

# THE EFFECT OF ADENOTONSILLECTOMY ON THE QUALITY OF LIFE AMONG CHILDREN TWO TO THIRTEEN YEARS OF AGE



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Submitted: 24/2/ 2017; Accepted: 1/8/2017; Published: 15/8/2017

## ABSTRACT

### *Background*

The tonsils and adenoid enlargement are the most common cause of respiratory tract obstruction in children and cause obstructive sleep apnea and snoring. These children may present with recurrent upper respiratory tract infection with frequent antibiotic uses. Parents may worry about some alteration in children's behavior and development which are caused by adenotonsillar enlargement.

### *Objectives*

To evaluate the quality of life of children with adenotonsillar enlargement, recurrent and chronic tonsillitis before and after adenotonsillectomy.

### *Patients and Methods*

A prospective observational study done. Data collected from (January 2015 to end of July, 2015). Parents of 118 children who underwent adenotonsillectomy in (ENT, Head and Neck Surgery – Sulaimani Teaching Center) were interviewed before the operation and 6 months after the operation, by using the questionnaire about quality of life, physical problems, sleeping problems, speech and swallowing problems, emotional discomfort, limitation of activities and parents' concerns; each of them scored from zero to six.

### *Results*

The score obtained by the questionnaire after adenotonsillectomy significantly reduced as compared to the score obtained before the operation. Symptoms which have the highest scores before the operation are nasal obstruction and snoring. There was a decrease in the number of upper respiratory tract infections after the adenotonsillectomy. There was a significant decrease in the use of antibiotics after adenotonsillectomy.

### *Conclusion*

We conclude that the quality of life of these children improved after adenotonsillectomy, especially the physical problems and sleep problems, the number of upper respiratory tract infections decreased and the decrease in the use of antibiotics, but children who have had symptoms of rhinitis had less improvement in their quality of life compared to the children who didn't have these symptoms.

**Keywords:** *Adenoid, Tonsils, Quality of life.*

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## INTRODUCTION

the most frequent otorhinolaryngological problems that occur in children are the enlargement of adenoid and palatine tonsils <sup>(1)</sup>. The tonsils and adenoid enlargements are the most common causes of the upper respiratory tract obstruction in children which give rise to obstructive sleep apnea and snoring. These children may present with recurrent upper respiratory tract infections with resultant misuse of large amounts of nonspecifically targeted antibiotics <sup>(2)</sup>.

Enlarged adenoid and tonsils play a major role in obstructive sleep apnea in children. Adenotonsillar enlargement may cause swallowing problem in some children. Also, the enlarged adenoids and tonsils may cause denasal speech by decreasing nasal airflow <sup>(3)</sup>. Parents may worry about some alterations in children's behavior and development due to the same pathology <sup>(4)</sup>. Tonsillectomy or adenotonsillectomy remains a commonly performed surgical procedure for children <sup>(1,4)</sup>.

The tonsils and adenoids are located at the entry of the respiratory tract, which are the largest components of the Waldeyer's ring. They are fundamental structures for kicking up the immune response and formation of antibodies. It may be the region for a series of pathological processes, especially infectious diseases, and results in a number of notable signs and symptoms that make up recurrent pictures of tonsillitis <sup>(5,6)</sup>. This is one of the main reasons for prescribing numerous classes of antibiotics with consequent resistance and riddled effects <sup>(7)</sup>. The administration of antibiotics and the topical intranasal delivery of corticosteroids for the temporary relief of the obstructive and/or allergic symptoms is applied mainly in the case one desires to postpone surgery or the risks of surgery are highly prospective <sup>(8)</sup>.

Among the indications and contraindications of adenotonsillectomy are the physical, psychological and socio-economic harms some patients might get in spending time and money to obtain medical assistance <sup>(5,6,9)</sup>. Tonsillectomy/adenoidectomy or adenotonsillectomy are the common surgical procedures performed in children. However, their practical indications differ from center to center. In the past, the most top indication for such surgery was recurrent tonsillitis. But nowadays, due to the bad impact of Obstructive sleep apnea on the quality of life and its increased incidence, it has become one of the most significant indications for adenotonsillectomy in such age group <sup>(10)</sup>.

Most of the researches and medical literatures regarding the effectiveness of adenotonsillectomy have focused on the alteration of objective measures such as the number of infections, and not the quality of life (QOL) or overall health status <sup>(11)</sup>. The World Health Organization (WHO) defines QOL as individuals' perception of their position in life in the context of the culture and value systems in which they live and have a relation to their goals, expectations, standards and concerns. <sup>(12)</sup> Parents' view is one essential evaluating criterion of quality outcome. The patient assesses his or her subjective position regarding QOL by filling out appropriate questionnaire which serves as a measuring tool. These standardized questionnaires have to fulfil the requirements of reliability, validity, and sensitivity to change <sup>(13)</sup>.

The main purpose of this study is to evaluate the quality of life of children with adenotonsillar enlargement, recurrent and chronic tonsillitis before and after surgery.

## PATIENTS AND METHODS

### Study design & settings

A prospective observational study carried out in (ENT, Head and Neck Surgery – Sulaimani Teaching Center) for the period from (4<sup>th</sup> of January, 2015 to end of July, 2015).

### Sampling

118 parents of children whom underwent adenotonsillectomy were interviewed before the operation and 6 months after the operation, by using the questionnaire about quality of life; developed by De Serres et al.

We compared the result of these two recorded scores. In those having lower score meaning that; quality of their life has improved.

### Inclusion criteria

Children whom underwent adenotonsillectomy in ENT, Head and Neck Surgery – Sulaimani Teaching Center for period from the 4<sup>th</sup> of January, 2015 to the 5<sup>th</sup> of February, 2015, their ages from 2 to 13 years.

### Exclusion criteria

Children below 2 years and 13 years and above was excluded, we exclude those children that have: debilitating diseases, like; cerebral palsy, only tonsillectomy, parents refuse to participate, those

children that having congenital abnormality like; craniofacial abnormality, down syndrome, etc.

### **Data collection**

The data were collected through an interview of parents of children whom underwent adenotonsillectomy in (ENT, Head and Neck Surgery – Sulaimani Teaching Center). The patients were diagnosed and indicated for adenotonsillectomy by ENT specialists in the Center. The parent of each selected child interviewed before the operation and 6 months after the surgery and we filled a prepared questionnaire about their quality of life. The response rate was 100% no any patient lost during follow up. The questionnaire included the following information: Demographic (name, age, gender, residence, telephone number, socioeconomic state).

For evaluation of the patients we used a questionnaire developed by De Serres et al. (2000) <sup>(14)</sup> and previously used in Brazil by Di Francisco et al. (2004) <sup>(15)</sup>. Other subjects were researched by using a questionnaire with a scale from 1 to 4 or more than 4, as the number of tonsillitis before the surgery, use of antibiotics before and after the surgery, number of pharyngitis and upper respiratory tract infections after the surgery. In a scale ranging from 1 to 10, we asked the level of satisfaction of the parents regarding the surgery. In order to evaluate the role of rhinitis in the quality of life of the children submitted to adenotonsillectomy, we asked about the rhinitis and the presence of the main symptoms of rhinitis.

### **Follow up**

All patients were followed up post-operatively by interviewing of their parents by using the same questionnaire which was used pre-operatively. The schedule of follow up was 6 months after operation. Each patient followed up by direct interview of their parents or by telephone.

### **Ethical considerations**

Objectives of the study were clarified and informal consent was taken from parents of the patients written on an ethical paper with privacy. Confidentiality of the data was maintained throughout the study. All collected data were used for research purpose and held in a password protected computer. Approval for this study has been obtained from university of Sulaimani, school of medicine and clinical directorate of the Sulaimani

Teaching Center of ENT, Head and Neck Surgery where all the data will be collected.

### **Statistical analysis**

All patients' data entered by using computerized statistical software; Statistical Package for Social Sciences (SPSS), version 21 was used. In all statistical analysis, level of significance (p value) set at <0.05, the results presented as tables and graphs. Descriptive statistics presented as (mean  $\pm$  standard deviation), frequencies and percentages. Multiple contingency tables conducted and appropriate statistical tests performed, paired sample T test used for compare means. For finding the correlation between domain and item of the domain we use the Spearman's non-parametric correlation.

## **RESULTS**

Data of 118 children were analyzed, comprising of 60 (50.74%) girls and 58 (49.26%) boys. Aged between 2 to 13 year at the time of surgery (average 6.19 years) and the higher prevalence was between children aged 2-7 years old (70 of 118; 59.32%) and (48 of 118; 40.68%) for children aged between 8-13 years old.

The number of children who lived in sulaimani city center was (63 of 118; 53.38%), periphery of sulaimani (43 of 118; 36.44%), rural area (12 of 118; 10.16%).

27 of the 118; 22.88% had loweconomic state, 81 of 118; 68.64% had intermediate economic state, 10 of 118; 8.47% had high economic state.

Our patients had various degree of nasopharyngeal and pharyngeal obstruction by adenotonsillar enlargement. (45 of 118; 38.13%) had (25-50%) of nasopharyngeal obstruction. (70 of 118; 59.32%) had (50-75%) of nasopharyngeal obstruction. (3 of 118; 2.54%) had (75-100%) of nasopharyngeal obstruction. (76 of 118; 64.4%) of them had 2<sup>nd</sup> degree of palatine tonsil enlargement. (35 of 118; 29.66%) of them had 3<sup>rd</sup> degree of palatine tonsil enlargement. (7 of 118; 5.93%) of them had 4<sup>th</sup> degree of palatine tonsil enlargement.

In (Tables 1) we have shown the scores obtained before adenotonsillectomy. Noted that the parents concern with the child's snoring was the domain that obtained the highest score (71.42%) in the preoperative period, followed by physical suffering (42.8%), emotional discomfort (40.67%), sleep problems (35.6%) and activity limitation (22.35%). Now, the domain associated with swallowing problem was the one with

the lowest score, obtaining 768 (21.51%) points from a total of 3,570 possibility.

The items that scored the most points before adenotonsillectomy were: nasal obstruction (528), snoring (526), nasalized speech (363), irritability (180) and school or day-nursery attendance (433). All had low postoperative score.

In Table 2 we have shown that the scores and percentage of scores of all domains reduced significantly.

In Table 3 we see the variations between pre and postoperative percentages. The parents' concern with

the child's snoring was the most significant one (69.31%), followed by physical suffering (39.53%), emotional discomfort (38.69%) and sleep problems (34.24%). The activity limitation had the second lowest difference (20.9%), preceding only Speech and Swallowing problems (19.86%). In relation to the summation of all the domains, the difference was of (31.91%).

**Note**

Pre-operative and post-operative percentages that used in (Table 3) were obtained from (Table 1 and 2).

**Table 1. Score obtained in the pre-adenotonsillectomy.**

Domains in the field of the stud	Minimum	Summation	Maximum	%
Physical suffering	0	1528	3570	42.8%
Sleep problems	0	1017	2856	35.6%
Speech and swallowing problems	0	768	3570	21.5%
Emotional discomfort	0	1452	3570	40.6%
Activity limitation	0	798	3570	22.3%
Parents' concern with the snoring	0	510	714	71.4%
Summation of all the domains	0	6073	17850	34.02%

**Table 2. Scores obtained in the post-adenotonsillectomy.**

Domains in the field of the study	Minimum	Summation	Maximum	%
Physical suffering	0	117.00	3570	3.27%
Sleep disorder	0	39.00	2856	1.36%
Speech and swallowing problems	0	59.00	3570	1.65%
Emotional discomfort	0	71.00	3570	1.98%
Activity limitation	0	52.00	3570	1.45%
Parents' concern with the snoring	0	39.00	714	5.46%
Summation of all the domains	0	377	17850	2.11%

Table 3. Percentage values before and after adenotonsillectomy.

Domains in the field of the study	Preop.	Postop.	Variation	P Value
Physical suffering	42.8%	3.27%	39.53%	<0.001
Sleep problems	35.6%	1.36%	34.24%	<0.001
Speech and swallowing problems	21.51%	1.65%	19.86%	<0.001
Emotional discomfort	40.67%	1.98%	38.69%	<0.001
Activity limitation	22.35%	1.45%	20.9%	<0.001
Parents' concern with the snoring	71.42%	5.46%	69.31%	<0.001
Summation of all the domains	34.02%	2.11%	31.91%	<0.001

As we correlate the level of palatine tonsil obstruction with the domains, we found a statistically positive and significant correlation between the level of obstruction and physical suffering, sleep problems, speech and swallowing problems, Emotional Discomfort, Activity limitation. Now, as we correlate the level of pharyngeal tonsil obstruction in the same fashion, we found a correlation with physical suffering, sleep disorders, speech and swallowing problems (table 4).

Comparing the items, we found positive association between physical suffering and sleep disorder, physical suffering and speech and swallowing problems, physical suffering and emotional discomfort, sleep disorder and speech and swallowing problems, sleep disorder and emotional discomfort, sleep disorder and activity limitation, speech and swallowing problems and emotional discomfort, speech and swallowing problems and activity limitation.

There were decreases in the number of upper respiratory tract infections after the adenotonsillectomy ( $p < 0.001$ ). During 6 months before the surgery (24 of 118; 20.33%) of our patients had 4 attacks of tonsillitis and upper respiratory tract infections and (94 of 118; 79.66%) of them had more than 4 attacks of tonsillitis and upper respiratory tract infections.

During 6 months after the operation (100 of 118; 84.74%) didn't have pharyngitis and upper respiratory tract infections, (9 of 118; 7.62%) of them had pharyngitis and upper respiratory tract infections for 1 time only, (7 of 118; 5.93%) of them had pharyngitis and upper respiratory tract infections only 2 times, (2 of 118; 1.69%) of them had pharyngitis and upper respiratory

tract infections for 3 times during 6 months after the operation.

There was a significant decrease in the use of antibiotics when we compared the periods before and after surgery ( $p < 0.001$ ). During 6 months before the surgery (24 of 118; 20.33%) of our patients used antibiotics for tonsillitis and upper respiratory tract infections 4 times and (94 of 118; 79.66%) of them used antibiotics more than 4 times. After the operation and during 6 months of follow up we found that (100 of 118; 84.74%) didn't use antibiotics, (9 of 118; 7.62%) of them used antibiotics for pharyngitis and upper respiratory tract infections for 1 time only, (7 of 118; 5.93%) of them used antibiotics for 2 times, (2 of 118; 1.69%) of them used antibiotics 3 times during 6 months after the operation.

Regarding table 6: shows mean difference, which was obtained from pre-operative mean (4.79) and post-operative mean (0.24), mean difference is (4.55). The large and worst score for the quality of life is (5), so the condition and quality of life of the children (4.55) scores became better regarding the Number of URTI and use of antibiotics during 6 months after the operation.

Rhinitis is generally frequent in patients with upper respiratory tract pathologies and it is present in 18 (15.1%) of the individuals in our study. These children had a lower level of satisfaction with the surgery ( $8.38 \pm 0.69$ ) when compared to the children without rhinitis ( $9.93 \pm 0.25$   $p = < 0.001$ ). There is a negative correlation between rhinitis and postoperative caregiver evaluation of satisfaction regarding the surgery ( $p = < 0.001$ ) (Table 7).

When we asked about the level of satisfaction of the parents regarding the surgery 6 months post operatively, it scored a high level of satisfaction, once in a scale from 1 to 10, (2 of 118; 1.69%) parents obtained mark

7, (7 of 118; 5.93%) parents reached mark 8, (16 of 118; 13.55%); mark 9, (93 of 118; 78.81%) of them reported the maximum mark of satisfaction.

**Table 4 . Correlation between the level of adenoid and palatine tonsil obstruction and the domains in the field of the study.**

Domains in the field of the study	Palatine tonsil		Pharyngeal tonsil	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
<b>Physical suffering</b>	0.569	<0.001	0.274	0.003
<b>Sleep problems</b>	0.541	<0.001	0.472	<0.001
<b>Speech and swallowing problems</b>	0.624	<0.001	0.537	<0.001
<b>Emotional discomfort</b>	0.439	<0.001	0.002	0.986
<b>Activity limitation</b>	0.245	0.007	0.129	0.162
<b>Parents' concern with the snoring</b>	0.091	0.324	0.100	0.277

Spearman's non-parametric correlation (n = 118 p ≤ 0.01).

**Table 5. Correlations among items by using correlation coefficient.**

	Coefficient	P value
<b>Physical suffering and Sleep problems</b>	0.310	<0.001
<b>Physical suffering and Speech and swallowing problems</b>	0.438	<0.001
<b>Physical suffering and Emotional discomfort</b>	0.538	<0.001
<b>Sleep problems and Speech and swallowing problems</b>	0.876	<0.001
<b>Sleep problems and Emotional discomfort</b>	0.458	<0.001
<b>Sleep problems and Activity limitation</b>	0.371	<0.001
<b>Speech, swallowing problems and Emotional discomfort</b>	0.523	<0.001
<b>Speech, swallowing problems and Activity limitation</b>	0.432	<0.001

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Table 6. Comparison between Number of Tonsillitis and URTI 6 months before Operation, Number of URTI 6 months after the Operation and Use of Antibiotics during 6 months before the Operation and 6 months After the Operation.

Paired sample	Paired Differences			d.f	P value
	Mean	Std. Deviation	Std. Error Mean		
1- Number of Tonsillitis and URTI 6 months before the Operation-Number of Pharyngitis and URTI 6 months after the Operation.	4.55	0.68	0.06	117	<0.001
2- Use of Antibiotics during 6 months before the Operation and 6 months After the Operation.	4.55	0.68	0.06	117	<0.001

Paired sample T-test

Table 7. Correlations between Rhinitis and Postoperative Caregiver evaluation of satisfaction regarding the surgery.

	Medical diagnosis of Rhinitis	Postoperative Caregiver evaluation of satisfaction regarding the surgery
Correlation Coefficient	1.000	-0.843-**
Medical diagnosis of Rhinitis Sig. (2-tailed)	.	0.000
N	118	118

\*\* Correlation is significant at the 0.01 level (2-tailed).  
Nonparametric Spearman's rho Correlations.

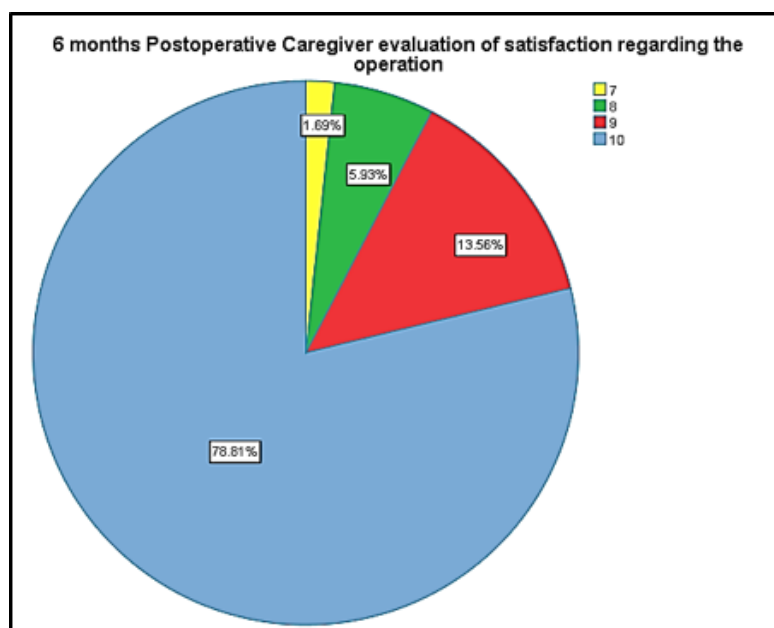


Figure.1 Level of satisfaction of the parents regarding the surgery 6 months post operatively.

## DISCUSSION

Tonsillectomy and/or adenotonsillectomy are common surgical procedures in children that are performed in otorhinolaryngology<sup>(11)</sup>.

Recently, quality of life has been a tip used to assess the impact the diseases have on children and their parents or caretakers, and adding such consideration to the treatment decision process<sup>(16, 17)</sup>. We used a specific questionnaire in this study. It was a particular instrument and aimed at assessing the impact of the disease it may have on a patient. We tried to combine that points with the grades of disease severity and importance of assessing children with adenotonsillar enlargement, as well as involving the fact in the decision of the treatment process.

Adenotonsillectomy is one of the most common surgeries performed in children<sup>(11)</sup>. The severe respiratory obstructive mechanisms and the high prevalence of recurrent infections, with the continuous unscientific use of antibiotics, and selection of a significant number of resistant bacteria as well may unite to form the criteria by which surgical treatment opted<sup>(5, 6)</sup>. In our area, we must take into account not only the physical suffering, but also the economic hardship, too. Such as extensive looking for medical consultations, long periods of delay for assistance and consuming expensive antibiotics. In our study, (91.4%) of our patients had low-intermediate financial status that was particularly highlighted.

The studied patients were 2-13 years old and girls were more than boys. These findings are consistent with results of Al-Kindy SA study in Saudi Arabia (2002)<sup>(18)</sup> which reported that the majority of the patients underwent adenotonsillectomy were child girls. Most studied patients had low-moderate economic state. A previous study in Erbil (2013)<sup>(19)</sup> by Ameen H H and Yaseen M A have reported the same findings.

The age range with a higher prevalence was between 2 to 7 years, a period in which the mucosa-associated lymphoid tissue is under formation and presents a higher susceptibility to infectious and allergic processes. A fact that also demonstrated by Modrzyński & Zawisza (2007)<sup>(20)</sup>.

In our study, when we compared the total number and percentage of scores obtained pre and postoperatively, we found that there was a high reduction in scores obtained post-operatively and 100% of the children

submitted to the surgical procedure had a score decline in all of the domains. It means that; adenotonsillectomy improves the quality of life in children with adenotonsillar enlargement; the same fact improved by Di Francisco et al.<sup>(15)</sup> and De serres et al.<sup>(14)</sup>.

Parents' concern with the child's snoring; physical suffering, emotional discomforts and sleep problems were the domains that achieved the highest scores in the pre-adenotonsillectomy questionnaire. These are the same domains that stood out in a similar paper published by De Serres et al.<sup>(14)</sup>; however, the author also firstly found sleep problems, followed by physical suffering and parents' concern with the child's snoring, which may have occurred because of cultural differences.

Analyzing the score obtained after surgery in these domains, we notice that parents' concern was the domain which obtained the highest percentage difference, afterwards was physical suffering, emotional discomforts and finally, sleep problems.

When we evaluated the physical suffering of the children before the surgery, the nasal obstruction had a higher average score with a large reduction after surgery. In the sleep disorders, the presence of snore presented a higher average score with a large reduction after surgery. According to Mitchell and Kelly (2004)<sup>(21)</sup> the adenotonsillectomy improved from 79 to 92% the life quality of children who had sleep obstructive disorder. Benninger & Walner (2007)<sup>(22)</sup> state that when such disorders are not corrected, they may lead to problems such as lack of attention, learning deficit, behavioral problems, or may cause more severe morbidity such as growth diminishment and pulmonary hypertension.

The speech and swallowing problems and activity limitations were scored the lowest in the pre-operative period; this findings are the same with the findings from De Serres et al.<sup>(15)</sup>. This can be explained by the fact that the parents' concern was more often associated with physical problems and sleep problems or because of the fact that an enlarged adenoid and tonsils are not able to limit the daily activities of children, at least among the ones included in our study.

We analyzed the items of each domain in the field of the study separately in order to know which of them was responsible for the highest score, we found that: nasal obstruction, snoring, nasal voice, irritability and school or day-nursery attendance with the highest percentages associated with their specific domains. Bernard et al

(2009) <sup>(3)</sup> find that the nasal obstruction, snoring, nasal voice, irritability and school or day-care attendance were responsible for the highest score within their domains.

In relation to the nasal obstruction items and snoring; (98.3%) of our patients had nasal obstruction and snoring. This fact can be explained by; parents pay extreme attention regarding the children's lack of capacity to breathe through the nose and with noisy breathing during sleep.

We noticed that there was a correlation between (physical sufferings, sleep problems, speech and swallowing problems) with adenoid and palatine tonsils. Also we found that a larger palatine tonsil volume is still associated with emotional discomfort and activity limitation. Such fact is similar to the findings by Di Francesco et al. <sup>(15)</sup>

The surgeries reduced the number of postoperative infectious episodes during 6 months pre and post-operative period from (100% to 15.13%). Conlon et al (1999) <sup>(23)</sup> confirm that the reduction of upper respiratory tract infections after surgery was the main reason of satisfaction of the parents. Fujimori et al (2002) <sup>(24)</sup> suggest that the surgical treatment is an effective approach to improve the oral bacterial flora in children with tonsillitis. As mentioned above, under the conditions of the developing countries, the difficult access to specialized professionals and the high cost of antibiotics not often available in the public network are important factors to be taken into account upon indication of the surgery in children who have recurrence of upper respiratory tract infections.

When the interviewees were asked about an evaluation as for the satisfaction of the surgery for the postoperative quality of life, we obtained a high total level of satisfaction. The improvement in the quality of life was confirmed after adenotonsillectomy in Luiz Euribel et al (2009) <sup>(10)</sup>.

It is important to emphasize that the group that did not have the maximum satisfaction have been associated with rhinitis, a result also demonstrated by DI Francesco et al (2004) <sup>(9)</sup> and Luiz Euribel et al (2009) <sup>(10)</sup>.

### **Conclusions**

By means of the data presented, we may conclude that the adenotonsillectomy improved the children's life quality, mainly for the improvement of the physical

suffering and sleep disorders, the significant reduction in the number of upper respiratory tract infections and the decrease in the use of antibiotics. However, the improvement was less significant in children with symptoms of rhinitis.

### **Recommendations**

To obtain a definitive result about the effect of adenotonsillectomy on the quality of life we need to do a follow up for long duration. In this study you can obtain some information about the effect of adenotonsillectomy on the cognition and behavior of child, but to obtain more information further study is recommended especially Child Behavior checklist (CBCL), Behavioral Assessment System for Children (BASC), Developmental Neuropsychological Assessment (NEPSY), Tests of Variables of Attention (TOVA) and Child Health Questionnaire Parent Form-28 (CHQPF-28).

It is wished that large, multicenter, randomized, controlled studies to be done to provide a needed data about the efficacy of adenotonsillectomy on the children with adenotonsillar hypertrophy in ameliorating the adverse effects on cognition, behavior, and QOL that is commonly noted in such children.

### **REFERENCES**

1. Di Francesco I RC, Felipe SG, Komatsu CL. Improvement in the quality of life of children after adenotonsillectomy. *Rev Bras Otorrinolaringol.* 2004; 70:748-751.
2. Carneiro LE, Neto GC, Camera MG. Adenotonsillectomy Effect on the Life Quality of Children with Adenotonsillar Hyperplasia. *Intl. Arch. Otorhinolaryngol.* 2009; 13(3):270-276.
3. Pitkäranta A, Karma P. Tonsils and Adenoids. In: Graham JM, Scadding GK, Bull PD, Editors. *Pediatric ENT.* New York: Springer; 2007. p. 131-140.
4. Nikakhlagh S, Rahim F, Boostani H, Shirazi SB, Saki N. The Effect of Adenotonsillectomy on Quality of Life in Adults and Pediatric patients. *Research Journal of Biological Sciences.* 2006; 4 (12): 1259-1261.
5. Garetz SL. Behavior, cognition, and quality of life after adenotonsillectomy for pediatric sleep-disordered breathing: summary of the literature. *Otolaryngol Head Neck Surg.* 2008; 138:19-26.

6. Burton MJ, Glasziou PP. Tonsillectomy or adenotonsillectomy versus non-surgical treatment for chronic/recurrent acute tonsillitis. *Cochrane Database Syst Rev.* 2000; (2):CD001802.
7. Le TM, Rovers MM, van Staaik BK, van den Akker EH, Hoes AW, Schilder AG. Alterations of the oropharyngeal microbial flora after adenotonsillectomy in children: a randomized controlled trial. *Arch Otolaryngol Head Neck Surg.* 2007; 133:969-972.
8. Brodsky L, Poje C. Tonsillitis, Tonsillectomy and Adenoidectomy. In: Bailey BJ, Johnson JT, Newlands SD, Editors. *Head & Neck Surgery-Otolaryngology.* Fourth Edition. Philadelphia: Lippincott Williams & Wilkins; 2006. p. 1948-1969.
9. Constantin E, Kermack A, Nixon GM, Tidmarsh L, Ducharme FM, Brouillette RT. Adenotonsillectomy improves sleep, breathing, and quality of life but not behavior. *J Pediatr.* 2007; 150:540-546
10. Neelima Gupta, Lakshmi Vaid, PP Singh. Impact of Tonsillectomy on Quality-of-life in Children: Our Experience. *Indian Journal of Clinical Practice, Vol. 24, No. 6, November 2013, p:543-546*
11. Beraldin BS, Rayes TR, Villela PH, Ranieri DM. Assessing the impact adenotonsilectomy has on the lives of children with hypertrophy of palatine and pharyngeal tonsils. *Braz J Otorhinolaryngol .* 2009;75(1):64-9.
12. Baumann I. Quality of life before and after septoplasty and rhinoplasty. *GMS Current Topics in Otorhinolaryngology - Head and Neck Surgery* 2010; 9: 47-58.
13. The WHOQOL group. Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment. *Psychol Med.* 1998;28:551-558. DOI: 10.1017/S0033291798006667.
14. De Serres LM, Derkay C, Astley S, Deyo RA, Rosenfeld RM, Gates GA. Measuring quality of life in children with obstructive sleep disorders. *Arch Otolaryngol Head Neck Surg.* 2000; 126(12):1423-9.
15. Di Francesco RC, Felipe SG, Komatsu CL. Improvement in the quality of life of children after adenotonsillectomy. *Rev Bras Otorrinolaringol.* 2004; 70:748-751.
16. Verlade-Jurado E, Avila-Figueroa C. Methodological considerations for evaluating quality of life. *SaludPublMéx.* 2002;44(5):448-62.
17. Stewart MG, Friedman EM, De Jong A, Hulka GF, Bautista MH, Anderson SE. Validation of an outcomes instrument for tonsil and adenoid disease. *Arch Otolaryngol Head Neck Surg.* 2001; 127(1):29-35.
18. Al-Kindy SA. Do antibiotics decrease post-tonsillectomy morbidity? *Saudi Med J.* 2002; 23 (6): 705-7.
19. Ameen HH, Yaseen MA. The role of amoxicillin in preventing post-tonsillectomy complications. *Zanco J.Med.Sci.* 2013; 17 (1).
20. Modrzynski M, Zawisza E. An Analysis of the incidence of adenoid hypertrophy in allergic children. *Int. J. PediatrOtorhinolaryngol.* 2007; 71:713-719.
21. Mitchell RB, Kelly J, Call E, Yao N. Quality of life after adenotonsillectomy for obstructive sleep apnea in children. *Arch Otolaryngol Head Neck Surg.* 2004; 130:190-194.
22. Benninger M, Walner D. Obstructive sleep-disordered breathing in children. *Clin Cornerstone.* 2007; 9:6-12.
23. Conlon BJ, Donnelly MJ, Mcshane DP. Improvements in health and behavior following childhood tonsillectomy: a parental perspective at 1 year. *Int J PediatrOtorhinolaryngol.* 1997; 41:155-161.
24. Fujimori I, Goto R, Kikushima K, Hisamatsu Ken-ichi, Murakami Y, Yamada T. Investigation of oral a -Streptococcus showing inhibitory activity against pathogens in children with tonsillitis. *Int J PediatrOtorhinolaryngol.* 1995; 33:249-255.