RESEARCH ARTICLE

RESULTS OF OLFACTORY TESTS ON 109 ELDERLY WOMEN COMPARISON OF ODOUR STICK AND OPEN ESSENCE

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ABSTRACT

There are two methods for testing 12 types of odours closely related to the lives of Japanese people (ink, wood, perfume, menthol, mandarin oranges, curry, household gas, roses, cypress, sweaty socks, condensed milk, fried garlic).There are few research reports comparing the two types of odour tests, odor stick and open essence, on the same subjects. Therefore, this study aimed to clarify whether there are differences between the two types of odour tests, odour stick and open essence, by conducting the same subjects. The purpose of this study was to clarify the difficult-to-understand odours and easy-to-understand odors in the two types of odour tests by comparing the results of the two types of odour tests on the same elderly female subjects. Olfaction tests were conducted on 109 elderly females using odour sticks and open essences. After smelling the odours, participants selected one of the options (four types of odours and six types of odorless odours that could be smelled but were undetectable). They selected one and wrote it down on the answer sheet. Participants were 109 elderly women, with a mean age ± standard deviation (median: minimum-maximum) of 71.3 ± 5.8 years (71 years: 60 years-92 years).The number of correct answers to the odours was classified as being easily detectable for 6 or more of the 12 types, and being difficult to detect for less than 6 types. As a result, 84 people were able to easily detect odours using the odour stick, and 82 people were able to easily detect odours using the open essence, and the results of the chi-square test showed no significant difference ($P = 0.751$). However, when comparing each smell, the results of the chi-square test showed that the open essence was statistically significantly more difficult to distinguish than the odour stick for mandarin oranges (0.0001**) and fried garlic (P-0.0001**). The correct answer rate (number of smells correctly answered out of 12) for the two smells was not statistically significant. However, since there were smells that were easy to distinguish with the smelly stick but difficult to distinguish with the open essence (mandarin oranges and fried garlic), it may be necessary to evaluate by smell in the future. We think it is necessary to increase the number of people in the future and continue to investigate whether there are smells that are easy to distinguish and difficult to distinguish with the open essence and odour stick.

INTRODUCTION

In the Sniff test, the smells checked vary depending on the country. This is because differences in lifestyle can affect the smells you are exposed to throughout your life. In Japan, a sniff test is used to test 12 different smells (ink, wood, perfume, menthol, mandarin oranges, curry, household gas, roses, cypress, sweaty socks, condensed milk, fried garlic). There are two types of sniff test: open essence and odour stick. Open Essence is a laminated card-type product manufactured by Fujifilm, with a system where the answer options for the odour are revealed when you open the cared.

On the other hand, the odour sticks are manufactured by Daiichi Pharmaceutical Industry Co., Ltd., and participants are asked to open a smell-soaked filter paper in front of their nose while looking at the answer options. Although the tests use the same 12 odorants, there have been few studies examining whether the data obtained from each test kit is consistent for the same subjects. Therefore, the purpose of this study was to compare the results of two types of odour tests in the same subjects.

MATERIALS AND METHODS

The participants in this study were 109 elderly women aged between 60 and 92 years (mean age ±standard deviation: 71.3 ± 5.8) who had attended a health class.

This study was reviewed and approved by the Ethics Committee of Nagoya Women's University. This experiment was conducted only with participants who had received an explanation of the study and signed and stamped the subject consent form. First, participants tested 12 different smells using the Open Essence smell test kit and wrote down the results in the answer column. After a ten minute break, participants tested 12 different smells using the Smell Stick smell test kit and wrote down the results in the answer column. To compare the results of the two types of odour tests, the number of correct and incorrect answers for each of the 12 odours was statistically compared using the chi-square test.

RESULTS

The 109 elderly women aged between 60 and 92 years (mean age ±standard deviation: 71.3 ± 5.8)(See Table1).

Table 1. Age distribution of 109 elderly women

	60s	70s	80s	90s
Femail	41	62	5	1

All 109 elderly women who participated took two types of odor tests and wrote their results in the answer column (See Table 2).

Table 2. Number of people by number of correct answers (Elderly women) (n=109)

Number of Corredt Answer	0 point	1 point	2 points	3 points	4 points	5 points	6 points
Open Essence	1	1	1	4	8	12	12
Odour Stick	2	1	0	3	9	10	5

Number of Corredt Answer	7 points	8 points	9 points	10 points	11 points	12 points
Open Essence	24	16	13	9	3	5
Odour Stick	16	13	23	11	7	9

The results of the chi-square test for the number of correct answers and incorrect answers in the two types of odor tests are shown in Table 3. There was no statistically significant difference between the results of the two odour tests (P=0.751).

The results of the chi-square test comparing the results of the 12 different types of odour test are shown in Tables 4 to 15.

Table 3. Comparison of the results of two types of odour tests (n=109)

The maximum score is 12 points	Less than Six correct answers	Six or more correct answers
Open Essence	27	82
Odour Stick	25	84

Table 4. χ2 Test　Comparison of the results of two types of odour tests (India Ink) Elderly women (P=0.074　)

India ink (n=109)	Correct answer	Incorrect answer	Total
Odour Stick	57	52	109
Open Essence	70	39	109
Total	127	91	218

Table 5. χ2 Test　Comparison of the results of two types of odour tests (Timber) Elderly women (P=0.498　)

Timber	Correct answer	Incorrect answer	Total
Odour Stick	54	55	109
Open Essence	59	50	109
Total	113	105	218

Table 6. χ2 Test　Comparison of the results of two types of odour tests (Perfume) Elderly women (P=0.404)

Perfume	Correct answer	Incorrect answer	Total
Odour Stick	70	39	109
Open Essence	64	45	109
Total	134	94	218

Table 7. χ2 Test　Comparison of the results of two types of odour tests (Menthol) Elderly women (P=0.225)

Mentho	Correct answer	Incorrect answer	Total
Odour Stick	83	26	109
Open Essence	75	34	109
Total	158	60	218

Table 8. χ2 Test　Comparison of the results of two types of odour tests (Mandarin Orange) Elderly women (P=0.0001**)

Mandarin Orange	Correct answer	Incorrect answer	Total
Odour Stick	53	56	109
Open Essence	23	86	109
Total	76	142	218

Table 9. χ2 Test　Comparison of the results of two types of odour tests (Curry) Elderly women (P=0.043*)

Curry	Correct answer	Incorrect answer	Total
Odour Stick	90	19	109
Open Essence	100	9	109
Total	190	28	218

Table 10. χ2 Test　Comparison of the results of two types of odour tests (Household Gas) Elderly women (P=0.246)

Household Gas	Correct answer	Incorrect answer	Total
Odour Stick	78	31	109
Open Essence	70	39	109
Total	148	70	218

Table 11. χ2 Test　Comparison of the results of two types of odour tests (Rose) Elderly women (P=0.343)

Rose	Correct answer	Incorrect answer	Total
Odour Stick	53	56	109
Open Essence	60	49	109
Total	113	105	218

Table 12. χ2 Test　Comparison of the results of two types of odour tests (Cypress) Elderly women (P=0.077)

Cypress	Correct answer	Incorrect answer	Total
Odour Stick	70	39	109
Open Essence	82	27	109
Total	152	66	218

Table 13. χ2 Test　Comparison of the results of two types of odour tests (Stinky Socs / Sweaty) Elderly women (P=0.060)

Stinky Socs / Sweaty	Correct answer	Incorrect answer	Total
Odour Stick	80	29	109
Open Essence	67	42	109
Total	147	71	218

Table 16. Comparison of the results of two types of odour tests (χ2 Test Results)

Elderly women (n=109)	χ2 Test Results
India Ink	P=0.074
Timber	P=0.498
Perfume	P=0.404
Mentho	P=0.225
Mandarin Orange	P=0.0001**
Curry	P=0.043*
Household Gas	P=0.246
Rose	P=0.343
Cypress	P=0.077
Stinky Socs / Sweaty	P=0.060
Condensed Milk	P=0.300
Fried Garlic	P=0.0001**

*=P<0.05, **=P<0.01

Tavble 14. χ2 Test Comparison of the results of two types of odour tests
(Condensed Milk) Elderly women者 (P=0.300)

Condensed Milk	Correct answer	Incorrect answer	Total
Odour Stick	80	29	109
Open Essence	73	36	109
Total	153	65	218

Table 15. χ2 Test Comparison of the results of two types of odour tests（Fried Garlic）Elderly women（P=0.0001**）

Fried Garlic	Correct answer	Incorrect answer	Total
Odour Stick	76	33	109
Open Essence	32	77	109
Total	108	110	218

Moreover, only the chi-square test results for the 12 different types of odours are shown in Table 16. Of the 12 different odours, there was a statistically significant difference between the results of the open essence and the odour stick for the odours of mandarin orange (P-0.0001**) and fried garlic (P=0.0001**). In both cases, the open essence was shown to have a harder smell to discern that the odour stick.

DISCUSSION

In previous studies, females performed well on olfactory tests than males[1-10], with a statistically significant decline in olfactory perception with increasing age[1-12,]. In other hand, we have also reported that taste test results are maintained regardless of age, not only females but also males[1-14]. In recent years, there have been reports of cases showing abnormalities in the sense of taste and smell due to the COVIS-19 epidemic[15-25]. However, there are also results that indicate that COVID-19 had no impact in regional cities[26-27]. Furthermore, investigations into the relationship between olfactory test results and lifestyle habits have revealed a link with otolaryngological conditions (such as dizziness and tinnitus)[28-31]. In this study of elderly women, there was no statistically significant difference in the number of correct answers in the two types of odour tests. However, when comparing 12 different odours, the results showed that for the odours of mandarin orange and flied garlic, the open essence was statistically significantly less detectable than the odour stick.

Therefore, it became clear that combining the results of two types of odor tests poses the risk of showing incorrect results depending on the type of odour. Furthermore, even when comparing odor test results by age group, it is highly likely that comparisons will not be possible unless the test method is the same. In the future, we would like to increase the number of participants and clarify the differences between the two types of test kits for 12 different odours.

CONCLUSION

The results of two types of olfactory tests using the same twelve types of odors were compared for the same subjects (109 Females over 40 years old). As a result, there was no statistically significant difference in the number of correct answers. However, when the results of the two types of olfactory tests using each individual odor were compared, a statistically significant difference was found for the odour of mandarin oranges and the odor of roasted garlic. When comparing test results by age group or subject, the test methods must be standardized even if the same 12 types of odour are used.

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