disease-specific quality of life in children with Clinically Obstructive Sleep Apnea symptoms.Inferior turbinectomy is seldom performedfor children due to its many disadvantages suchas risk of significant postoperative bleeding, requirednasal packing, synechia, and the risk of delayed onset ofatrophic rhinitis [24].

Inferior turbinectomy can preserve physiological functioning of the turbinate and reduce formation of postoperative nasal crusting. Based on these benefits, inferior turbinectomy is a feasible surgical modality for treating inferior turbinate hypertrophy in children [25].

Conclusion

We can conclude fromresults that reduction in volume of the inferior turbinate plays an important role in treating pediatric sleep disorders and improving quality of life rather than adenotonsillectomy alone.

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