Intranasal Steroid Use and Satisfaction in Allergic Rhinitis: A Cross-Sectional Study from an Asian Perspective

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Abstract

Background: Intranasal steroid (INS) is the most effective medication class for controlling allergic rhinitis (AR) symptoms, however its effectiveness is limited by patient compliance. Previous studies have explored INS use, compliance, satisfaction and experience. There is, however, no Asian study on these factors in entirety.

Objective: We aimed to investigate the rate of compliance to usage of INS and explore the reasons for non-compliance in our local population.

Methods: We conducted a prospective cross-sectional study on 65 AR patients in a tertiary hospital. Recruited patients were administered a questionnaire to collect data about symptoms, INS use and concerns they may have. Statistical analysis was performed using SPSS.

Results: The overall compliance rate to INS was 63.1%. Amongst all patients, 83.1% and 72.3% of patients found it effective and worth using INS respectively. Non-compliance was associated with increased frequency of dosing (p = 0.050), presence of sensory attributes (p = 0.041) and forgetfulness (p = 0.049). The top 3 most frequent sensory attributes experienced by patients include throat rundown (29.2%), aftertaste (21.5%) and immediate taste (20.0%). There was a significant difference between brands of INS with regard to sensory attributes experienced (p = 0.003) but not side effects (p = 0.070).

Conclusions: Identifying risk factors for non-compliance to INS can help healthcare providers address difficulties faced by patients and hence increase compliance, allowing better control of AR symptoms.

Keywords

Allergic rhinitis, Intranasal steroids, Compliance, Sensory attributes, Side effects

Introduction

Allergic rhinitis (AR) is a disease that affects a large number of people in our population, especially among the young. Local population-based studies reported a prevalence of AR in 44% of Singaporean school children [1] and a prevalence of 13.1% of rhinitis in Singapore based on the definition used by the International Consensus Report [2]. Globally, the prevalence has increased over the past two to three decades, and it is estimated that between 10 to 25% of the global population is affected [3]. It is characterized by a Type I Gel and Coombs, IgE-mediated inflammation of the membranes of nasal cavity in response to inhaled allergen exposure manifesting in symptoms such as nasal congestion, rhinorrhea, sneezing, nasal and ocular itch and occasional postnasal discharge [4]. Classification is based on the pattern (seasonal, perennial or episodic), frequency (intermittent or persistent) and severity of symptoms (mild, moderate and severe) [4]. When poorly controlled, AR can have a notable impact on one’s quality of life including daily activities, sleep and work performance, resulting in reduced concentration and productivity [5,6].
The approach to treating AR includes allergen avoidance, as well as pharmacological therapies. There are many different forms of pharmacotherapy available in the market including oral and topical antihistamines, topical anti-cholinergics, decongestants, immunotherapy and topical intranasal steroids (INS) and more. To better guide the selection of appropriate treatment from the multiple drug classes available, there have been several guidelines issued by professional organizations [4,7].

Of all the pharmacological therapies available, topical INS has been recognized to be the most effective medication class for controlling AR in patients with moderate to severe and/or persistent symptoms [4,7,8]. Despite its proven effectiveness in randomized controlled trials [3], the observed efficacy in clinical practice is often lower, due to several factors. These include patient perceptions and preferences, side effects, presence of sensory attributes experienced and method of delivery, which may be barriers to the initiation and compliance to INS therapy.

In this study, we aimed to investigate the rate of compliance to usage of INS and explore the reasons for non-compliance in our local population.

Methods

This is a prospective cross-sectional study conducted over the period of July 2019 to April 2020, in an outpatient Otorhinolaryngology clinic of a tertiary hospital in Singapore. Patients with AR, who presented to the clinic, were identified and invited to participate in our study. All patients provided written informed consent and this study was approved by our hospital’s Institutional Review Board.

A questionnaire was designed and administered to patients to collect epidemiological data, severity of AR based on symptoms and quality of life parameters, details of INS use and concerns patients may have. Epidemiological data included the patient’s age, gender and race. Questions on INS use included frequency of use, technique of spraying, frequency of missed-dose due to forgetfulness, sensory attributes and side effects experienced. A copy of the questionnaire used is available upon request.

Inclusion criteria comprised patients aged 21 years and above who were diagnosed with AR and were using or had used INS sprays. Exclusion criteria comprised patients who declined the use of INS as treatment from the outset, pregnant women and patients on long term steroids or immunosuppressants.

Statistical analysis was performed using SPSS 23 (SPSS Statistics for Windows, Version 23.0.; IBM Corp, Armonk, New York). Descriptive statistics were summarized as counts (n) and percentages for categorical data, mean, median and range for continuous data. Shapiro-Wilk test was used to assess data normality. For continuous variables, comparisons were made using unpaired t-test for parametric data or Mann-Whitney U test for non-parametric data. For categorical variables, Chi-square or Fisher’s exact tests were used to determine statistical significance. Binary logistic regression was performed for multivariate analysis of all relevant variables compared. All p-values were 2-sided based on a 95% confidence interval and p < 0.05 was used to reject the null hypothesis.

Results

Demographics

There were a total of 65 participants recruited for
the study. Overall, the mean age at the time of study was 43 years (range of 21 to 77 years, median 39 years, and mode 21 years). There were 35 males and 30 females recruited, with a male:female ratio of 7:6. There were 50 Chinese, 5 Malays, 8 Indians and 2 of “Others” ethnicity. The ethnicities of Myanmese and Nepalese were classified under “Others”.

INS spray

The most common INS sprays used by our participants were Fluticasone furoate (Avamys®) (53.8%), Mometasone furoate (Nasonex®) (35.4%), followed by Triamcinolone acetonide (Nasocort®) (10.8%) as illustrated in Figure 1.

Compliance

Overall, 83.1% and 72.3% of patients found INS effective and worth using respectively. We defined compliance as patients who continued using INS, similar to the study by Ganesh, et al. [9]. Compliance rate in our study was 63.1%, with twenty-four patients (36.9%) reported having stopped using their INS spray. The reasons for non-compliance included: The perception that INS spray was ineffective (n = 12), finding it troublesome to use (n = 9), fear of systemic side effects (n = 5), fear of losing effectiveness (n = 4), symptom resolution or improvement (n = 3) and fear of damage to the mucous membranes of the nose (n = 1).

On performing multivariate analysis using binary logistic regression, non-compliance to INS was associated with forgetfulness (p = 0.027), side effects experienced (p = 0.033) and the sensory attributes experienced while using the INS sprays (p = 0.049).

Table 1 describes the frequency that patients forgot to use their INS and the corresponding compliance rate. The majority of patients (41/65, 63.1%) have forgotten to use their INS at least once. With increasing frequency of having missed their dose of INS due to forgetfulness, the compliance rate correspondingly decreased, with a compliance rate of 79.2%, 72.7%, 54.2% and 16.7% for patients who never forgot to use, forgot to use their INS less than once a week, forgot one to three times a week, and forgot more than three times a week respectively.

Overall, 40 patients (61.5%) reported having experienced side effects (Table 2). These included, in descending order of frequency, rebound effects after stopping the use of INS sprays (33.8%), becoming dependent (23.1%), sneezing attacks (13.8%) and headache (12.3%). Compliance rate was higher for patients who did not experience side effects (76%) compared to patients who did experience at least one of these side effects (55%). Of note, 5 (7.7%) patients experienced epistaxis and of these 5 patients, 4 (80%) used the contralateral hand to administer, of which 2 sprayed away from the septum, 1 sprayed along the septum and 1 towards the septum.

On the other hand, 31 (47.7%) patients experienced sensory attributes (Table 3) and these included, in descending order of frequency, throat rundown (29.2%), aftertaste (21.5%), immediate taste (20.0%) scent or odor (16.9%) and urge to sneeze (16.9%).

There was a significant difference between the different brands of INS and frequency of sensory attributes experienced (p = 0.007) but there was no significant difference for side effects (p = 0.240). With reference to Table 4, there were a significantly lower proportion of subjects reporting sensory attributes who were using Fluticasone furoate (Avamys®) (28.6%) compared to both Mometasone furoate (Nasonex®) (65.2%) and Triamcinolone acetonide (Nasocort®) (83.3%). Figure 2 illustrates the various sensory attributes participants
44.2% were taught by pharmacists, 44.2% were taught by doctors and 11.5% were taught by nurses.

### Discussion

Our study found that the compliance rate of 63.1% is comparable to rates reported in literature [9]. We have also identified the factors which have influenced the compliance to INS sprays, namely forgetfulness, sensory attributes and side effects experienced by patients. These factors are important in helping us optimize the efficacy and safety of treatment while reducing the burden of AR symptoms experienced by patients.

We found that 63.1% of our patients had forgotten to use their INS at some point in time and for 9.2% of them, this could be up to more than 3 times a week. A study by Loh, et al. [10] found that 77.8% of patients reported having forgotten to use their INS to various degrees over a 30 day period of once daily dosing regimen and this had an impact on the effectiveness of the INS. Continuous daily use of INS has been found to be superior to other dosing strategies such as taking only as when it is required, resulting in fewer symptoms and better quality of life [11].

Continued patient education by healthcare professionals on the symptoms of AR and training on the proper use of INS, as well as addressing potential misconceptions or concerns that patients might have that might be a barrier to usage of INS such as regarding medica-
tion safety or loss of response to frequent use can help
to convince patients of the importance of continued
treatment and increase compliance. Patient education
can be enforced at several levels with collaboration be-
tween doctors, nurses and pharmacists [12].

With the efficacies of various brands of INS largely
comparable in reducing AR symptoms, the impact of
the various sensory attributes of INS sprays on patients’
preference, compliance and adherence to treatment
[13] cannot be underestimated. The higher the intensity
of an unfavorable sensory attribute, the less likely
patients will be compliant with their INS spray. Different
aspects of INS formulations confer potentially unpalat-
able attributes to an INS. Studies comparing between
sensory attributes of different INS preparations have
also found that patients reported overall preference
for Fluticasone furoate compared to Mometasone furo-
ate, due to less run down the throat or out of the nose,
less bitter tasting and less irritation [14,15]. This was
attributed to the lower spray volume of aqueous solu-
tion used, differences in nozzle length and the fineness
and dispersal of the spray. Another randomized dou-
ble-blind crossover study by Bachert and El-Akkad [16]
found that patients overall preferred Triamcinolone
acetonide to Fluticasone propionate or Mometasone
furoate due to a more favourable taste and odor profile,
although it was associated with more nose and throat
rundown. To our knowledge, there has been no study
as yet, comparing patient preferences and sensory attri-
utes of Fluticasone furoate to Triamcinolone acetoni-
de formulations. The findings of our study suggest that
Fluticasone furoate has a lower frequency of sensory at-
tributes and hence might contribute to a more pleasant
experience and higher compliance rate.

The side effects experienced by patients on INS in
our study correspond to literature findings, with the
most common side effects occurring as a result of local
irritation to the nasal mucosa with symptoms such as
dryness, burning sensation, taste and smell disturbanc-
es. Incidence of epistaxis found in our study lies within
the range of 4% to 8% of patients as quoted by other
studies [17,18]. It is postulated that proper technique
used to administer INS can help to reduce incidence
of side effects. Benninger, et al. reviewed all relevant
studies and taking into consideration the findings on the
mechanics of existing INS devices, made recommenda-
tions on the administration of INS sprays to help pa-
ients better understand and use INS [19]. The authors’
recommended technique was to direct the INS at the
lateral nasal wall, while using the contralateral hand, to
facilitate deposition on the middle, inferior turbinates
and middle meatus. The middle meatus is targeted as
swelling and congestion can occur here frequently, and
it is the common drainage pathway of the frontal, max-
illary and anterior ethmoid sinuses. The concentration
of ciliated cells is also higher here and these can be har-
nessed to facilitate a wider area of distribution of the
INS within the nose [19]. In another study, Ganesh, et al.
found that administering INS with the ipsilateral hand
was associated with a four times higher risk of patients
experiencing epistaxis and three times more likely to
stop INS as compared to contralateral technique [9].
This was not found in our study although it may be dif-
cult to draw an association given our relatively small
sample size. Sniffing after spraying is also recommend-
ed, as it may help prevent the administered INS from
dripping out of the nose.

Referencing Benninger’s recommended technique,
our study found that the steps for the administration of
INS were not executed correctly and this might have re-
sulted in a greater proportion of patients experiencing
local side effects from INS use. A reason for this could
be patients having forgot how to perform the steps or
unclear instructions were given by healthcare profes-
sional educators, since a majority of our patients did
report having been instructed on how to use their INS.
Patients using INS should be given clear instructions on
the correct self-administration technique as this could
potentially improve compliance and result in better
symptom control. While the directions differ slightly for
each product, in general, the technique involves several
common steps to ensure proper administration. Each
INS formulation includes specific instructions for dosing
and administration [20-22], and this should be properly
reviewed with the patient.

Despite all the above sensory attributes, side effects
and non-compliance, 83.1% and 72.3% of patients still
found INS effective and worth using respectively. This
highlights that INS is effective, and its effectiveness be
further improved upon when we address the problems
patients face when using it, which we’ve identified in
our study. The importance of patient education cannot
be overemphasized and every member of the health-
care team (doctors, nurses, pharmacists) has a role to
play in this.

There are several limitations to our study. Firstly, this
is a relatively small study population, with a total of 65
subjects recruited. This was partly due to the COVID-19
pandemic where we have been actively deferring clinic
consults for non-urgent conditions such as AR. This has
resulted in a decrease in attendance of patients to our
clinic for the first half of the year of 2020. Nevertheless,
we employed multivariate analysis to eliminate any sta-
tistical biasness resulting from the small study popula-
tion.

Secondly, the proportion of patients on each brand
of INS was unequal. In particular, only 10.4% of our
study population was using Triamcinolone acetonide.
This could affect the comparison across all three INS in
terms of frequency of sensory attributes.

Thirdly, the effect of concomitant oral therapy in re-
lieving symptoms of AR was not explored. Future stud-
ies can take this into account when evaluating the effect of INS on symptoms improvement.

Nonetheless, despite our limitations, we believe that our study has shed light on the reasons for non-compliance to INS as well as the various difficulties and side effects patients experience while using their INS. These findings will better help us healthcare professionals tweak our current practice, so as to improve our patients’ experience with their use of INS.

Conclusion

This study provides insight on how patients’ compliance to INS and hence efficacy of treatment can be improved. Patients should be properly educated on the administration technique to increase efficacy and safety of INS. The importance of regular, continual administration cannot be overemphasized. Patient should also be given the appropriate choice of INS formulation based on favorable formulation characteristics or sensory attributes that they experience.

Funding and Conflict of Interest

None.

References