

# ASSESSMENT OF PULMONARY FUNCTION TEST AND QUALITY OF LIFE IN CHILDREN WITH ADENOTONSILLAR HYPERTROPHY.

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## ABSTRACT:

### TITLE:

Assessment of pulmonary function test and quality of life in children with adenotonsillar hypertrophy.

### AIM:

The aim of the study is to assess the quality of life and pulmonary function in children with adenotonsillar hypertrophy.

### OBJECTIVES:

1. To assess the quality of life in those children with adenotonsillar hypertrophy during the period of pre- and post-tonsillectomy.
2. To analyse the spirometric parameters consequent to adenotonsillar hypertrophy and the subsequent changes after adenotonsillectomy.

### METHODOLOGY IN BRIEF:

1. A cross sectional study was conducted in which quality of life was assessed in 30 children admitted at Saveetha Medical College and Hospital due to adenotonsillar hypertrophy between February 2021 and May 2021.

2. A prospective study was conducted in which 30 children admitted at Saveetha Medical College and Hospital due to adenotonsillar hypertrophy between February 2021 and May 2021 were evaluated for pulmonary function test. Five spirometric parameters were selected for an evaluation which had to be done pre-operatively and 30 days post operatively. Data was analysed statistically.

**CONCLUSION:** Based on this study, by analysing the spirometric parameters of pre- and post-tonsillectomy, adenotonsillectomy is found to have a positive effect on pulmonary function. It also helps in deciding early intervention to prevent cardiopulmonary complications.

**KEYWORDS:** Adenotonsillectomy, Forced vital capacity, Spirometry, Waldeyer's ring.

### INTRODUCTION:

The tonsils are a collection of lymphoid organs present in Waldeyer's ring consisting of two tubal tonsils, an adenoid tonsil, the lingual tonsils and two palatine tonsils. They play a very crucial role in the immune system of the human body<sup>1</sup>. The adenotonsillar hypertrophy (ATH) is one of the common disorder among children. It is considered to be the common cause of upper airway obstruction in the paediatric population. The significant role of adenotonsillar hypertrophy as an important causative factor in obstruction of airways and impairment of ventilation during sleep has been very well established.

It can lead to significant problems in the absence of proper treatment such as peritonsillar abscess, severe throat pain, rheumatic fever, post streptococcal glomerulonephritis, toxic shock syndrome, meningitis, brain abscess and also, cardiopulmonary complications and corpulmonale. It also leads to sleep-related breathing disorders such as obstructive sleep apnoea and chronic alveolar hypoventilation<sup>2</sup>. Fortunately, adenotonsillectomy is found to have a prominent improvement in the quality of life, behaviour of patients and cognition.

The present study is designed to assess the quality of life in terms of recurrent tonsillitis requiring antibiotics, eating and swallowing disturbances and sleep and airway disturbances before and after adenotonsillectomy using a brief, well formatted questionnaire in paediatric population and also, to see the alteration in spirometric parameters consequent to adenotonsillar hypertrophy and subsequent changes after adenotonsillectomy<sup>3</sup>.

## **MATERIALS:**

### **STUDY DESIGN:**

1. A cross sectional type of study was conducted in which the quality of life was assessed in 30 children with ATH admitted at Saveetha Medical College and Hospital due to adenotonsillar hypertrophy between February 2021 and May 2021.

2. A prospective study was conducted in which 30 children admitted at Saveetha Medical College and Hospital due to adenotonsillar hypertrophy between February 2021 and May 2021 were evaluated for pulmonary function test (spirometric test). The post operative spirometric test was done after 15 days. Informed consents from parents of all children were taken after explanation of the study objectives.

### **PATIENTS:**

30 patients in the paediatric age group with adenotonsillar hypertrophy admitted at Saveetha Medical College and hospital between February 2021 and May 2021 constituted the study population.

## **METHODOLOGY:**

All the patients were subjected to undergo thorough ENT examinations, laboratory testing, and plain x-ray of the nasopharynx. Data such as name, age, sex, presence of recurrent upper respiratory tract infections, previous ENT operations were obtained from all the patients constituting the study population.

### **PRE AND POST ADENOTONSILLECTOMY QUESTIONNAIRE:**

Questionnaires enquiring about the complaints of children including snoring, presence of pain, frequent consumption of antibiotics, apnoea during sleep and the impact of these factors on their quality of life and health were filled by the parents one day prior to surgery and 15 days after surgery. Results were analysed and tabulated statistically based on scoring.

### **PULMONARY FUNCTION TEST (SPIROMETRY):**

Spirometry is one of the pulmonary function test useful in the investigation and in the management of patients with respiratory diseases. It is a non invasive test. Spirometry can measure all the lung volumes except residual volume.<sup>4</sup>

The patient was made to sit in a chair in an exam room. A small clip was placed on the nose of the patient to keep the nostrils closed. A breathing mask shaped like a cup was fixed to the mouth of the patient. The patient was instructed to inhale deeply, made to hold in the breath for a few seconds and was then instructed to exhale as much as possible into the breathing mask. This procedure was performed several times to ensure that the results were consistent.<sup>5</sup> The manoeuvre was performed with a maximal inspiration and expiration. Spirometric values of FEV1, FEV1/FVC, FVC and many such parameters were recorded, tabulated and analysed statistically.

## **RESULTS:**

### **PRE AND POST ADENOTONSILLECTOMY QUESTIONNAIRE:**

The patients were asked to fill a questionnaire comprising various symptoms such as snoring, pain, speech abnormalities one day pre operatively, and 15 days post operatively and the data were compared (table 1 in page 9).

Out of a total score of 74, three categories such as low, moderate and high were designated based on the severity of the symptoms in the study population.

### **PRE- ADENOTONSILLECTOMY:**

Based on the scores given by the patients for various symptoms, it was observed that 22 patients fall in the category of low severity, 5 patients in the moderate category and 3 patients in the category of high severity. On analyzing the data, it was noted that the patients gave an increased score for symptoms such as pain, difficulty in swallowing and excessive sleepiness.

### **POST ADENOTONSILLECTOMY:**

Analysis of data showed an improvement in the severity of symptoms post operatively. 26 patients fall under the category of mild severity, 4 patients in the moderate category and none in the severe category. The patients experienced a decrease in the severity of the symptoms mentioned in the pre adenotonsillectomy section. Quality of life was improved in these patients after performing adenotonsillectomy.

## **SPIROMETRIC PARAMETERS OF PRE- AND POST-ADENOTONSILLECTOMY:**

The table below shows pre-operative and post-operative spirometric parameters of the study population.

- a. FVC: Forced vital capacity.
- b. PEF: Peak expiratory flow.
- c. MEF<sub>25</sub>: Maximal expiratory flow recorded at 25% of FVC.

- d. FEV<sub>1</sub>: Forced expiratory volume recorded during the first second of expiration.  
 e. MEF<sub>25-75</sub>: Mid expiratory forced expiratory flow.  
 f. FEV<sub>1</sub> /FVC: Ratio of forced expiratory volume recorded during the first second of expiration to forced vital capacity.

An improvement has been observed in parameters such as peak expiratory flow (PEF), maximal expiratory flow at 25% of FVC (MEF<sub>25</sub>), peak expiratory flow (PEF), mid expiratory forced expiratory flow (MEF<sub>25-75</sub>), forced vital capacity (FVC), 15 days after surgery as compared with pre-adenotonsillectomy<sup>6</sup>.

There has been no significant difference observed in the forced volume of expiration in the first second of expiration (FEV<sub>1</sub>), forced expiratory volume during the first second to the forced vital capacity (FEV<sub>1</sub>/FVC) ratio.

**TABLE 1:** Scoring based on level of severity of symptoms.

Sl. No.	Level of severity of symptoms	Score (Range)
1.	Low severity	0-24
2.	Moderate severity	25-49
3.	High severity	50-74

**TABLE 2:** Spirometric parameters of Pre and post adenotonsillectomy.

	Parameters	Spirometric parameters recorded pre-operatively (mean ± SD)	Spirometric parameters recorded post-operatively (mean ± SD)
1.	FVC <sup>a</sup>	1.25±0.22	1.32±0.24
2.	PEF <sup>b</sup>	2.63±0.59	2.72±0.49
3.	MEF <sub>25</sub> <sup>c</sup>	1.12±0.32	1.20±0.34
4.	FEV <sub>1</sub> <sup>d</sup>	1.19 ±0.20	1.21±0.19
5.	MEF <sub>25-75</sub> <sup>e</sup>	1.76 ±0.5	1.85±0.4
6.	FEV <sub>1</sub> /FVC <sup>f</sup>	95±4	91±5

- a. FVC: Forced vital capacity.  
 b. PEF: Peak expiratory flow.  
 c. MEF<sub>25</sub>: Maximal expiratory flow recorded at 25% of FVC.  
 d. FEV<sub>1</sub>: Forced expiratory volume recorded during the first second of expiration.  
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 f. FEV<sub>1</sub> /FVC: Ratio of forced expiratory volume recorded during the first second of expiration to forced vital capacity.

## **DISCUSSION:**

### ***QUALITY OF LIFE:***

A prominent improvement in the score was observed in post adenotonsillectomy questionnaire when compared with pre adenotonsillectomy questionnaire. There had been an observed improvement in several parameters such as mouth breathing during day time, frequent visits to hospital, snoring and pain.<sup>7</sup> Thus, adenotonsillectomy has found to have a positive impact in the quality of life in children with enlarged tonsils.

### ***SPIROMETRIC TEST:***

The obstruction of upper airways was evaluated by spirometry. This helped in the detection of obstructive changes in the upper airways.

In the present study, improvement in several spirometric parameters such as FVC, PEF 15 days after surgery has been observed in children with enlarged tonsils when compared with baseline measures. Similar to present study, Kavukcu et al. has reported an increase in FVC, PEF, FEV<sub>1</sub>, MEF<sub>25</sub>, FEF, and FEF<sub>75</sub> after adenotonsillectomy.

Children with adenotonsillar hypertrophy have trouble with nasal breathing. So, they prefer to breathe through mouth.<sup>8</sup> It has been also assumed that less nasal humidification and warming due to mouth breathing can produce changes in the diffusion and viscosity of the surfactant which act as a potential stimulus for obstruction of bronchioles. Breathing through mouth for a very long time can also cause some undesired effects on the respiratory function, by deformation of the craniofacial skeleton, oral cavity and posture and also on the psychological characteristics.

The simplicity of the spirometry test helps in the reproducibility of similar studies in routine medical practice.<sup>9</sup> On the other hand, it is difficult to obtain accurate measurements through spirometry because of poor cooperation of the patients in performing the test in children. Spirometry has been found to be beneficial in taking a timely intervention with respect to adenotonsillectomy.

## CONCLUSION:

From this study it can be noted that pulmonary function (spirometry) test can expose the obstructive effect of adenotonsillar hypertrophy whenever clinical signs or symptoms are present. And also, it has been observed that the quality of life is improved in these patients after performing the surgery<sup>10</sup>. Thus, spirometry is a valuable indicator and also provides a timely intervention in patients with adenotonsillar hypertrophy for performing adenotonsillectomy.

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