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Intranasal Corticosteroid Spray Usage in Patients with Allergic Rhinitis: Correctness in Technique and Compliance

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ABSTRACT

Introduction

Intranasal corticosteroid spray (INCS) needs to be administered correctly and regularly for it to be effective in treating allergic rhinitis. This study aimed to assess the correctness of technique and compliance of intranasal corticosteroid spray usage in patients with allergic rhinitis.

Methods

It was a cross-sectional study conducted in the Dept of ENT-Head and Neck surgery, Tribhuvan University Teaching Hospital from April to September 2023. Patients aged 18 or more with allergic rhinitis on INCS or had been on INCS in the past three months were assessed for INCS administration technique based on EPOS 2020 checklist and their compliance asked. Factors that could hinder the correct techniques and compliance were assessed.

Results

A total of 138 patients, 71 males and 67 females, aged 18 to 55 years were included. Most of them (60/138; 43.5%) had completed secondary level education. 97.1% (134/138) had been prescribed INCS spray by ENT doctor and 89.13% (124/ 138) had received verbal instructions mostly by ENT doctor (91.1%). 7.2% (10/138) completed all the steps as per EPOS 2020 checklist whilst 25/138 (18.1%) completed five essential steps. The correctness of the INCS administration technique however did not differ with age, gender, academic qualification, prescriber or whether instructions were given or not. 119/138 (86.2%) patients reported being compliant.

Conclusion

INCS spray was scarcely administered with the correct technique although the compliance was good. This study emphasizes the need for effective patient and healthcare worker education pertaining to correct INCS technique.

Keywords

Intranasal corticosteroid; allergic rhinitis; compliance; spray technique

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INTRODUCTION

Allergic rhinitis (AR) is a worldwide health problem affecting over 500 million people globally.[1] It impairs health related quality of life (HRQOL) and also has a huge economic burden with work absenteeism and lost productivity.[1] Hence, addressing AR is of utmost importance to regain a good quality of life, productivity and subsequently prevent indirect expense.

Intranasal corticosteroids (INCS) is the standard first line treatment for AR.[2] It controls symptoms without much systemic side effects when sufficient drug concentration reaches the nasal mucosa.[2] It may, however, take several weeks before optimum symptom control can be achieved.[2] Correctly administered, regular INCS usage is a challenge in itself.[3-5] Non-compliance in these patients accounts for around 30%.[6,7] Current guideline on AR management strongly recommends clinicians to check nasal spray technique and compliance.[6,8] However, skipping INCS related instructions to patients is as common as 40-53.5% even in developed countries.[6,7]

Hence, the disparity between the ideal INCS usage and the patients' administering technique is apparent but the gravity of the situation remains unexplored. Analyzing patients' INCS administering technique is crucial in developing measures for effective patient education. This study thus aimed to assess the current scenario with regards to correct technique and compliance of intranasal corticosteroid spray usage in patients with AR.

METHODS

This was a cross-sectional study conducted from April to September 2023 in the department of ENT-Head and Neck Surgery, Maharajgunj Medical Campus, Tribhuvan University Teaching Hospital, Institute of Medicine, Maharajgunj. Ethical clearance was taken (Ref no. 449(6-11) E2) from the Institutional Review Committee of Institute of Medicine. Those who consented were enrolled for the study.

Based on the prevalence of non-compliance to INCS reported as 90% in a study by KC et al.[9] the sample size calculated using Cochran's formula ($n = z^2pq/e^2$) was 138; keeping $z = 1.96$ at confidence level of 95%, tolerable error at 5%.

Patients with allergic rhinitis aged 18 or more, currently on INCS or had used INCS in the last three months at least for two weeks were included. Those on topical medications other than INCS like steroid drops, decongestant sprays or drops, saline sprays, with learning disability, those dependent on caretaker for the INCS administration were excluded.

The patients meeting the inclusion criteria filled in a self-administered questionnaire with structured and filter questions related to patient demographics, INCS prescriber and instructions and compliance. The questionnaire was prepared in Nepalese language by the researcher after reviewing the literature and adapting the relevant information to Nepalese context.

As for the INCS administration technique, the patients were instructed to tick the steps they followed on the Nepalese translated version of the checklist proposed by EPOS 2020.[10] A pilot study on ten patients assessed the test-retest reliability of the questionnaire and the translated checklist.

Data were entered in Microsoft® Excel (Version 16.72) and analyzed using Jamovi (Version 2.3). Descriptive data were analyzed using frequency, percentage, ratio, mean, standard deviation, median and IQR and inferential statistics using Chi-square and Kruskal- Wallis test. The normality was tested by Shapiro-Wilk test. A p-value <0.05 was considered significant.

RESULTS

A total of 138 patients were enrolled in this study. The age ranged from 18 to 55 years (median 30, IQR 15). The male: female ratio was 1.05:1. As per the education level, most of them (43.5%) had completed secondary level education (Table 1).

Most of the patients (134, 97.1%) had been prescribed INCS spray by an ENT doctor and majority of them (124, 89.8%) were instructed verbally. The patients (14/138) who did not receive instructions from ENT doctor resorted to other resources for instructions (Table 2).

When tallying all the steps as per EPOS 2020 checklist,[10] only ten out of 138 (7.2%) patients

Table 1. Patient demographics

Gender	Number (%)
Gender	
Male	71 (51.4%)
Female	67 (48.5%)
Age in years	
18-30	71 (51.4%)
31-50	50 (36.2%)
>50	17 (12.3%)
Education level	
Informal	11(8%)
Basic	30 (21.7%)
Secondary	60(43.5%)
Undergraduate	29 (21.01%)
Post graduate	8 (6.5%)
Total	138 (100)

Table 2. INCS Prescriber and instructions

	Prescriber and instructions	Number (%)
Prescriber	ENT doctor	134 (97.1%)
	Respiratory physicians	3 (2.17%)
	Self – prescribed	1 (0.7%)
INCS instruction received (138)	Yes	124 (89.8%)
	No	14 (10.1%)
INCS instruction received from (124)	ENT doctor	113 (91.1%)
	Prescription dispenser	8 (6.4%)
	Doctor other than ENT	3 (2.4)
Source of INCS usage when not instructed (14)	As per own understanding	8 (57.1%)
	Drug information leaflet provided with the spray bottle	3 (21.4%)
	Information leaflet provided in earlier outpatient visit	2 (14.2%)
	Browsing the internet	1(7.14%)
	Total	138 (100)

completed all the steps. Narrowing down these steps to five essential ones as recommended by De Boer et al.[11], only 25 (18.1%) followed all steps correctly.

Removing the cap, gently inserting the nozzle tip into one nostril and repeating the administration of the spray on the other side were followed by all (100%). The least correctly performed steps were keeping the head upright (45%), aiming the nozzle away from the septum (45.6%) and using the right hand to spray the left nostril and vice versa (45.6%). Amongst the five essential steps, the most correctly performed step was shaking the bottle vigorously by 83.3% whilst the least correctly performed step was aiming the nozzle away from the septum by 45.6% (Table 3).

There was no statistical difference in the accuracy of the technique irrespective of the age, gender, prescriber, instruction source or without instruction (Table 4).

Out of the 138 patients, 119 (86.2%) were compliant whilst 19 (13.7%) were non-compliant. Amongst the non-compliant patients, ten used it most of the times while nine used it sometimes only. The factors for non-compliance were improvement in nasal symptoms in 13, no symptom improvement in two, cost factor in two and side effects like nasal irritation in two.

DISCUSSION

Due to chronicity of allergic rhinitis, prolonged use of INCS is needed for it to remain optimally effective. In addition, its administration with a proper, precise technique is equally important as each step has its own reason. Nose blowing or cleaning the nose is intended for better distribution of topical steroids. Most INCS are in suspension form containing

Table 3. Number of well- executed steps as per EPOS 2020 checklist[10] and five essential steps.

	Steps	Number (%)
1.	Gently blow the nose*	76 (55%)
2.	Shake the spray bottle vigorously *	115 (83.3%)
3.	Remove the cap	138 (100%)
4.	Keep your head upright	63 (45%)
5.	Gently insert the nozzle tip into one nostril	138 (100%)
6.	Aim the tip of the nozzle away from the septum*	63 (45.6%)
7.	Use right hand to spray the left nostril and vice versa	63 (45.6%)
8.	Do not close the nostril not receiving the medication	80 (60.6%)
9.	While slowly breathing in, press the nasal spray *	90 (65.2%)
10.	Apply the number of spray recommended	136 (98.5%)
11.	Take the nozzle out and breathe out through your mouth *	81(58.6%)
12.	Repeat the administration step in the other nostril	138 (100%)
13.	Clean the spray nozzle and replace the cap	101 (73.1%)

**Five essential steps recommended for correct INCS administration by De Boer et al.[11]*

Table 4. Correct technique of INCS spray administration based on various factors

Factors		EPOS 2020 checklist steps			Five essential steps		
		Correct technique	Incorrect technique	p value	Correct technique	Incorrect technique	p value
Age (years)	18- 30	4	67	0.57	13	58	0.78
	31-50	5	45		10	40	
	>50	1	16		2	15	
Gender	Male	6	65	0.57	14	57	0.61
	Female	4	63		11	56	
Academic qualification	Informal	0	11	0.11	0	11	0.26
	Basic	3	27		7	23	
	Secondary	6	54		11	49	
	Undergraduate	1	28		5	24	
	Post graduate	0	8		2	6	
Prescriber	ENT	10	124	0.57	25	109	0.34
	Respiratory physician	0	1		0	1	
	Doctor other than ENT	0	2		0	2	
	Self-purchase	0	1		0	1	
Instructed by	ENT	9	104	0.55	21	92	0.81
	Respiratory physician	0	1		0	1	
	Doctor other than ENT or respiratory physician	0	2		0	2	
	Prescription dispenser	1	7		2	6	
	No instruction given	0	14		2	12	

thixotropic agents that increase the viscosity. The viscosity of the drug suspension is decreased when the bottle is shaken consequently forming a mist when sprayed. Keeping head upright and hence avoiding bending the head backwards avoids the medicine to reach the pharynx which could cause irritation and also systemic absorption. Bending the head forward could lead to the medicine trickling anteriorly from the nose. To avoid this, breathing in while spraying with head forward lets the medicine reach the nasal cavity. Directing the nozzle away from the septum allows better distribution of the spray as the lateral nasal wall has comparatively more cilia than the septum and also prevents epistaxis. Although relatively complicated, using the contralateral hand for spraying causes less mechanical irritation.[11]

In the current study, the most frequent prescriber of the INCS unsurprisingly was ENT doctor. A few have been prescribed by respiratory physicians also probably because the patient may have associated asthma, although this co-morbid condition was not explored in this study. One had self-prescribed. Self-prescription is common in Nepal as many medicines are easily available over the counter which includes INCS also.

A significant number of patients (89.13%) had been given verbal instructions mostly by ENT doctor (91%). This was better than reported in a UK based survey by Ganesh et al.[7] where only 53.5% of patients stated given demonstration by their general practitioner. Interestingly, in the study in Thailand by Rattanawong et al.[12] none of the patients were instructed by any medical personnels. The other less numbered sources of instructions in our study varied from doctors other than ENT, patient information leaflet, drug information leaflets available with the spray bottle and the internet.

In our study, a mere 7.2% (10/138) patients completed all the steps of EPOS 2020 checklist.[10] When limiting these to five essential steps, the percentage increased slightly (18.1%). This was in concordance to findings from other studies. KC et al.[9] found less than 10% amongst 81 patients correctly demonstrating all the given steps as per the WHO check list. Similarly, in the study by Rattanawong et al.[12] only six patients (4%) correctly performed all 12 steps of INCS administration, while 44 patients (29.33%) correctly performed the five recommended essential steps. In both these studies, the patients had not received prior INCS administration instruction. Whilst in the study by Loh et. al[13] even with prior demonstration, only 28 patients (44.4%) were able to show the complete six-step nasal spray technique at 30-day follow-up visit.

In our study, there was no difference in the correctness of the INCS administration technique

in relation to age, gender, academic qualification, prescriber or source of instruction. This however differed in the study by KC et al.[9] in which only education was found to be significant unlike other factors namely age, gender, marital status, and occupation. In our study, patients had received only verbal instructions while in their study, pharmacist led individualized education and training was given. Re-enforcing the instructions is difficult in the setup like ours where doctor-patient interaction time is limited due to huge patient overload. This could result in patients forgetting the instructions as reported by 77.8% of patients in a study by Loh et al.[13] Hence Ocak et al.[14] stressed on assessing the patient on regular interval, re-evaluate the medication and re-emphasize to take the prescribed medicine to address this issue.

Interestingly, the knowledge of healthcare workers on the correct technique of the INCS administration has been doubted by the findings of De Boer et al.[11] Based on the assessment with 29 steps outlined in the Dutch protocol, only about 50% of the 29 steps were performed. Even when narrowing the 29 steps down to five essential steps, only 36 % of the participants could perform all the five steps. So, this study uncovered the lack of awareness even amid healthcare workers in demonstrating the technique of INCS administration. This will definitely culminate into inadequate instructions to the patients. The poor INCS administration technique across all spectrum of educational background or irrespective of instruction received in our study probably could be due to inadequate or improper instructions the patients received. So, it is important for health care workers to be updated on a regular basis.

Interestingly, there is a wide variation in the INCS administration techniques adopted in various studies. Benninger et al.[15] therefore rightfully pointed out a lack of a "gold standard" test for the effective INCS spray technique. Not only is there differences in the protocols but ENT doctors in the same department also had no consensus on a standard technique as stated by Ganesh et al.[7] This variation could lead to difficulty in comparing the results of various studies. This study used a widely accepted EPOS 2020 checklist, a detailed one covering all steps from preparation to the core spray technique to cleanliness. Hence, getting all the steps correct could be challenging especially if healthcare workers also are not aware of all the steps. The correctness rate in our study improved once the assessment was done for a less exhaustive five essential steps. Standardizing the INCS application technique helps both patient and healthcare provider to follow the same technique that facilitates proper steroid distribution and maximum effectiveness.[15]

In the current study, 19 (13.7%) patients admitted being non- compliant. This however could not be objectively verified as this was a cross sectional study. In real, the compliance may be lesser. Loh et al. [13] noted that 1.6% patients admitted being non-compliant when actually 11 % were non-compliant when assessed objectively. Ganesh et al.[7] quoted non-compliance of 29.1%.

The factors leading to non-compliance amongst the 19 (13.7%) patients were improvement in nasal symptoms (13), no symptom improvement (two), cost factor (two) and side effects like nasal irritation (two). Ganesh et al.[7] also found lack of symptom resolution and side effects like nasal irritation and epistaxis leading to non-compliance. Interestingly, like in our study, four discontinued due to symptom resolution.[7] Other factors noted by Ocak et al.[14] were persistence of symptoms inspite of taking INCS, side effects, lower education status and also time constraints for self-care due to family obligations if caring for more than two dependent children.

Two patients in our study had side effects namely nasal irritation that led to non-compliance. Nasal irritation and epistaxis are known side effects of INCS particularly if the tip is pointed towards the septum. A study by Rattanawong et. al[12] showed the risk of epistaxis and nasal irritation increased by 3.6 times when pointing the tip towards the septum. These two patients in our study also had the tip pointed towards the septum. So, the side effects and the subsequent reduced compliance were mostly attributed to faulty INCS administration technique. Ganesh et al.[7] noted patients using ipsilateral hand to apply INCS were more likely to develop epistaxis and have poor compliance because the INCS is likely to be directed towards the more sensitive and vascular septal mucosa when using ipsilateral hand for spraying.[7] So, more attention to this step has been recommended.[12]

The inability to generalize the result of this single centre study is the limitation of this study. The 13 steps EPOS 2020 checklist[10] was exhaustive and had dissimilarities from other protocols and checklist. However, the essential five key steps were selected for assessment. The INCS administration technique and the compliance were assessed subjectively only. The quality of instructions given to the patients which could directly impact the INCS spray technique was not assessed in this study. However, it gave an insight or current status into patients' behavior regarding nasal spray usage.

CONCLUSION

INCS spray administration technique was poorly followed by most of the patients. The reported compliance, however was good. This study emphasizes the need for effective and regular patient and healthcare worker education pertaining to correct INCS techniques using a standard easy-to-follow protocol.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

AUTHOR CONTRIBUTIONS

UG: Research concept, research design, literature review, research experiment, data collection, statistical analysis, manuscript preparation; SK: research design, literature review, research experiment, data collection, statistical analysis, manuscript preparation.

REFERENCES

1. Ozdoganoglu T, Songu M, Inancli HM. Quality of life in allergic rhinitis. Ther Adv Respir Dis. 2012 Feb;6(1):25-39. doi: 10.1177/1753465811424425. Epub 2011 Oct 27. PMID: 22032987.
2. Trangsrud AJ, Whitaker AL, Small RE. Intranasal corticosteroids for allergic rhinitis. Pharmacotherapy. 2002 Nov;22(11):1458-67. doi: 10.1592/phco.22.16.1458.33692. PMID: 12432972.
3. Abdullah B, Abdul Latiff AH, Manuel AM, et al. Pharmacological Management of Allergic Rhinitis: A Consensus Statement from the Malaysian Society of Allergy and Immunology. J Asthma Allergy. 2022 Aug 2;15:983-1003. doi: 10.2147/JAA.S374346. PMID: 35942430; PMCID: PMC9356736.
4. Bousquet J, Schünemann HJ, Togias A, et al. Next-generation Allergic Rhinitis and Its Impact on Asthma (ARIA) guidelines for allergic rhinitis based on Grading of Recommendations Assessment, Development and Evaluation (GRADE) and real-world evidence. J Allergy Clin Immunol. 2020;145(1):70-80.e3. https://doi.org/10.1016/j.jaci.2019.06.049
5. Hossenbaccus L, Linton S, Garvey S, et al. Towards definitive management of allergic rhinitis: Best use of new and established therapies. Allergy, Asthma Clin Immunol . 2020;16(1):1–17. Available from: https://doi.org/10.1186/s13223-020-00436-y
6. Jamil W, Alahwal A, Suman R, et al. Do patients correctly use steroid nose spray? A patient-reportedsurvey of the nasal spray technique and patient compliance; J. of Clinical Otorhi. 2021 3(4). DOI: 10.31579/2692-9562/033
7. Ganesh V, Banigo A, McMurran AEL, et al. Does intranasal steroid spray technique affect side effects and compliance? Results of a patient survey. J Laryngol Otol. 2017 Nov;131(11):991-996. doi: 10.1017/S0022215117002080. Epub 2017 Oct 20. PMID: 29050548..
8. Treat S, Ebert CS Jr, Farzal Z, et al. Intranasal Corticosteroids: Patient Administration Angles and Impact of Education. Rhinol Online. 2020;3:160-166. doi: 10.4193/rhinol/20.070. Epub 2020 Nov 8. PMID: 34263161; PMCID: PMC8276915.
9. KC B, Khan GM, Shrestha N. Nasal Spray Use Technique Among Patients Attending the Out-Patient Department of a Tertiary Care Hospital, Gandaki Province, Nepal. Integr Pharm Res Pract. 2020 Sep 22;9:155-160. doi: 10.2147/IPRP.S266191. PMID: 33062617; PMCID: PMC7519804.
10. Fokkens WJ, Lund VJ, Hopkins C, et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2020. Rhinology. 2020 Feb 20;58(Suppl S29):1-464. doi: 10.4193/Rhin20.600. PMID: 32077450.
11. de Boer M, Rollema C, van Roon E, et al. Observational study of administering intranasal steroid sprays by healthcare workers. BMJ Open. 2020 Aug 30;10(8):e037660. doi: 10.1136/bmjopen-2020-037660. PMID: 32868363; PMCID: PMC7462155.
12. Rattanawong S, Wongwattana P, Kantukiti S. Evaluation of the techniques and steps of intranasal corticosteroid sprays administration. Asia Pac Allergy. 2022 Jan 24;12(1):e7. doi: 10.5415/apallergy.2022.12.e7. PMID: 35174058; PMCID: PMC8819420.
13. Loh CY, Chao SS, Chan YH, et al. A clinical survey on compliance in the treatment of rhinitis using nasal steroids. Allergy. 2004 Nov;59(11):1168-72. doi: 10.1111/j.1398-9995.2004.00554.x. PMID: 15461597.
14. Ocak E, Acar B, Kocaöz D. Medical adherence to intranasal corticosteroids in adult patients. Braz J Otorhinolaryngol. 2017 Sep-Oct;83(5):558-562. doi: 10.1016/j.bjorl.2016.06.007. Epub 2016 Jul 20. PMID: 27472982; PMCID: PMC9444794.
15. Benninger MS, Hadley JA, Osguthorpe JD, et al. Techniques of intranasal steroid use. Otolaryngol - Head Neck Surg. 2004;130(1):5–24. https://doi.org/10.1016/j.otohns.2003.10.007