Clinical Manifestations of Patients with Adenoid and Adenotonsillar Hypertrophy at Universitas Airlangga Hospital 2016-2021

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Abstract

Background: Adenoid hypertrophy is a condition that affects the upper respiratoty tract and commonly occurs in children. Adenoid hypertrophy often occurs concurrently with tonsillar hypertrphy leading to the term adenotonsillar hypertrophy. The most common cause of this condition is allergies. If not diagnosed early, adenoid and adenotonsillar hypertrophy can lead obstructive sleep apnea which can result in a decreased quality of life.
Objective: The aim of this study is to explain patient characteristics such as age and gender, clinical manifestations, and operative management of patients at Universitas Airlangga Hospital.
Methods: A descriptive observational study with a cross-sectional design conducted from January 2016 to December 2021, utilizing secondary data from medical records with a total sampling technique.
Results: The distribution of the majority of patients in the age group of 5-11 years consisted of 3 (42.9%) individuals with adenoid hypertrophy and 18 (58.1%) individuals with adenotonsillar hypertrophy. The majority of patients were male, comprising 4 (57.1%) and 16 (51.6%) individuals for adenoid and adenotonsillar hypertrophy, respectively. Adenotonsillar hypertrophy was diagnosed more frequently, accounting for 31 (81.6%) patients. The most common complaints found in patients with adenoid hypertrophy were snoring and breathing difficulties experienced by all patients (100%), while the most common complaint in patients with adenotonsillar hypertrophy was snoring experienced by all patients (100%). The majority of adenoid sizes obtained were classified as grade III (50-75%), with 4 (57.1%) individuals for adenoid hypertrophy and 18 (58.1%) individuals for adenotonsillar hypertrophy. Adenoidectomy was performed in all patients (100%) with adenoid hypertrophy, and adenotonsillectomy was performed in 29 (93.5%) patients with adenotonsillar hypertrophy.
Conclusion: Across 38 patient, majority of adenoid and adenotonsillar hypertrophy patients from January 2016 to December 2021 in Universitas Airlangga Hospital were male and belonged to the age group of 5 to 11 years old. In terms of clinical manifestations, most patients were diagnosed with adenotonsillar hypertrophy. The main complaints of snoring and difficulty breathing are experienced by all patients with adenoid hypertrophy, while in patients with adenotonsillar hypertrophy, snoring is found to be the primary complaint experienced by all patients. Grade III adenoid was the most commonly observed in radiological examinations and nearly all patients underwent operative management.

Keywords: adenoid hypertrophy; adenotonsillar hypertrophy; obstructive sleep apnea

1. Introduction

Adenoids are lymphoid tissues located in the nasopharynx and part of the Waldeyer's ring (Nelson et al., 2020). The lymphoid tissue forming the Waldeyer's ring includes the palatine tonsil, tubal tonsil, lingual tonsil, and pharyngeal tonsil also known as adenoid (Arambula, Brown, and Neff, 2021). The adenoid and tonsil are positioned as the first line of defense against microorganism (Nelson at al., 2020). Physiologically, the adenoid undergoes hypertrophy until the age of 8 and typically disappears by the age of 16 (Viswanatha, 2020). Adenoid hypertrophy is a common condition in children (Babakurban, 2016). Abnormal growth of both the adenoid and palatine tonsils in the same patient is known as adenotonsillar hypertrophy (Shuaibu et al., 2022).

The data from India indicate a 9% prevalence of adenoid hypertrophy in the age group of 6-25 years with a higher proportion in males compared to females. In Beirut, the prevalence of adenoid hypertrophy in the age group 17-43 years is approximately 60% with a higher occurrence in males, accounting for around 54% (Ratunanda et al, 2016). In a study conducted in Nigeria, it was found that the majority of patients accounting for 62,4% suffered from adenotonsillar obstructive disease followed by obstructive adenoid disease at 22,8% (Shuaibu et al., 2022).

Adenoid hypertrophy can be caused by both infectious and non-infectious factors (Geiger and Gupta, 2020). Adenoid hypertrophy has an impact on decreased academic performance, excessive sleepiness, and psychological issues, thereby disrupting the child's quality of life. Therefore, diagnostic modalities are needed to determine the management (O et al., 2021). The diagnosis is established through a thorough medical history, physical examination, and additional diagnostic tests (Ratunanda et al., 2016). The ambiguity in the child's reported symptoms by parents and difficulties in clinical examination pose challenges in the decision making process (Hamza and V. T., 2019). Undiagnosed adenoid hypertrophy can lead complications if not identified early (Abd-Allatif et al., 2014).

A study on the epidemiological data of adenoid and adenotonsillar hypertrophy at Universitas Airlangga Hospital has not been conducted previously. This is the basis for researchers to undertake a study on the clinical manifestations of patients with adenoid and adenotonsillat hypertrophy at Universitas Airlangga Hospital from 2016 to 2021.

2. Methods

This study was conducted in Universitas Airlangga Hospital using a descriptive observational study with a cross-sectional design. Data were collected using secondary data from medical records. The study sample included all patients with adenoid and adenotonsillar hypertrophy in Universitas Airlangga Hospital from January 2016 to December 2021 who met the inclusion criteria. The inclusion criteria were patients aged 1-45 years. Patients with incomplete medical records were excluded from this study. The sampling technique used was total sampling. All data were analyzed with statistical application programs and presented in frequency table. The Research Ethics Committee of Universitas Airlangga Hospital approved this study with reference number 112/KEP/2022.

3. Results

The results of patient data collection for adenoid and adenotonsillar hypertrophy from January 2016 to

December 2021 in Universitas Airlangga Hospital consisted of 138 patients and the number included based on the inclusion criteria was 38 patients.

Table 1. Frequency distribution of subjects based on gender

Gender	Adenoid Hypertrophy		Adenotonsillar Hypertrophy	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Male	4	57,1	16	51,6
Female	3	42,9	15	48,4
Total	7	100	31	100

The majority of patients with adenoid and adenotonsillar hypertrophy are male, with a total of 4 individuals (57,1%) for adenoid hypertrophy and 16 individuals (51,6%) for adenotonsillar hypertrophy.

Table 2. Frequency distribution of subjects based on age

Age (year)	Adenoid Hypertrophy		Adenotonsillar Hypertrophy	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
0-5	2	28,6	5	16,1
5-11	3	42,9	18	58,1
12-16	2	28,6	5	16,1
17-25	0	0	1	3,2
26-35	0	0	2	6,5
36-45	0	0	0	0
Total	7	100	31	100

The age category of 5-11 years is the most common age group among adenoid and adenotonsoillar hypertrophy patients, with 3 individuals (42,9%) for patients with adenoid hypertrophy and 18 individuals (58,1%) for patients with adenotonsillar hypertrophy.

Table 3. Frequency distribution of subjects based on diagnosis

Diagnosis	Frequency (n)	Percentage (%)
Adenoid hypertrophy	7	18,4
Adenotonsil hypertrophy	31	81,6
Total	38	100

The majority of patients have been diagnosed with adenotonsillar hypertrophy, as many as 31 patients (81,6%).

Table 4. Frequency distribution of subjects based on main complaint

Main Complaint	Adenoid Hypertrophy		Adenotonsillar Hypertrophy	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Snoring	7	100	31	100
OSA	4	57,1	21	67,7
Difficulty Breathing	7	100	8	25,8

The most common main complaint found in patients with adenoid hypertrophy are snoring and difficulty breathing experienced by all patients totaling 7 individuals (100%). Meanwhile, the most common main complaint found in patients with adenotonsillar hypertrophy is snoring experienced by all patients totaling 31 individuals (100%).

Table 5. Frequency distribution of subjects based on radiological examination

Radiological Examination	Adenoid Hypertrophy		Adenotonsillar Hypertrophy	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Grade I	0	0	1	3,2
Grade II	0	0	10	32,3
Grade III	4	57,1	18	58,1
Grade IV	3	42,9	2	6,5
Total	7	100	31	100

The majority of patients, both those with adenoid hypertrophy and adenotonsillar hypertrophy have adenoid sizes categorized as grade III, with 4 individuals (57,1%) and 18 individuals (58,1%) respectively.

Based on the obtained data, it was found that adenoidectomy was performed on all patients (100%) with adenoid hypertrophy, and adenotonsillectomy was performed on 29 out of 31 patients (93.5%) with adenotonsillar hypertrophy.

4. Discussion

Based on the results of this study, it was found that adenoid and adenotonsillar hypertrophy occurs more frequently in males 57,1% and 51,6%. These results are in line with previous research on adenoid hypertrophy patients in Universitas Airlangga Hospital for the period 2019-2021, which reported 46 (63%) males and 27 (37%) females (Nugroho et al., 2023). Another study by Yaseen, Khammas, and Anbaky found that there were 81 (54%) male patients and 69 (46%) female patients (Yaseen, Khammas and Anbaky, 2012). It is likely that male patients are more exposed to excessive allergen exposure (Althobaiti et al., 2020). Smoking habits and dietary patterns can also be factors contributing to the higher occurrence in males (Triola, Zuhdi, and Vani, 2020). In the 2012 study, it was found that 12 patients, comprising of 10 males and 2 females had a history of smoking (Rout et al, 2013).

As presented in table 2, it is known that the highest percentage are 42,9% and 58,1% within the age range of 5-11 years. The previous research on adenoid hypertrophy patients in Universitas Airlangga Hospital during the period 2019-2021 indicated that the majority of patients were aged 6-10 years (Nugroho et al., 2023). A total of 38% of adenoid hypertrophy patients in the 2021 study were in the age group of 6-8 years (O et al., 2021). This is consistent with previous research which suggests that after birth, lymphoid tissue undergoes development and the early childhood period is when lymphoid tissue reaches its maximun growth (Babakurban, 2016). There is a difference with research in Nigeria, which found that the majority of adenoid hypertrophy patients were in the age range of 3-5 years amounting to 51,1%. Regional variatons may be a contributing factor to these differences (Rilwanu et al., 2022). The disparities are likely also influenced by diverse socioeconomic status, lifestyles, and cultures (Dawood and Khammas, 2017).

The majority of patients were diagnosed with adenotonsillar hypertrophy, specifically 31 individuals accounting for 81,6% of the total patients. The study by Shuaibu et al found that obstructive adenotonsillar disease is the most common diagnosis among patients (Shuaibu et al., 2022). Previous research has found that children who experience tonsil hypertrophy often also experience adenoid hypertrophy (InformedHealth.org, 2019). This is because the adenoids and tonsils are the body's first lymphoid organs that come into contact with ingested and inhaled pathogens. The growth size correlates with immunologic activity. Both humoral and

cellular immune responses are controlled by various specific immunologic compartments found in the tonsil and adenoid tissues. This results in both normal flora and pathogenic microbes potentially causing overall enlargement of lymphoid tissue (Lalwani, 2020).

The results obtained in this study indicate the primary complaints found in patients with adenoid hypertrophy include snoring and difficulty breathing, experienced by all patients (100%). Additionally, 4 out of 7 patients (57.1%) also suffer from OSA. As for patients with adenotonsillar hypertrophy, all patients (100%) experience snoring, 21 out of 31 patients (67.7%) have OSA, and 8 out of 31 patients (25.8%) experience difficulty breathing. Snoring is the most common symptom in patients with adenotonsillar hypertrophy at the time of initial diagnosis accounting for 84,2%, followed by rhinitis at 80,2%, and mouth breathing at 74,3% (Shuaibu et al., 2022). A study involving 248 patients found that 58% of the patients snored and 42% experienced OSA (Cioffi et al., 2007). This occurs because the adenoids are located at the back of the nasal cavity, so the main symptoms will affect nasal function when there is enlargement (Rout et al, 2013).

A blocked or narrowed airway can lead to snoring. When a person sleeps, all the muscles in the body relax including the muscles that keep the airway wide open, allowing air to freely enter the lungs. The upper throat often remains open, allowing air to pass easily during sleep. Some may experience narrowing in the throat area. Breathing may stop while they sleep, often for more than ten seconds as the muscles in the upper throat relax. When breathing stops briefly like this, it is called apnea (Mountsinai.org,2023). Enlarged adenoids may be nearly twice their normal size and obstruct the airflow through the nasal passages. Although enlarged adenoids may not physically block the back of the nose, they can restrict airlow enough to make nasal breathing feel difficult leading to the habit of breathing through an open mouth. Enlarged adenoids can also partially block the nasal airway, potentially affecting the quality of the voice (Rout et al, 2013).

From this study, the data reveals that the most common adenoid size in patients with adenoid hypertrophy is grade III at 57.1%, followed by grade IV at 42.9%. Meanwhile, in patients with adenotonsillar hypertrophy, the most common grades are III and II, with percentages of 58.1% and 32.3%, respectively. This data differs slightly from previous research which found grade III as the most common adenoid size with a percentage of 51,7% in 31 patients and grade II as the second most common size with a percentage of 30% in 18 patients (O et al, 2021). Study by Sharma et al also indicates that the most common adenoid size in patients is grade III at 36,8% and grade II at 35,8% (Sharma et al, 2016). The immunological role of the adenoids causes them to develop rapidly in the first few years of life. The size and shape change significantly during childhood with dynamic growth occurring between the ages of 3 and 6 years. This growth may be related to the somewhat slow expansion of the nasopharyngeal cavity. After the age of 6, adenoid growth is limited along with the expansion of the nasopharyngeal cavity and respiratory passages. When the adenoids become infected, inflammation can cause immunologically active cells to become inactive, reducing the capacity to transport antigens. This triggers metaplasia into layered squamous epithelium. These changes result in inadequate antigen absorption and impaired cell function (Niedzielski et al., 2023).

Data obtained from this study indicates that adenoidectomy was performed on all patients with adenoid hypertrophy (100%) and adenotonsillectomy was performed on 29 out of 31 patients with adenotonsillar hypertrophy (93.5%). Surgery becomes recommended course of action when conservative measures prove ineffective and symptoms worsen despite pharmacological treatment (Łapińska and Zawadzka-głos, 2016). The most commonly performed surgeries in children involve tonsillectomy, adenoidectomy, or adenotonsillectomy. Clinical recommendations suggest that children experiencing obstructive sleep-

disordered breathing with negative impacts on growth, school performance, and behaviour should consider undergoing tonsillectomy and/or adenotonsillectomy. Respiratory disturbances encompass various conditions ranging from snoring to the most severe form of OSA. Obstructive sleep apnea or OSA is characterized by irregular breathing and sleep patterns that can be observed during nighttime polysomnography (Schneuer et al., 2022).

Other countries such as Scotland and Australia have reported an increase in the rates of adenotonsillectomy and adenoidectomy among younger children. One main cause of the rise in adenotonsillectomy has been identified as the increased number of young children identified and treated for OSA or other less severe respiratory problems (Schneuer et al., 2022). Based on this study, it was found that 4 out of 7 patients (57.1%) with adenoid hypertrophy and 21 out of 31 patients (67.7%) with adenotonsillar hypertrophy experienced OSA. Distinctive snoring, sleep disturbances, neurocognitive and behavioral problems such as learning disabilities, behavioral disorders, attention deficits, and hyperactivity are signs and symptoms of this syndrome. Developmental delays, mental disorders, and pulmonary hypertension are the main consequences of OSA (Cioffi et al., 2007).

Adenotonsillectomy is found to be curative in 75-100% of children with OSA according to the American Academy of Pediatrics on OSAS (Babakurban, 2016). Adenotonsillectomy can improve the quality of life and cure OSA in children up to 85-95%. Research comparing the quality of life of children before and after adenotonsillectomy showed a 87,7% improvement with 74,5% indicating a signicant improvement (Lalwani, 2020). Several studies have investigated the impact of adenotonsillectomy on the quality of life using both objective and subjective data. These studies indicate that adenotonsillectomy results in significant changes in polysomnographic parameters such as an increase in oxygen saturation levels and a decrease in the number of apnea episodes (Torretta et al., 2017). The increased use of adenotonsillectomy as a first-line treatment may be influenced by concerns of physicians and parents about the potential long-term impacts on cardiovascular, cognitive, behavioral, and developmental effects of OSA in children. Adenoidectomy can be performed for OSA as long as the tonsils are not enlarged (Schneuer et al., 2022).

5. Conclusion

The majority of adenoid and adenotonsillar hypertrophy patients from January 2016 to December 2021 in Universitas Airlangga Hospital were male and belonged to the age group of 5 to 11 years old. In terms of clinical manifestations, most patients were diagnosed with adenotonsillar hypertrophy. The main complaints of snoring and difficulty breathing are experienced by all patients with adenoid hypertrophy, while in patients with adenotonsillar hypertrophy, snoring is found to be the primary complaint experienced by all patients. Grade III adenoid was the most commonly observed in radiological examinations and nearly all patients underwent operative management.

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References

Abd-Allatif, M., Ibrahim, H., Yehia, S., Abd-Elwahab, S. and Raghib, K. (2014). THE EFFECT OF ADENOID HYPERTROPHY ON INTELLIGENCE QUOTIENT AT PRESCHOOL AGE.

Althobaiti, T., Hadaidi, W., Alghamdi, A., Alghashmari, K., Hadaidi, A. and Abd-Elrahman, T. (2020). Adenoid hypertrophy in adults: causes and precipitating factors. International Journal of Medicine in Developing Countries, pp.1792–1796. doi:https://doi.org/10.24911/ijmdc.51-1599758714.

Arambula, A., Brown, J.R. and Neff, L. (2021). Anatomy and physiology of the palatine tonsils, adenoids, and lingual tonsils. World Journal of Otorhinolaryngology - Head and Neck Surgery, 7(3), pp.155–160. doi:https://doi.org/10.1016/j.wjorl.2021.04.003.

Babakurban, S.T. (2016). Adenoidectomy: current approaches and review of the literature. The Turkish Journal of Ear Nose and Throat, 26(3), pp.181–190. doi:https://doi.org/10.5606/kbbihtisas.2016.32815.

Cioffi, S., Harumi Itamoto, C., Pradella-Hallinan, M., Pizarro, G., Tufik, S., Pignatari, S., Reginaldo, R. and Fujita (2007). BJORL-SGP (Publishing Management System -Brazilian Journal of Otorhinolaryngology) oon July 16. Brazilian Journal of otorhinolaryngology, [online] 76(5). Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9450721/pdf/main.pdf [Accessed 7 Oct. 2023].

Dawood, M.R. and Khammas, A.H. (2017). Diagnostic Accuracy of Radiology and Endoscopy in the Assessment of Adenoid Hypertrophy. An International Journal of Otorhinolaryngology Clinics, 9(1), pp.6–9. doi:https://doi.org/10.5005/jp-journals-10003-1251.

Geiger, Z. and Gupta, N. (2020). Adenoid Hypertrophy. [online] PubMed. Available at: https://www.ncbi.nlm.nih.gov/books/NBK536984/ [Accessed 8 May 2022].

Hamza, S.B. and V. T., R. (2019). Assessment of size of adenoid-comparison of adenoidal nasopharyngeal ratio and nasal endoscopy in children with chronic adenoiditis. International Journal of Research in Medical Sciences, 7(3), p.776. doi:https://doi.org/10.18203/2320-6012.ijrms20190922.

InformedHealth.org (2019). Enlarged tonsils and adenoids: Surgery for enlarged tonsils or adenoids. [online] www.ncbi.nlm.nih.gov. Institute for Quality and Efficiency in Health Care (IQWiG). Available at: https://www.ncbi.nlm.nih.gov/books/NBK536875/.

Lalwani, A.K. (2020). Current Diagnosis & Treatment Otolaryngology Head and Neck Surgery /. New York, N.Y.: Mcgraw Hill Medical, C.

Łapińska, iwona and Zawadzka-głos, lidia (2016). adenoid and tonsils hypertrophy − symptoms and treatment. New Medicine, 20(4), pp.103–106. doi:https://doi.org/10.5604/14270994.1228134.

Mountsinai.org (2023). Obstructive sleep apnea - adults Information | Mount Sinai - New York. [online] Mount Sinai Health System. Available at: https://www.mountsinai.org/health-library/diseases-conditions/obstructive-sleep-apnea-adults.

Nelson, W.E., Kliegman, R., W, J., Behrman, R.E., Robert Charles Tasker, Shah, S.S., Blum, N.J. and Wilson, K.M. (2020). Nelson textbook of pediatrics. Vol. 1. Philadelphia: Elsevier, Cop.

Niedzielski, A., Chmielik, L.P., Mielnik-Niedzielska, G., Kasprzyk, A. and Bogusławska, J. (2023). Adenoid hypertrophy in children: a narrative review of pathogenesis and clinical relevance. BMJ Paediatrics Open, [online] 7(1), p.e001710. doi:https://doi.org/10.1136/bmjpo-2022-001710.

Nugroho, P.S., Falerina, R., Rakhma, H.K. and Nurfaizi, A. (2023). Correlation of Clinical Score, Radiological Examination, and Nasopharyngeal Endoscopy in Adenoid Hypertrophy Patients as a Consideration of Adenoidectomy. Korean journal of otorhinolaryngology-head and neck surgery, 66(5), pp.315–321. doi:https://doi.org/10.3342/kjorl-hns.2022.00227.

O, S., Jyothirmai, A.S.L., Satish Chandra, T. and Murthy, P.S.N. (2021). Assessment of adenoid hypertrophy with clinical grading versus radiology and endoscopy- A cross-sectional study. IP Journal of

Otorhinolaryngology and Allied Science, 3(4), pp.130–135. doi:https://doi.org/10.18231/j.ijoas.2020.028.

Ratunanda, S.S., Satriyo, J.I., Samiadi, D., Madiadipoera, T. and Anggraeni, R. (2016). Efektivitas Terapi Kortikosteroid Intranasal pada Hipertrofi Adenoid Usia Dewasa berdasarkan Pemeriksaan Narrow Band Imaging. Majalah Kedokteran Bandung, 48(4), pp.228–233. doi:https://doi.org/10.15395/mkb.v48n4.914.

Rilwanu, M.D., Saidu, S.A., Ma'aji, S.M., Danfulani, M., Yunusa , G.H., Hafsat, A.-R.O., Iseh, K.R. and Ahmad, A. (2022). Correlation between radiographic adenoidnasopharyngeal ratio and clinical symptoms of adenoid hypertrophy in a tertiary health institution in North West Nigeria. Asian Journal of Medical Sciences, 13(4), pp.161–166. doi:https://doi.org/10.3126/ajms.v13i4.41969.

Rout, M.R., Mohanty, D., Vijaylaxmi, Y., Bobba, K. and Metta, C. (2013). Adenoid Hypertrophy in Adults: A case Series. Indian Journal of Otolaryngology and Head & Neck Surgery, [online] 65(3), pp.269–274. doi:https://doi.org/10.1007/s12070-012-0549-y.

Schneuer, F.J., Bell, K.J., Dalton, C., Elshaug, A. and Nassar, N. (2022). Adenotonsillectomy and adenoidectomy in children: The impact of timing of surgery and post-operative outcomes. Journal of Paediatrics and Child Health, 58(9), pp.1608–1615. doi:https://doi.org/10.1111/jpc.16052.

Sharma, K., Pannu, M.S., Arora, A. and Sharma, V. (2016). Preventive Audiology: Screening for Hearing Impairment in Children Having Recurrent URTI. Indian Journal of Otolaryngology and Head & Neck Surgery, [online] 68(2), pp.163–166. doi:https://doi.org/10.1007/s12070-015-0937-1.

Shuaibu, I., Usman, M., Ajiya, A., Chitumu, D., Mohammed, I., Abdullahi, H., Adebola, S. and Adamu, A. (2022). Adenoid and tonsil hypertrophy in Zaria, North Western Nigeria: Review of clinical presentation and surgical outcome. Journal of West African College of Surgeons, [online] 12(1), p.23. doi:https://doi.org/10.4103/jwas.jwas_71_22.

Torretta, S., Rosazza, C., Pace, M.E., Iofrida, E. and Marchisio, P. (2017). Impact of adenotonsillectomy on pediatric quality of life: review of the literature. Italian Journal of Pediatrics, [online] 43(1), p.107. doi:https://doi.org/10.1186/s13052-017-0424-2.

Triola, S., Zuhdi, M. and Vani, A.T. (2020). Hubungan Antara Usia Dengan Ukuran Tonsil Pada Tonsilitis Kronis Di Rumah Sakit Islam Siti Rahmah Padang Sumatera Barat Pada Tahun 2017 - 2018. Health & Medical Journal, 2(1), pp.19–28. doi:https://doi.org/10.33854/heme.v2i1.299.

Yaseen, E.T., Khammas, A. and Anbaky, F.A. (2012). Adenoid enlargement assessment by plain X-ray & Nasoendoscopy. undefined. [online] Available at: https://www.semanticscholar.org/paper/Adenoid-enlargement-assessment-by-plain-X-ray-%26-Yaseen-Khammas/163189c4f2bab99c85c53b4d850725326430d3b3 [Accessed 29 May 2022].