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Research Paper

The olfactometry and taste examination results for ten years (2009-2018) in the Yakumo study by using the data of the testee list

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ABSTRACT

The present study examined the relationship between olfactory function and taste function for ten years. A personal function test was calculated from the Yakumo study database, and the odour stick identification test and salt taste identification test were administered to healthy elderly people. The participants were community dwellers who voluntarily participated in the Yakumo Study and had managed everyday life by themselves. We combined data of ten years (2009-2018) and checked a taste test result and the olfactometry result. This data were made from a consultation result list which was handed to a testee by hand. The testee was in his/her 80s from 40s. The data were compared according to the generation. They were classified into three categories: the normal range, observation required, consultation required. The gustatory test was performed using test paper SALSAVE (ADVANTEC Co. Ltd.), which included 7 different densities of NaCl on a test paper, as follows: 0.0, 0.6, 0.8, 1.0, 1.2, 1.4 and 1.6 mg/cm^2. The participant placed a test paper on the tongue and closed the mouth to feel the taste. 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.We compared the answer of generation and found that recognition of odour identification test was that the participant of the normal range decreases with age, on the contrary, participants of the consultation required increase with age. It was revealed that Male participant had worsen olfactometry result by the generation that was earlier than Female participant. Also, it was found that there was difference between age with regard to taste examination results. Based on the taste examination results, there were not huge difference between males and females. It will be necessary to obtain the result of the aging through olfactory and taste examination by performing more detailed data analysis in the future.

Key words: Healthy elderly people, olfactory function, taste function, Yakumo study.

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 (Quint et al., 2001 ; Welge-Lussen and Wolfensberger, 2007; Kallmann et al., 1944).

Present in a narrow region of the mucosa that covers the inside of the nose (olfactory epithelium) are the olfactory receptor neurons. The dendritic ends (olfactory cilia) of these neurons detect odour molecules that enter the nose

Table 1: Participant number of inhabitants examination in Yakumo study 2009 to 2018. (n=468) olfactometry.

Variable	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Male	151	177	148	170	153	148	194	217	188	189	1735
Female	279	253	215	217	217	193	203	266	226	264	2333
Total	430	430	363	387	370	341	397	483	414	458	4050

Table 2: Participant number of inhabitants examination in Yakumo study 2009 to 2018. (n=4050) Taste examination.

Variable	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Male	136	175	141	170	208	148	196	218	184	195	1771
Female	259	247	203	219	217	184	203	258	226	263	2279
Total	396	422	344	389	425	332	399	476	410	458	4050

via currents of air, which produces an electrical signal. This signal travels up through the bone that forms the ceiling of the nasal cavity (the cribriform plate) via nerve fibres that converge on the olfactory bulb, an enlarged area of nerve cells of the brain that also form olfactory nerves. Signals passing through the olfactory bulb travel to the brain along these olfactory nerves, where the signals are interpreted, and the smell is recognized (Mori et al., 2006). The medial aspect of the temporal lobe that remembers smells is also stimulated at this point, and the brain can identify the odour based on a memory of previously experienced smells. In other words, smell identification requires an already-accumulated set of experienced smells (Serizawa et al., 2000, 2004).

Both olfaction and gustation start to decline in humans around the age of 50-59 years, with 40% of the elderly experiencing a noticeable decline (Doty et al., 1983). A person's first awareness of decline 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 responsible for enrichment and psychological stimulation in our everyday lives, such as with the scents and smells of foods and flowers (Saito et al., 2006). 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, this study aims to understand 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 particularly difficult to distinguish for individuals of these age and sex groups as compared with previous short-term findings (Katayama et al., 2017; Katayama et al., 2018a, b and c). Based on the Yakumo-cho inhabitants examination for 10 years, we obtained the taste and olfactometry result. This result might help draw attention to issues faced by individuals in their daily lives and facilitate improvement in their quality of life.

MATERIALS AND METHODS

Participants

The participants were community dwellers who voluntarily participated in the Yakumo Study and had managed their everyday life themselves. The Yakumo Study has been conducted since 1981 as a joint project between the town of Yakumo in Hokkaido and the Nagoya University Graduate School of Medicine. Professionals in the fields of epidemiology, internal medicine, orthopedics, neuropsychology, ophthalmology, otolaryngology, and urology were included in the Yakumo Study. The analysed data here were based upon the database from 2005 from the neuropsychology and otolaryngology teams. The participants had been engaged in a variety of jobs, not only white collar but also in agriculture, fishery, and forestry. Therefore, this town can be regarded as representative of today's Japanese society. From the database, 4068 olfactometry participants (2333 females and 1735males) and 4050 taste examination participants (2279 female and 1771 male) were selected from the data of August, 2009-2018 (Tables 1 and 2).

Assessment of salt taste identification

The gustatory test was performed using test paper SALSAVE (ADVANTEC Co. Ltd.), which included 7 different densities of NaCl on a test paper, as follows: 0.0, 0.6, 0.8, 1.0, 1.2, 1.4, and 1.6 mg/cm^2. The participant placed a test paper on the tongue and closed the mouth to feel the taste. We examined it from the light taste. The participant understanding of taste was referred to as detection. When the participant said that it is saltiness, it was referred to as recognition. Firstly, the participant rode 0.0% of test papers

Table 3: Age composition of participants in Yakumo study (total number of male in ten years: 2009 to 2018). Olfactometry (n= 1735).

Year	40's	50's	60's	70's	80's	Total
2009	9	22	59	45	16	151
2010	17	23	72	51	14	177
2011	7	16	70	40	15	148
2012	8	21	92	37	12	170
2013	8	21	92	20	12	153
2014	8	21	73	39	7	148
2015	17	38	92	36	11	194
2016	19	34	105	46	13	217
2017	14	29	85	51	9	188
2018	20	33	76	51	9	189
Total	127	258	816	416	118	1735

on the tongue and checks taste. The participant evaluated the taste of the test paper, and checked taste on a tongue from a test paper having a low density of NaCl sequentially afterward. There is the report that detection of salt taste is more important than salt taste recognition (Nishimoto et al., 2005).

Assessment of odour identification

The Odour Stick Identification Test (OSIT-J) was used to assess odour perception. This test possesses high reliability and validity (Kobayashi, 2005). The OSIT-J included 12 different odorants identified. Since odour perception is not necessarily culture-free, the Japanese version was employed (Kobayashi et al., 2007; Kobayashi et al., 2006). The basic procedure resembled that of the San Diego Odour Identification Test (Murphy et al., 1994). The aromas used in the OSIT-J included 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 then sniffed the paper and identified the odour. The 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.

Statistical processing

We collected the statistics and handled data of the sense of smell threshold and taste threshold. The data that were not normally distributed were compared with the uncorrelated Mann-Whitney test of the nonparametric test.

Ethical review board

This study was conducted with the approval of the Ethical Review Board (Nagoya women's university 'hitowomochiita kenkyunikansuru iinkai'). The approval number is 29-22

RESULTS

Participants age distribution

We combined the olfactometry data of ten years and had a table according to sex and the age of the participant. The male was 1735 participants in all: 40s were 127 participants, 50s were 258 participants, 60s were 816 participants, 70s were 416 participants, and 80s were 118 participants (Table 3). The female was 2333 participants in all: 40s were 269 participants, 50s were 504 participants, 60s were 925 participants, 70s were 529 participants, and 80s were 106 participants (Table 4).

We combined the taste examination data of ten years and had a table according to sex and the age of the participant. The male was 1771 participants in all: 40s were 129 participants, 50s were 276 participants, 60s were 807 participants, 70s were 442 participants, and 80s were 117 participants (Table 5).

The female was 2279 participants in all: 40s were 272 participants, 50s were 476 participants, 60s were 914 participants, 70s were 526 participants, and 80s were 91 participants (Table 6).

Assessment of odour identification

When a participant recognizes six kinds or more among 12

Table 4: Age composition of participants in Yakumo study (total number of female in ten years: 2009 to 2018). Olfactometry (n= 2333).

Year	40's	50's	60's	70's	80's	Total
2009	30	76	111	56	6	279
2010	24	58	78	65	28	253
2011	10	40	92	56	17	215
2012	27	47	92	47	4	217
2013	27	47	92	47	4	217
2014	21	34	78	49	11	193
2015	23	55	79	39	7	203
2016	39	53	103	53	18	266
2017	25	49	96	49	7	226
2018	43	45	104	68	4	264
Total	269	504	925	529	106	2333

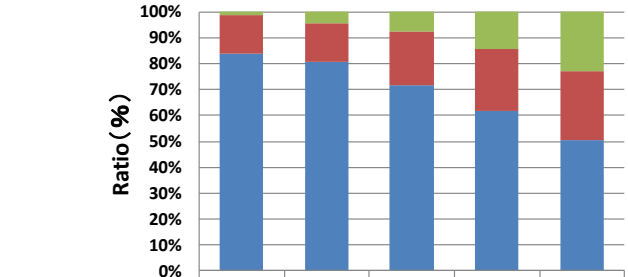
Table 5: Age composition of participants in Yakumo study (total number of male in ten years: 2009 to 2018). Taste examination (n= 2279).

Year	40's	50's	60's	70's	80's	Total
2009	9	22	47	42	16	136
2010	17	21	72	51	14	175
2011	7	10	70	40	14	141
2012	8	21	93	36	12	170
2013	8	47	92	49	12	208
2014	8	21	73	39	7	148
2015	19	38	92	36	11	196
2016	19	34	106	46	13	218
2017	14	29	81	51	9	184
2018	20	33	81	52	9	195
Total	129	276	807	442	117	1771

Table 6: Age composition of participants in Yakumo study (total number of female in ten years: 2009 to 2018). Taste examination (n= 2279).

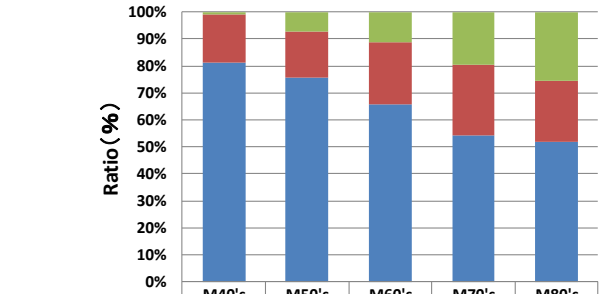
Year	40's	50's	60's	70's	80's	Total
2009	31	57	111	54	6	259
2010	24	52	78	65	28	247
2011	10	38	92	56	7	203
2012	29	47	92	47	4	219
2013	27	47	92	47	4	217
2014	21	34	69	49	11	184
2015	23	55	79	39	7	203
2016	39	52	101	53	13	258
2017	25	49	96	49	7	226
2018	43	45	104	67	4	263
Total	272	476	914	526	91	2279

kinds of smells, they have a diagnosis of the normal. When participant recognizes three from five kinds of smells, they have a diagnosis of the observation required. In the case of the recognition of less than two kinds of smells, a participant has a diagnosis of consultation required. The result of the sense of smell of (2009-2018) is shown in Figure 1 according to the generation for ten years. The ratio of participant of the normal range in the sense of smell



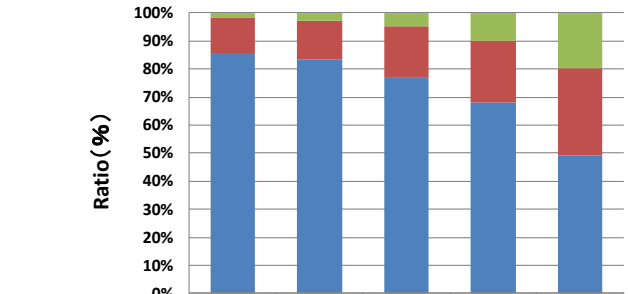
	40's	50's	60's	70's	80's
Consultation required	5	33	134	134	51
Observation required	58	113	357	227	60
Normal range	333	616	1250	584	113

Figure 1: Ratio according to the generation of the olfactometry result (Total of 10 years: 2009-2018).



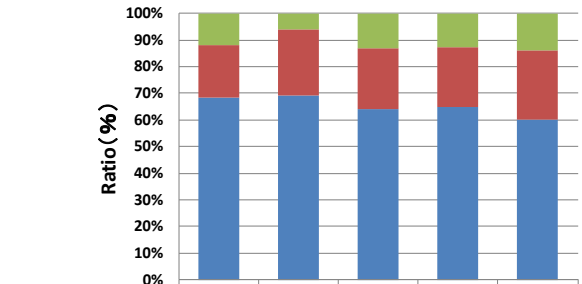
	M40's	M50's	M60's	M70's	M80's
Consultation required	1	19	90	82	30
Observation required	23	44	188	109	27
Normal range	103	195	538	225	61

Figure 2: Ratio according to the generation of the olfactometry result (Male , total of 10 years: 2009-2018).



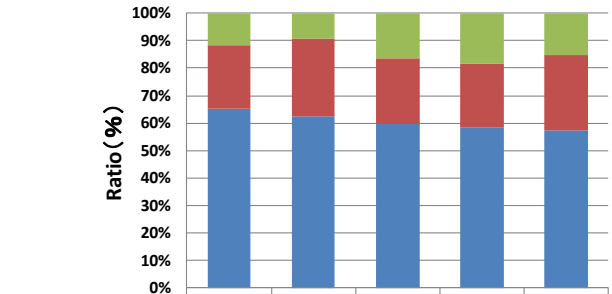
	F40's	F50's	F60's	F70's	F80's
Consultation required	4	14	44	52	21
Observation required	35	69	169	118	33
Normal range	230	421	712	359	52

Figure 3: Ratio according to the generation of the olfactometry result (Female , total of 10 years: 2009-2018).



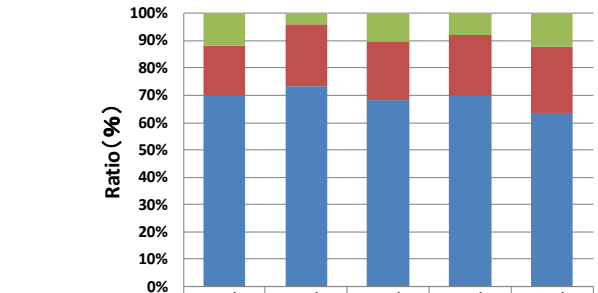
	40's	50's	60's	70's	80's
Consultation required	47	45	225	122	29
Observation required	80	186	391	220	54
Normal range	274	521	1105	626	125

Figure 4: Ratio according to the generation of the taste examination result (Total of 10 years: 2009-2018).



	M40's	M50's	M60's	M70's	M80's
Consultation required	15	26	133	81	18
Observation required	30	78	191	102	32
Normal range	84	172	483	259	67

Figure 5: Ratio according to the generation of the taste examination result (Male , total of 10 years: 2009-2018).



	F40's	F50's	F60's	F70's	F80's
Consultation required	32	19	92	41	11
Observation required	50	108	200	118	22
Normal range	190	349	622	367	58

Figure 6: Ratio according to the generation of the taste examination result (Female , total of 10 years: 2009-2018).

result lowered as they became old. We showed an olfactometry result according to male and female. The result of the male is shown in Figure 2. The participant of the normal range had approximately 80% male 40s, butdecreased to approximately 50% as they became 80s. The result of the female is shown in Figure 3.The participant of the normal range had approximately 85% at female 40s, but decreased to approximately 50% as they became 80s, same as male data. However, approximately 10% of olfactometry results of female were higher than a male from 40s to 70s (Figures 4 to 6).

Table 7: The result in the same subject of olfactometry and taste examination in the past ten years (2009 to 2018) according to the general distinction (Total).

Variable	Total (n= 4061)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	1978(48.7%)	471(11.6%)	191(4.7%)
Taste test observation required	614(15.1%)	232(5.7%)	93(2.3%)
Taste test consultation required	333(8.2%)	104(2.6%)	65(1.6%)
	40's Total (n=395)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	234(59.2%)	36(9.1%)	2(0.5%)
Taste test observation required	56(14.2%)	18(4.6%)	2(0.5%)
Taste test consultation required	43(10.9%)	3(0.8%)	1(0.3%)
	50's Total (n=733)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	422(57.6%)	63(8.6%)	18(2.5%)
Taste test observation required	133(18.1%)	41(5.6%)	9(1.2%)
Taste test consultation required	32(4.4%)	9)1.2%)	6(0.8%)
	60's Total (n=1279)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	843(48.8%)	191(11.0%)	70(4.0%)
Taste test observation required	262(15.2%)	103(6.0%)	36(2.1%)
Taste test consultation required	145(8.4%)	51(2.9%)	28(1.6%)
	70's Total (n=1006)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	414(41.2%)	141(14.0%)	70(7.0%)
Taste test observation required	129(12.8%)	60(6.0%)	37(3.7%)
Taste test consultation required	99(9.8%)	31(3.1%)	25(2.5%)
	80's Total (n=218)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	65(29.8%)	40(18.3%)	31(14.2%)
Taste test observation required	34(15.6%)	10(4.6%)	9(4.1%)
Taste test consultation required	14(6.4%)	10(4.6%)	5(2.3%)

The number represents the number of people; () is ratio by the generation.

Assessment of salt taste identification

We performed cognitive inspection of the saltiness. 0.6-1.0% of saltiness recognition of the participant gave a diagnosis of the normal range. 1.2-1.4% of saltiness recognition of the participant gave a diagnosis of observation required. More than 1.6% of saltiness recognition of the participant gave a diagnosis of consultation required. We did not obtain the huge change by the generation such as the sense of smell recognition in the saltiness recognition. However, the result of the saltiness recognition was slightly higher in female than in male, such as sense of smell recognition.

Comparison of olfactmetry with taste examination by the same participant

The result of the sense of smell recognition and the taste recognition by the same participant is shown in Table 7;

Table 8: The result in the same subject of olfactometry and taste examination in the past ten years (2009 to 2018) according to the general distinction (Male).

Variable	Male (n= 1760)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	729(41.2%)	208(11.8%)	100(6.2%)
Taste test observation required	269(15.3%)	113(6.4%)	57(3.2%)
Taste test consultation required	152(8.6%)	69(3.9%)	54(3.1%)
	40's Male (n=126)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	72(57.1%)	12(9.5%)	0(0%)
Taste test observation required	19(15.0%)	8(6.3%)	1(0.8%)
Taste test consultation required	12(9.5%)	2(1.6%)	0(0%)
	50's Male (n=256)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	126(49.2%)	20(7.8%)	8(3.1%)
Taste test observation required	50(19.5%)	20(7.8%)	5(2.0%)
Taste test consultation required	17(6.6%)	4(1.6%)	6(2.3%)
	60's Male (n=816)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	346(64.2%)	92(11.3%)	43(5.3%)
Taste test observation required	122(15.0%)	57(7.0%)	24(4.9%)
Taste test consultation required	71(8.7%)	38(4.7%)	23(2.8%)
	70's Male (n=445)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	156(35.1%)	64(14.4%)	39(8.8%)
Taste test observation required	56(12.6%)	26(5.8%)	20(4.5%)
Taste test consultation required	42(9.4%)	20(4.5%)	22(4.9%)
	80's Male (n=117)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	29(24.8%)	20(17.1%)	19(16.2%)
Taste test observation required	22(18.8%)	2(1.7%)	7(6.0%)
Taste test consultation required	10(8.5%)	5(4.3%)	3(2.6%)

The number represents the number of people; () is ratio by the generation.

and the result of the Male is shown in Table 8, and the female in Table 9.

1,978 people (48.7% of the whole participant) based on the taste recognition and the sense of smell recognition were in the normal range. In addition, 65 people (1.6% of the whole participant) based on taste recognition and the sense of smell recognition were consultation required. As a result of having compared it according to the generation, it was as follows: There was more than 48% participant of the normal range as both taste recognition and sense of smell recognition were from 40s to 60s. However, participant of both normal range were getting small number from 70 to 80's generations. A participant of the both normal range had many number of female result than male result when compared.

Statistical processing

We collected the statistics and handled data of the sense of

Table 9: The result in the same subject of olfactometry and taste examination in the past ten years (2009 to 2018) according to the general distinction (Female).

Variable	Female (n= 2321)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	1249(53.8%)	263(11.3%)	82(3.5%)
Taste test observation required	345(14.9%)	119(5.1%)	36(1.6%)
Taste test consultation required	181(7.9%)	35(1.5%)	11(0.5%)
	40's Female (n=269)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	162(60.2%)	24(8.9%)	2(0.7%)
Taste test observation required	37(13.8%)	10(3.7%)	1(0.4%)
Taste test consultation required	31(11.5%)	1(0.4%)	1(0.4%)'
	50 Female (n=477)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	296(82.1%)	43(9.0%)	10(2.1%)
Taste test observation required	83(17.4%)	21(4.4%)	4(0.8%)
Taste test consultation required	15(3.1%)	5(1.0%)	0(0%)
	60's Female (n=913)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	497(54.4%)	99(10.8%)	27(3.0%)
Taste test observation required	140(15.3%)	46(5.0%)	12(1.3%)
Taste test consultation required	74(8.1%)	13(1.4%)	5(0.5%)
	70's Female (n=561)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	258(46.0%)	77(13.7%)	31(5.5%)
Taste test observation required	73(1.3%)	34(6.0%)	17(3.0%)
Taste test consultation required	57(10.2%)	11(2.0%)	3(0.5%)
	80's Female (n=101)		
	Olfactometry/Normal range	**Olfactometry/Observation required**	**Olfactometry/Consultation required**
Taste test normal range	36(35.6%)	20(19.8%)	12(11.8%)
Taste test observation required	12(11.9%)	8(7.9%)	2(2.0%)
Taste test consultation required	4(4.0%)	5(5.0%)	2(2.0%)

smell threshold and taste threshold. The data that were not normally distributed were compared with the uncorrelated Mann-Whitney test of the nonparametric test. The sense of smell threshold and the taste threshold were calculated as normal range with 0 point, observation required was one point and consultation required was two points. After having added up three scores, we calculated the average and compared it. The olfactometry result is shown in Tables 10, 11 and 12. As a result of statistics calculation, there was no gender gap in the sense of smell recognition. The sense of smell recognition was shown to be lower with age.

The taste test result is shown in Tables 13, 14 and 15. As a result of statistics calculation, there was gender gap in the taste recognition. The taste threshold was different in male and female data. Male understood that the taste recognition was low. Also, the sense of taste recognition was understood to be lower with age.

DISCUSSION

As expected, the correct identification rate measured using the odour identification test decreased with an increase in age, indicating that olfaction declines with an increase in

Table 10: Male olfactometry normal range, (%) vs. the other, (%). Statistical processing result.

Generation	Normal range (%)	The other (%)
40's	81.1	18.9
50's	75.6	24.4
60's	65.9	34.1
70's	54.1	45.9
80's	51.7	48.3
Average	65.7	34.3
SD	12.9	12.9

Mann-Whitney p=0.008**; * p<0.05; ** p <0.01.

Table 11: Female olfactometry normal range, (%) vs. the other, (%). Statistical processing result.

Generation	Normal range (%)	The other (%)
40's	85.8	14.2
50's	83.9	16.1
60's	77.0	23.0
70's	67.9	32.1
80's	49.1	50.9
Average	72.7	27.3
SD	15.0	14.9

Mann-Whitney p=0.015*; * p<0.05; ** p <0.01.

Table 12: Olfactometry statistical processing result.

Generation	Normal range (%)	The other (%)
40's	0.197	0.160
50's	0.318	0.192
60's	0.451	0.278
70's	0.656	0.420
80's	0.737	0.708
Average	0.472	0.361
SD	0.226	0.223

Mann-Whitney p=0.246; * p<0.05; ** p <0.01.

Table 13: Male test examination normal range (%) vs. the other (%). Statistical processing result.

Generation	Normal range (%)	The other (%)
40's	65.1	34.9
50's	62.3	37.7
60's	59.9	40.1
70's	58.6	41.4
80's	57.3	42.7
Average	60.6	39.4
SD	3.1	3.1

Mann-Whitney p=0.008**; * p<0.05; ** p <0.01.

age. This result is similar to that obtained by Ayabe et al. (2005) and shows the validity of the test method used in this study. Our level of sensory recognition of odours is created by the circumstances of our everyday lives (Yatagai et al., 1995). These data provided are in line with our last data which was accepted (Katayama et al., 2017; Katayama et al., 2018 a, b, and c).

We collected more data and tried to decide the cut-off

Table 14: Female test examination normal range (%) vs. the other (%). Statistical processing result.

Generation	Normal range (%)	The other (%)
40’s	69.0	31.0
50’s	73.3	26.7
60’s	68.1	31.9
70’s	69.8	30.2
80’s	63.7	36.3
Average	68.8	31.2
SD	3.5	3.5

Mann-Whitney p=0.008**; * p<0.05; ** p <0.01.

Table 15: Test examination statistical processing result.

Generation	Normal range (%)	The other (%)
40’s	0.465	0.419
50’s	0.471	0.307
60’s	0.566	0.420
70’s	0.597	0.380
80’s	0.581	0.484
Average	0.536	0.402
SD	0.063	0.065

Mann-Whitney p=0.027**; * p<0.05; ** p <0.01.

level of taste examination and cut-off level of odour examination in the future. It was revealed that the sense of smell recognition declined from these findings of 10 years earlier than the taste recognition. Furthermore, we compared the result of the male and female, and male understood that both the sense of smell recognition and the taste recognition were lower than female in the whole. The sense of smell recognition began to lower from 60s. It was shown that the taste recognition was hard to be affected by the age such as the sense of smell recognition. It will be necessary to investigate the connection with the lifestyle in future. In addition, it is assumed that more detailed data analysis is necessary, this three classification (normal range, observation required, consultation required) is not enough to understand the taste recognition and the sense of smell recognition. However, we obtained the result according to the generation by the accumulation of data for 10 years. It is a big achievement that we were able to grasp the situation of the taste recognition and the sense of smell recognition about 80s in particular. The person who had low threshold of the sense of smell recognition and the taste recognition became clear by each generation. In the 40's participant, 0.3% participant, the both sense of smell recognition and the taste recognition were low. Since 50s was 2.3%, 60's was 1.6%, 70's was 2.5%, 80's was 2.3%. This Yakumo study will create an insight into conducting one end fundamental researches on sense of smell recognition and taste recognition in the future. The study on sense of smell recognition and taste recognition will continue in Yakumo-cho in future.

Conclusion

In this study, examinations of taste and olfactometry in Yakumo-cho inhabitants were performed. The Odour results of female had better recognition than male. Taste results was different between male and female but not as huge as olfactometry. As for the male, odour recognition decreases from 60 years old in particular. It was revealed that the taste recognition was hard to be affected by the age such as the sense of smell recognition. It will be necessary to investigate the connection with the lifestyle in the future. In addition, it is assumed that more detailed data analysis is necessary, this three classification (normal range, observation required, consultation required) is not enough. These data are not enough to understand the taste recognition and the sense of smell recognition. However, we obtained the result according to the generation by the accumulation of data for 10 years. It is a big achievement that we were able to grasp the situation of the taste recognition and the sense of smell recognition about 80s in particular. We collected more data and tried to decide the cut-off level of taste examination and cut-off level of odour examination for each generation. There are few studies on the sense of smell recognition and the taste recognition using the same participant. This Yakumo study will create an insight into conducting one end fundamental researches

on sense of smell recognition and taste recognition in the future.

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