Research Article

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# COMPARISON OF OLFACTORY SENSITIVITY FOR BLACK PEPPER, LEMON, CAMPHOR AND JASMINE IN HEALTHY FEMALES OF KERALA, INDIA

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**ABSTRACT**

Nose is one among panchaganendriya, which is essential for olfaction and respiration but also provides a route for drug administration. Although extensive literature is existing on research and sensory system, but research and olfactory system is very minimum. Hence the present study was undertaken to compare olfactory sensitivity for black pepper *(Piper nigrum),* lemon *(Citrus limon),* camphor *(Cinnamomum camphora)* and jasmine *(Jasminum)* in healthy females of Kerala. A total of 170 apparently healthy, willing females (18-24 years) were included in the study. Blast injection method as used to measure olfactory sensitivity. We have observed that significant difference in the olfactory sensitivity to pepper, lemon, camphor and jasmine odors. Data was presented as mean ± SD. *P<0.05 is significant, **P<0.01 is significant, ***P<0.001 was significant. Participants have more olfactory sensitivity to jasmine and least olfactory sensitivity to lemon.

**Keywords:** Olfactory sensitivity, Females, odors

## INTRODUCTION

Nose is one among panchaganendriya, which is essential for olfaction and respiration but also provides a route for drug administration[1]. The olfactory system, which senses odors, is vital to our lives, and comprises one of the most primal parts of the brain. The olfactory epithelium was supplied by branches of trigeminal nerve[2]. Olfactory sensitivity may be defined as a particular sensation elicited by the action of chemical substances on the olfactory system[3]. Activation of areas from frontal and temporal lobes linked to the association areas is essential for discrimination and comparison between odors[4]. It was reported that human attitude varies towards olfaction. Interestingly, the sense of smell appears to be more important to females than males[5,6]. Olfactory sense is essential for selection of food, for protection, selection of mate, to detect emotions[7,8]. As olfactory system is closely related to the limbic system, it may have positive or negative effects on the emotions and memory[9]. Although extensive literature is existing on research and sensory system, but research and olfactory system is very minimum. Hence the present study was undertaken to compare the olfactory sensitivity for pepper, lemon, camphor and jasmine in healthy females.

## MATERIALS AND METHODS

### Ethical consideration

The study protocol was approved by Institutional Ethics Committee (EC/1/2015). The study was performed in accordance with the "Ethical Guidelines for Biomedical Research on Human Participants, 2006" by the Indian Council of Medical Research and the Declaration of Helsinki, 2008.

### Participants

A total of 170 apparently healthy, willing females (18-24 years) were included in the study after obtaining, written informed consent. Unwilling participants, participants with any nasal/ olfactory disorders and any other complications were excluded from the study.

### Blast injection method

Blast injection method[10] as used to measure olfactory sensitivity. The olfactometer, manufactured by Anand agencies, Pune was used in the study. The apparatus has a tightly stopper bottle, equipped with an inlet and outlet tube. With both tubes closed, using a pinch clamp, the air in the bottles becomes saturated with vapor from the odorous liquid in the bottom of the bottle, which is introduced by the examiner. The pressure in the bottle is raised by introduction of a specific volume of air by the use of hypodermic syringe (Glycerine syringe), manufactured by Satguru plastic industries, connected to the inlet tube. When the outlet tube is opened, passing a small get of odor-laden air into the nostrils, through the nose piece attached to the outlet. The threshold is designated MIO or minimum identifiable odor and is expressed in terms of amount of odorous vapor released into the nostrils.

### Presenting the odors

7 grams of pepper mixed with 30 ml of water was used in the study to present pepper odor. 30 ml of fresh lemon juice without water was used to present lemon odor. 4 drops of camphor oil was mixed with water was used to present camphor odor. 6 numbers of fresh jasmine flowers was used to present jasmine odor.

**Measuring the olfactory sensitivity**

The hypodermic syringe was marked with centimeter scale from 0 to 12 from down to upwards. We have presented different amounts of odors by changing the pressure in the syringe and minimum pressure required to identify the odor was recorded as measured height by the markings on the syringe.

According to the Boyle's law,

$P_1V_1=P_2V_2$

$P_1$ =1 atm = 011325 pascal

$P_2= P_1V_1/ V_2$

$P_2= P_1h_1/h_2$

$h_1$= total height=12 cm

h2= measured height

If the measured height is 1 cms, the amount of pressure presented will be 12 atm, which is considered as olfactory sensitivity.

**Data analysis**

Data was presented as mean ± SD. Data was analyzed by SPSS 20.0 using One-way analysis of variance followed by Tukey's Multiple Comparison Test. P value <0.05 was considered as significant.

**RESULTS**

Figure 1 presents olfactory sensitivity of the participants for pepper, lemon, camphor and jasmine. Participants have more olfactory sensitivity to jasmine and least olfactory sensitivity to lemon. There is significant difference in the olfactory sensitivity to pepper, lemon, camphor and jasmine odors.

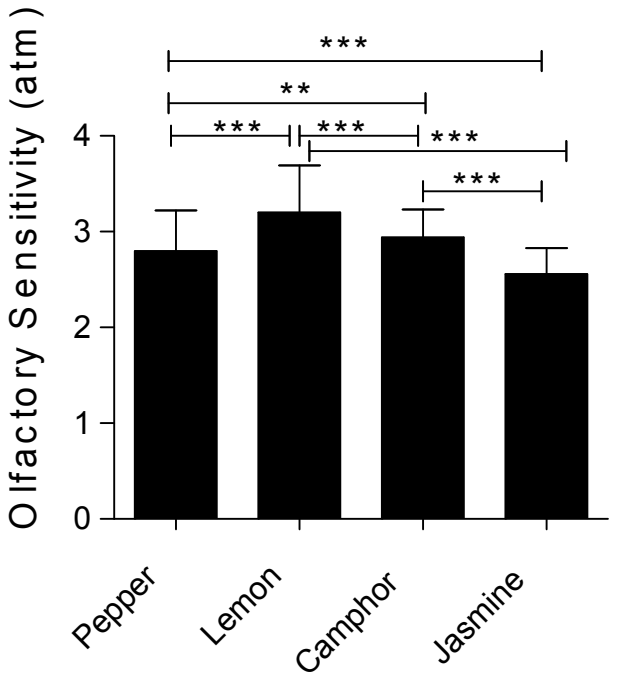


**Figure 1: Olfactory sensitivity of the participants for pepper, lemon, camphor and jasmine**

Data was presented as mean ± SD. *P<0.05 is significant, **P<0.01 is significant, ***P<0.001 was significant.

**DISCUSSION**

Normal functioning of olfactory system is essential for selection of the food and in fact it is the sensation through which we interact with the environment[4]. Though, humans have very less number of genes for olfaction compared with animals, humans can identify many odors even in small quantities[11]. Olfactory sensations requires interaction of many brain areas including the olfactory cortex and the olfactory tubercle, some parts of cerebral tonsils, certain hypothalamic areas, medio–dorsal thalamus and medial and lateral orbito–frontal cortex[12]. So smell is linked closely with taste, appetite and emotions. Increase in the odor detection was reported to increase food intake[13]. It was reported that use of the type of smell in the research should be selected carefully as some odors not only stimulates olfactory system but also stimulates somatosensory system that is the nerve endings in our nose[14]. It was reported that exposure to pleasant fragrances tend give higher 'attractiveness ratings'[14]. Our study agrees with this statement as we have observed higher sensitivity to fragrance odor that is jasmine.

**Limitations**

We have measured olfactory sensitivity manually. We have not assessed cyclical variation of olfactory sensitivity.

**CONCLUSION**

From our results, we conclude that Participants have more olfactory sensitivity to jasmine and least olfactory sensitivity to lemon. We recommend further detailed studies to understand olfactory sensitivity and its role health and disease.

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