



A PROSPECTIVE STUDY OF 1393 CASES OF ADENOTONSILLECTOMY IN A TERTIARY REFERRAL CENTRE. A CURIOUS ALTERNATE YEAR SURGE IN INCIDENCE.

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ABSTRACT

The aim of this study is to know the pattern of the proportions of patients who underwent Adenotonsillectomy or Tonsillectomy in a tertiary referral hospital in Chennai city during 2006 – 2013. This is a prospective study conducted in a tertiary referral center during 2006 - 2013. All the patients who came for Adenoidectomy and/or Tonsillectomy during this period were included in the study. The various symptoms associated with adenoidectomy were studied. Statistical Package for Social Sciences (SPSS) version 22.0 is used to analyze the data. The total number patients underwent for Adenoidectomy and/or Tonsillectomy were 1393. Among the patients 58.7% were females, 66.1% were under the age of 14 years. Almost all (99.5%) experienced throat pain. Nasal obstruction was observed in 83.2% of patients. Snoring was noticed in 54.0% of patients. Age group, Nasal discharge, Nasal obstruction, Snoring, and Ear discharge were strongly associated with Adenoidectomy ($P < 0.001$). A curious phenomenon was observed i.e. every alternate year there was a peak observed in the incidence of Adenoidectomy. A surge was found in the incidence of Adenoidectomy every alternate year. This requires further studies to find out whether it is related to climatic conditions or virulence of the causative organism. Such studies may give us insight into unknown causal factors and may be instrumental in instituting preventive and therapeutic measures.

KEY WORDS: "Adenotonsillectomy", "Incidence", "Tertiary referral centre", "alternate year peak".



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INTRODUCTION

Adenoidectomy and Tonsillectomy is one of the most commonly performed procedure in any ENT department of any hospital. There was no study available from south India associated with it. This study was conducted to find the factors associated with it and the pattern of Adenoidectomy surgeries over a period of time from 2006 to 2013. Adenoids and Tonsils are lymphoid tissues that form a part of the Immune system. During the second trimester tonsils are formed and produce lymphocytes¹. Adenoids are found in the nasopharynx and Tonsils are situated in the tonsillar fossae on either side in the oropharynx. Both of them form a part of the Waldeyer's Ring^{2, 3}. They are therefore prone to hypertrophy or infection. Common organisms that can cause infections here are Adenovirus, Enter virus, and Rhinovirus. Tonsils can undergo Benign Idiopathic Hypertrophy (HBI). Symptoms include throat pain, pain during swallowing, and enlargement of Jugulo-Diaphragmatic Nodes. Both may also cause general symptoms like fever, malaise and Obstructive sleep apnea. Adenoid enlargement produces symptoms like nasal obstruction, nasal discharge, hypo nasal voice, mouth breathing, snoring, sleep apnea, and recurrent otitis media^{4,5}. Adenoid hypertrophy is found more in children with allergic rhinitis, in adults cigarette smoke was found to be another important factor⁶. Clinical scoring for adenoid hypertrophy was first developed for OSA in children⁷, Cohan and Konark Method⁸ is also used for radiological assessment. Other methods of scoring use symptoms, clinical assessment, lateral airway X-Ray and endoscopic assessment⁹. X-Ray is also found to be effective¹⁰. The Cohan and Konark Method has the highest positive predictive value and is a useful tool¹¹. Nasal endoscopy is a standard method^{11, 12, 13}, and correlates well with adenoid hypertrophy^{17,14,15}. Correlation was highest between clinical scoring and Endoscopic assessment. Correlation between clinical score and Radiological assessment was weak. We subjected all patients to either X-Ray skull lateral view for soft tissue or C T Paranasal Sinuses and Diagnostic Nasal Endoscopy. Indications for tonsillectomy were Chronic Tonsillitis and obstructive symptoms. Adeno-tonsillitis can act as a focus of infection and lead to complications like sinusitis,

pharyngitis, laryngitis, quinsy, parapharyngeal abscesses, skin, eye and joint problems, rheumatic heart disease, acute Glomerular nephritis and Sleep Apnea Syndrome. Keeping in mind the various causes of adeno-tonsillitis, their various clinical manifestations and differences in age predilection, this study was planned to produce a pattern regarding the percentage of total ENT patients undergoing Adeno-tonsillectomy, their age and sex wise distribution and to find any unique relation which might be revealed like the relationship between order of birth and Adeno tonsillectomy

MATERIALS AND METHODS

This is a prospective study conducted in ENT department of Kilpauk Medical College Hospital, Chennai during 2006 - 2013. All the patients came for Adenoidectomy and/or Tonsillectomy during this period were included in the study. Once the patient visited ENT out-patient department of the tertiary referral center, after detailed examination he/she was put in to the in-patient ward for Adeno tonsillectomy. After getting the informed consent, the socio demographic data and data related to family history, symptoms, and other relevant information were collected by using a structured questionnaire. The collected data were double entered and cross verified before analyzing it.

Statistical Analysis

Descriptive statistic like mean and proportions were calculated. Chi-Square test is used to compare proportions. Statistical Package for Social Sciences (SPSS) version 22.0 is used to analyze the data. Significance level is fixed at 5% ($\alpha=0.05$).

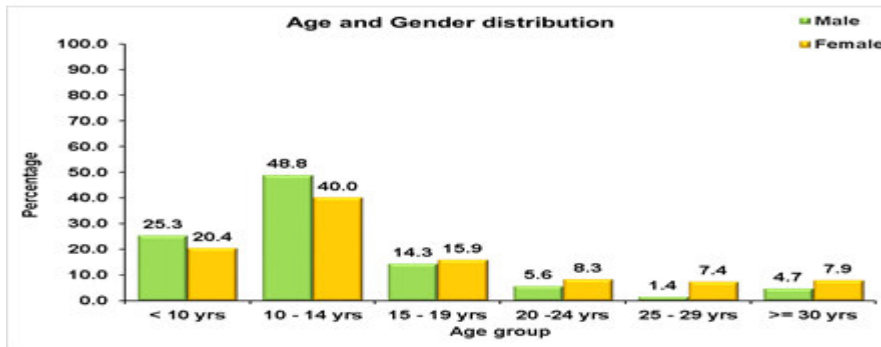
RESULTS

Among the patients underwent for Adeno-tonsillectomy, 58.8% of them were females. More than one fifth (22.4%) of the patients were less than 10 years old; 43.7% were 10-14 years; 15.2% were 15-19 years; 7.2% were 20-24 years; 4.9% were 25-29 years; and 6.6% were 30 years or more.

Table 1
Gender wise distribution of characteristics

Variables	Gender				P-Value			
	Male		Female					
	N	%	N	%				
Age group	< 10 yrs	145	25.3	167	20.4	312	22.4	<0.001
	10 - 14 yrs	280	48.8	328	40.0	608	43.6	
	15 - 19 yrs	82	14.3	130	15.9	212	15.2	
	20 -24 yrs	32	5.6	68	8.3	100	7.2	
	25 - 29 yrs	8	1.4	61	7.4	69	5.0	
	>= 30 yrs	27	4.7	65	7.9	92	6.6	
Total	574	100.0	819	100.0	1393	100.0		
Child Birth Order	First born	60	10.6	119	14.7	179	13.0	0.027
	Others	505	89.4	691	85.3	1196	87.0	
	Total	565	100.0	810	100.0	1375	100.0	
Throat Pain	Absent	2	.3	5	.6	7	.5	0.707
	Present	570	99.7	814	99.4	1384	99.5	
	Total	572	100.0	819	100.0	1391	100.0	
Nasal Obstruction	Absent	107	18.7	127	15.5	234	16.8	0.120
	Present	466	81.3	692	84.5	1158	83.2	
	Total	573	100.0	819	100.0	1392	100.0	

Nasal Discharge	Absent	302	52.7	446	54.5	748	53.7	0.519
	Present	271	47.3	373	45.5	644	46.3	
	Total	573	100.0	819	100.0	1392	100.0	
Snoring	Absent	271	47.3	368	45.0	639	46.0	0.407
	Present	302	52.7	449	55.0	751	54.0	
	Total	573	100.0	817	100.0	1390	100.0	
Ear Discharge	Absent	270	47.1	416	50.8	686	49.3	0.177
	Present	303	52.9	403	49.2	706	50.7	
	Total	573	100.0	819	100.0	1392	100.0	
Tonsillectomy	Not done	1	.2	0	.0	1	.1	0.412
	Done	572	99.8	819	100.0	1391	99.9	
	Total	573	100.0	819	100.0	1392	100.0	
Adenoidectomy	Not done	255	44.6	411	50.2	666	47.9	0.040
	Done	317	55.4	408	49.8	725	52.1	
	Total	572	100.0	819	100.0	1391	100.0	
Histopathology	Chronic Tonsillectomy	572	99.8	819	100.0	1391	99.9	0.412
	Tuberculosis	1	.2	0	.0	1	.1	
	Total	573	100.0	819	100.0	1392	100.0	



Graph 1
Age & Gender wise distribution of characteristics

Among the participants 25.3% of males and 20.4% of females were below 10 years of age; 48.8% of males and 40.0% of females were 10-14 years of age (graph 1). The age and gender distribution was statistically significant ($P < 0.001$). About 89.5% of males and 85.3% of females were not first born and statistically significant ($P = 0.027$). Almost all males (99.7%) females (99.4%) had throat pain. All the patients had the cervical adenitis. Nasal obstruction was present in 81.3% of males and in 84.5% females ($P > 0.05$). Nasal discharge

was noticed in 47.3% of males and 45.5% of females ($P > 0.05$). More or less equal number of males (52.7%) and females (55.0%) were snoring habit ($P > 0.05$). Ear discharge were noticed in 52.9% males and 49.2% of females ($P > 0.05$). Except one male all underwent tonsillectomy. Adenoidectomy had done for more males (55.4%) than females (49.8%) ($P = 0.040$). Histopathology results showed that only one male had TB tonsil and all other were chronic Tonsillitis (Table-1).

Table 2
Distribution of characteristics according to Age group.

		Age group												P-Value		
		< 10 yrs		10 - 14 yrs		15 - 19 yrs		20 - 24 yrs		25 - 29 yrs		>= 30 yrs			Total	
		N	%	N	%	N	%	N	%	N	%	N	%			
Order of Birth	First Born	33	10.6	78	12.9	33	15.6	18	18.4	6	9.0	11	12.9	179	13.0	0.380
	Others	277	89.4	527	87.1	178	84.4	80	81.6	61	91.0	74	87.1	1197	87.0	
	Total	310	100.0	605	100.0	211	100.0	98	100.0	67	100.0	85	100.0	1376	100.0	
Throat Pain	Absent	0	.0	1	.2	5	2.4	1	1.0	0	.0	0	.0	7	.5	0.326
	Present	312	100.0	606	99.8	207	97.6	99	99.0	69	100.0	92	100.0	1385	99.5	
	Total	312	100.0	607	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1392	100.0	
Nasal Obstruction	Absent	74	23.7	136	22.4	15	7.1	3	3.0	2	2.9	4	4.3	234	16.8	<0.001
	Present	238	76.3	472	77.6	197	92.9	97	97.0	67	97.1	88	95.7	1159	83.2	
	Total	312	100.0	608	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1393	100.0	
Nasal Discharge	Absent	99	31.7	292	48.0	165	77.8	74	74.0	49	71.0	69	75.0	748	53.7	<0.001
	Present	213	68.3	316	52.0	47	22.2	26	26.0	20	29.0	23	25.0	645	46.3	
	Total	312	100.0	608	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1393	100.0	
Snoring	Absent	214	68.8	362	59.5	36	17.1	9	9.0	6	8.7	12	13.0	639	45.9	<0.001
	Present	97	31.2	246	40.5	175	82.9	91	91.0	63	91.3	80	87.0	752	54.1	
	Total	311	100.0	608	100.0	211	100.0	100	100.0	69	100.0	92	100.0	1391	100.0	
Ear Discharge	Absent	103	33.0	241	39.6	152	71.7	72	72.0	50	72.5	68	73.9	686	49.2	<0.001
	Present	209	67.0	367	60.4	60	28.3	28	28.0	19	27.5	24	26.1	707	50.8	
	Total	312	100.0	608	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1393	100.0	
Tonsillectomy	Not done	0	.0	1	.2	0	.0	0	.0	0	.0	0	.0	1	.1	0.727
	Done	312	100.0	607	99.8	212	100.0	100	100.0	69	100.0	92	100.0	1392	99.9	
	Total	312	100.0	608	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1393	100.0	
Adenoidectomy	Not done	7	2.3	214	35.2	200	94.3	95	95.0	66	95.7	84	91.3	666	47.8	<0.001
	Done	304	97.7	394	64.8	12	5.7	5	5.0	3	4.3	8	8.7	726	52.2	
	Total	311	100.0	608	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1392	100.0	

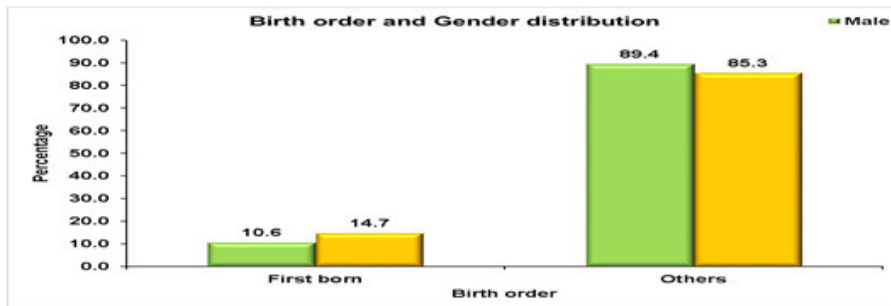
	Chronic Tonsillectomy	312	100.0	0.607	99.8	212	100.0	100	100.0	69	100.0	92	100.0	1392	99.9	
Histopathology	Tuberculosis	0	.0	1	.2	0	.0	0	.0	0	.0	0	.0	1	.1	0.727
	Total	312	100.0	608	100.0	212	100.0	100	100.0	69	100.0	92	100.0	1393	100.0	

Interestingly the First –born were observed as 10.6%, 12.9%, 15.6%, 18.4% 9.0% and 12.9% , for <10years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, and 30 or more years respectively (P>0.05). More than three fourth patients had Nasal obstruction and with increased prevalence with respect to age. Nasal obstruction was found in 76.3%, 77.6%, 92.9%, 97.0% 97.1% and 95.7% for <10years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, and 30 or more years respectively (P<0.001). Nasal discharge was found more prevalent among children < 15 years of age, as it was 68.3% in < 10 years and 52.0% in 11-14 years of age, for other age

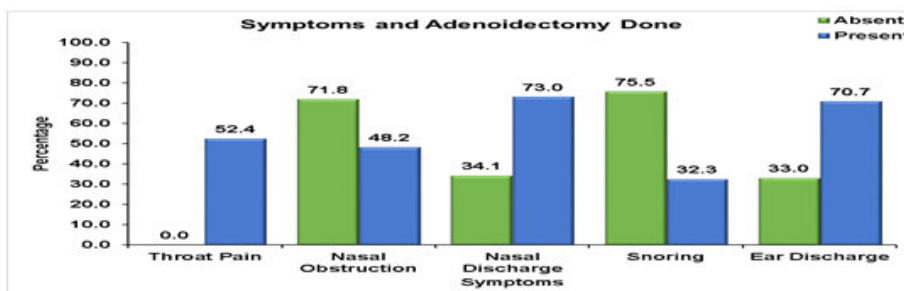
groups it is around 25.0% (P<0.001). Snoring was more prevalent among adults than children < 15 years of age, snoring was observed in 31.2%, 40.5%, 82.9%, 91.0% 91.3% and 87.0% for <10years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, and 30 or more years respectively (P<0.001). Ear discharge was found more common among children < 15 years of age, as it is 67.0% in < 10 years and 60.4% in 11-14 years of age, for other age groups it is around 27.0% (P<0.001). Adenoideotomy was performed for 97.7% in < 10 years and 64.8% in 11-14 years of age, for other age groups it was less than 10.0% (P<0.001) (Table 2).

Table 3
Factors associated with Adenoideotomy

		Adenoideotomy				P-Value	
		Not done		Done			Total
		N	%	N	%		
Order of birth	First-born	98	54.7	81	45.3	179	100.0
	Others	556	46.5	639	53.5	1195	100.0
	Total	654	47.6	720	52.4	1374	100.0
Throat Pain	Absent	7	100.0	0	.0	7	100.0
	Present	659	47.6	725	52.4	1384	100.0
	Total	666	47.9	725	52.1	1391	100.0
Nasal Obstruction	Absent	66	28.2	168	71.8	234	100.0
	Present	600	51.8	558	48.2	1158	100.0
	Total	666	47.8	726	52.2	1392	100.0
Nasal Discharge	Absent	492	65.9	255	34.1	747	100.0
	Present	174	27.0	471	73.0	645	100.0
	Total	666	47.8	726	52.2	1392	100.0
Snoring	Absent	156	24.5	482	75.5	638	100.0
	Present	509	67.7	243	32.3	752	100.0
	Total	665	47.8	725	52.2	1390	100.0
Ear Discharge	Absent	459	67.0	226	33.0	685	100.0
	Present	207	29.3	500	70.7	707	100.0
	Total	666	47.8	726	52.2	1392	100.0
Tonsillectomy	Not done	1	100.0	0	.0	1	100.0
	Done	665	47.8	726	52.2	1391	100.0
	Total	666	47.8	726	52.2	1392	100.0
Histopathology	Chronic Tonsillectomy	666	47.9	725	52.1	1391	100.0
	Tuberculosis	0	.0	1	100.0	1	100.0
	Total	666	47.8	726	52.2	1392	100.0



Graph 2
Birth order and gender distribution in adenoideotomy



Graph 3
Symptoms distribution in adenoideotomy done

Adenoidectomy had been performed for 45.3% first-born and rest was 53.5 % (graph 2). Adenoidectomy is statistically associated with lower order of birth ($P=0.040$). Those who had throat pain, 52.4% of them were underwent Adenoidectomy but none in those who did not have throat pain. Adenoidectomy was performed for 52.2% of patients those who had Cervical adenitis. Nasal obstruction was present only in 48.2% of patients who underwent Adenoidectomy ($P<0.001$), whereas Adenoidectomy was performed for 73.0% of patients

with Nasal discharge and it was 34.1% among no nasal discharge group ($P<0.001$). Adenoidectomy is performed for 32.3% of patients those who had snoring and it is 75.5% among those who did not have snoring ($P<0.001$). Ear discharge was positively associated with Adenoidectomy; Adenoidectomy is performed for 70.7% of ear discharge group and it is 33.0% among no ear discharge group ($P<0.001$) as seen in graph 3. Both Adenoidectomy and Tonsillectomy done for 52.2% of patients.

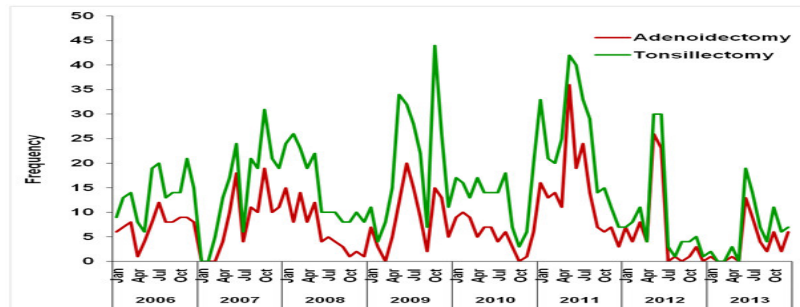


Figure 1
Month wise Tonsillectomy and Adenoideotomy

DISCUSSION

Among the patients, females are 58.8% and males are 41.2%. More than one fifth (22.4%) of the patients are less than 10 years old; 43.7% are 10-14 years; 15.2% are 15-19 years; 7.2% are 20-24 years; 4.9% are 25-29 years; Among the participants 25.3% of males and 20.4% of females are below 10 years of age; 48.8% of males and 40.0% of females are 10-14 years of age. The age and gender distribution is statistically significant ($P<0.001$), which may be because the school going children are exposed to a different mix of bacteria. About 89.5% of males and 85.3% of females are not first-born and statistically significant ($P=0.027$), the reason might be because the first born are given better care usually. Almost all males (99.7%) females (99.4%) have throat pain. All the patients have the cervical adenitis. Nasal obstruction are present in 81.3% of males and in 84.5% females ($P>0.05$) this is mostly as not all patients have adenoids. Nasal discharge are noticed in 47.3% of males and 45.5% of females ($P>0.05$). More or less equal number of males (52.7%) and females (55.0%) are snoring habit ($P>0.05$). Ear discharge are noticed in 52.9% males and 49.2% of females ($P>0.05$). Except one male all are underwent tonsillectomy. Adenoidectomy have done for more males (55.4%) than females (49.8 %) ($P=0.040$) and 6.6% are 30 years or more as today nasal endoscopy helps to diagnose the presence of adenoid hypertrophy . Histopathology results showed that only one male having Tuberculosis and all other had features of chronic inflammation. First-born are observed as 10.6%, 12.9%, 15.6%, 18.4% 9.0% and 12.9% for <10years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, and 30 or more years respectively ($P>0.05$). Almost all the patients (99.5%) have throat pain which is the common symptom for tonsillitis. More than three fourth patients have Nasal obstruction and with increased prevalence with respect to age. Nasal obstruction was found in 76.3%, 77.6%, 92.9%, 97.0% 97.1% and 95.7% for <10years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, and 30 or

more years respectively ($P<0.001$). This may be because of the associated conditions like deviated nasal septum, inferior turbinate hypertrophy, and allergy as age increases. Nasal discharge are found more prevalent among children < 15 years of age, as it is 68.3% in < 10 years and 52.0% in 11-14 years of age, for other age groups it is around 25.0% ($P<0.001$). This can be because the younger children would be more prone to suffer from adenoids which would block the choanae leading to nasal discharge. Whereas snoring is more prevalent among adults than children < 15 years of age, snoring was observed in 31.2%, 40.5%, 82.9%, 91.0% 91.3% and 87.0% for <10years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, and 30 or more years respectively ($P<0.001$). Ear discharge are found more common among children < 15 years of age, as it is 67.0% in < 10 years and 60.4% in 11-14 years of age, for other age groups it is around 27.0% Adenoidectomy have performed for 45.3% first-born and rest were 53.5% . Adenoidectomy is statistically associated with lower order of birth ($P=0.040$). This is because adenoids usually undergo atrophy as the child grows. Only 48.2% of patients who underwent Adenoidectomy had nasal obstruction. ($P<0.001$). Adenoidectomy is performed for 73.0% of Nasal discharge group and it is 34.1% among no nasal discharge group ($P<0.001$ Adenoidectomy is performed for 32.3% of patients who had snoring and it is 75.5% among those who are not snoring ($P<0.001$). This is because adenoids that do not completely obstruct the chonae would lead to less nasal discharge and snoring. Ear discharge is positively associated with Adenoidectomy; Adenoidectomy is performed for 70.7% of ear discharge group and it is 33.0% among no ear discharge group ($P<0.001$). Both Adenoidectomy and Tonsillectomy done for 52.2% of patients. Post-operative bleeding was encountered only in 5 patients. Mortality was encountered only in one patient. This is most probably because the facility was a tertiary care centre. A curious phenomenon was noticed.

It was found that a surge in Adenotonsillectomy occur every alternate year.

CONCLUSION

Ours is a tertiary care centre. This study involved 1393 cases over a period from 2006 – 2013. We found that male children were more prone to adenoiditis and adenoidectomy was performed more for them. More patients with birth after the first born were found to undergo surgery. Ear discharge was present in 7 % of the patients who underwent adenoidectomy. This shows that patients come to tertiary care centre only after adenoids are complicated with ear discharge. A suitable methodology has to be devised to identify and manage the upper respiratory infection early and in an effective manner. However, the surge in Adenotonsillectomy found in this study warrants further research to find out whether it is variation in the bacterial make up that leads to this surge. More depth studies have to be done on the antibiotic policies i.e. what are the antibiotics used, should culture and sensitivity be done before prescribing antibiotics, various dosage schedule have to be studied

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to identify the causative factor for this alternative year surge in Adeno tonsillectomy . A coordinated study with meteorological ,pollution control or environmental departments have to be done to find out whether it is related to this alternative year surge in cases of Adenotonsillectomy . Such studies may give us insight into unknown causal factors and may be instrumental in instituting preventive and therapeutic measures.

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CONFLICT OF INTEREST

Conflict of interest declared none.