# Baby Shampoo versus Commercial Anti-fogging Solution to Prevent Fogging during Nasal Endoscopy: A Randomized Double-Blinded, Matched-Pair, Equivalent Trial

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***Objective:*** *To compare the minimization of the fog condensation during nasal endoscopy between a commercial anti-fogging agent and baby shampoo.*

***Material and Method:*** *This randomized double-blinded matched pair study was conducted at the Department of Otorhinolaryngology, Faculty of Medicine, Khon Kaen University during February 4, 2013 to March 14, 2013. The commercial anti-fogging solution (Ultrastop®) and baby shampoo solution (Johnson's® no more tear®) were compared. A computer generated randomization was performed to select the solution applying on the lens for nasal endoscopy of the right nasal cavity. The other solution was then used for the left one. Three passes of endoscopy were performed to examine the floor of the nose, the sphenoethmoidal recess and the middle meatus area which spent about 30 seconds for each time of endoscopy. The time to become foggy on the lens and the preferred solution assessed by the endoscopists were recorded.*

***Results:*** *There were 71 eligible patients recruited in the study, 37 males (52.1%) and 34 females (47.9%). There was no fogging during a 30-second nasal endoscopy either by baby shampoo or commercial anti-fogging solution. However, 9.86% (95% CI 2.75-16.97) of endoscopists preferred commercial anti-fogging agent, 7.04% (95% CI 0.94-13.14) preferred baby shampoo and 83.10% (95% CI 74.16-92.03) had equal satisfaction. Both agents had no statistically significant difference for preventing foggy on the lens.*

***Conclusion:*** *Baby shampoo is an effective agent to prevent fogging during nasal endoscopy and comparable with the commercial anti-fogging agent.*

***Keywords:*** *Anti-fogging agent, Baby shampoo, Nasal endoscopy*

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Nasal endoscopy is an invasive procedure for examining nasal cavities, nasopharynx and paranasal sinuses in ENT clinics. The quality of image visualized during nasal endoscopy is essential for physicians in reaching the correct diagnosis. Examinee's breath air usually fogs endoscopy lens during procedures and may affect image quality and thereby clinical diagnosis. Fogging can be prevented by using a surfactant or anti-fogging agent. Nowadays a commercial anti-fogging agent (Ultrastop®) is accepted as the standard solution to prevent fogging on the lens during the procedure. However this solution is quite expensive. So, another surfactant such as diluted chlorhexidine (Hibiscrub®) which is cheaper than Ultrastop® is off-label used as an anti-fogging solution in many ENT clinics. Piromchai et al[1] compared the anti-fogging property of Ultrastop®, chlorhexidine (Hibiscrub®) and a baby shampoo (Johnson's® no more tear®) with no agent in vitro and showed that the Ultrastop® and the baby shampoo (Johnson's® no more tear®) had the most anti-fogging effect when used isolate. Johnson's® Baby Shampoo is a surfactant that shows in vitro antimicrobial effects with modest inhibition of bacterial biofilm formation and has been used to treat biofilm in chronic rhinosinusitis[2,3]. Diluted Johnson's® Baby Shampoo has not been tested in vivo as an anti-fogging agent

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during nasal endoscopy. This present study, therefore, aimed to compare the anti-fogging property and adverse events between the commercial agent (Ultrastop®) and diluted Johnson's® Baby Shampoo during nasal endoscopy.

## Material and Method

We conducted a randomized double-blinded, matched pair equivalent clinical trial in participants who attended the outpatient Department of Otorhinolaryngology, Faculty of Medicine, Khon Kaen University, Thailand between February 4, 2013 and March 14, 2013. The inclusion criteria were participants who needed nasal endoscopy for examining nasal cavities, nasopharynx or paranasal sinuses, and aged more than 18 years. Patients with a history of allergy to baby shampoo or surfactant or presence of large nasal tumors or deviated nasal septum that would impede the insertion of nasal endoscope were excluded. Each participant gave written informed consent before enrollment.

A computer generated randomization was performed to allocate either Ultrastop® or baby shampoo solution (Johnson's® no more tear®) for the right nasal cavity. The other solution was used for another side of the nasal cavity. Sealed opaque envelopes were used to conceal the allocated treatment. Nasal endoscopy was performed in a room with a temperature between 25-30 degrees celsius. Before nasal endoscopy was performed, the lens of endoscopy was wiped with either Ultrastop® or baby shampoo solution (Johnson's® no more tear®) with the concentration of 1:100 (baby shampoo 1 ml in 100 ml of 0.9% normal saline) by an investigator (IP). The three physicians who performed nasal endoscopy were blinded to the solution. Thirty seconds were spent for nasal endoscopy. The endoscope was passed through the floor of the nasal cavity, the middle meatus and sphenoethmoidal recess. Investigators who performed endoscopy compared the fogging effect between both two nasal cavities and assessed the preference.

The sample size was calculated based on the differences of fogging incidence between using both solutions of 10%, 90% power of the test and 95% confidence interval[4-7]. A total of 71 participants were enrolled.

This study was approved by the Khon Kaen University Ethics Committee in human research.

## Results

Table 1 shows demographic data of the participating patients. The mean age of the participants was 40.2 years (range 18-60 years). No fogging of the lens was seen during nasal endoscopy for 30 seconds, and there was no nasal irritation. Preferences assessed by three physicians who performed nasal endoscopy demonstrated that 9.86% (95% CI 2.75-16.97) of endoscopists preferred commercial anti-fogging agent, 7.04% (95% CI 0.94-13.14) preferred baby shampoo and 83.10% (95% CI 74.16-92.03) had equal satisfaction.

## Discussion

This was the first clinical trial comparing anti-fogging effects between the commercial antifog solution (Ultrastop®) and baby shampoo solution (Johnson's® no more tear®) during nasal endoscopy showing that there were no differences of anti-fogging and adverse events.

Piromchai et al[1] showed a study in vitro comparing the anti-fogging efficacy between commercial anti-fogging agent (Ultrastop®), chlorhexidine (Hibiscrub®) and baby shampoo, in which no agent was applied to rigid endoscope lens before putting them into a mist generator. They showed that the commercial anti-fogging agent and baby shampoo had the most protective benefit and performed significantly better than no agent. Baby shampoo (Johnson's® no more tear®) was shown to have an anti-biofilm effect with no serious adverse events when used as a nasal irrigation for the symptomatic post-functional endoscopic sinus surgery in patients with chronic sinusitis[3]. Other anti-fogging agents used for

**Table 1.** Demographic data of the participants

| Gender | Males (n = 37) | Females (n = 34) |
|---|---|---|
| Mean age (range) | 39.8 (18.4-60.0) | 40.4 (18.0-60.0) |
| Postoperative sinus surgery | 19 | 21 |
| Chronic rhinosinusitis with nasal polyps | 10 | 8 |
| Chronic nasal obstruction | 6 | 4 |
| Nasopharyngeal tumor | 2 | 1 |

an endoscope are soap and povidone iodine[8,9] which prevent the condensation of water in the form of small droplets on the surface of the lens.

Baby shampoo is very cheap, easy to find and has been reported to have very minimal nasal irritation. It may be used as an alternative anti-fogging agent during nasal endoscopy.

The advantage of this study is the study design of randomized double blinded with the use of nasal endoscopy of the other side of nasal cavity in the same participant as a control which can prevent the selection and assessment biases and balance the baseline characteristics of both interventions. However this study assessed the anti-fogging only during a first 30-second nasal endoscopy which is suitable only for examination of nasal cavities, paranasal sinuses and nasopharynx. The comparative effects for anti-fogging during endoscopic sinus surgery, which spent a longer period of time, should be further studied.

**Conclusion**

Baby shampoo (Johnson's® no more tear®) is an anti-surfactant which can prevent fogging on the endoscope lens. So it can be used as an alternative anti-fogging agent during nasal endoscopy.

**What is already known on this topic ?**

Commercial anti-fogging agent (Ultrastop®) is accepted to be used to prevent fogging on the endoscope lens during nasal endoscopy. Other anti-fogging agents have also been used as an anti-fogging agents but there were no comparative study of these agents.

**What this study adds ?**

This study shows that Baby shampoo (Johnson's® no more tear®) which is an anti-surfactant has similar efficacy to prevent foggy on the endoscope lens as commercial anti-fogging agent (Ultrastop®).

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**Potential conflicts of interest**

None.

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## *แชมพูเด็กและสารละลายกันฝ้าทางการค้าในการป้องกันการมัวระหว่างตรวจโพรงจมูกด้วยการส่องกล้อง: การศึกษาทางคลินิกชนิดได้ผลพอ ๆ กันแบบสุ่มโดยการปกปิดสองทางด้วยการจับคู่*

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***วัตถุประสงค์:*** *เพื่อเปรียบเทียบการลดการเกิดฝ้าของเลนส์ในการส่องตรวจโพรงจมูกด้วยกล้องระหว่างการใช้สารป้องกันฝ้าทางการค้าและแชมพูเด็ก*

***วัสดุและวิธีการ:*** *การศึกษาชนิดสุ่มแบบปกปิดสองทางโดยการจับคู่นี้ได้ดำเนินการที่ ภาควิชาโสต ศอ นาสิกวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น ระหว่างวันที่ 4 กุมภาพันธ์ พ.ศ. 2556 ถึงวันที่ 14 มีนาคม พ.ศ. 2556 โดยการเปรียบเทียบสารละลายป้องกันฝ้าทางการค้า (Ultrastop®) และแชมพูเด็ก (Johnson's® no more tear®) ใช้คอมพิวเตอร์สุ่มการเลือกสารละลายใช้ป้องกันฝ้าบนเลนส์สำหรับการส่องตรวจโพรงจมูกด้วยการใช้กล้องสำหรับโพรงจมูกด้านขวา ดังนั้นอีกสารละลายได้ใช้สำหรับการส่องตรวจโพรงจมูกซ้าย ในการส่องตรวจโพรงจมูกด้วยกล้องได้ทำการใส่กล้องเข้าไปในโพรงจมูก 3 บริเวณ ได้แก่บริเวณพื้นของโพรงจมูก, sphenoethmoidal recess และบริเวณ middle meatus โดยใช้เวลาในการส่องโพรงจมูก 30 วินาที ทำการบันทึกเวลาตั้งแต่เริ่มการใช้กล้องส่องโพรงจมูกถึงเวลาที่เกิดการมัวของเลนส์ และบันทึกสารละลายที่ชอบมากกว่าของผู้ทำการส่องกล้อง*

***ผลการศึกษา:*** *มีผู้ป่วยเข้าร่วมการศึกษา 71 คน เป็นเพศชาย 37 คน (52.1%) และเพศหญิง 34 คน (47.9%) ระหว่างการส่องกล้องตรวจโพรงจมูก 30 วินาที ไม่พบมีการมัวของเลนส์ทั้งการใช้แชมพูเด็ก หรือสารละลายกันฝ้าทางการค้า อย่างไรก็ดีแพทย์ผู้ทำการส่องกล้องชอบใช้สารละลายป้องกันฝ้าทางการค้ามากกว่าแชมพูเด็ก 9.86% (95% CI 2.75-16.97) ในขณะที่ชอบแชมพูเด็กมากกว่าในการป้องกันการมัวของเลนส์ 7.04% (95% CI 0.94-13.14) และชอบพอ ๆ กัน 83.10% (95% CI 74.16-92.03) สารทั้งสองไม่พบมีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติในการป้องกันการมัวของเลนส์*

***สรุป:*** *แชมพูเด็กเป็นสารที่มีคุณสมบัติในการป้องกันการมัวของเลนส์ระหว่างการส่องตรวจโพรงจมูกด้วยกล้องและได้ผลพอ ๆ กับสารละลายป้องกันฝ้าทางการค้า*