

Results of the Olfactory Cognition Test Performed on 117 Peoples

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Abstract

Recently, many types of research have reported odors. There are several types of tests used for testing, but in Japan, there are odor sticks, open essences, TT olfactometry, etc. This time, we report that we conducted an olfactory cognitive test using open essence on healthy 117 peoples (35 males and 83 females). The Open Essence (made by FUJIFILM) has the smell as same as the odor Stick Identification Test (OSIT-J). The aromas used in the open essence includes curry, perfume, Japanese cypress, India ink, menthol, rose, wood, stinkysocks/sweat, roasted garlic, condensed milk, gas for cooking and Japanese mandarin aromas. This 12 different kinds of perception is not necessarily culture-free; the Japanese version employed. Depending on the type of odor, that were difficult to understand and some that were easy to understand. The most well-recognized odor was the smell of Curry, and the most hard to understand odor was mandarin orange. In males, the highest cognitive odor was Curry, and the lowest odor was Stir-fried garlic. In females, the highest cognitive odor was Curry, and the lowest odor was mandarin orange. In the future, it will be necessary to perform olfactory cognitive ability by age, using open essence.

Index terms— olfaction test, open essence, cognition, gender.

1 Introduction

There are various types of olfactory recognition tests, but as a simple test, odor sticks or open essences are currently used in Japan. Olfactory disorders are classified into 1. Respiratory, 2. Peripheral, 3. Central. There are, of course, cases of age-related decline in olfactory ability. However, in recent years, it has been reported that an olfactory disorder appears as an initial symptom of Alzheimer's dementia. It is a central olfactory disorder in which the brain that processes odor information is damaged. Also, the olfactory disorder is also presenting as an initial symptom in the current problem of COVID-19 infection. It is a peripheral olfactory disorder, and olfactory mucosal olfactory disorder in which the olfactory mucosa degenerates is suspected. Olfactory cognitive ability is closely related to the quality of life.

Therefore, this study focused on the perception of smell and aimed to understand the actual situation of 12 different kinds of odors closely related to Japanese life in each age and gender. To begin with, we report on the olfactory perception of 35 males and 83 females.

2 II.

3 Materials and Methods

4 a) Participants

The participants were 35 males and 83 females (n=117) who voluntarily participated in olfactory tests. Males were 35 peoples and females were 83 peoples. Age $\pm$ standard deviation was 29.29 ± 16.96 years old males and

41 41.89±24.66 years old female. The maximum was 82years old, and the minimum was 12 years old male. The
42 maximum was 87 years old, and the minimum was 16 years old female. They were healthy, not going to the
43 hospital and taking no medication. They were self-reported and had no colds and no fever. (Table 1).

44 5 b) Assessment of odour identification

45 The Odor Stick Identification Test (OSIT-J) was used to assess odor perception for many years for our study.
46 This test possesses high reliability and validity 1).

47 The basic procedure resembles that of the San Diego Odor Identification Test 2). The aromas used in the OSIT-
48 J include curry, perfume, Japanese cypress, India ink, menthol, rose, wood, stinky socks/sweat, roasted garlic,
49 condensed milk, gas for cooking; and Japanese mandarin aromas 3,4). This 12 different odorants perception is not
50 necessarily culture-free, the Japanese version was employed 3,4). Each fragrance was enclosed in microcapsules
51 made of melamine resin 3,4 In this study, we use The Open Essence (made by FUJIFILM) has the smell as same
52 as the odor Stick Identification Test (OSIT-J). The open essence is a card type, and the scent had already applied
53 to the card. When participants open the card, it has the same scent as OSIT-J. Each correct answer was scored
54 as one point with the total performance score ranging from 0 to 12 points 5,6). We defined it as follows: normal
55 range as more than six points, borderline as 3 to 5 points, and abnormal as less than 2 points 5,6). All of these
56 methods are the same as in the previously reported paper 5,6).

57 6 c) Ethical review board

58 This study conducted with the approval of the Ethical Review Board (Nagoya women's university Ethics
59 Committee: 'hitowomochiitakennkyuunikansuruininkai'). The approval number is 30-11.

60 7 III.

61 8 Results

62 9 a) Odour identification (number of correct answer)

63 Twelve different kinds of olfactory cognitive tests conducted on female students by using the Open Essence. The
64 results shown in Table 1. When there are six or more types of recognition among the 12 types of odors, it
65 considered as an acceptable range (we call it a normal range). This time, 23 out of 35 males could recognize
66 more than six kinds of odors, as same as 75 out of 83 females could recognize more than six kinds of odors. By
67 the way, one student had four types of perceptible odors. The average value of the olfactory recognition test
68 results of 35 males was 7.3 ± 2.3 and 83 females was 8.6 ± 2.2 (Table2. and Table 3.). Next, Tables4 and 5 show the
69 results of individually examining each of the 12 odors. Curry was the smell that both ales and females showed
70 the highest olfactory perception. The odor that males had the lowest olfactory perception was Stir-fried garlic.
71 But, the odor that female has the lowest olfactory perception was mandarin orange. It was the smell of Wood
72 and Cypress that both males and females had about the same olfactory cognition in both senses. However, the
73 olfactory perception of other odors was better in females than in males. Females had a 12.7% better olfactory
74 perception than males with India Ink. As well, females had a 20.4% better olfactory perception than males with
75 Perfume. Females had 18.6% better olfactory perception than males with Menthol. Females had a 16.9% better
76 olfactory perception than males with Household gas. Females had a 14.1% better olfactory perception than males
77 with Rose. Females had a 16.1% better olfactory perception than males with Stinky socks/ Sweaty. Females had
78 a 33.8% better olfactory perception than males with Condensed milk. There were four types of odors in males
79 and six types in females with olfactory recognition of 70% or more. Three of them (Curry, Household gas, Stinky
80 socks/ Sweaty) were the same for both males and females.

81 10 Discussion

82 The male and female olfactory cognitive test results examined. Comparing the results, there was no difference
83 between males and females, but there was a big difference when the odors examined individually. The smell of
84 Curry, Household gas, and Stinky socks/Sweaty had higher cognitive scores in both males and females. On the
85 other hand, Mandarin orange and Stir-fried garlic have lower cognitive scores in males and females. Regarding
86 other odors, females had better cognitive scores than males except for the smell of Cypress. When considering
87 the quality of life, it is necessary to be able to recognize the odor associated with the deliciousness of food (Curry,
88 Condensed milk, etc.). Since the Curry has a lot of recovery after eating, the smell can be recognized. However,
89 since there are few opportunities to eat condensed milk, the smell may be difficult to understand. Higher olfactory
90 cognition scores for Household gas and Stinky socks/ Sweaty in this study indicated that healthy people could
91 avoid dangers (gas explosions and food poisoning). However, since there was a difference in olfactory cognition
92 scores between males and females, it is necessary to collect more data in the future to investigate the difference
93 in sex.

94 V.

11 Conclusions

The participants were 35 males and 83 females (n=117) who voluntarily participated in olfactory tests. The average value of the olfactory recognition test results of 35 males was 7.3 ± 2.3 and 83 females was 8.6 ± 2.2 . Comparing the results, there was no difference between males and females, but there was a big difference when the odors examined individually. The smell of Curry, Household gas, and Stinky socks/Sweaty had higher cognitive scores in both males and females. On the other hand, Mandarin orange and Stir-fried garlic have lower cognitive scores in males and females. However, the olfactory perception of other odors was better in females than in males. From this result, it is necessary to examine not only the number of correct answers but also the recognition score of 12 kinds of odors individually. In the future, we would like to perform the same olfactory cognitive test on more participants and compare the differences by sex and age.

1

Figure 1: Table 1 :

	10's	20's	30's	40'a	50's	60's	70's	80's
Male(n=35)	7	17	6	2	0	1	0	2
Female (n=82)	8	34	3	6	6	7	11	7
Total (n=117)	15	51	9	8	6	8	11	9

Figure 2:

2

Figure 3: Table 2 :

3

[Note: b) Odour identification (percentage of each smell)]

Figure 4: Table 3 :

4

	0	1	2	3	4	5	6	7		8	9	10	11
Male(n=35)	0	0	0	0	6	4	2	7		3	8	1	3
Female (n=82)	1	0	0	2	2	3	8	2		13	16	22	12
Total (n=117)	1	0	0	2	8	7	10	9		16	24	23	15
Male (n = 35)								7.3±2.3					
Femela (n = 83)								8.6±2.2					
Total (m = 117)								8.2±2.3					

Figure 5: Table 4 :

Male (n=35)	14	21	19	23	11	35	27	17	26	26	16	10
Female (n=82)	52	55	62	70	23	79	78	52	58	75	66	32
Total (n=117)	66	76	81	93	34	114	105	69	84	101	82	42

Figure 6: Numver of recognition±Standard Deviation Indea Ink Wood Perfume Menthol Mandarin orange Curry Household gas Rose Cypress Stinky socks/Sweaty Condensed milk Stir-fried garlic

5

IV.

Figure 7: Table 5 :

Male (n=35) (%)	40.0	60.0	54.3	65.7	31.4	100.0	77.1	48.6	74.3	74.3	45.7	28.6
Female (n=82) (%)	62.7	66.3	74.7	84.3	27.7	95.2	94.0	62.7	69.9	90.4	79.5	38.5
Total (n=117) (%)	56.4	65.0	69.2	79.5	29.1	97.4	89.7	59.0	71.8	86.3	70.1	35.0

Figure 8: Indea Ink Wood Perfume Menthol Mandarin orange Curry Household gas Rose Cypress Stinky socks/Sweaty Condensed milk Stir-fried garlic

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