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EFFECT OF INTRANASAL STEROIDS ON ADENOID HYPERTROPHY

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Abstract

Objective: *To evaluate the effect of intranasal steroids on adenoid hypertrophy in children.*

Study Design: *Quasi experimental study.*

Place and Duration of Study: *Ear, nose and Throat (ENT) Department, Pak Emirates Military Hospital; From December 2022 to December 2023.*

Methodology: *This was conducted on a sample size of n=128. Study included Children aged 3-13 years with adenoid hypertrophy presenting to ENT OPD congregated into two groups with 64 children in each; NSD Group and NS Group. Following detailed history given by parents about symptoms and endoscopic evaluation. Effects of 8week course of Beclomethasone topical application and Normal saline drops on patients were assessed. Data was analyzed using (SPSS) version 23.*

Results: *A total of 128 children were enrolled into intranasal steroid treatment (NSD) and normal saline treatment (NS) groups (n=64 each), with comparable baseline characteristics. Post-treatment, the NSD group showed greater improvements for nasal blockage (45.3% vs. 32.8%), snoring (59.4% vs. 25%), and rhinorrhea (64.1% vs. 32.8%), along with significant reductions in adenoid size on X-ray and endoscopy. Paired sample t-test showed the significant improvements in both groups ($p<0.001$), though intergroup comparison demonstrated superior outcomes with NSD for nasal blockage, snoring, rhinorrhea, and X-ray grading ($p<0.01$).*

Conclusion: *Early referral to specialist clinics is crucial for timely diagnosis and early institution of medical management of adenoid hypertrophy. Its efficacy promises to decrease the burden of surgery cases and prevent several longterm complications.*

INTRODUCTION

Adenoid tissue refers to a lymphoid aggregate present at the upper and posterior walls of the nasopharynx, contributing to formation of waldeyer's ring. In the early childhood, it plays an active role in providing local immunity via Immunoglobulin A, G and M against various inhaled particles and offending agents.[1] Repeated exposure to such stimuli may stimulate eosinophil induced inflammation, which in turn activates interleukin 4 and 25 in the adenoid epithelium and trigger its hypertrophy.[2] Adenoid hypertrophy (AH) is a clinical condition with a reported prevalence rate of up to 58% among children from 6 months to 15 years.[3] Hypertrophied adenoids by blocking the airway lead to several complaints like persistent mouth breathing, snoring, nasal discharge, postnasal drip, and persistent cough.[4] Longterm

complications include otitis media leading to hearing loss and obstructive sleep apnea which may complicate into irreverible cor pulmonae.[5] For curative relief of AH, a variety of medical and surgical treatment options are recorded in literature. Intranasal steroid preparations (INS)are recognized as a valid therapeutic option, they bind with glucocorticoid receptors on the surface of adenoid tissue, reduces local inflammation with almost negligible systemic absorption [1]. Beclomethasone is a synthetic type lipid-soluble corticosteroid, its topical intranasal preparation is known for its local anti-inflammatory effects.[6] No significant side effects of INS were recorded except epistaxis in selected cases. [7] In Pakistan, Khyber-Pakhtunkhwa region efficacy of intranasal steroid was recorded as 88% as compared to control group (74%) in managing AH.[8] Due to the **scarcity of locally available data of Rawalpindi in last 05-years record,** rationale of this study was to generate **clinically relevant evidence** for medical management of AH in children, and to plan strategies to reduce the burden of surgery.

Methodology:

This quasi-experimental study was conducted at the ENT outpatient department of Pak Emirates Military Hospital, Rawalpindi, from December 2022 to December 2023. Approval was obtained from the Hospital Ethics Committee (ref no. A/28/ERC/85/2025), and written informed consent was taken from primary caregivers.

Inclusion Criteria: Children aged 3–13 years with AH, confirmed by history, clinical assessment and further verified by lateral cephalometric radiographs and endoscopic findings, were included. Residents of Rawalpindi and Islamabad who could attend monthly follow-ups accompanied by a primary caregiver were eligible.

Exclusion criteria: were prior intranasal/systemic steroid use within 1 year, acute respiratory infection within 2 weeks, history of chronic epistaxis, immunodeficiency, hypersensitivity to beclomethasone, or aforementioned adenoidectomy.

Sample size was calculated for moderate effect size (0.5), 95% confidence, and 80% power, yielding 128 children, divided equally into intranasal steroid (NSD) and normal saline (NS) groups. The NSD group received intranasal Beclomethsone spray (1 puff in each nostril for 100mcg/actuation formula), and the NS group normal saline drops, both for 8 weeks.

Baseline symptoms (Nasal blockage, snoring and rhinorrhea) were graded from1-4 as: none; occasional; frequent; constant. Adenoid size was assessed with lateral nasopharyngeal X-ray using the adenoid–nasopharynx (A/N) ratio: Grade I (0.00–0.25), Grade II (0.26–0.50), Grade III (0.51–0.75), Grade IV (0.76–1.00). [9]Endoscopic evaluation with a 0.5 mm Flexible Fiberoptic Direct Nasolaryngoscope (FODNL) under topical 4% xylocaine (no decongestant) was graded by choanal obstruction: Grade I (0–25%), Grade II (26–50%), Grade III (51–75%), Grade IV (76–100%).[10]

Follow up data was recorded at 8th week. SPSS version 23 was used for statistical analysis. Statistical significance was assessed using paired sample t-test ($p<0.05$).

RESULTS :

Out of 128 patients, NSD group comprised of 48.4% (n=31) males and 51.6% (n=33) females, with a mean age of 5.9531±1.75869 (3-9) years, while NS group consisted of an equal proportion of both genders (32 versus 32; 50% each), with a mean age of 5.0000±0.83571 (3-7) years.

All the data was comparable in both groups before initiation of treatment. After treatment, both groups found individually efficacious (Table I).

Table I: Descriptive analysis of Clinical profile of both groups (n=64 versus n=64)

Clinical Parameters	Intranasal Steroid treated Group (n=64)		Normal Saline treated Group (n=64)	
	Pre-treatment N(percentage)	Post-treatment N(percentage)	Pre-treatment N(percentage)	Post-treatment N(percentage)
Nasal Blockage	➢ None: 0 ➢ Occasional :09 (14.1% ➢ Frequent: 44 (68.8%) ➢ Constant :11(17.2%)	➢ None: 29(45.3%) ➢ Occasional : 27 (42.2%) ➢ Frequent 7(10.9%) Constant : 1 (1.6%)	➢ None: 2(3.1%) ➢ Occasional :14 (21.9%)% ➢ Frequent: 39 (60.9%) ➢ Constant :9(14.1%)	➢ None: 21(32.8%) ➢ Occasional :18(28.1%)% ➢ Frequent: 20 (31.3%) ➢ Constant :5(7.8%)
Snoring	➢ None: 4(6.3%) ➢ Occasional: 13 (20.3%) ➢ Frequent: 36 (56.3%) ➢ Constant: 11(17.2%)	➢ None: 38 (59.4%) ➢ Occasional: 25(39.1%) ➢ Frequent: 1 (1.6%) ➢ Constant: 0	➢ None: 1(1.6%) ➢ Occasional :12 (18.8%) ➢ Frequent: 40(62.5%) ➢ Constant :11(17.2%)	➢ None: 21(25%) ➢ Occasional :26 (40.6%)% ➢ Frequent: 19 (29.7%) ➢ Constant : 3(4.7%)
Rhinorrhea	➢ None: 3(4.7%) ➢ Occasional: 9 (14.1%) ➢ Frequent: 43 (67.2%) ➢ Constant: 9(14.1%)	➢ None: 41 (64.1%) ➢ Occasional : 16 (25%) ➢ Frequent: 5 (7.8%) ➢ Constant: 2 (3.1%)	➢ None: 4 (6.3%) ➢ Occasional :13 (20.3%) ➢ Frequent: 44 (68.8%) ➢ Constant :8(12.5%)	➢ None: 21(32.8%) ➢ Occasional :18 (28.1%)% ➢ Frequent: 21 (32.8%) ➢ Constant :4(6.3%)
X-ray	➢ Grade I: 1 (1.6%) ➢ Grade II: 10 (15.6%) ➢ Grade III: 20 (31.3%) ➢ Grade IV: 33(51.6%)	➢ Grade I: 14(21.9%) ➢ Grade II: 26 (40.6%) ➢ Grade III: 16 (25%) ➢ Grade IV: 8 (12.5%)	➢ Grade I: 5(7.8%) ➢ Grade II: 13 (20.3%) ➢ Grade III: 28 (43.8%) ➢ Grade IV: 18 (28.1%)	➢ Grade I: 15(23.4%) ➢ Grade II: 20(31.3%) ➢ Grade III: 21 (32.8%) ➢ Grade IV: 8 (12.5%)
Endoscopy	➢ Grade I: 5 (7.8%) ➢ Grade II: 13 (20.3%) ➢ Grade III: 25 (39.1%) ➢ Grade IV: 21 (32.8%)	➢ Grade I: 23 (35.9%) ➢ Grade II: 24 (37.5%) ➢ Grade III: 13 (20.3%) ➢ Grade IV: 4(6.3%)	➢ Grade I: 6(9.4%) ➢ Grade II: 15(23.4%) ➢ Grade III: 29 (45.3%) ➢ Grade IV: 14 (21.9%)	➢ Grade I: 16(25%) ➢ Grade II: 28 (43.8%) ➢ Grade III: 15 (23.4%) ➢ Grade IV: 5 (7.8%)

The statistical analysis of post-treatment effects in the NSD group validated statistically significant (p = 0.000) improvements in all study variables (Table II).

Table II: Statistical Analysis of Pre- and Post-treatment clinical effects in the Intranasal Steroid Group (Paired t-test) N=64

Clinical Parameters	Mean of the paired differences ± Standard deviation	95% Confidence interval of the diffence		t	Two sided p-value
		Lower	Upper		
Pre versus Post Treatment nasal blockage	1.34375± 0.87684	1.12472	1.56278	12.260	0.000
Pre Versus Post treatment Snoring	1.42188 ± 0.93952	1.18719	1.65656	12.107	0.000
Pre versus Post treatment Rhinorrhea	1.40625 ± 1.03462	1.14781	1.66469	10.874	0.000
Pre versus Post-treatment endoscopy	1.00000 ± 0.83571	0.79125	1.20875	9.573	0.000
Pre versus Post treatment X-ray	1.04688± 0.89849	0.82244	1.27131	9.321	0.000

Similarly, improvement was observed on assessing post treatment effects (p value=0.000) in NS group too (Table III).

Table III: Statistical Analysis of Pre- and Post-treatment clinical effects in the Normal Saline Group (Paired t-test) N=64

Clinical parameters	**Mean of the paired differences ± Standard deviation**	**95% Confidence interval of the differnce**		**t**	**Two sided p-value**
		Lower	Upper		
Pre versus Post Treatment nasal blockage	0.71875± 1.25317	0.40572	1.03178	4.588	0.000
Pre Versus Post treatment Snoring	0.81250 ± 1.00593	0.56122	1.06378	6.462	0.000
Pre versus Post treatment Rhinorrhea	0.67188 ± 1.27310	0.35386	0.98989	4.222	0.000
Pre versus Post-treatment Endoscopy	0.65625± 0.82074	0.45124	0.86126	6.397	0.000
Pre versus Post treatment X-ray	0.57813 ± 0.79292	0.38006	0.77619	5.833	0.000

The intergroup comparison of post-treatment effects between NSD and NS groups validated the superior efficacy of NSD group via paired sample t-test for all study variables except for endoscopic findings (Table IV).

Table IV: Comparison of Post-treatment Effects in Intranasal Steroid (NSD) and Normal Saline (NS) Groups Using Paired Sample t-test (n=64 versus 64)

Clinical Parameters	Mean of the paired differences ± Standard deviation	95% Confidence interval of the diffence		t	Two sided p-value
		Lower	Upper		
Post Treatment nasal blockage	-0.45313 ± 1.20751	-.75475	-.15150	-3.002	0.004
Post treatment Snoring	-0.71875 ± 1.03078	-.97623	-.46127	-5.578	0.000
Post treatmant Rhinorrhea	-0.62500 ± 1.13389	-.90824	-.34176	-4.410	0.000
Post-treatment X-ray	-0.64063 ± 0.96555	-.88181	-.39944	-5.308	0.000
Post treatment endoscopy	-0.17188 ± 0.82721	-.37851	0.3476	-1.662	1.01

DISCUSSION:

In our study, comparable baseline characteristics in both groups were to minimize confounding factors and allow a reliable assessment of treatment effects.

The efficacy of INS found in our results is consistent with Alqutub et al., which also recorded that benefits of intranasal corticosteroids in treating AH (Relative risk = 0.30, 95% CI [0.17–0.54], P < 0.0001), improved overall clinical symptom scores (SMD = −0.81, 95% CI [−1.01 to −0.60], P < 0.00001), and reduced adenoid size (Standardized mean difference= −1.33, 95% CI [−1.91 to −0.75], P < 0.00001).[11]

Arslan et al. in their study compared the role of INS in children with and without allergic rhinitis and found significant improvement in both groups in the adenoid to choana ratio (P < 0.001). However, the reduction in adenoid size (P = 0.025), and the lesser need for surgery (P = 0.035) was markedly reported for non-allergy group.[12]

In contrary to our results, Zwierz et al. used mometasone INS and employed Boleslawska scale for grading AH and found pretreatment average mean as 65.73 ± 12.57% versus post-tretament 65.52 ± 12.68% (p=0.743; around grade II or III) by 6th month of treatment. It might be reflection of using a different group of INS. [13]

The improvement recorded in NS group represents the properties of saline nasal preparation in cleansing the nasal passages by flushing out irritants, mucus, and pathogenic organisms, reducing inflammation in the nose and adenoids, and thereby improving breathing and sleep.[14] Chitsuthipakorn et al. in their study noticed reduction in rhinorrhea (CI: -0.66 to -0.05),[15] While Cabaillot reported that saline helps in improving only rhinological symptoms (CI: −0.45; −0.13).[16]

The intergroup statistical comparison between both the groups recorded superiority of NSD group in all terms except the endoscopic findings. Our findings are consistent with previously published data,

In comparison, Naqi et al. also reported the significant control of symptoms and improved radiological and endoscopic grades after medical therapy for adenoid hypertrophy, through they used a different modality of tretament.[17]

Dahilo et al. did not find any significant relationship of X-ray findings with severity of clinical symptoms.[18]

Cassano et al. highlighted the importance of endoscopic findings by stating that patients with endoscopic grades I–III adenoid hypertrophy by and large benefit from medical therapy.[10]
Interestingly, Singh et al. steroid treated groups showed superior efficacy on normal saline treated group on symtoms controls as well as X-ray and endoscopic examination ($p<0.001$ for both).[19]
Though radiographs often overestimate adenoid size, especially in cases of moderate hypertrophy, leading to diagnostic inaccuracies.[20]
No significant side effects of tretament were observed in either group. Overall, **beclomethasone was superior to normal saline** in improving clinical symptoms and reducing adenoid size, while saline remained a useful adjunct.
It was a single center study and was further limited by short duration follow up. Future multicenter longitudinal studies with longer follow-up periods are warranted to confirm the durability of treatment effects.

Conclusion:
Effective medical management may reduce the need for surgical intervention. This practice may minimize complications and improve quality of life for children.

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