

The Effects of Indanazoline and Xylomethazoline on Nasal Congestion and Mucociliary Activity

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✓ In the present study, we examined the effects of xylomethazoline and indanazoline on nasal congestion and mucociliary activity by 99 m Tc scanning and computerized tomography. Changes in the length, width and the area of the conchae were determined with tomography measurements. There was a statistically significant difference between pre and post treatment values in both the xylomethazoline and indanazoline groups ($p < 0.01$). We found that treatments with both indanazoline and xylomethazoline do not affect the mucociliary function. There was no significant difference regarding their effects of these two drugs on the nasal functions.

Key words: Indanazoline, Xylomethazoline, Nasal Congestion, Mucociliary Activity.

INTRODUCTION

Nose is an organ with various important functions such as olfaction, humidification, protective mucociliary activity and resonator contribution to speech. Therefore these functions are influenced by the factors leading changes in the nose^(1,2). A substantial part of the medical remedies that has been found successful in the treatment of the majority of nose and paranasal sinus disorders includes topical decongestants.

Topical decongestants showing their effects via alpha adrenergic receptor system are mainly imidazoline derivatives^(3,4). In the present study, we examined the effects of xylomethazoline and indanazoline in the form nasal sprays, on nasal congestion and mucociliary activity by 99m Tc scanning and computed tomography.

MATERIALS AND METHODS

The study group comprised of 30 subjects (17 males; 13 females, mean age: 31 years) having no symptoms suggestive of nose and paranasal sinus disease. Detailed histories

of all subjects were obtained. After a complete otorhinolaryngological examination subjects with nose and sinus disease were excluded from the study. Nose and paranasal sinus computerized tomography (CT) of all the subject studied were obtained. The length, width and the area of the inferior conchae were measured bilaterally on tomographic images (Figure 1). In order to eliminate the impact of nasal cycle in the assessments, the sum of bilateral conchae values were used. Tomographic scannings were performed in the same way before and after the xylomethazolin and indanazoline treatment. Nasal mucociliary transport function was examined by 99m Tc scanning. Scintigraphic images were taken after dripping of 99m Tc labeled macroalbumin aggregate and then the transport of the aggregate to the nasopharynx was observed. The distance taken was measured in millimeters and the time needed for it was recorded. The transport rate of the aggregate as the mucociliary transport rate was calculated in mm/minute. Time activity curves were ob-

tained by using the affinity areas observed around the macroalbumin aggregate particles on the images. Elimination half-time ($T_{1/2}$) was determined from the time curves showing exponential reduction. Measurements and assessments were performed in the same way before and 48-72 hours after the application of the nasal sprays.

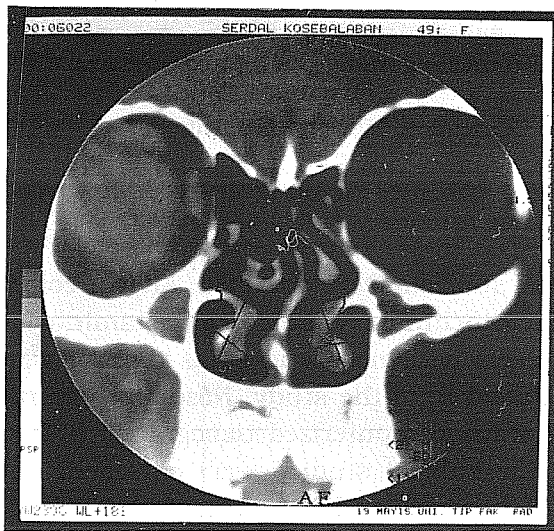


Figure 1 : The measurements of the inferior concha

After the tomographic and scintigraphic examinations, nasal sprays prepared and numbered. The nasal sprays packed and numbered by the same researcher after the dispersion of indanazoline or xylo-methazoline. The contents of the packages were kept hidden till the end of study. Sprays were applied 3 times a day in both of the nostrils for a period of 48-72 hours. Within 2 hours following the ultimate dose, tomographic and scintigraphic examinations were repeated. Thirty subjects who received nasal sprays in a double-blind manner were divided into two groups consisting fifteen sub-

jects depending on the drug applied. In the statistical analysis of the results of the study "Mann-Whitney U test" and "Wilcoxon's paired rank test" were used⁽⁵⁾. After pre-treatment examinations completed, the subjects were divided into two groups consisting of 15 subjects. One of them received xylo-methazoline and the other indanazoline.

RESULTS

Of the subjects studied, 15 received xylo-methazoline while the rest received indanazoline. Mean age was 34.3 years in the xylo-methazoline group and 28.1 years in the indanazoline group.

Changes in the length, width and the area of the conchae were determined with tomographic measurements. There was a statistically significant difference between pre and post treatment values in both the xylo-methazoline and indanazoline groups (Table I-II $p < 0.01$). The difference between pre and post treatment mucociliary transport rates was not significant for both drugs (Table I-II > 0.05). The difference between the maximum and minimum values of elimination half-time was also not significant in both groups (Table I-II $p < 0.05$). The parameters in both groups were also compared and no significant difference was found in pre-treatment values of the length, width and area of conchae, mucociliary transport activities and elimination $T_{1/2}$ (Table III $p > 0.05$). After nasal applications of xylo-methazoline and indanazoline the length, width and area of inferior conchae, mucociliary transport rate and elimination $T_{1/2}$ was measured, and no statistically differences were found between indanazoline and xylo-methazoline groups (Table IV $p > 0.05$).

DISCUSSION

Nasal topical decongestants are sympat-

Table-1 : Pre application mean values in the xylomethazoline group.

PARAMETER	PRE-AP*	POST-AP**	T	P
Width (mm)	19.09±1.07	13.26±1.05	7.0	<0.01
Lenght (mm)	26.27±1.14	21.73±1.11	1.0	<0.01
Area (cm ²)	2.55±0.18	1.57±0.16	4.5	<0.01
Elimination T _{1/2} (min)	13.33±2.36	16.80±3.58	43.0	>0.05
Mucociliary Transport				
Rates (mm/min)	5.80±0.63	5.16±0.84	43.0	>0.05

* PRE-AP : PRE-APPLICATION

**POST-AP: POST-APPLICATION

Table-2 : Pre application mean values in the indanazolin group.

PARAMETER	PRE-AP*	POST-AP**	T	P
Width (mm)	17.70±1.30	12.99±0.87	6.0	<0.01
Lenght (mm)	27.35±1.21	22.35±1.14	0.0	<0.01
Area (cm ²)	2.37±0.28	1.65±0.16	4.0	<0.01
Elimination T _{1/2} (min)	19.38±4.54	15.85±2.46	54.0	>0.05
Mucociliary Transport				
Rates (mm/min)	5.65±4.54	5.43±0.63	52.0	>0.05

hormymetic agents affecting alpha adrenergic receptor system and provide nasal decongestion, enhancement of nasal ventilation and ventilation of paranasal sinuses. They may lead, stimulating sympathetic nervous system, some sistemic side effects such as tachycardia, increases in blood pressure and stimulation of central nervous system. Anderson and Bende (1984) reported that nasal secretion and congestion diminished with stimulation of alpha adrenergic receptors in healthy subject. Jennson and Malm, suggested that xylomethazoline is more effective in nasal congestion and nasal blood flow than the exercises⁽⁶⁾. Stringer et al.

showed that the application of local decongestants in patients with paranasal sinus enfections had diminished the blood flow of inferior nasal conchae by 44 % and of medial conchae by 25 %⁽⁷⁾. One of the aspects to be taken into the account while evaluating nasal functions and particularly congestion is the nasal cyclus. Whereas congestion and decongestion phases show alternant changes, the total resistance in both nostrils remains unchanged⁽⁷⁾. Regarding this, the unilateally evaluation of the effectiveness of a drug may be misleading. Therefore both nasal cavities should be evaluated. In the present study, evaluations on

Tablo-3: Pre application mean values in the group with and Indanazolin groups applicated

PARAMETER	Indanazolin	Xylomethazolin	U	P
Width (mm)	17.70±1.30	19.09±1.07	146.0	>0.05
Lenght (mm)	27.35±1.21	26.27±1.14	121.5	>0.05
Area (cm ²)	2.37±0.28	2.55±0.18	136.5	>0.05
Elimination T _{1/2} (min)	19.38±4.54	13.33±2.36	129.5	>0.05
Mucociliary Transport				
Rates (mm/min)	5.65±0.69	5.80±0.63	121.0	>0.05

Tablo-4:Post application mean values in the group with and Indanazolin groups applicated

PARAMETER	Indanazolin	Xylomethazolin	U	P
Width (mm)	12.99±0.87	13.26±1.05	119.5	>0.05
Lenght (mm)	22.35±1.14	21.73±1.11	128.0	>0.05
Area (cm ²)	1.65±0.16	1.57±0.16	125.0	>0.05
Elimination T _{1/2} (min)	15.85±2.46	16.80±3.58	11.5	>0.05
Mucociliary Transport				
Rates (mm/min)	5.43±0.63	5.16±0.84	129.0	>0.05

congestion were performed according to Cole et al., on inferior conchae due to major contribution on congestion⁽⁸⁾. All examinations were performed at the same time of the day under same conditions in order to eliminate the impact of nasal cyclus, in both groups we found statistically significant decreases in the values of the length, width and area of inferior conchae (Table I-II).

One of the important functions of nose is the mucociliary activity, in which ciliary respiratory epithelium and mucous layer are the components of great importance. To-

pical application of the drugs may be hazardous to mucociliary system either affecting mucous layer or underlying ciliary epithelium⁽⁹⁾. Post-treatment mean transport rates in the scintigraphic examinations were.

5043±0.63mm/min. in indanazoline group and 5016±0.63mm/min. in xylomethazoline group, leading to the observation that in both groups there were no marked changes in the post-treatment mucociliary transport rates (Table I). According to these findings we concluded that the treatments with both indanazoline and xylomethazoline for short periods do not affect the muco-

ciliary function. In addition, Petruson and Hanson, reported that xylomethazoline treatment for 6 weeks did not effect the mucociliary transport and also in electron microscopic examination after 6 weeks they didn't observe any structural or functional damage⁽⁹⁾. Nasal cyclus plays an important role on nasal functions. Littlejohn et al. Noted that mucociliary function could be influenced by nasal cyclus and reported the clearance of congestion phase was more rapid⁽¹⁰⁾. In his study Passali suggested that a diurnal activity exist in mucociliary functions⁽¹¹⁾. Regarding these, in order to eliminate the effects of nasal cyclus, our study was performed at the same time of the day under the same conditions.

According to the results of the present study, we concluded that indanazoline and xylomethazoline have comparable and adequate effects in subjects with normal nasal mucosa, whereas they don't affect mucociliary function. Regarding their effects on these functions there were no significant difference between two drugs.

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