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Research Article

### IS THERE A CORRELATION BETWEEN IMPROPER USE OF INTRANASAL CORTICOSTEROIDS AND THEIR SIDE EFFECTS?

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**Abstract:**

**Background:** The current guidelines recommend the use of intranasal corticosteroids (INCS) as the first-line treatment for allergic rhinitis (AR), chronic rhinosinusitis (CRS) and acute rhinosinusitis (ARS).

INCS is associated with various topical side effects in 5%–10% of patients. Improper technique of administration is a major factor that influences the incidence of adverse effects of INCS, therefore patient education about the proper technique of administration of these agents is imperative.

**Objective:** To find out whether improper use of INCS will lead to increase the incidence of their side effects.

**Methods:** It is a cross-sectional study conducted at the rhinology clinic of king AbdulAziz university hospital, Riyadh, KSA, over a 6-month in the period extending from February to August 2018, where the questionnaire distributed for patients who are using INCS.

Data analysis was performed using Statistical Package for the Social Sciences software.

**Results:** A total of 150 patients responded for the questionnaire. 97.3% reported the use of the right hand for spraying both nostrils, 2% use of the ipsilateral hand for spraying and none them use the contralateral technique. Only 5.3% of the patients directed the nozzle of the dispenser away from the septum (proper technique), whereas the remaining 94.7% patients reported aiming the nozzle in the improper direction (toward the septum or in a straight (parasagittal) direction).

Improperly directed spray was significantly associated with nasal dryness ( $P = 0.008$ ) but not with epistaxis and pain.

**Conclusion:** Improperly directed nozzle of INCS is associated with higher incidence of nasal dryness

**Key words:** Corticosteroids, rhinosinusitis, nasal spray, side effects.

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**INTRODUCTION:**

The current guidelines recommend the use of INCS as the first-line treatment for AR[1], CRS[2] and ARS, either as a monotherapy or as an adjuvant to antibiotic therapy[2]. INCS have shown high response rates in terms of improvement in symptoms as well as quality of life of patients with AR and CRS. Intranasal administration of corticosteroids offers the advantage of direct targeting of the nasal mucosa with minimal potential for systemic side effect[3], facilitating their use in patients in whom systemic steroid therapy has been contraindicated. Systemic safety of topical nasal steroids is well established; moreover, the second-generation INCS agents (mometasone, fluticasone, and ciclesonide) have favorable pharmacokinetic properties, which further minimize their systemic bioavailability (<1%) as compared with older INCS[4]. The nasal mucosa presents a relatively large (160 cm<sup>2</sup>), easily accessible surface for administration of topical medication[5] which partly explains the excellent effect of topical steroid therapy. Good control of CRS necessitates long-term adherence to INCS.

According to the World Health Organization report, approximately 50% of all patients with chronic illnesses are non-adherent to long-term therapy[6]. The main reasons for poor adherence to INCS therapy include its side effects, inconvenience, poor efficacy, or forgetfulness[7].

INCS therapy is associated with various topical side effects in 5%–10% of patients regardless of the formulation[8]. Improper technique of administration is a major factor that influences the incidence of adverse effects of INCS; therefore, patient education about the proper technique of administration of these agents is imperative[9]. According to the published literature, the side effects may result from prolonged

use of medication and are aggravated by improper technique of administration. Therefore, side effects associated with chronic use of topical steroid spray may be one of the underlying causes of poor patient adherence.

**METHODS:**

We obtained the IRB approval for our study no. E-18-2817.

It is a cross-sectional study conducted in the rhinology clinic at the King Abdulaziz University Hospital, KSA, over a 6-month period extending from February to August 2018. Patients were selected via simple random sampling by distributing a predesigned questionnaire with the following variables: (demographic data, diagnosis of AR or CRS, type of topical nasal steroid, technique of administration of the nasal steroid and the side effects that they may have developed). Written informed consent was obtained from each participant.

We included all patients above the age 18 years old with CRS or AR who were followed up regularly in the clinic and using with topical steroids sprays (mometasone furoate, fluticasone furoate or budesonide). We excluded patients with less than 6 months use of nasal spray, patients on aspirin, clopidogrel or other blood thinner drugs or systemic decongestant drugs. Data analysis was performed using Statistical Package for the Social Sciences software. This study is designed for the first time and there is no sponsor or funding agency for the current work.

**RESULTS:**

A total of 150 patients responded for the survey, 52.7% are male and 47.3% are female, most of the participants (95%) are less than 60 years old (Table 1).

Table (1): Demographic data of the participants:

		Count	Percentage (%)
Sex	Female	71	47.3
	Male	79	52.7
Age (years)	18 – 30	54	36.0
	31 – 45	34	22.7
	46 – 60	55	36.7
	More than 60 years old	7	4.7

Regarding the side effects; despite most of the patients didn't report any of them, nasal dryness is the most prevalent adverse effect 26.7%, while the epistaxis and pain are less, 12.7% and 15.3% respectively.

Table 2: Counts &amp; percentages of patients by the side Effects variables

		Count	Percentage (%)
Epistaxis	Never	131	87.3
	Rarely	9	6.0
	Sometimes	10	6.7
Dry Nose	Never	103	68.7
	Rarely	22	14.7
	Sometimes	18	12.0
	Usually	7	4.7
Pain	No Pain	127	84.7
	Mild Pain	15	10.0
	Moderate Pain	8	5.3

In our population of participants, (97.3%) reported the use of the right hand for spraying both nostrils; (2%) of them use the ipsilateral technique for spraying, and none of them doing the contralateral technique (Table 3).

For the direction of the nozzle during spraying, (94.7%) of the patient aiming the nozzle improperly,

either toward the septum 4.7% or straight (parasagittal) direction 90%. (table3).

We found that (58.7%) of the patients are spraying while the head in neutral position, only (3.3%) of them spraying while the head is down ( table 3).

Table(3): Technique of INCS use

		Count	Percentage (%)
Which Hand Do you Use?	Left Hand for Both Nostrils	1	0.7
	Right Hand for Both Nostrils	146	97.3
	Right Hand for Right Nostril and Left Hand for Left Nostril	3	2.0
Direction of the Spray	Away from Septum	8	5.3
	Straight	135	90.0
	Towards Septum	7	4.7
Head Position During	Head Downwards	5	3.3
	Head Upwards	57	38.0
	Neutral position	88	58.7

Finally, we correlated in the next table ( table 4) between the side effects and the improper direction of nozzle during spraying, statistically nasal dryness is associated with improper direction of nozzle( p value0.008), while is not the case with the epistaxis and pain ( p value = 0.5 and 0.4)

Table (4):The Chi-Square statistics of associations and their p-values for direction of the spray and the side effects.

Side Effects	Chi-square	p-value
Epistaxis	1.226	0.542
Dry Nose	11.786	0.008
Pain	1.530	0.465

### DISCUSSION:

In this study, most patients (94.7%) used the improper method for administration of nasal steroids by aiming the nozzle of the dispenser towards the septum or in a parasagittal direction. The straight (parasagittal) direction of spray is likely to have a negative impact on the septum in patients with septal deviation, which is a common deformity. This may have resulted in a slightly higher incidence of adverse effects, i.e., nasal dryness, pain, and epistaxis in our population compared to current literature. We found a statistically significant association between improper directed spray and nasal dryness.

The skin and mucosa of the anterior portion of the nasal cavity are the first recipients of topically administered INCS; therefore, it is important to ensure that the mucosa is not damaged by this application [3]. There are two plausible mechanisms of occurrence of epistaxis during administration of INCS, i.e., mechanical trauma caused by the nozzle of the dispenser and chemical trauma caused by the steroids, which may manifest as mucosal thinning [10,11]. However, histological data generated from long-term study on the use of various INCS in patients with perennial allergic rhinitis demonstrated no evidence of atrophy or deleterious pathological changes in the nasal mucosa following 6-month to 5-year use [12]. During administration of INCS, the spray should be directed towards the lateral wall of the nasal cavity, which is the site of the inflamed mucosa over the turbinates and meati [4,10]. The contralateral technique helps in directing the nozzle laterally, whereas the ipsilateral technique is associated with higher incidence of adverse effects [13]. However, the fundamental point is the direction of the nozzle because patients may still tend to direct the nozzle toward the septum even with the use of the contralateral technique. More than half (58.7%) of the patients surveyed reported maintaining the head in a neutral position during administration. This finding is inconsistent with that of a study by Ganesh et al. wherein 53.7% of the patients preferred the head-up position in which the drug is mainly distributed on the nasal floor and is

liable to pass quickly to the nasopharynx [11]. Knowing that surveyed patients had CRS, the suitable head positions that facilitate administration of the drug towards the middle meatus are the Mygind (lying head back) and Mecca (head down and forward) positions [3].

In our study 95% of the patients reported the use of the right hand to spray both nostrils, which is related to the Islamic belief that everything should be handled with the right hand. Only 2% of the patients in our study used the contralateral technique, which is in stark contrast to the 45.6% patients reported by Ganesh et al. [11].

The most commonly used INCS spray in our study population was mometasone furoate (61.3%), the frequency of which is comparable to that reported by Ganesh et al. (48%) [11].

We believe that physicians should pay more attention and invest time in explaining the proper technique of using INCS to patients. This may help reduce the incidence of local adverse effects and increase efficacy.

### CONCLUSION:

The patients using improper technique are more prone to have nasal dryness. No clear correlation between improper technique and pain or epistaxis.

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