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Abstract: The present study examined the relationship between olfactory function for ten years. A personal function test was calculated from the Nagoya Women's University study database, and the odor stick identification test and open essence identification test were administered to healthy young and elderly people. The participants were community dwellers who voluntarily participated in the Nagoya Women's University Study and had managed everyday life by themselves. We combined data of 2018 and checked two kinds of the olfactometry result. These data were made from a consultation result list which was handed to a testee by hand. The test age was in his/her 80s from 40s and in his/her 20s from 10s. The data were compared according to the generation (young age is 20.1  $\pm$  0.7 years old and old age is 74.5  $\pm$  10.0 years old). We conducted two kinds of olfaction tests. The Odour Stick Identification Test (OSIT-J) was used to assess odour perception. This test possesses high reliability and validity. The OSIT-J includes 12 different odorants to be identified. The Odour Essence Identification Test was used to assess odour perception, too. It also includes 12 different odorants to be identified. We compared the answer of generation and compared the results of the two olfactory tests. As a result, there were no statistically significant differences in the total number of correct answers in young people and old people in the two olfactory test results. In addition, we compare young people and old people who increased the number of correct answer in the two kinds of olfactory examination, the same person, and those who decreased, but there was no statistically significant difference. However, there were statistically significant differences between India ink and perfume and Household (domestic) gas compared with young people and old people with two kinds of olfactory test results. From the results of this study, it was found that the results of two kinds of olfactory test can be used together as a research result for the result of correct answer rate number. However, it became clear that careful handing is necessary for individual smell.

Key words: Healthy elderly people, healthy young people, olfactory function, the odor stick test, the open essence test.

## **1. Introduction**

Japan is an ageing society. The proportion of elderly population in Japan will become the highest among the total population in the next ten years. There is a concern that with increasing age, individuals would soon be unable to identify through the sense of smell. Furthermore, nasal congestion and olfactory disorders occurring after inflammation that are caused by allergic rhinitis, modern day hay fever, and common colds also inhibit the sense of smell [1-3].

Both olfaction and gustation start to decline in humans around the age of 50-59 years, with 40% of the elderly

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experiencing a noticeable decline [4]. A person's first awareness declines in olfaction as our primary dependence for identification of flavour occurs when one is unable to distinguish foods by taste alone.

Olfaction also performs an important and essential role in our ability to detect dangers, including the smell of leaking gas, the burning odour of fire, and the putrid smell of rotten food. Olfaction is also enrichment and responsible for psychological stimulation in our everyday lives, such as with the scents and smells of foods and flowers [5]. In an already aged society, healthy olfaction is a necessary part of creating a safe and fertile living environment and for improving an individual's quality of life. Considering these circumstances, the age-related decline in olfactory and taste function in participants aged 40-49 years, 50-59 years, 60-69 years, 70-79 years, and 80-89 years. We identified the odours and taste are particularly difficult to distinguish for individuals of these age and sex groups as compared with previous short-term findings [6-9]. This result might help draw attention to issues faced by individuals in their daily lives and facilitate improvement in their quality of life. Curently in Japan two types of olfactory test kit (odol stick and odol essence) are used. The two kinds of olfactory test kits are inspecting using exactly the same twelve kinds of smells. However, it has not been clarified whether these two types of olfactory test results can be used together as a single data. In addition, there are few comparative studies of the results of two olfactory tests in the correct answer rate of each smell and the total mumber of correct responses. Therefore, in this study, two kinds of olfactory test results were respectively conducted for young people and old people, and the results are compared and reported.

# 2. Material and Methods

#### 2.1 Participants

There were 22 young people (15 males and 7 females) who participated in this study and 37 old

people (7 males and 28 females) who participated in this study. The participants participated in this research as a volunteer. They received a sufficient explanation about the contents of the research and they consented and signed a consent form. The average age of young people was 20.1 years (19-21 years), and the average age of old people was 74.5 years (43-88) (see Table 1).

They first made an olfactory test with an odor stick. After one month they made olfactory test with open essence.

#### 2.2 Assessment of Odour Identification

The Odour Stick Identification Test (OSIT-J) was used to assess odour perception. This test possesses high reliability and validity [10]. The OSIT-J includes 12 different odorants to be identified. As odour perception is not necessarily culture-free, the Japanese version was employed [11, 12]. The basic procedure resembles the San Diego Odour Identification Test [13]. The aromas used in the OSIT-J includes curry, perfume, Japanese cypress, India ink, menthol, rose, wood, nattou/sweat socks, roasted garlic, condensed milk, gas for cooking, and Japanese mandarin aromas. Each fragrance was enclosed in microcapsules made of melamine resin. These microcapsules were mixed with an odourless solid cream and then shaped to look like a lipstick. During the inspection test, the examiner applied each odorant to a piece of paraffin paper. After application, the examiner handed the paper to the participant, who would then sniff the paper and identify the odour. Participants selected each answer from a set of cards, each of which listed the name of an odorant, including the correct answer. Each correct answer was scored as one point, with the total performance score ranging from 0 to 12 points [14].

As same, the Odour Essence Identification was used to assess odour perception. It is basically an olfactory test kit created using exactly the same smell. However, the odour essence is printed with odour answering options in it when opening a smelly paper.

And, the answer is a mechanism to fill in an answer sheet prepared separately.

### 2.3 Statistical Processing

Collected results were tabulated by each method, and were compiled separately for young people and old people. The data summarized statistically processed the odour stick correct answer number, odour essence correct answer number, young people and old people combination using Chi-Square Test. With respect to each odour, the statistical processing was carried out using the Chi-Squared Test or the Fisher Direct Stochastic Method in young people and old people when the two kinds of olfactory test results were the same or different. For the same person, statistics processed the number of correct answers of the odour essence compared to the number of correct responses of the odour stick using l×m Sprit Table Test for young people and old people divided into increase, no change, and decrease.

## 2.4 Ethical Review Board

This study was conducted with the approval of the Ethical Review Board (Nagoya Women's University "hito wo mochiita kenkyu ni kansuru iinkai"). The approval number is 29-22.

## 3. Results

#### 3.1 Participants Age and Sex

Table 1 shows the average age and sex or participants. The old people were 1.5 times more participants than the young. Many males participated in young people, and female participants were many in old people.

## 3.2 Assessment of Odour Identification

Table 2 shows comparison of correct answer rates

of two kinds of odour kits in 12 types of scents. The olfactory examination result using odour stick in young people had the correct answer number of  $9.0 \pm 1.7$ , in old people had the correct answer number of  $6.5 \pm 3.0$ . The olfactory examination result using open essence in young people had the correct answer number of  $10.2 \pm 1.4$ , in old people had the correct answer number of  $6.0 \pm 2.9$ . The data summarized statistically processed the odour stick correct answer number, odour essence correct answer number, young people and old people combination using Chi-Square Test. As a result of statistical processing, there was no significant difference at p = 0.778.

Table 3 shows odour kit comparison of correct answer percentage of 12 different smells by different kit. Twelve different smells were that, Indian ink, Wood, Perfume, Household gas, Rose, Cypress, Menthol, Mandarin orange, Curry, Steamed-socks/Sweaty smell, Condensed milk and Fried garlic.

In young people correct answer rate of the odour essence was higher than the odour stick. In particular, Indian ink, Perfume and Household gas had a high value. On the other hand, Steamed-socks/Sweaty smell was decreased. The old people's correct answer did not change much compared to young people. However, household gases have a higher rate of correct answers. On the other hand, the rate of correct answers of Mandarin orange smell was decreased.

Tables 4-15 show respect to each odour, the statistical processing was carried out using the Chi-Squared Test or the Fisher Direct Stochastic Method in young people and old people when the two kinds of olfactory test results were the same or different. As a result, Indian ink, Perfume and Household gas answer changed. These three kinds of smells were statistically significant.

Table 1. Average age and sex of participants

			F F	
	Total number of peope	Male	Female	Average age $\pm$ SD
Yong people	22	15	7	$20.1 \pm 0.7$
Old people	33	5	28	74.5±10.0

SD= Standard Deviation

types of scents	(Average±SD)	
	Odour stick	Odour essence
Participants	$Average \pm SD$	$Average \pm SD$
Yong people (n=22)	9.0±1.7	$10.2 \pm 1.4$
Old people (n=33)	$6.5 \pm 3.0$	$6.0 \pm 2.9$
CD- Ctondord Deviation		

Table 2. Comparison of correct answer rates of two kinds of odour kits in 12

SD= Standard Deviation Chi-square test P=0.778 \*p<0.05 \*\*p<0.01

Tabel3. Odour Kit comaparison of correct answer percentage of 12 different smells by different kit

Participants	Types of Odour Kit	Indian ink	Wood	Perfume	Household gas	Rose	Cypress
Yong people (n=22)	Odour stick	50.0	86.4	59.1	59.1	68.2	63.6
	Odour essence	95.5	90.9	81.8	81.8	81.8	77.3
	Odour stick	35.1	51.4	51.4	10.8	29.7	73.0
Ola people (n=33)	Odour essence	54.5	51.5	36.4	63.6	39.4	27.3
Participants	Types of Odor Kit	Menthol	Mandarin orange	Curry	Steamed socks/Sweaty smell	Condensed milk	Fried garlic
Vana naanla (n-99)	Odour stick	90.9	72.7	90.9	100.0	68.2	95.5
tong people (n-22)	Odour essence	95.5	77.3	95.5	86.4	63.6	86.4
Old people (n=33)	Odour stick	75.7	40.5	70.3	73.0	67.6	70.3
	Odour essence	69.7	18.2	97.0	60.6	36.4	42.4

Table 16 shows for the same person, statistical processed the number of correct answers of the open essence compared to the number of correct responses of the odour stick using  $l \times m$  Sprit Table Test for young people and old people divided into increase, no

Tabel 4. Comparison of correct answers by odor in two kinds of smell kits (Indean ink)

	Young	Old
Number of people in the sema answer	10	24
Number of people in the different answer	12	9
Chi-square test P=0.041* *p<0.05 **p	<0.01	

Table 5. Comparison of correct answers by odor in two kinds of smell kits (Wood)

	Young	Old
Number of people in the sema answer	17	20
Number of people in the different answei	5	13
Chi-square test P=0.971 *n<0.05 **n<	0.01	

 
 Table 6. Comparison of correct answers by odor in two kinds of smell kits (Perfume)

	Young	Old
Number of people in the sema answer	11	26
Number of people in the different answer	11	7
Chi-square test P=0.026* *p<0.05 **p	<0.01	

 
 Table 7. Comparison of correct answers by odor in two kinds of smell kits (Menthol)

	Young	Old
Number of people in the sema answer	21	29
Number of people in the different answer	1	4
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Fisher direct stochastic method p=0.638 \*p<0.05 \*\*p<

Table 8.	Comparison	of correc	t answers	by odor in
two	kinds of sme	ll kits (M	landarin o	range)

	Young	Old
Number of people in the sema answer	15	22
Number of people in the different answer	7	11
Chi-square test P=0.907 *p<0.05 **p<	0.01	

Table 9. Comparison of correct answers by odor in two kinds of smell kits (Curry)

	Young	Old
Number of people in the sema answer	19	24
Number of people in the different answe	3	9
Fisher direct stochastic method p=0.324	+⊳<0.	05 **o<

Table 10. Comparison of correct answers by odor in two kinds of smell kits (Household gas)

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	Young	Old
Number of people in the sema answer	15	13
Number of people in the different answer	7	20
Chi-square test P=0.036* *p<0.05 **p	<0.01	

Table 11.. Comparison of correct answers by odor in two kinds of small kits (Pase)

	30/	
	Young	Old
Number of people in the sema answer	13	27
Number of people in the different answer	9	6
Chi-square test P=0.064 *p<0.05 **p	(0.01	

Table 12. Comparison of correct answers by odor in two kinds of smell kits (Cypress)

	Young	Old
Number of people in the sema answer	11	17
Number of people in the different answer	11	16
Chi-square test P=0.912 *p<0.05 **p<	0.01	

Table13.. Comparison of correct answers by odor in two kinds of smell kits (Steamed socks/Sweaty

	Young	Old
Number of people in the sema answer	19	21
Number of people in the different answer	3	12
Chi-square test P=0.064 *p<0.05 **p	(0.01	

Table 14. Comparison of correct answers by odor in two kinds of smell kits (Condensed milk)

	Young	Old	
Number of people in the sema answer	11	20	
Number of people in the different answer	11	13	
Chi-square test P=0.437 *p<0.05 **p<	0.01		

Table 15. Comparison of correct answers by odor in two kinds of smell kits (Fried garlic)

	Young	Old
Number of people in the sema answer	20	23
Number of people in the different answer	2	10
Fisher direct stochastic method p=0.096	} *p<0.0	)5 **p<

Table 16. Increase or dicrease of the number of correct answers of the smell essence compared to the number of correct responses of the odor stick

	Increase	e Sam	e Decrease
Young	12	3	7
Old	11	5	17
1 X m :	split table 1	est p=0.271	*p<0.05 **p<0.01

change, and decrease. As the result there was no statistically significant difference.

# 4. Discussion

Olfactory tests were conducted on young people and the old people using two kinds of olfactory test kits, and the results were compared. Comparison of correct answer of two kinds of odour kits in 12 types of scents was no different by using statistical analysis of Chi-square test. From this, it was suggested that the data obtained from the two olfactory test kits using this time can be used together as one data.

And increase or decrease of the number of correct answer of the open essence compared to the number of correct answers of the odour stick by using  $l \times m$ Sprit Table Test for young people and old people divided into increase, no change, and decrease. But there was not a statistically significant difference. However, when statistically calculating 12 kinds of smells individually, there was a statistically significant difference in the three kinds of smells which were Indian ink, Perfume and Household gas. Based on this point, it is necessary to carefully observe the data obtained from the two kinds of olfactory test kits in the future.

# **5.** Conclusion

We participated in young people and old people and conducted odour examination using two types of olfactory test kits. There was no statistically significant difference in the number of correct answers of the two kinds of olfactory test kits. Similarly, there was no statistically significant difference when comparing the results of two olfactory tests in the same participant. From these results, it was suggested that in the future, the results of two olfactory tests using this time can be processed as a single data. However, when 12 kinds of smells were individually processed statistically, there were statistically significant differences in the three kinds of odours. In future it is necessary to increase the number of cases and to show more accurate statistical processing results. It is a future task.

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