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Active anterior rhinomanometric (AAR) evaluation of nasal airway resistance in normal Iranian sample

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Abstract:

Background: The most important and complex phenomenon of respiratory function of the nose is related to different nasal anatomy. The differences in facial anatomic structure between different races may also be reflected in nasal resistance and airflow. Caucasians has different facial anatomic structure which is the reflection of intranasal resistance or consequence of airflow. The active anterior rhinomanometric (AAR) is recommended for objective assessment of nasal airway resistance (NAR) in inspiration and expiration which can be calculated via nasal airflow.

Methods: This study designed to evaluate the resistance of the nasal airway in Iranian samples and comparing with the standard methods. An epidemiologic case series cross sectional study was designed for 100 Iranian adult volunteer without nasal breathing problems and with AAR inclusion criteria. All subjects had to undergo a primary assessment of relevant symptoms of nasal disease and nasal examination before undergoing AAR assessment.

Results: The mean values of total nasal airway resistance sere 0/38±0/17 pa/cm^2/s in inspiration and 0/41±0/27 pa/cm^2/s in expiration at 150 pas pressure point. Unilateral nasal resistance in right and left in inspiration were respectively 0.88±0.69pa/cm^2/s and 0.90±0.57at 150 pa/cm^2/s pas pressure point. Also unilateral nasal resistance in right and left in expiration were respectively 0.95±0.72 pa/cm^2/s and 0.95±0.57 pa/cm^2/s at 150 pas pressure point.

Conclusion: The study concluded that nasal airway resistance had the same range as the standard in different races and also no correlation exist between nasal resistance and sex, age, height, weight and smoking. Our suggestion is more epidemiologic studies if there are any queries in Iranians' airway resistance in larger sample size and wider areas.

Keywords: Nasal airway resistance (NAR), rhinomanometry, race.

Introduction

The most important function of the nose is respiration a complex phenomenon related to different nasal cavity in various races [1-3]. This complex phenomenon can cause different description of nasal opening sensation [3]. Evaluation of abnormal nasal resistance needs to assess nasal air flow and resistance in different races objectively which can be achieved by Active anterior rhinomanometry (AAR) [3,4]. This method also can assess the effect of medical and surgical treatment objectively before and after therapeutic modalities, and the effects of different subjective thresholds can be omitted so that

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normal nasal airway resistance in different races needs to be determined. This is the first study of NAR mean in normal Iranian population. The aim of this study was to evaluate the NAR mean in normal Iranian sample and its relation to factors such as sex, age, height, weight and smoking.

Methods

One-hundred adult volunteers with more than eighteen years old ages with no history of atopia, systemic disease, without significant nasal anomaly in physical examination and drug consumption in preceding 2 weeks enrolled in study, with cross-sectional method to evaluate the nasal resistance by active anterior rhinomanometry. Their NAR measured before and after decongestant agent in different pressures (75,150,300 Pascal) in right and left nasal cavity in inspiration and expiration by GMI-NR6 rhinomanometer attached to two outflow airways and one outflow pressure sensor with one anterior mask for receiving data for processing with soft ware that has instructed by GMI Company. Their information such as age, sex, height, weight and smoking and pressure in right and left nasal cavity were evaluated with SPSS 12 software statistically analyzed.

Results

Of 100 adult individual 54 (54%) were male and 46 (46%) female with mean age 38/1 ±16/3 yr. 10% were smoker, with mean weight of 68/9±12/8 kg and mean height 164/4 ± 9/8 cm. The mean NAR in 150 Pascal in inspiration before decongestion in right side was 0/88 ± 0/69 and left side 0/9±0/57 pas/ cm^2/sec. The mean NAR in 150 Pascal in expiration before decongestion in right side was 0/95±0/72 and left side 0/95±0/57 pas/ cm^2/sec. The mean total *NAR in* 150 Pascal in inspiration before decongestion was 0/38 ± 0/17 and expiration 0/41±0/27 pas/cm^2/sec. The mean NAR in broms point in inspiration before decongestion in right and left side 35/6±16/4 and 36/6 ± 14/7 and in expiration in right and left side 37/2±17/2 and 38/6±15/2 pas/ cm^2/sec. The mean NAR in right side in 75 Pa was 0/69±0/53 and left side 0/74±0/46 pas/ cm^2/sec. In 300 Pa mean NAR raised to 1.06±1.05 in right side and 1.06±0.85 pas/ cm^2/sec in left side. NAR was significantly decreased after decongestion in all pressure and in left with total (NAR) (P-value<0/001)

Discussion

In this study total NAR in 150 pas was 0/38±0/17. In similar study by Cole and others in 800 normal adults in 150 pas, mean total NAR was 0/33 pas /cm^2/sec [5].

In the other study in UK, in 103 adult with 150 pas resistance was 0/65 and with 75 pas resistance 0/24 pas [6]. That shows greater NAR in English population relative to Iranian population. Also total resistance was reported from 0/27 to 0/43 pas. The differences between mean resistances studied in various countries could be due to differences in race and especially in facial anatomy. Similar to previous study, in this study the mean total NAR and resistance in right and left side were greater in expiration than inspiration [8-10]. Thus attention to respiratory phase is critical. The cause of difference in resistance between inspiration and expiration is the effect of nasal turbinates in diminishing resistance that is differs in inspiration and expiration [11]. In this study, similar to some of previous study, and the NAR showed no significant differences between males and females [5,6] but in studies with greater population the NAR was greater in females than males [9]. This study and other studies [6,12,13] showed no correlation between NAR and age and weight. In another study on 192 pediatric NAR increased with increasing age [14]. There was no correlation between smoking and the NAR, and nevertheless some of previous studies reported increase of resistance due to smoking [9]. However small percent of smoker adults in our study might be caused by negative correlation with resistance [6].

Conclusion

In this study like others all calculated resistances in inspiration and expiration, of right and left side were measured after use of decongestant and all of them significantly decreased. Finally the limits of this study can be operative bias and limitation population under study. Eventually, the objective of NAR tests is important in evaluation of intranasal diseases and deformities and also in medical and surgical treatments. For measurement of NAR mean, determination of resistance in any race and population is necessary, and this evaluation need to be done on greater population and extensive ranges.

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