

## Original Research Article

# Radiological findings and clinical features for the diagnosis of adenoid hypertrophy: a study from Iraq

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## ABSTRACT

**Background:** Adenoid enlargement is a prevalent condition among children. Adenoidectomy has been done based on clinical symptoms. The purpose of this study is to determine the agreement between clinical features of adenoid enlargement, X-ray and adenoid size.

**Methods:** Hundred symptomatic children were enrolled into this study at ENT. Department of Al-Bin Sina teaching hospital in Mosul city of Iraq. History was taken, clinical examination for adenoid enlargement and skull X-ray (lateral view) were performed for all children with assessment of adenoid size 1 day before operation.

**Results:** The respondent composed of 5% male children and 46% females with average age of 6 years. Adenoid facies were the most frequent presentation followed by snoring then nasal obstruction. Around 64% had positive otoscopic findings and another 58% had hearing impairment and only 22% had ear discharge. All of the clinical findings showed (100%) sensitivity and specificity vary from (64%) to (90%). The accuracy rate for clinical features ranged from 92% to 98%. X-ray findings show a low accuracy rate (92%) in comparison to others.

**Conclusions:** Clinical findings could be used to select children for adenoidectomy, especially when endoscopic examination is not available or cannot be performed.

**Keywords:** Adenoids, Radiography, Adenoid size, Correlation

## INTRODUCTION

Adenoid enlargement is a prevalent ailment affecting toddlers and school age. Clinical features of child with enlarged adenoid were first describe by Meyer in 1870, he listed symptoms of nasal obstruction, mouth breathing, anterior and posterior nasal discharge and dead speech as being due to adenoid enlargement.<sup>1</sup> It was postulated that these symptoms are justified to diagnose adenoid enlargement and warrant adenoidectomy". This theory survived over 100 years and despite of doubts, most surgeons consider it as the most important factor when deciding adenoidectomy.<sup>2</sup>

On the other hand, others discussed the value of radiography in the diagnosis of adenoid enlargement. Radiography is a reliable and non-traumatic investigation in children undergo adenoidectomy.<sup>3,4</sup>

Image study using paranasal sinuses X-ray is a very simple, easy and comfortable method to evaluate the sizes of adenoids. Earlier in 90s, Cohen et al supported that paranasal sinuses X-ray is the best way to determine pharyngeal tonsil hypertrophy.<sup>5</sup>

Adenoidectomy remains one of the commonest surgical procedure in children. In addition to cost, there are

frequent complications including bleeding, hyper nasality, aesthetical and psychological disturbances.<sup>6</sup> So, far, reliable criteria for surgical intervention are clinical pictures like nasal obstruction, snoring, hypo-nasality, adenoids facies and recurrent otitis media with effusion.<sup>7</sup>

There is a growing evidence supporting the necessity to associate clinical symptoms with radiological findings for optimal decision to remove adenoid among symptomatic children.<sup>8</sup> This study aims to determine the association between clinical findings and adenoid volume confirmed by adenoidectomy.

## METHODS

This was a cross-sectional study design which was conducted from June 2019 to October 2019 at Bin Sina teaching hospital in Mosul city. All patient who was admitted during the study period for adenoidectomy with or without myringotomy were targeted in this study. Sample size was calculated using online calculator for sensitivity and specificity studies. Based on expected agreement between clinical features and size of adenoid with minimum value of 0.89. With expected precision and drop out of 10%, the final sample size was 107. We adopted a census method of sampling in which we targeted all available patients.

The study adopted the following inclusion criteria- (1) child under age of 10-year-old. (2) both sexes. (3) suffering of major adenoid enlargement symptoms. The exclusion criteria were (1) children with nasal septal deviation or (2) children with congenital anomalies.

History was taken, clinical examination for the signs and symptoms of adenoid enlargement and skull X-ray (lateral view) were performed for all the children with the assessment of adenoid size one day before operation. This assessment is based on the above two parameters i.e., clinical findings and skull X-ray.

Ethical approval obtained from hospital administration and informed consent was obtained from guardian of each participant.

### Clinical assessment

The main clinical outcomes were translated into nasal obstruction score (NOS) and ear problem score (EPS). The NOS include (history of nasal obstruction, nasal discharge, hypo nasal speech, snoring, adenoid facies, mouth breathing, anterior and posterior rhinos' copy). All these features were scored (1) if present and zero (0) if absent. The features related to the EPS were history of hearing impairment, history of ear discharge and positive otoscopic findings (retraction of tympanic membrane, dull colour reduced mobility) similar scoring were performed.

## Radiography

A lateral nasopharyngeal X-ray was taken in all patients in an erect position, with the mouth closed and slightly extended neck. The films were then assessed by a radiologist who was blinded to the physical findings, according to the Cohen and Konak method.<sup>9</sup>

### Assessment of adenoid volume

Adenoidectomy was carried out by standard curettage method using (St. Clair Thomson) carefully removing all of trapped air. The volume ranged from 2-6 ml and it was divided into two categories: (1) Small: if the tissue measured 2-4 ml. (2) Large: if it was >4-6 ml.

### Statistical analysis

Data were entered and analysed using SPSS v.26. Descriptive statistics were produced for the study sample and related parameters. Sensitivity and specificity were calculated for the agreement between clinical features, X-ray and adenoid size.

## RESULTS

The respondent composed of 54% male children and 46% females. Their age ranged between 3 to 8 years with average of 6 years. Table 1 shows the distribution of components of nasal obstruction score. As the sample is 100, results showed percentage distribution. It is observable that adenoid facies were the most frequent presentation followed by snoring then nasal obstruction. The least presenting symptom was Anterior rhinoscopy.

**Table 1: Distribution of nasal obstruction score.**

Clinical findings	Nasal obstruction score	
	Present %	Absent %
Nasal obstruction	72	28
Nasal discharge	38	62
Snoring	75	25
Adenoid facies	77	23
Mouth breathing	29	71
Anterior rhinoscopy	27	73
Posterior rhinoscopy	15	85
Hypo-nasality	66	34

Table 2 shows that around 64% had positive otoscopic findings and another 58% had hearing impairment and only 22% had ear discharge.

**Table 2: Distribution of ear problem score.**

Clinical feature	Ear problem score	
	Present	Absent
History of hearing impairment	58	42
History of ear discharge	22	78
Positive otoscopic findings	64	46

Table 3 demonstrates the agreement between clinical features and X-ray findings versus adenoid measurements. All of the clinical findings showed (100%) sensitivity and specificity vary from 64 to 90%, adenoid facies have the lowest specificity (64%) and nasal obstruction has the highest one (90%), X-ray also

showed sensitivity of (100%) and specificity (63%). The accuracy rate for clinical features ranged from 92 to 98%, history of hearing impairment and adenoid facies has the lowest rate (92%), and nasal obstruction showed the highest rate (98%), X-ray findings show a low accuracy rate (92%) in comparison to others.

**Table 3: Sensitivity and specificity of clinical feature, X-ray and adenoid size.**

Variables	Positive scoring >50%	Large volume	Sensitivity	Specificity	Accuracy
Nasal obstruction	72	70	100	90	98
Snoring	75	68	100	70	93
Adenoid facies	77	59	100	64	92
Hypo-nasality	66	60	100	85	93
Hx hearing impairment	58	50	100	84	92
Positive otoscopic findings	64	60	100	88	96
X-ray findings	78	70	100	63	92

## DISCUSSION

This study is based on the assessment of adenoid size by clinical and radiological examination in order to determine which of each approach is most reliable method in the diagnosis of adenoid enlargement and whether diagnosis should depend on clinical findings alone or with X-ray for the child being considered for adenoidectomy.

Regarding OS, the present study showed that more than two thirds of the cases included in the study had adenoid fades, snoring, and nasal obstruction (77%, 75%, 72%) respectively, hypo nasal speech is present in (66%) of the cases, mouth breathing, nasal discharge, anterior and posterior rhinoscopy were excluded. These findings are in agreement with Hibbert who approved that snoring, hypo-nasality and nasal obstruction statistically correlate with children being considered for adenoidectomy. He also excluded nasal discharge, anterior and posterior rhinoscopy, he stated that mouth breathing, nasal discharge and post nasal drip can occur in normal children or children with allergic rhinitis.<sup>10</sup>

Earlier, Rasmus et al showed that children who were clinically assessed as mouth breathers by open lip posture had identical nasal air flow to normal children.<sup>11</sup> Moreover, Lones et al mentioned that posterior rhinoscopy in small children is Difficult.<sup>12</sup>

Considering EPS, the present study showed that history of hearing impairment (57%) and positive otoscopic findings (64%) score higher than history of ear discharge (22%). These figures are in agreement with Kindermann who demonstrated an evidence of Eustachian tubes occlusion by adenoid.<sup>13</sup> On the other hand, Hibbert and Stell stated that no significant differences in the size of adenoid children being considered for adenoidectomy with myringotomy.<sup>14</sup>

Sensitivity, specificity and accuracy rates were calculated for the clinical features who has the highest score (>50%). The gold standard used here was the adenoid volume removed by operation. The study revealed that all the clinical features had a sensitivity of 100% and specificity in percentage ranging from 90% in nasal obstruction to (64%) in adenoid fades with an accuracy rate ranging from 98% of nasal obstruction to 92% in adenoid fades and history of hearing impairment.

The results of present study are supported by other studies. It was shown that obstructive symptomatology score had the highest correlation with endoscopic and operative findings.<sup>15</sup> Maw et al found reasonable correlation between clinical findings and adenoid volume removed by adenoidectomy.<sup>16</sup> Others like Berhein and Steel stated "In general we have not had. difficulty after studying the history and making an examination, of determining when adenoidectomy is indicated."<sup>17</sup>

However, others reported that there was a very little correlation between history and examination with the size of adenoid, casting doubt on the value of symptoms in diagnosing adenoid enlargement.<sup>18</sup>

Regarding, pre-operative X-ray assessment of adenoid in children being considered for adenoidectomy, the present study showed that X-ray had a sensitivity of 100% and less specific than that of clinical findings (59%) in comparison with adenoid volume with an accuracy rate equal to 92 % which is similar to the lowest rate of clinical findings. These findings were agreed in tandem with other studies like Cohen et al. who found a weak correlation between X-ray and operative findings.<sup>5</sup> A meta-analysis showed that radiology can be misleading.<sup>19</sup> Moreover, Musbahi et al reported that only 2.5% of otolaryngologists in United Kingdom using radiology as a routine check before adenoidectomy.<sup>20</sup> However, this idea was contradicted by others like Weitz who noted that

radiology is reliable and non-traumatic investigation, also Hibbert and Whiteous reported a reasonable correlation between a lateral radiography and adenoid volume.<sup>5,21</sup>

Furthermore, Tagaya et al proved that X-ray results are of value in diagnosis of adenoid enlargement with a good correlation with adenoid size.<sup>22</sup>

Lastly, Wormald suggested that: routine X-ray for evaluation of adenoids size is not necessary, clinical evaluation using speech and historical data as well as per-operative digital palpation of nasopharynx are sufficient for the clinicians.<sup>23</sup>

Although we have made possible efforts to provide a valid result, some limitations are evident in this study. Firstly, the results came from a single centre which may limit the generalization of the results. Secondly, other advanced method of diagnosis was not employed to avoid extra cost on patients.

## CONCLUSION

This study showed that the clinical features are sufficient to make the decision for surgery. It has a higher accuracy rate than X-ray of adenoid, more reliable and avoiding unnecessary radiation. X-ray can be spared for selected cases when the diagnosis of adenoid enlargement is in doubt. The results are expected to guide clinician on suitable use of diagnostic criteria prior to surgery.

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