



## COMPARING PRE AND POSTOPERATIVE OXYGEN SATURATION IN CHILDREN UNDERWENT TONSILLO-ADENOID RESECTION AND TONSILAR RESECTION

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### ABSTRACT

**Aims:** Cardiopulmonary diseases may be seen in patients with chronic adenotonsillar hypertrophy that lead to severe obstructive sleep apnea (OSA), among which pulmonary hypertension is the most well-known. Here we compared the oxygen saturation in children who underwent tonsillo-adenoid resection (TAR) or tonsillar resection. **Materials and Methods:** Fifty patients diagnosed with chronic tonsillitis and adenoid hypertrophy was studied in the Department of Otorhinolaryngology and head and neck surgery. All the patients have undergone TAR or tonsillar resection and oxygen saturation was recorded by pulse oximeter pre and post surgery. **Results:** Male preponderance was observed (72%). Postoperative oxygen saturation ( $97.27 \pm 0.096$ ) was significantly higher to preoperative oxygen saturation ( $96.42 \pm 0.123$ ) ( $p < 0.001$ ). Among 50 patients, 15 underwent tonsillar resection and 35 TAR, 29 (58%) patient had risen in oxygen saturation postoperatively, 19 (38%) patient had same saturation as prior to saturation, 2 (4%) patient had fallen in saturation after the surgery. **Conclusion:** TAR is an important surgery to improve oxygen saturation in children having chronic tonsillitis. This also improves other associated complaints of snoring, mouth breathing, ear infections.

**KEYWORDS :** Tonsillo-adenoid Resection, Oxygen Saturation, Surgery, Tonsillitis And Adenoid Hypertrophy

### INTRODUCTION:

Sleep-disordered breathing (SDB) is characterized by an abnormal respiratory pattern or abnormal ventilation during sleep. SDB varies in severity and includes a spectrum of clinical entities with primary snoring at one end to the most severe form, obstructive sleep apnea (OSA), at the other end [1].

Adenotonsillectomy (ATE) with complete removal of the tonsils and adenoid is the first-line therapy for children with OSA. In otherwise healthy, nonobese children of young ages, and with enlarged tonsils, ATE is considered highly effective [2].

Hypoxemia is a potentially serious post-operative complication [3]. Present study aimed to elucidate post-operative hypoxia in children after ENT procedures and to use the information gathered to enhance postoperative care.

### Materials and Methods

Fifty patients' chronic tonsillitis and adenoid hypertrophy were studied prospectively in the Department of Otorhinolaryngology and head and neck surgery, Gandhi Medical College and Hamidia Hospital, Bhopal from 2016 to 2017. Written Informed consent was obtained from all the parents of the participants.

Patients with Clinical evidence of enlarging tonsils, evidence of enlarged adenoid, patients who underwent tonsil adenoid resection were included. Infants, children scheduled to undergo only adenoidectomy, or children with 4 neurologic, genetic and craniofacial abnormalities and children with a co-morbid illness like childhood asthma, seizure disorder, congenital cardiac disease, nasal polyposis or chest infection were excluded from the present study.

In patients with clinical evidence of tonsilloadenoid, oxygen saturation were recorded by a pulse oximeter. A thorough history was taken and physical examination was done. The demographic data and common presenting symptoms of the children with adenotonsillar enlargement selected to participate in the study were acquired with a structured proforma.

Most parents and caregivers were unwilling to give consent to the subject for the purpose of this study. So we relied on history alone to rule out adenoid hypertrophy. Pulse oximetry was done using a wrist-worn pulse oximeter, CMS50, with a pediatric probe. The recording lasted for at least 4 h.

All the data analysis was performed using IBM SPSS ver. 20 software. Data are expressed as a percentage. The paired t-test was used to compare the quantitative data. Frequency distribution was used to obtain the percentage of each variable. P value of  $< 0.05$  is considered

as significant.

### RESULTS

Majority of the patients belong to the age group of 6-10 years [27 (54%)] and were male [36 (72%).

Out of 50 patients, 43 (86%) had completed vaccination whereas only 7 (14%) had not completed vaccination, 37 (74%) were literate and most of the subjects belong to the lower class [30 (60%)]. Most of the subjects had average nutritional status [35 (70%)].

Most of the patients were diagnosed with chronic-tonsillitis with adenoid hypertrophy [23 (46%)] followed by chronic tonsillitis [21 (42%)].

Out of 50 patients, 41 (82%) complained pain in throat, 35 (70%) complained difficulty in swallowing, 41 (82%) complained difficulty in breathing, 43 (86%) complained about snoring, 46 (92%) complained about ear infection and 45 (90%) complained about upper respiratory tract infection.

**Table 1: Distribution of patients according to Throat examination**

Throat examination	Status	No of patients	Percentage
Sleep Apnea	Yes	2	4
	No	48	96
Right Tonsil	Grade 1	1	2
	Grade 2	11	22
	Grade 3	30	60
	Grade 4	8	16
Left Tonsil	Grade 1	2	4
	Grade 2	13	26
	Grade 3	28	56
	Grade 4	7	14
Posterior Pharyngeal Wall status	Congested	27	54
	NAD	23	46

NAD; no abnormality detected

The majority had Jugludigastric Lymphadenopathy [35 (70%)] and the majority had adenoid hypertrophy [35 (70%)].

**Table 2: Comparing Preoperative and postoperative oxygen saturation among the study group**

Oxygen saturation	N	Mean	Std. Error Mean	t value	df	P value
Preoperative	50	96.42	0.123	-6.063	48	<0.001
Post operative	50	97.26	0.096			

## DISCUSSION

It has been observed that not all obstructive episodes are associated with oxygen desaturation. Drawing from this, it means that not every child with adenotonsillar enlargement who snores, mouth breathes and has apnoeic episodes during sleep has oxygen desaturation [4].

In the present study 46% were diagnosed with chronic-tonsillitis with adenoid hypertrophy. Izu et al performed a similar study and reported adenotonsillar hypertrophy as the most prevalent (61.2%) in children with OSAS [5]. Lower prevalence was reported by Kang et al (13.06%) [6] whereas prevalence reported by Jaime et al (85.2%) [7] was higher as compared to present study findings.

Jaime et al evaluated the effect of adenotonsillectomy on the oxygen saturation measured by nocturnal pulse oximetry in children with SBD and reported male preponderance (66.7%) [7]. Kang et al also reported male preponderance (69.5%) in their study [7]. A recent study by Adegbiyi et al also reported male preponderance (69.2%) which is in line with the present study findings [8].

Most of the patients in present study belong to age group of 6-10 years (54%), which is in agreement to the reports of Bailey et al and Scholle et al [9, 10]. This age period coincided with the period of most frequent infections of the upper respiratory tract and the period of maximum enlargement of nasopharyngeal and palatine tonsil [11]. Strengthening this fact in present study 90% of the subjects showed upper respiratory tract infection at the time of diagnosis.

The indication for adenoidectomy and tonsillectomy in children with adenotonsillar hypertrophy is straightforward in the presence of obstructive sleep apnea (OSA) proven by polysomnography (PSG) or in snoring children with an abnormal, full-night pulse oximetry recording [12, 13]. The American Academy of Pediatrics (AAP) Clinical Practice Guidelines state that all children should be screened for snoring and recommended PSG as the gold standard for diagnosis of OSA because patient history and physical examination are poor discriminators of primary snoring and OSAS [13].

Recent reports showed success rates that vary from 27.2% to 82.9% [14]. Children snoring regularly generally have a narrow maxilla compared to children who do not snore. The impairment of nasal breathing with increased nasal resistance has a well-documented negative impact on early childhood maxilla-mandibular development, making the upper airway smaller and might lead to adult OSA [15]. Surgery in young children should be performed as early as possible to prevent the resulting morphologic changes and neurobehavioral, cardiovascular, endocrine, and metabolic complications. The close postoperative follow-up to monitor for the residual disease is equally important [16].

Adenotonsillectomy has been demonstrated by several studies to be the treatment of choice for obstructive adenotonsillar enlargement [17]. Pulse oximetry has been validated to be a reliable modality for monitoring oxygen saturation in children [18]. There is a strong parental satisfaction after adenotonsillectomy owing to the resolution of symptoms of their children/wards [19]. This further gives credence to the fact that adenotonsillectomy is the treatment of choice for adenotonsillar enlargement. In present study had compared the pre and postoperative oxygen saturation and found that postoperative oxygen saturation (97.27%) was significantly higher compared to preoperative oxygen saturation (96.39%) ( $p < 0.001$ ), which showed improvement in oxygen saturation after surgery.

Mbam et al compared the nocturnal oxygen saturation profiles of 60 children (1–9 years) with adenotonsillar enlargement with that of normal children. They reported that the mean nocturnal SPO<sub>2</sub> (peripheral saturation of oxygen) profiles of children with adenotonsillar enlargement were as follows: basal = 96.86 %, minimum = 84.99 %; maximum = 99 % and average SPO<sub>2</sub> % = 87.74 % while the saturation profiles of the control group were as follows; basal = 97.88 %, minimum = 89.71 %; maximum = 99 %, average SPO<sub>2</sub> % = 90.82 %. (Mbam TT 2014) Mbam et al concluded that normal children have better nocturnal saturation profiles than children with adenotonsillar enlargement [4].

Some technical challenges that arose were managed as were done in previous studies. Movement of the hand during recording is usually recorded as desaturation by a pulse oximeter.

Jaime et al evaluated the effect of adenotonsillectomy on the oxygen saturation measured by nocturnal pulse oximetry in children with SBD. Thirty-one children with suspected SBD and a clinical indication for adenotonsillectomy were recruited. All of them underwent overnight oxygen saturation monitoring before and after surgery. There was a significant improvement in the postoperative oxygen desaturation index (ODI) (0.65; 0.5-1.3) compared with the preoperative index (1.63; 1.1-2.4) ( $p < 0.001$ ). Adenotonsillectomy improved the oxygen saturation measured by nocturnal pulse oximetry in children with sleep breathing disorders [7].

Min et al performed a prospective study on 30 male patients to evaluate the effects of adenotonsillar hypertrophy on snoring in children. They reported that the noise level of the snoring sound, the lowest arterial oxygen saturation, and the adenoidal-nasopharyngeal ratio showed a significant correlation with the severity of snoring, but the degree of palatine tonsillar hypertrophy and the body mass index failed to disclose any significant relationship [20].

Kargoshaie et al tried to establish whether adenotonsillectomy is effective on the severity of oxygen desaturation or improve oxygen saturation in children with sleep breathing disorders on 32, aged 4-7 years, with a clinical indication for adenotonsillectomy. The study revealed a significant improvement in the postoperative oxygen desaturation index (1.60±3.22) compared with the preoperative oxygen desaturation index (3.98±4.93) ( $p < 0.01$ ). Oxygen desaturation events at the level of oxygen saturation 85-89% were significantly improved after the operation ( $p < 0.01$ ). No significant differences were seen in the desaturation events at the levels of oxygen saturation lower than 85%. Hence, concluded that nocturnal oxygen saturation improves mildly after adenotonsillectomy in children with sleep breathing disorders [17].

Adegbiyi et al did a prospective study of children under 10 years over a period of 24 months to assess the age group distribution, predisposing factors, clinical manifestation and complications of adenotonsillar hypertrophy in Nigeria, they reported that 253 subjects were enrolled into the study. Adenotonsillar hypertrophy affected all age groups studied. A high incidence was noted among the under 2-year-olds. The Male: Female ratio was 2:1. Chronic cases constituted 55.7% of our study population. Common predisposing factors were atopy (73.9%), familial history (67.3%) and recurrent upper respiratory tract infection (58.2%) [8].

The present study had few limitations of being small in sample size; a large clinical trial is required to strengthen the present study findings.

## CONCLUSION

To conclude, most of the subjects were young male subjects. Chronic-tonsillitis with adenoid hypertrophy is a common problem in the present population. Most common presenting complained were a pain in the throat, difficulty in swallowing and breathing, snoring and upper respiratory tract infection. Common features during throat examinations are sleep apnea and posterior pharyngeal wall with congestion. Adenotonsillectomy is an important surgical method to improve oxygen saturation in children with adenoid hypertrophy.

**Key message:** Adenotonsillectomy is an important surgical method to improve oxygen saturation in children with adenoid hypertrophy.

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