Compliance of Nasal Irrigation in Children with Allergic Rhinitis and Rhinosinusitis

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Background: *The compliance and tolerance of nasal saline irrigation (NSI) has not been studied in the Thai pediatric population.*
Objective: *To determine the compliance of NSI in the children with allergic rhinitis and rhinosinusitis.*
Material and Method: *60 evaluable children diagnosed with allergic rhinitis and/or rhinosinusitis, aged 3 to 15 years, were recruited from Thammasat University Hospital. The children were divided into 3 different age groups; (20/gp): age 3 to 5 years (y), 6 to 10 y and 11 to 15 y. At enrollment, the parent or guardians of children were interviewed via a questionnaire (knowledge of NSI, opinions regarding compliance if NSI were prescribed and the technique of which NSI was taught). Children were followed-up to month to assess NSI compliance. Patients with poor NSI compliance were reevaluated regarding their NSI technique.*
Results: *Most parents thought NSI would improve their child's disease: 90% for age group 3 to 5 y, 95% (6 to 10 y), and 80% (11 to 15 y). Furthermore, most thought their child would tolerate NSI: 75% (3 to 5 y), 80% (6 to 10 y) and 100% (11 to 15 y). However, only 6 parents (30%) in age group 3 to 5 y thought that their child could have good compliance with NSI. At follow-up, 65% of age group 3-5 y had good compliance. Patients in all age groups had good compliance for NSI, group 6 to 10 y (85%). Although those aged 6-10 y (85%) did so most successfully.*
Conclusion: *In this small study, children aged 3 to 15 y, most tolerate and complied well with NSI. NSI should more widely prescribed as adjunctive therapy for pediatric patients with rhinitis and rhinosinusitis.*

Keywords: *Nasal saline irrigation, Allergic rhinitis, Pediatric rhinosinusitis*

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Allergic rhinitis (AR) is a common disease worldwide. The prevalence of AR in the United Kingdom is 26% and in children worldwide lies at 20%, but the prevalence of the disease is also likely to increase[1]. In Thailand, the prevalence of AR is 10 to 45%[2].

Rhinosinusitis (RS) is also a common clinical problem in children and adults. It is the most common complication patients with the common cold or other upper respiratory tract infections (URTIs) endure. It is estimated that 2 to 10% of children with URTIs experience acute RS[3]. Children typically have 3 to 8 URTIs per year but 10 to 15% have 12 URTIs per year[4]. The prevalence of acute or chronic RS in the pediatric population is 6 to 12% and 5 to 15%, respectively, in different studies[5].

Allergic rhinitis (AR), non-allergic rhinitis, acute infective rhinitis, the common cold and sinusitis all may lead to long-term symptoms, such as nasal airway obstruction, congestion, rhinorrhea, cough, headache, and daytime fatigue. In the absence of adequate treatment, complications may ensue, notably acute otitis media and RS. Several treatment options are available for patients and have traditionally included antibiotics, corticosteroid nasal sprays, and symptomatic treatment via over the counter medications.

Nasal saline irrigation has been used as an adjunctive therapy for URTI, AR and RS such as with good efficacy and few complications tinnitus, nasal itching, nasal sinus pain and epistaxis[6]. Despite this, NSI use occurs in <10% of adult patients[7]. This low NSI rate has led to the presumption that children will not cooperate or tolerate the act of irrigation because

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children are usually fearful of the process.

Nevertheless, the compliance with and tolerance of NSI has not been studied in the Thai pediatric population. In our experience, there is often an assumption by parents and physicians a like that children will be unwilling to attempt NSI and would not be able to tolerate it. The objective of this study was to determine the compliance of nasal saline irrigation in children with AR or RS.

Material and Method

Study site & subjects

The study took place at the Allergy Clinic of Thammasat University Hospital (TUH), Pathumthani, Thailand from 1 August to 30 September 2016.

Inclusion criteria

Patients were enrolled into the study if they met all of the following inclusion criteria:

1) Male or female and aged between 3 to 15 years.

2) Had either AR or rhinosinusitis diagnosed at our Allergy Clinic.

3) Had either ever or never had NSI.

4) Parents or guardians who were willing to supervise NSI and attend the 1 month follow-up with their child.

Exclusion criteria

Contraindications to NSI (e.g. of nasal saline irrigation such as cleft palate, bleeding disorder, choanal atresia) led to patient exclusion.

Study design

This was a prospectively conducted questionnaire-based descriptive study.

The study consisted of three parts:

First visit

1) Administration of a questionnaire: (1) demographic data and details of their AR or RS, (2) parental/guardian demographic data, and (3) parental/guardian knowledge and attitude regarding NSI (whether they thought their child would tolerate and comply with NSI, and their concerns regarding NSI).

2) Parents/guardians were taught the NSI technique using a demonstration video.

3) An NSI record form was given.

Second visit (1 week)

1) One week later, the NSI technique evaluated.

Third visit (1 month)

1) Parents/guardians who fully supervised their child for 30 days were evaluated for compliance. If the patients did not have good compliance, we reevaluated their NSI technique.

We defined good compliance as the use of NSI $\geq$4 days per week.

Ethics consideration

The present study was performed according to the rules of the Human Research Ethics Committee of the TUH Faculty of Medicine. The study was approved by the TUH ethics committee and all parents/guardians gave writing informed consent via written permission.

Statistical analysis

All clinical variables were summarized by descriptive statistics using Microsoft Excel, then by the ready program of SPSS version 23 (College Station, Texus USA).

Results

A total of 86 patients were enrolled during the study period. A total of 26 children were excluded because of: (1) loss to follow-up (n = 3), and (2) a different parent/guardian attended the follow-up day (n = 23). Thus, a total of 60 children were successfully followed-up with completed questionnaires.

Demographic characteristics of the patients

A summary of patient demographics is shown in Table 1. Overall, males predominated over females and most older children had AR while for the youngest age group, the main diagnosis was RS.

Parental/guardian demographics are shown in Table 2. For all age groups, the mothers took primary care of the patient's disease. Most of the parents were educated up to a Bachelor degree level. The majority of parents did not have a history of AR or RS and had no previous experience of NSI.

Questionnaire results

At the first visit, high proportions of parents/guardians thought NSI would improve their child's disease; 90, 95, and 80% for age groups 3 to 5 y, 6 to 10 y, and 11 to 15 y respectively (Fig. 1). Furthermore, most believed their child would tolerate NSI; 75%, 80% and 100% for age groups 3 to 5 y, 6 to 10 y, and 11 to 15

Table 1. Demographic characteristics of the patients

Demographic Data	Age group 3 to 5 years n (%)	Age group 6 to 10 years n (%)	Age group 11 to 15 years n (%)
Patient	20	20	20
Gender			
Males	11 (55)	14 (70)	13 (65)
Females	9 (45)	6 (30)	7 (35)
Median age in years	4.6	7.9	12.0
Disease			
Allergic rhinitis	5 (25)	12 (60)	16 (80)
Allergic rhinitis with asthma	3 (15)	1 (5)	2 (10)
Allergic rhinitis with sinusitis	11 (55)	7 (35)	2 (10)
Allergic rhinitis with asthma and sinusitis	1 (5)	0	0

Table 2. Demographic characteristics of the parents

Demographic data	Age group 3 to 5 years n (%)	Age group 6 to 10 years n (%)	Age group 11 to 15 years n (%)
Parent			
Father	5 (25)	4 (20)	5 (25)
Mother	14 (70)	13 (65)	13 (65)
Grandparents	1 (5)	3 (15)	2 (10)
Education			
Primary school	0	1 (5)	3 (15)
Secondary school/ Vocational certificate	0	4 (20)	3 (15)
College certificate/ High vocational certificate	2 (10)	0	3 (15)
Bachelor degree	14 (70)	11 (55)	10 (50)
Master degree/Doctorate degree	4 (20)	4 (20)	1 (5)
Occupation			
Housemaid/Housewife	3 (15)	5 (25)	5 (25)
Government employee	4 (20)	10 (50)	9 (45)
Healthcare worker	2 (10)	1 (5)	1 (5)
Shopkeeper	4 (20)	3 (15)	1 (5)
Self-employed	7 (35)	3 (15)	4 (20)
Income/month			
<10,000 bath	2 (10)	1 (5)	0
10,000-30,000 bath	10 (50)	9 (45)	12 (60)
30,000-50,000 bath	2 (10)	7 (35)	6 (30)
50,000-100,000 bath	3 (15)	1 (5)	1 (5)
>100,000 bath	3 (15)	2 (10)	1 (5)
Past medical history			
Allergic rhinitis/Asthma	4 (20)	7 (35)	6 (30)
Rhinosinusitis	4 (20)	0	0
None	12 (60)	13 (65)	14 (70)
Nasal saline irrigation experience			
Yes	10 (50)	5 (25)	7 (35)
No	10 (50)	15 (75)	13 (65)

y respectively (Fig. 1).

However, for NSI compliance, only 6 parents (30%) in age group 3 to 5 y thought that their child would achieve good compliance with irrigation, contrasting with higher proportions for the other two age groups (Fig. 1).

The majority of parents (75%) of the 3 to 5 and 6 to 10 y groups thought NSI would not be associated with any complications where as 65% of parents in the 11 to 15 y group thought there would be complications. The complications that all parents in the three age groups were concern about consist of; cough aspiration, nasal sinus pain, nausea, vomiting and epistaxis.

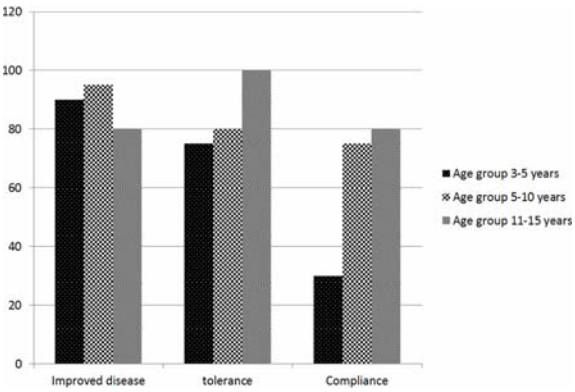

Fig. 1 Parents' opinion about nasal saline irrigation of children at first visit.

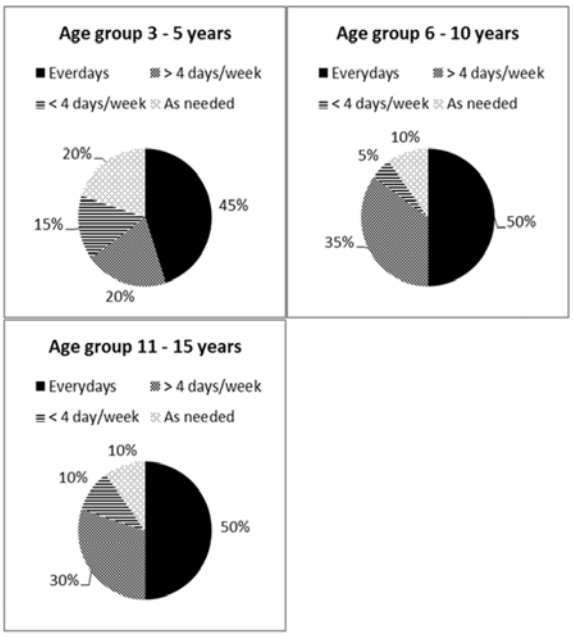

Fig. 2 The difference of compliance rates with nasal irrigation according to age groups.

Compliance assessment

Overall, we found that the patients in all age groups had good NSI compliance (65 to 85%) as defined. Moreover, high proportions (45 to 50%) of children were able to have NSIs use everyday (Fig. 2). The youngest age group had the lowest compliance.

In addition, we studied the reasons why patients had less than good NSI compliance, as summarized in Fig. 3.

In all age groups, the main reasons for poor compliance were: (1) a lack of good cooperation and complication occurrence, (2) difficulty in mastering the technique, and (3) fear of the procedure. NSI related complications and difficulty with the technique were broadly similar across the age groups but poor cooperation with the procedure was higher in the two younger age groups.

Belief that, nasal saline irrigation (NSI) could not improve the disease, was not present in all age groups as the reason for poor compliance.

At the first visit only 6 parents (30%) in age group 3 to 5 years thought that their child would have good compliance; this was considerably lower than the compliance actually achieved (Fig. 4). For the other two age groups, the opinion and acutal compliance rates matched.

Discussion

Our small study of children with AR or RS had good compliance rates with NSI across all age groups but with a lower rate in the youngest children. A recent Cochrane review provides evidence that NSI is beneficial not only when used as a treatment adjunct but also when used as the sole modality of treatment in adults[8]. Moreover, NSI significantly reduced the use of antibiotics and was well tolerated in adults. While minor side effects such as nasal burning, irritation and nausea have been reported, there has been no documented evidence of severe adverse effects[8]. However, the evidence supporting the use of NSI in children is less clear.

In the safety and efficacy study of Wei et al, once-daily NSI was performed for six weeks in 40 children age 4 to 17 y with chronic RS. Both normal saline and saline plus gentamicin were equally effective and tolerated well while the quality of life (QoL) was significantly improved after three weeks of irrigation in both groups. Compliance was over 90% (n = 36) for

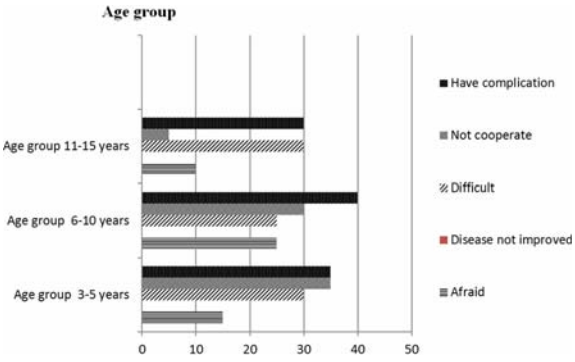

Fig. 3 The reasons for poor compliance with nasal saline irrigation.

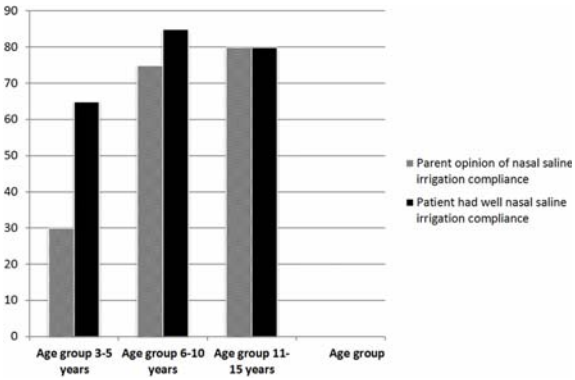

Fig. 4 The compliance rates of nasal irrigation in children compared with their parents/guardains' opinions at the first visit.

once daily irrigation over the 6 week treatment period[9].

Similar positive findings were reported by Chen et al when NSI was used in 61 AR affected children, aged 2 to 15 y. Compliance was good, intranasal corticosteroid dose was reduced, and symptoms signs improved significantly and the mean eosinophil count in nasal secretions decreased significantly at week 12[10].

Hong et al reported good compliance and efficacy of NSI in 77 children (4 to 14 y) with chronic RS that was refractory to medical treatment including antibiotics and nasal corticosteroids. Overall, 49 patients (63.6%) successfully carried out NSI throughout follow-up. The 6 to 8 y olds had the best compliance (80%) and the youngest age group (4 to 5 y) had the worst compliance (50%)[11]. These results were consistent with our results, as compliance of nasal irrigation in children with allergic rhinitis and rhinosinusitis was good, although NSI compliance was poorer in younger children.

We found that the parents of the youngest children had the lowest expectation of good compliance of their children but when NSI was attempted, the actual compliance rate doubled. These results are similar to those of Jeffe et al who found that only 28% of the parents thought that their children would tolerate NSI but 93% of 61 children attempted NSI and 86% tolerated it well. Moreover, 77% of children who attempted NSI were able to continue to use it for symptom relief[12].

There were some limitations to our study. We only analyzed patients who followed the protocol strictly, so our sample size decreased to 20% per arm. Some patients underwent nasal irrigation treatment before enrollment, so the selection bias contributed to a high rate of compliance. The completion of the survey by parents may have lead to recall bias as well.

Conclusion

Pediatric patients with AR or RS, aged 3 to 15 y tolerated NSI and had good compliance. NSI should be prescribed more often as adjunct therapy in AR and RS.

What is already known on this topic?

Nasal saline irrigation can used as adjunct treatment for pediatric allergic rhinitis and rhinosinusitis.

What this study adds?

There is often an assumption by parents and physicians that children will not comply with is and tolerate nasal saline irrigation poorly. This study showed that most children had good compliance with nasal saline irrigation.

Acknowledgements

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Potential conflicts of interest

None.

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ความร่วมมือในการล้างจมูกของผู้ป่วยเด็กโรคเยื่อบุจมูกอักเสบจากภูมิแพ้และโรคไซนัสอักเสบที่เข้ารับการรักษา โรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ

ชารีณีสังขนิตย์, อรพรรณ โพชนุกูล, เทพ เศรษฐบุตร, ประภาศรี กุลาเลิศ

ภูมิหลัง: โรคเยื่อบุจมูกอักเสบจากภูมิแพ้และไซนัสอักเสบเป็นปัญหาที่พบบ่อยในเด็กการรักษาโรคเหล่านี้มีทั้งการรักษาเฉพาะเจาะจงและการรักษาตามอาการ ร่วมกับการล้างจมูกด้วยน้ำเกลือเป็นการรักษาเสริมเพื่อลดอาการทางจมูก ผู้นิพนธ์เล็งเห็นถึงประโยชน์ของการใช้น้ำเกลือล้างจมูกในผู้ป่วยเด็ก แต่ปัจจุบันการศึกษาถึงความร่วมมือ และการทนต่อการล้างจมูกได้ของผู้ป่วยเด็กยังไม่มีในประเทศไทย

วัตถุประสงค์: เพื่อศึกษาถึงความร่วมมือในการล้างจมูกในผู้ป่วยเด็กโรคเยื่อบุจมูกอักเสบจากภูมิแพ้และโรคไซนัสอักเสบ

วัสดุและวิธีการ: เป็นการศึกษาวิจัยสำรวจเชิงพรรณนา (Descriptive research) โดยเก็บข้อมูลจากการสัมภาษณ์ ผู้ปกครองของผู้ป่วยเด็กอายุ 3 ถึง 15 ปีที่เข้ารับการรักษา ณ คลินิกโรคภูมิแพ้ โรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ ในระหว่างวันที่ 1 สิงหาคม ถึง 30 กันยายน พ.ศ. 2559 จำนวน 60 คนแบ่งเป็นกลุ่มอายุ 3 ถึง 5 ปี, กลุ่มอายุ 6 ถึง 10 ปี และกลุ่มอายุ 11 ถึง 15 ปี จำนวนกลุ่มละ 20 คน ได้ทำการเก็บข้อมูลโดยให้ผู้ปกครองตอบแบบสอบถามและสอนขั้นตอนการล้างจมูกให้กับผู้ปกครองของผู้ป่วย พร้อมให้แบบบันทึกการล้างจมูกสำหรับ 1 เดือน จากนั้นนัดติดตามที่ 1 เดือน เพื่อประเมินเรื่องความร่วมมือในการล้างจมูกจากแบบบันทึกการล้างจมูกและประเมินเทคนิคการล้างจมูกตามขั้นตอน

ผลการศึกษา: ในการสอบถามถึงความคิดเห็นของผู้ปกครองเกี่ยวกับการล้างจมูกในผู้ป่วยเด็ก ผู้ปกครองส่วนใหญ่คิดว่าการล้างจมูกผู้ป่วยทำให้อาการทางจมูกของโรคภูมิแพ้จมูกและโรคไซนัสอักเสบดีขึ้นในทุกกลุ่มอายุ โดยคิดเป็นร้อยละ 90 ในกลุ่มอายุ 3 ถึง 5 ปี, ร้อยละ 95 ในกลุ่มอายุ 6 ถึง 10 ปีและร้อยละ 80 ในกลุ่มอายุ 11 ถึง 15 ปี และยังมีความเห็นว่าผู้ป่วยเด็กสามารถทนต่อการล้างจมูกได้ในทุกกลุ่มอายุที่ทำการศึกษา โดยคิดเป็นร้อยละ 75 ในกลุ่มอายุ 3 ถึง 5 ปี, ร้อยละ 80 ในกลุ่มอายุ 6 ถึง 10 ปี และร้อยละ 100 ในกลุ่มอายุ 11 ถึง 15 ปี แต่อย่างไรก็ตาม ความคิดเห็นของผู้ปกครองต่อความร่วมมือในการล้างจมูกของผู้ป่วยเด็ก พบว่าผู้ปกครองเพียงร้อยละ 30 ของผู้ป่วยในกลุ่มอายุ 3 ถึง 5 ปี คิดว่าผู้ป่วยจะให้ความร่วมมือดีต่อการล้างจมูก แต่จากการศึกษากลับพบว่าผู้ป่วยส่วนใหญ่ในกลุ่มอายุ 3 ถึง 5 ปี ให้ความร่วมมือดีต่อการล้างจมูก โดยคิดเป็นร้อยละ 65 และยังพบว่าผู้ป่วยในทุกกลุ่มอายุในความร่วมมือดีต่อการล้างจมูก โดยพบว่ากลุ่มอายุ 6 ถึง 10 ปี ให้ความร่วมมือในการล้างจมูกดีที่สุด คิดเป็นร้อยละ 85 ซึ่งมากกว่าความคิดเห็นของผู้ปกครองว่าผู้ป่วยสามารถให้ความร่วมมือดีต่อการล้างจมูก เช่นเดียวกันกับกลุ่มอายุ 3 ถึง 5 ปี

สรุป: ผู้ป่วยเด็กโรคเยื่อบุจมูกอักเสบจากภูมิแพ้และโรคไซนัสอักเสบทุกกลุ่มอายุ (อายุ 3 ถึง 15 ปี) สามารถทนต่อการล้างจมูกได้อีกทั้งผู้ป่วยในทุกกลุ่มอายุให้ความร่วมมือในการล้างจมูกเป็นอย่างดี ดังนั้นจึงควรพิจารณาใช้ล้างจมูกเป็นหนึ่งในการรักษาโรคดังกล่าวในผู้ป่วยเด็กร่วมด้วย