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Comparison of Taste and Smell Test Results Before and After COVID-19 in Yakumo Residents Health Checkup Comparison between 2019 and 2022

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Abstract

Since August 2007, the authors have conducted health checkups for residents of Yakumo Town, Hokkaido, over three days yearly, with approximately 600 people.Taste and smell tests were conducted on the study participants, and the results have been reported.However, in 2020 and 2021, we were could not receive a health checkup data to the influence of the new coronavirus. But, in August 2022, we were finally able to obtain the results of taste and smell tests.Therefore, in this study, we compare the taste and smell test results obtained in August 2019 (before the COVID-19 epidemic) and in August 2022 (after the COVID-19 epidemic).Taste and smell were measured using a simple test kit, and height, weight, and blood pressure were also obtained.

Index terms— simple salty taste test, simple olfactory test, resident medical examination, age group.

1 Introduction

rom 2007 to 2019, every August in Yakumo Town, Hokkaido, the authors examined the sense of taste and olfactory tests during a health checkup for residents [1][2][3][4][5][6][7][8][9][10] **??**11] **??**12] .

However, in 2020 and 2021, we could not undergo a medical examination due to the COVID-19 epidemic.

As the COVID-19 epidemic has subsided, this fiscal year (August 2022), Hokkaido, August.

We obtained the taste and smell test results during the health checkup for the residents of Yakumo Town.

Therefore, we compared the taste and smell test results obtained in 2019 and the taste and smell test results obtained in 2022. I decided to confirm whether or not there was an impact of COVID-19 by comparing two data.

2 II.

3 Material and Method

Among the participants in the health checkup for Yakumo town residents were measured for height, weight, blood pressure (systolic and diastolic), salty taste tests, and olfactory tests.

There were 298 subjects (129 males 169 females) in 2019.

And there were 344 subjects (142 males, 202 females) in 2022.

Survey items comparing 2019 and 2022 are age, height, weight, systolic blood pressure, diastolic blood pressure, the results of a simple olfactory test, and the results of a simple salty taste test.

The results of the simple salty taste test were performed by using Salsive (manufactured by Advantech). The Salsive is the filter paper. Salsive comes in 6 different salt concentrations (0.6% 0.8%, 1.0% 1.2%, 1.4%, 1.6%). Participants put Salsive in their mouth to check the salty taste.

Concentration was recorded when participants perceived salty teste 13) .

The results of the simple olfactory test were performed using an odor stick (Daiichi Yakuhin Kogyo Co., Ltd.).

Twelve kinds of odors are applied to the filter paper (Japanese ink, wood, perfume, menthol, mandarin orange, curry, household gas, roses, cypress, stuffy socks/sweaty, condensed milk, fried garlic). The number of odors perceived by participants was recorded.

The obtained data were statistically processed by sex and age groups.

2019 and 2022 data were F-tested, and the results were either unpaired Student-t test or Mann.

Whitney test was performed to confirm the presence or absence of statistical significance.

4 a) Ethical review board

This study conducted with the approval of the Ethical Review Board (Nagoya women's University Ethics Committee: "hitowomochiitakennkyuunikannsuruiinnkai"). The approval number is 2019-26.

5 III.

6 Result

There were 298 participants (129 male and 169 female) in 2019, and 344 participants (142 male and 2022 female) in 2022. The distribution of each age group is shown in Table **??**. In both years, there were many participants in their 60s and 70s.

Table 2 shows the average values and standard deviations by age group for each inspection item in FY2019.

The average systolic blood pressure for both males and females in their 70s and 80s was 140 mmHg, exceeding the normal range.

However, the average diastolic blood pressure was 90 mmHg or less in both men and women, which was within the normal range.

The average value of the simple olfactory test results in the 80s female was six, and half of the twelve types of odors could be recognized. All females of other ages had a simple olfactory test result of six or higher.

However, the average value for males was six or less, resulting in a less recognizable odor.

The average value of salty taste test results for women in their 80s exceeds hers by 1.0%.

But otherwise, both males and females, in the age-specific salty taste test results, salty taste could be recognized less than 1.0%.

Table 3 shows the average values and standard deviations by age group for each inspection item in FY2022.

In females, the average systolic blood pressure in their 70s and 80s is over 140 mmHg, which exceeds the normal range.

And also in males, the average systolic blood pressure in their 80s is over 140 mmHg, which exceeds the normal range.

However, the mean diastolic blood pressure for both males and females was below 90 mmHg, which was within the normal range. Females in their 80's and males in their 80's and 70's recognized six or less of the twelve odors. As a result, olfactory recognition decreased with age.

The results of the salty taste test showed that they could recognize less than 1.0% salty taste for both males and females.

The results of 2022 and 2019 were compared using statistical methods.

The results of comparing the age distribution of females in 2022 and 2019 showed Table **??**. As a result, there was no statistically significant difference between 2022 and 2019. The results of comparing the height distribution of females in 2022 and 2019 showed Table **??**. As a result, there was no statistically significant difference between 2022 and 2019.

The results of comparing the height distribution of males in 2022 and 2019 showed The results of comparing the weight distribution of females in 2022 and 2019 showed Table **??**. As a result, there was no statistically significant difference between 2022 and 2019.

The results of comparing the weight distribution of males in 2022 and 2019 showed Table **??**. As a result, there was no statistically significant difference between 2022 and 2019. The results of comparing the systolic blood pressure distribution of females in 2022 and 2019 showed Table 10. As a result, there was no statistically significant difference between 2022 and 2019. The results of comparing the systolic blood pressure distribution of males in 2022 and 2019 showed Table **??**1. As a result, there was no statistically significant difference between 2022 and 2019. The results of comparing the diastolic blood pressure distribution of females in 2022 and 2019 showed Table 12. As a result, there was no statistically significant difference between 2022 and 2019. Table 13 shows the results of comparing males' systolic blood pressure by age group.

Although there was no statistically significant difference by age group, $P<0.05$ ($P=0.045$*) for all age groups. The results showed that the diastolic blood pressure in 2022 was statistically significantly lower than the diastolic blood pressure in 2019.

Table **??**4 shows the results of a comparison of females' olfactory test results by age group.

A statistically significant difference comes out in their seventies. In 2022, olfactory recognition was statistically significantly lower than in 2019 ($P<0.05$: $P=0.024$*). Comparing the results of the olfactory cognition test in 2022 and 2019, there was no statistically significant difference in each age group. However, as a result of the overall comparison, olfactory recognition was statistically significantly lower ($P<0.01$: $P=0.001$**) in 2022 than in 2019.

Table 15 shows the results of a comparison of male olfactory test results by age group.

A statistically significant difference comes out when he is in the 40s. In 2022, olfactory recognition was statistically significantly lower than in 2019 (P<0.05: P=0.014*).

Comparing the results of the olfactory cognition test in 2022 and 2019, other were no statistically significant difference in each age group. However, as a result of the overall comparison, olfactory recognition was statistically significantly lower (P<0.01: P=0.005**) in 2022 than in 2019. IV.

7 Discussion

For both male and female participants, age, height, and weight were not statistically significantly differences for comparison between 2019 and 2022. Females had no statistically significant difference in blood pressure between 2019 and 2022. However, there was no significant difference in diastolic blood pressure among males by age group, but when compared overall, the year 2022 was lower than in 2019. There was no statistically significant difference in cognition between 2019 and 2022 for salty taste. Regarding the sense of smell, there will be a statistically significant (P<0.05) decline in cognition in 2022 compared to 2019.

Whether this is due to the COVID-19 epidemic cannot be determined based on the results of this test alone. However, the results of this olfactory cognition test showed that the olfactory cognition in 2022 was lower than the olfactory cognition in 2019.

Therefore, we believe that it is necessary to continue to investigate the participants' sense of smell. At that time, we think it is needed to investigate COVID-19 morbidity as well. We believe it is necessary to track individuals individually.

Previous studies have reported a positive correlation between salt intake and blood pressure [15][16][17][18][19] . Therefore, in Japan and overseas, guidance to reduce salt intake is being carried out. Future studies will investigate the relationship dietary habits and blood pressure. It is necessary to investigate this in more detail. Relations with aging 20) and Alzheimer's disease 21,22) have also been reported regarding the decline in olfactory cognition. We could like to continue research on regional differences in Japan and clarify the results.

V.

8 Conclusion

We compared taste and smelled simple test results before COVID-19 (2019) and after COVID-19 (2022). As a result, no statistically significant difference was observed in preference in all ages between 2019 and 2022. However, 2022 tended to have fewerol factory perceptions in all ages than in 2019.Butthe smell was a statistically significant difference between 2019 and 2019 in the total participants. Compared to 2022, the value tends to be lower in 2022, with a significant difference overall, and 2022 is not recognizable. It was found that the number of certain odors decreased in 2022. However, on this data, it cannot be concluded that the decline in olfactory recognition in 2022 was due to COVID-19.

In the future, we would like to clarify the presence or absence of regional differences by conducting surveys on more items and comparing them.

2

Table 1. Age composition of participants in 2019 and 2022

(number of people)

		40s		50s		60s	70s	80s		Total	
	2019 Male	10		24		49	40	6		129	
	2019 Female	23		40		66	37	3		169	
Year	2022 Male 2022 Female	13 34		20 37		38 64	59 57	12 10		142 202	
2022											
22											
Volume	Female Age	Average	??	Average	??	Average	??	Average	??	Average	??
XXII		45.22	2.61	54.33	3.04	64.52	2.77	72.84	2.57	82.00	2.00
Issue		40s		50s		60s		70s		80s	
II											
Version											
I											
D D D D)	Hight	158.01	5.17	155.52	6.01	153.80	5.15	150.56	5.38	147.37	2.84
(	Weight	57.15	11.48	56.42	9.08	55.66	8.91	52.82	10.01	49.57	11.37
Medical	Systolic blood	122.26	15.75	131.58	20.57	137.14	19.05	140.11	24.48	149.00	29.44
Research	pressure Diastolic	70.13	10.11	77.35	12.95	77.05	11.94	74.70	11.33	77.00	7.00
	blood pressure	9.26	1.91	9.60	1.81	8.94	2.37	7.43	2.22	6.33	2.08
	Olfactory test	0.88	0.37	0.87	0.37	0.85	0.35	0.90	0.39	1.07	0.64
	results Salty taste	Average	??	Average	??	Average	??	Average	??	Average	??
	test results Male	40s		50s		60s		70s		80s	
Global	Age Hight Weight	45.50	3.21	54.83	3.14	64.84	3.32	73.03	3.17	84.83	3.76
Journal	Systolic blood	170.05	4.63	167.96	6.29	167.28	5.89	164.69	5.35	159.13	1.75
of	pressure Diastolic	74.15	11.32	71.34	8.93	68.93	9.35	66.23	10.08	63.50	6.39
	blood pressure	136.80	18.35	131.00	18.98	138.27	14.50	145.53	24.70	134.67	14.94
	Olfactory test	80.90	14.36	81.33	11.34	83.12	8.70	79.73	15.39	66.17	9.02
	results Salty taste	9.00	2.00	8.13	2.15	7.18	2.34	6.49	3.27	5.67	2.80
	test results	0.90	0.33	0.92	0.47	0.89	0.38	0.94	0.46	0.90	0.21

Figure 1: Table 2 .

3

Female	40s		50s		60s		70s		80s	
	Average	??	Average	??	Average	??	Average	??	Average	??
Age	44.85	2.65	55.08	2.95	65.02	3.00	73.84	2.77	82.50	2.46
Hight	156.21	10.80	157.30	5.44	174.61	169.53	151.48	6.46	149.02	6.68
Weight	55.26	11.65	68.28	74.94	54.65	10.21	59.21	36.86	53.38	12.22
Systolic blood pressure	122.59	22.51	131.95	20.20	135.20	19.31	144.80	20.63	149.70	16.81
Diastolic blood pressure	70.18	11.45	75.03	14.33	76.30	11.91	77.11	12.83	75.30	11.96
Olfactory test results	8.44	2.70	8.78	2.11	8.66	2.54	6.16	2.65	5.90	2.47
Salty taste test results	0.88	0.33	0.72	0.19	0.81	0.31	0.85	0.31	0.64	0.08
	40s		50s		60s		70s		80s	
Male	Average	??	Average	??	Average	??	Average	??	Average	??
Age	46.00	3.14	53.90	2.75	63.66	2.68	73.63	2.41	84.67	3.89
Hight	168.51	7.80	168.45	5.49	167.91	6.13	164.59	5.88	159.70	7.10
Weight	78.64	19.32	71.61	10.67	70.14	8.93	65.49	9.75	63.61	10.38
Systolic blood pressure	131.15	16.12	130.85	16.79	135.61	18.27	137.32	21.84	144.92	20.75
Diastolic blood pressure	77.8	17.2	79.9	10.6	79.8	9.2	76.7	12.9	72.9	13.8
Olfactory test results	6.38	2.53	8.15	2.43	6.61	3.03	5.72	3.06	3.58	2.87
Salty taste test results	0.89	0.41	0.81	0.28	0.91	0.36	0.89	0.41	0.97	0.46
		40s			50s				60s	
	2019		2022		2019	2022		2019	2022	
F-test		P=0.476			P=0.422				P=0.260	
unpaired-t test		P=0.611			p=0.272				p=0.326	
Mann-Whitney test										
		70s			80s				Total	
	2019		2022		2019	2022		2019	2022	
F-test		P=0.295			P=0.405				p=0.022	
unpaired-t test		P=0.086			p=0.756				p=0.134	
Mann-Whitney test										

Figure 2: Table 3 .

ï¼?”

	40s	50s	60s	
2019	2022	2019	2022 2019	2022
F-test	P=0.481	P=0.264	P=0.081	
unpaired-t test	P=0.199	p=0.306	p=0.082	
Mann-Whitney test				
	70s	80s	Total	
2019	2022	2019	2022 2019	2022
F-test	P=0.039*	P=0.293	p=0.119	
unpaired-t test		p=0.662	p=0.199	
Mann-Whitney test	p=0.063			

Figure 3: Table ï¼?” Age

?

Figure 4: Table ? Age

7

Table ? Hight Comparison Results for 2019 and 2022 Participants Female (169 in 2019, 202 in 2022)

	40s	50s	60s	
	2019	20222019	20222019	2022
F-test	P=0.0001**	P=0.263	P=0.443	
unpaired-t test		P=0.177	P=0.653	
Mann-Whitney test	P=0.987			
	70s	80s	Total	
	2019	20222019	20222019	2022
F-test	P=0.210	P=0.093	P=0.003**	
unpaired-t test	P=0.626	P=0.631		
Mann-Whitney test			P=0.311	

Table ? Hight Comparison Results for 2019 and 2022 Participants Male (129 in 2019, 142 in 2022)

	40s	50s	60s	
	2019	20222019	20222019	2022
F-test	P=0.063	P=0.262	P=0.392	
unpaired-t test	P=0.586	P=0.786	P=0.631	
Mann-Whitney test				
	70s	80s	Total	
	2019	20222019	20222019	2022
F-test	P=0.248	P=0.001**	P=0.115	
unpaired-t test	P=0.960		P=0.575	
Mann-Whitney test		P=0.235		

Figure 5: Table 7 .

10

Table ? Weight Comparison Results for 2019 and 2022 Participants Male (129 in 2019, 142 in 2022)

	40s		50s		60s	
2019	2022		2019	2022	2019	2022
F-test	P=0.049*		P=0.201		P=0.377	
unpaired-t test			P=0.928		P=0.544	
Mann-Whitney test	P=0.789					
	70s		80s		Total	
2019	2022		2019	2022	2019	2022
F-test	P=0.414		P=0.130		P=0.033**	
unpaired-t test	P=0.781		P=0.876			
Mann-Whitney test					P=0.776	
						Year
						2022
	40s		50s		60s	25
2019		2022	2019	2022	2019	2022
F-test	P=0.038*		P=0.453		P=0.455	
unpaired-t test			P=0.937		P=0.567	
Mann-Whitney test	P=0.552					
	70s		80s		Total	
2019		2022	2019	2022	2019	2022
F-test	P=0.147		P=0.193		P=0.363	
unpaired-t test	P=0.343		P=0.958		P=0.618	
Mann-Whitney test						

Figure 6: Table 10 Systolic

13

	40s	50s	60s	
2019	2022	2019	2022 2019	2022
F-test	P=0.286	P=0.343	P=0.346	
unpaired-t test	P=0.648	P=0.669	P=0.090	
Mann-Whitney test				
	70s	80s	Total	
2019	2022	2019	2022 2019	2022
F-test	P=0.119	P=0.172	P=0.438	
unpaired-t test	P=0.327	P=0.312	P=0.045*	
Mann-Whitney test				

?14 Olfactory test results Comparison Results for 2019 and 2022 Participants Female(169 in 2019, 202 in 20

	40s	50s	60s	
2019	2022	2019	2022 2019	2022
F-test	P=0.044*	P=0.170	P=0.284	
unpaired-t test		P=0.072	P=0.512	
Mann-Whitney test	P=0.257			
	70s	80s	Total	
2019	2022	2019	2022 2019	2022
F-test	P=0.130	P=0.432	P=0.006**	
unpaired-t test	P=0.024*	P=0.789		
Mann-Whitney test			P=0.001**	
	40s	50s	60s	
2019	2022	2019	2022 2019	2022
F-test	P=0.229	P=0.281	P=0.049*	
unpaired-t test	P=0.014*	P=0.971		
Mann-Whitney test			P=0.568	
	70s	80s	Total	
2019	2022	2019	2022 2019	2022
F-test	P=0.282	P=0.516	P=0.095	
unpaired-t test	P=0.315	P=0.138	P=0.005*	
Mann-Whitney test				

Figure 7: Table 13 Diastolic

15

Figure 8: Table 15

16

	40s	50s	60s	
2019	2022	2019	2022 2019	2022
F-test	P=0.305	P=0.001**	P=0.144	
unpaired-t test	P=0.985		P=0.501	
Mann-Whitney test		P=0.087		
	70s	80s	Total	
2019	2022	2019	2022 2019	2022
F-test	P=0.060	P=0.003**	p=0.001*	
unpaired-t test	P=0.482			
Mann-Whitney test		P=0.093	P=0.187	

Figure 9: Table 16

16

	40s	50s	60s	
2019	2022	2019	2022 2019	2022
F-test	P=0.261	P=0.019*	P=0.342	
unpaired-t test	P=0.962		P=0.807	
Mann-Whitney test		P=0.365		
	70s	80s	Total	
2019	2022	2019	2022 2019	2022
F-test	P=0.255	P=0.005*	P=0.265	
unpaired-t test	P=0.597		P=0.551	
Mann-Whitney test		P=0.585		

Figure 10: Table 16

17

Figure 11: Table 17

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