



Research Article

**QUESTIONNAIRE SURVEY RESULTS ON SWALLOWING IN YAKUMO TOWN
RESIDENT'S HEALTH EXAMINATION (2010)**

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ABSTRACT

Japan is a super-aging society and is making efforts to extend the healthy life expectancy of the elderly. In order to prevent under nutrition, frailty syndrome, and sarcopenia in the elderly, it is necessary to maintain the functions of mastication and swallowing. A Questionnaire survey on swallowing was conducted at the annual resident health checkup in Yakumo-cho, Hokkaido, Japan, where population migration is small. 159 males and 257 females answered 15 questions about swallowing function in a self-administered manner. Participants are independent Yakumo-cho residents over 40 years old. More than 70% of both males and females answered that there was no problem with all the questions. However, compared to females, males had poorer saliva output, and had difficulty breathing due to saliva, were statistically significantly. Also, compared to males, females had a throat problem was statistically significantly. In the future, it will be necessary to investigate lifestyle habits including eating habits and exercise habits to understand the swallowing function status.

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INTRODUCTION

Japan is a super-aging society. Therefore, prevention of various lifestyle-related diseases starting from the 40s is needed to extend the healthy life expectancy of Japanese people. Muscle weakness throughout the body causes flail and sarcopenia^{1,2)}, resulting in diminished swallowing function³⁾. Muscle atrophy caused by aging-related physiological phenomena, lack of exercise, and lack of nutrition⁴⁾. It has been pointed out that these causes may be related to changes in the central nervous system muscle fibers themselves, hormones and nutrition, and lifestyle habits^{5),6),7)}. Therefore, the purpose of this study was to conduct a questionnaire survey on swallowing at the annual resident health checkup in Yakumo-cho, Hokkaido, Japan, where population migration is small, and to understand the current situation regarding swallowing of residents in their 40s and over.

MATERIAL AND METHODS

Participants

A questionnaire survey was conducted among the participants of the Yakumo Town Residents' Health Examination, among the participants who consulted the otolaryngology department.

Questionnaire survey

There were a total of 15 items in the questionnaire survey on swallowing. The questionnaire was self-administered to the participants. The contents of the question show below.

1. Do you have a hard time chewing solid foods (apples, cookies, rice crackers, etc.)
2. Does food remain in the mouth (chin or back of tongue) or get caught in the upper jaw after swallowing?
3. When eating or drinking, can food or drink come out of your nose?
4. Can food that you chew well drip from your mouth?
5. Do you feel a lot of drooling? (Have you ever felt drooling or difficulty swallowing?)
6. Do you swallow well-chewed food several times as it passes through your throat?
7. Do you have a hard time swallowing solid food?
8. Do you have a hard time swallowing mashed food?
9. Do you feel like a lump of food is stuck in your throat while eating?
10. Do you cough when swallowing liquid?
11. Do you cough when swallowing solid foods?
12. Does your voice change immediately after eating or drinking? (For example, the voice withers, the voice becomes quiet, etc.)

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13. Can saliva enter the trachea and cause coughing or difficulty breathing except during meals (such as at night) ?
14. Do you have difficulty breathing while eating ?
15. Have you ever had pneumonia or bronchitis in the last year ?

RESULTS

Participants Age and Sex

The number of participants in the otolaryngology area of the Yakumo Town Residents Examination in 2010 was 159 males and 257 females (To see Table 1). Looking at the participants by age group, males were most likely to participate in their 60's (60 peoples), and females were most likely to be in their 60's (101 peoples).

Table 1. Age distribution of participant in Yakumo study 2010 years

	40's	50's	60's	70's	80's
Male (n=159)	11	25	60	45	19
Female (n=257)	28	65	101	55	8
Total (n=416)	39	90	161	100	27

Questionnaire survey results

As a result of asking Question 1 (Do you have a hard time chewing solid foods?) to the participants, more than 80% of both male and female answered that there was no problem. The average male response was 80.2% and the average female response was 87.6%. The mean female response was 7.4% higher than mean male response.

Table2. Do you have a hard time chewing solid foods(apples, cookies, rice crackers, etc.) ? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	24	86
50's (M=25, F=65)	23	92	57	88
60's (M=60, F=101)	46	77	89	88
70's (M=45, F=55)	27	60	42	76
80's (M=18, F=8)	13	72	8	100
Average	24.0	80.2	44.0	87.6
Standard deviation	14.0	15.9	31.2	8.5
Unpaired t-test	P<0.3869			

As a result of asking Question 2 (Dose food remain in the mouth or get caught in the upper jaw after swallowing?) to the participants, more than 70% of both male and female answered that there was no problem. The average male response was 71.6% and the average female response was 79.8%. The mean female response was 8.2% higher than mean male response.

Table3. Does food remain in the mouth (chin or back of tongue) or get caught in the upper jaw after swallowing ? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	8	73	26	93
50's (M=25, F=65)	21	84	54	83
60's (M=60, F=101)	44	73	78	77
70's (M=45, F=55)	35	78	40	73
80's (M=18, F=8)	9	50	5	73
Average	23.4	71.6	40.6	79.8
Standard deviation	15.9	12.9	27.7	8.4
Unpaired t-test	P<0.2682			

As a result of asking Question 3 (When eating or drinking, can food or drink come out of your nose?) to the participants, more

than 90% of both male and female answered that there was no problem. The average male response was 96.0% and the average female response was 94.8%. The mean male response was 1.2% higher than mean female response.

Table4. When eating or drinking, can food or drink come out of your nose ? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	28	100
50's (M=25, F=65)	24	96	62	95
60's (M=60, F=101)	56	93	97	96
70's (M=45, F=55)	41	91	52	95
80's (M=18, F=8)	18	100	7	88
Average	30.0	96.0	49.2	94.8
Standard deviation	18.3	4.1	34.2	4.3
Unpaired t-test	P<0.6631			

As a result of asking Question 4 (Can food what you chew well drips form your mouth?) to the participants, more than 90% of both male and female answered that there was no problem. The average male response was 93.4% and the average female response was 91.4%. The mean male response was 2.0% higher than mean female response.

Table5. Can food what you chew well drips form your mouth ? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	26	89
50's (M=25, F=65)	24	96	65	100
60's (M=60, F=101)	58	97	99	98
70's (M=45, F=55)	41	91	52	95
80's (M=18, F=8)	15	83	6	75
Average	29.8	93.4	49.6	91.4
Standard deviation	19.5	6.7	35.9	10.1
Unpaired t-test	P<0.7025			

As a result of asking Question 5 (Do you feel a lot of drooling?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 86.2% and the average female response was 95.4%. The mean female response was 9.2% higher than mean male response.

Table6. Do you feel a lot of drooling ? (Have you ever felt drooling or difficult ot swallow ?) 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	9	82	25	89
50's (M=25, F=65)	24	96	65	100
60's (M=60, F=101)	53	88	94	93
70's (M=45, F=55)	39	87	52	95
80's (M=18, F=8)	14	78	8	100
Average	27.8	86.2	48.8	95.4
Standard deviation	18.2	6.8	33.7	4.7
Unpaired t-test	P<0.0378*			

As a result of asking Question 6 (Do you swallow well-chewed food several times as it passes through your throat?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 87.6% and the average female response was 89.4%. The mean female response was 1.8% higher than mean male response.

Table7. Do you swallow well-chewed food several times as it passes through your throatか? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	10	91	27	96
50's (M=25, F=65)	23	92	56	86
60's (M=60, F=101)	53	88	93	92
70's (M=45, F=55)	40	89	47	85
80's (M=18, F=8)	14	78	7	88
Average	28.0	87.6	46.0	89.4
Standard deviation	18.1	5.6	32.4	4.6
Unpaired t-test	P<0.5924			

As a result of asking Question 7 (Do you have a hard time swallowing solid food?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 87.8% and the average female response was 94.2%. The mean female response was 6.4% higher than mean male response.

Table8. Do you have a hard time swallowing solid food? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	26	93
50's (M=25, F=65)	21	84	61	94
60's (M=60, F=101)	54	90	94	93
70's (M=45, F=55)	37	82	50	91
80's (M=18, F=8)	15	83	8	100
Average	27.6	87.8	47.8	94.2
Standard deviation	17.8	7.5	33.1	3.4
Unpaired t-test	P<0.1206			

As a result of asking Question 8 (Do you have a hard time swallowing mashed food?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 85.8% and the average female response was 96.2%. The mean female response was 10.4% higher than mean male response.

Table9. Do you have a hard time swallowing mashed food? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	28	100
50's (M=25, F=65)	25	100	63	97
60's (M=60, F=101)	58	97	101	100
70's (M=45, F=55)	42	93	53	96
80's (M=18, F=8)	7	39	7	88
Average	28.6	85.8	50.4	96.2
Standard deviation	21.4	26.3	35.7	4.9
Unpaired t-test	P<0.4104			

As a result of asking Question 9 (Do you feel like a lump of food itch in your throat while eating?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 90.6% and the average female response was 81.8%. The mean male response was 8.8% higher than mean female response.

Table10. Do you feel like a lump of food itch in your throat while eatingか? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	10	91	23	79
50's (M=25, F=65)	23	92	57	88
60's (M=60, F=101)	54	90	86	85
70's (M=45, F=55)	41	91	45	82
80's (M=18, F=8)	16	89	6	75
Average	28.8	90.6	43.4	81.8
Standard deviation	18.3	1.1	30.9	5.1
Unpaired t-test	P<0.0053**			

As a result of asking Question 10 (Do you cough when swallowing liquid?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 87.6% and the average female response was 89.8%. The mean female response was 2.2% higher than mean male response.

Table11. Do you cough when swallowing liquidか? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	10	91	25	89
50's (M=25, F=65)	23	92	59	91
60's (M=60, F=101)	53	88	90	89
70's (M=45, F=55)	38	84	44	80
80's (M=18, F=8)	15	83	8	100
Average	27.8	87.6	45.2	89.8
Standard deviation	17.6	4.0	31.6	7.1
Unpaired t-test	P<0.5645			

As a result of asking Question 11 (Do you cough when swallowing solid foods?) to the participants, more than 85% of both male and female answered that there was no problem. The average male response was 88.4% and the average female response was 90.8%. The mean female response was 2.4% higher than mean male response.

Table12. Do you cough when swallowing solid foods? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	10	91	27	96
50's (M=25, F=65)	23	92	63	67
60's (M=60, F=101)	55	92	99	98
70's (M=45, F=55)	40	89	51	93
80's (M=18, F=8)	14	78	8	100
Average	28.4	88.4	49.6	90.8
Standard deviation	18.8	5.9	34.9	13.6
Unpaired t-test	P<0.7263			

As a result of asking Question 12 (Does your voice change immediately after eating or drinking?) to the participants, more than 70% of both male and female answered that there was no problem. The average male response was 87.6% and the average female response was 96.8%. The mean female response was 9.2% higher than mean male response.

Table13. Does your voice change immediately after eating or drinking? (For example, the voice withers, the voice becomes quiet, etc.) 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	27	96
50's (M=25, F=65)	19	76	64	98
60's (M=60, F=101)	46	77	100	99
70's (M=45, F=55)	41	91	50	91
80's (M=18, F=8)	17	94	8	100
Average	26.8	87.6	49.8	96.8
Standard deviation	15.6	10.6	35.3	3.6
Unpaired t-test	P<0.1042			

As a result of asking Question 13 (Can saliva enter the trachea and cause coughing or difficulty breathing except during meals?) to the participants, more than 79% of both male and female answered that there was no problem. The average male response was 79.4% and the average female response was 87.4%. The mean female response was 8.0% higher than mean male response.

Table14. Can saliva enter the trachea and cause coughing or difficulty breathing except during meals (such as at night) ? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	9	82	25	89
50's (M=25, F=65)	19	76	56	86
60's (M=60, F=101)	46	77	97	96
70's (M=45, F=55)	38	84	43	78
80's (M=18, F=8)	14	78	7	88
Average	25.2	79.4	45.6	87.4
Standard deviation	16.0	3.4	34.2	6.5
Unpaired t-test	P<0.0404*			

As a result of asking Question 14 (Do you have difficulty breathing while eating?) to the participants, more than 90% of both male and female answered that there was no problem. The average male response was 94.6% and the average female response was 95.0%. The mean female response was 0.4% higher than mean male response.

Table15. Do you have difficulty breathing while eating? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	10	91	28	100
50's (M=25, F=65)	24	96	64	98
60's (M=60, F=101)	54	90	97	96
70's (M=45, F=55)	43	96	51	93
80's (M=18, F=8)	18	100	7	88
Average	29.8	94.6	49.4	95.0
Standard deviation	18.2	4.1	34.4	4.7
Unpaired t-test	P<0.8894			

As a result of asking Question 15 (Have you ever had pneumonia or bronchitis in the last year?) to the participants, more than 95% of both male and female answered that there was no problem. The average male response was 96.4% and the average female response was 97.2%. The mean female response was 0.8% higher than mean male response.

Table16. Have you ever had pneumonia or bronchitis in the last year ? 2010

	Male (n=159)		Female (n=257)	
	No	%	No	%
40's (M=11, F=28)	11	100	27	96
50's (M=25, F=65)	24	96	64	98
60's (M=60, F=101)	54	90	97	96
70's (M=45, F=55)	43	96	53	96
80's (M=18, F=8)	18	100	8	100
Average	30.0	96.4	49.8	97.2
Standard deviation	17.9	4.1	34.3	1.8
Unpaired t-test	P<0.6996			

DISCUSSION

The results of a questionnaire survey on swallowing by residents of Yakumo Town who participated in the residents' health examination showed that the average value of both males and females exceeded 70% in all 15 questionnaires. Participants aged 40 and over who were able to live independently and walk to the examination site were shown to maintain swallowing function as they grew older. However, comparing the results of the questionnaire survey of males and females, males have poorer saliva output than females (Table 6. Unpaired t-test P<0.05), and males saliva may make breathing difficult than females (Table 14, unpaired t-test P<0.05). Also, females have problem of throaty than males (Table 10, unpaired t-test P<0.01). In the future, it will be possible to clarify the relationship between malnutrition and masticatory power and swallowing function by investigating lifestyle-related habits (including exercise^{8),9),10)} and eating habits.

CONCLUSION

In Yakumo-cho, Hokkaido, Japan, where the population is a little moving, a questionnaire survey on swallowing was conducted at the time of the residents' health examination. As a result, questionnaire results were obtained from 159 male and 257 female participants. The questionnaire consisted of 15 items, and more than 70% of both males and females answered that there was no problem with swallowing function in all questions. However, it was statistically significantly worse for males than for females in terms of saliva output, and saliva making breathing difficult. Also, it was statistically significantly worse for females than for males in terms of throaty. In the future, we would like to investigate lifestyle habits including eating habits and exercise to understand the swallowing function status.

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References

1. Chen LK, Liu LK, Woo J, *et al.* Sarcopenia in Asia: consensus report of the Asian Working Group for Sarcopenia. *JAM Med Dir Assoc* 2014; 15: 95-101.
2. Anker SD, Morley JE, von Haehling s. Welcome to the ICD-10 code for sarcopenia. *J Cachexia Sarcopenia*

- Muscle 2016; 7: 512-514.
3. Veldee MS, Peth LD. Can protein-calorie malnutrition cause dysphagia? *Dysphagia* 1992; 7: 86-101.
 4. Hudson HM, Daubert CR, Mills RH. The interdependency of protein-energy malnutrition, aging, and dysphagia. *Dysphagia* 2000; 15: 31-38.
 5. Rogers MA, Evans WJ. Changes in skeletal muscle with aging: effects of exercise training. *Exerc Sport Sci Rev* 1993; 21: 65-102.
 6. Roubenoff R, Hughes VA. Sarcopenia: current concepts. *J Gerontol A Biol Sci Med Sci* 2000; 55: M716-724.
 7. Carmeli E, Coleman R, Reznick AZ. The biochemistry of aging muscle. *Exp Gerontol* 2002; 37: 477-489.
 8. Shaker R, Kern M, Bardan E, *et al.* Augmentation of deglutitive upper esophageal sphincter opening in the elderly by exercise. *Am J Physiol* 1997; 272: G1518-1522.
 9. Autunes EB, Lunet N. Effects of the head lift exercise on the swallow function: a systematic review. *Gerodontology* 2012; 29: 247-257.
 10. Robbins J, Gangnon RE, Theis SM, Kays SA, Hewitt AL, Hind JA. The effects of lingual exercise on swallowing in older adults. *J Am Geriatr Soc* 2005; 53: 1483-1489.

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