Women have better olfactory perception for wine aromas

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Abstract. The objective of this work was to verify the influence of the gender on the olfactory perception of aromas found in the wines, as well as to identify the aromatic groups most perceived by men and women. Twenty different aromas of different aromatic classes described in the wines were used: fruity, spices, wood, herbaceous, floral, buttery, defects. The different aromatic groups were packed in Erlenmeyer glasses wrapped with aluminum paper in order to avoid the visualization of the aromas by the participants. Fifty people, 25 men and 25 women, aged between 21 and 65 years, were ramdomly separated in groups of 10 people to participate of the evaluation. The influence of the gender on the ability to identify aromas was verified. Women matched 56.8% of the aromas, while men matched 44.6%. In relation to the aromatic class, a greater index of the feminine gender in all the aromatic classes was verified, being spices the group of aromas that women most perceived, with 80.6% of hits, followed by the floral aromas with 50% accuracy. For men, the aromatic class with the highest index of accuracy was also the spices, however, with a success rate of 58.4%, followed by the herbaceous group with 38.2% of correct answers. Both females and males obtained high scores for the group of wine defects (acetic acid and ethyl acetate), 85.2% and 81.0%, respectively, overcoming the other aromatic classes. Buttery aromas were the ones least recognized by women, with 30.8% of hits, whereas the least perceived aroma for men were the floral ones, with no hits observed in any group of participants. The results found in this study show that there are differences in olfactory perception between men and women, and this factor, in addition to the wine service temperature, wine glass type, olfactory memory, must also be considered in sensory analysis. Female gender has a greater ability to identify aromas in relation to the male gender, since women have a greater number of cells in the olfactory bulb, which is the brain region responsible for smell detection.

1. Introduction

Sensory analysis can be defined as a scientific discipline used to evoke, measure, analyze and interpret reactions of aliment and material characteristics in the way they are perceived by the olfactory, gustatory, tactile, auditory and visual sensory systems that evaluate the attributes of aliments [1]. A sensory quality can be determined by the interaction between man and aliment and implicate in cultural, ethnic and sociological aspects [2]. This quality is associated to the stimuli from aliment and the physiological and social conditions of the individuals that are evaluating the product in an environmental context in which the product and the individual are located [3].

In the sensorial analysis, the olfactory examination is one of the main stages in the wine tasting, because through it we can detect aromas that allow to determine with precision many characteristics about the wine that is being tasted, for example: the variety, the producing region, the age of wine or its defects. However, several factors can affect wine's olfactory sensations, such as the serving temperature, wine glass type, and taster's olfactory memory.

Olfactory sense allows to identify the odor and the aroma of the product, that are perceived by the olfactory organ when volatile substances are aspirated [4].

Studies have pointed out that women have a keener olfactory sense than men, and this fact is correlated with the presence of estrogen. In the gestation and menstrual period women present hyperosmia, that is a moderate accentuation of olfactory sensitivity [5].

It is known that there are differences in olfactory perception between male and female genders, however, few researches have correlated the aromas found in wines according to gender. In this context, the aim of this study was to verify the influence of the gender on the olfactory perception of aromas found in wines, as well as to identify the aromatic groups most perceived by men and women.

2. Materials and methods

The test was performed with twenty different aromas from different aromatic groups described in wines as: fruity, spices, herbaceous, floral, yeast/buttery and defective aromas.

The different aromatic groups were prepared 30 minutes before starting the olfactory evaluation and were placed in Erlenmeyer glasses wrapped with aluminum foil to the evaluators do not visualized the product that brought the aroma.

Fifty people were selected to the evaluation: 25 men and 25 women, aged between 21 and 65 years, separated into groups of 10 people. The evaluation occurred individually, in a specially room prepared for the olfactory examination, free of odors and other external interferences

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Table 1. Influence of the gender on the olfactory perception of different aromas from wines and sparkling wines.

Gender	Hits (%)	Erros (%)
Female and Male	50.1	49.9
Female	56.8	43.2
Male	44.6	55.4

Table 2. Percentage of hits and errors of male and female genders submitted to olfactory perception of different aromatic groups found in wines.

Grupo de Aromas	Female and Male	
	% Hits	% Erros
Fruity	40.1	59.9
Spices	67.4	32.6
Herbaceous	42.0	58.0
Floral	25.0	75.0
Defective	82.6	17.4
Yeast/Buttery	23.9	76.1

that could influence the aroma evaluation. The tasters were instructed to smell the samples in a time of twenty seconds for each sample. As soon as they smelled, they described the odors perceived in a datasheet besides a code from each sample.

After the evaluation the data were computed and a descriptive analysis was processed with the hits obtained by men and women in relation to the aromas and the aromatic groups.

3. Results and discussion

It was observed the influence of the gender in the perception of aromas found in wines and sparkling wines. According to Table 1, it was verified that the female gender presented a mean of 56.8% of correct answers, whereas for the male gender the average of hits was only 44.6%. Evaluating both genders together was observed an average of 50.1% of hits from the aromas evaluated.

It was possible to observe the effect of genders also in the olfactory perception of the different aromatic groups (fruity, spices, herbaceous, floral, yeast/buttery and defective aromas).

Analyzing both male and female genders, it was verified that the aromas related to the defect of the wines (acetic acid and ethyl acetate) were the most noticeable, with 82.6% of hits, followed by the aromatic group of spices and herbaceous, with 67.4% and 42% of hits, respectively. The buttery aromas, that come from the yeasts, were the least identified by the tasters (Table 2).

However, according to Tables 3 and 4, it was verified that for the female gender is easier to identify the fruity, spicy, herbaceous, floral, defective and buttery aromatic groups in relation to male gender. The aromatic groups of defective and spices were the ones that obtained the highest percentages of correct answers in female gender, with 85.2%% and 80.6% of hits, respectively. The buttery aromas were the least identified by the female gender, with only 19.5% of correct answers. According to Minim [3], the sensory quality of a product can vary from person to person and can be influenced by specific factors of the aliment, such as appearance, taste, texture, form, method of preparation, cost and seasonality. In addition to these

Table 3. Percentage of correct answers and errors for the female gender submitted to olfactory perception of different aromatic groups from wines.

Aromatic Group	Female	
	% Hits	% Errors
Fruity	46.1	53.9
Spices	80.6	19.4
Herbaceous	48.5	51.5
Floral	50.0	50.0
Defective	85.2	14.8
Yeast/Buttery	30.8	69.2

Table 4. Percentage of correct answers and errors for the male gender submitted to olfactory perception of different aromatic groups from wines.

Aromatic Group	Male	
	% Hits	% Errors
Fruity	35.9	64.1
Spices	58.4	41.6
Herbaceous	38.2	61.8
Floral	0.0	100.0
Defective	81.0	19.0
Yeast/Buttery	19.5	80.5

aspects, there are still influences related to specific factors of the taster, such as age, sex, educational level, culture, physiological state and financial condition.

Analyzing only the male gender (Table 4), it was verified that the aromatic group of spices was the most identified, with 58.4% of hits, but it is 22.2% less of correct answers than did the female gender for the same aromatic group. For the male gender, the floral aromatic group was not identified by any participant.

Analyzing the aromatic groups evaluated in this work, it was verified that the aromas related to the defects of the wines are the most noticeable, followed by the aromatic group of spices and herbaceous. These data are in agreement with those found in a study carried out by Nascimento et al. (2014), who verified that the aromas of acetic acid, clove and cinnamon had the highest success rates of hits. This result can be justified by the wide use of these spices in Brazilian cuisine, as well as the intense aromas that come from them [6].

The olfactory is a primordial sense of enormous significance to human beings and animals. It is known that a subtle alteration in the structure of chemical odors can drastically alters the perceived smell. Olfactory sensory neurons are responsible to detect odors and express different receptors, causing different signals in the brain and, thus, make possible the perceptions of different specific odors [7].

Female gender has a greater ability to identify aromas in relation to the male gender, since women have a higher number of cells in the olfactory bulb, which is the brain region responsible for smell detection. These cells, when they smell, attach to the olfactory bulb neurons, which in turn trigger memory-related brain cells and conscious interpretation.

4. Conclusion

The results found in this study show that there are differences in olfactory perception between men and women, and this factor, in addition to the wine service temperature, wine glass type, olfactory memory, must also be considered in sensory analysis. The most perceptive aromatic group was defective aromas and spices and the more difficult to olfactory sense was yeast/buttery aromas, for the both genders. Female gender has a greater ability to identify aromas in relation to the male gender, especially defective, spices and floral aromatic groups.

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