The Third Molar Agenesis in Japanese Adolescents

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Abstract Third year high school students of Numatate (Akita Prefecture) and Tanegasima (Kagosima Prefecture) were examined by direct inspection and by study of casts and two-dimensional roentgenographic cephalograms as a part of an epidemiological survey. Samples consisted of 401 subjects ranging from 17 years 3 months to 18 years 11 months old. There were no significant differences in incidence of third molar agenesis between left and right side. Also, no significant differences were found in incidence of each type of third molar agenesis between local samples and between sexes. No significant difference in the incidence of individuals with fully erupted, partly erupted and impacted third molar was seen between local samples and between sexes. The third molars in 71.9% of the subjects without agenesis were impacted. One or more third molars were missing in 43.1% of subjects. This is higher than any of the rate for other populations so far reported.

INTRODUCTION

Materials were collected to find the basic morphological conditions of the dento-facial complex of Japanese adolescents in order to establish preventive procedures to treat the abnormal occlusions which seem to prevail in the present younger Japanese generation. Third molar agenesis was one phase of the investigation based on these materials.

MATERIALS AND METHOD

Third year high school students at Tanegasima (Kagosima sample) and Nu-

matate (Akita sample) were examined by direct inspection and by study of casts taken by alginate impression and two-dimensional roentgenographic cephalograms.

The presence or absence and the eruption or impaction of the third molars were determined by cross examination of two investigators.

Samples consisted of 401 individuals. The mean ages of two local samples were 17 years 9 months for both sexes, ranging from 17 years 3 months to 18 years 11 months for male and 17 years 3 months to 18 years 6 months for female in Kagosima sample, and from 17 years 4 months to 18 years 6 months for male and 17 years 4 months to 18 years 4 months for female in Akita sample.

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Table 1 Incidence of third molar agenesis in each quadrant.

Agenesis		Kagosima				Akita				Total	
		Male		Female		Male		Female			
		n	%	n	%	n	%	n	%	n	%
None	$\frac{MM}{MM}$	62	62.0	56	51.4	53	53.5	57	61.3	228	56.9
One	$\frac{M}{MM}$	5	5.0	2	1.8	2	2.0	4	4.3	13	3.2
	$\frac{M}{MM}$	3	3.0	3	2.8	4	4.0	3	3.2	13	3.2
	$\frac{MM}{M}$	2	2.0	3	2.8	3	3.0	0	0.0	8	2.0
	$\frac{MM}{M}$	2	2.0	3	2.8	3	3.0	0	0.0	8	2.0
	$\frac{MM}{M}$	2	2.0	3	2.8	3	3.0	0	0.0	8	2.0
Two	$\frac{MM}{MM}$	5	5.0	15	13.8	10	10.1	11	11.8	41	10.2
	$\frac{MM}{MM}$	2	2.0	7	6.4	4	4.0	1	1.1	14	3.5
	$\frac{M}{M}$	0	0.0	0	0.0	1	1.0	0	0.0	1	0.2
	$\frac{M}{M}$	0	0.0	1	0.9	0	0.0	1	1.1	2	0.5
	$\frac{M}{M}$	0	0.0	1	0.9	0	0.0	1	1.1	2	0.5
	$\frac{M}{M}$	0	0.0	0	0.0	1	1.0	1	1.1	2	0.5
	$\frac{M}{M}$	0	0.0	0	0.0	1	1.0	1	1.1	2	0.5
Three	$\frac{M}{M}$	2	2.0	1	0.9	3	3.0	0	0.0	6	1.5
	$\frac{M}{M}$	1	1.0	2	1.8	2	2.0	1	1.1	6	1.5
	$\frac{M}{M}$	4	4.0	3	2.8	2	2.0	1	1.1	10	2.5
	$\frac{M}{M}$	3	3.0	0	0.0	2	2.0	0	0.0	5	1.2
Four	$\frac{M}{M}$	9	9.0	12	11.0	9	9.1	12	12.9	42	10.5
Total		100	100.0	109	100.0	99	99.7	93	100.1	401	99.9

RESULTS

The incidences of third molar agenesis in each of the four quadrants for each local sample and each sex are shown in Table 1. There were no significant differences in incidence between the unilateral types in each one, two and three agenesis

in the samples pooled areas and sexes. Therefore, for further analysis, the left and right sides have been combined to show only the number of third molars in the mandible and maxilla.

There were no significant differences in incidence between local samples and sexes in each type of agenesis as shown

Table 2. Incidence of third molar agenesis in each sex and in each local sample.

	Males				Females				Total	
	Kagosima		Akita		Kagosima		Akita			
	n	%	n	%	n	%	n	%	n	%
$\frac{2}{2}$	62	62.0	53	53.5	56	51.4	57	61.3	228	56.9
$\frac{1}{2}$	8	8.0	6	6.1	5	4.6	7	7.5	26	6.5
$\frac{2}{1}$	4	4.0	6	6.1	6	5.5	0	0	16	4.0
$\frac{0}{2}$	5	5.0	10	10.1	15	13.8	11	11.8	41	10.2
$\frac{2}{0}$	2	2.0	4	4.0	7	6.4	1	1.1	14	3.5
$\frac{1}{1}$	0	0	2	2.0	2	1.8	3	3.2	7	1.7
$\frac{0}{1}$	3	3.0	5	5.1	3	2.8	1	1.1	12	3.0
$\frac{1}{0}$	7	7.0	4	4.0	3	2.8	1	1.1	15	3.7
$\frac{0}{0}$	9	9.0	9	9.1	12	11.0	12	12.9	42	10.5
Total	100	100.0	99	100.0	109	100.1	93	100.0	401	100.0

Table 3. Incidence of Individuals with fully erupted, partly erupted and impacted third molars.

	Kagosima				Akita				Total	
	Male		Female		Male		Female			
	n	%	n	%	n	%	n	%	n	%
Fully erupted	6	6.6	3	3.1	1	1.1	4	4.9	14	3.9
Partly erupted	20	22.0	18	18.6	28	31.1	21	26.0	87	24.2
Impacted	65	71.4	76	78.4	61	67.8	56	69.1	258	71.9
Total	91	100.0	97	100.1	90	100.0	81	100.0	359	100.0

in Table 2, where the numerator indicated the maxilla and the denominator indicated the mandible. A 2 indicates no agenesis; 1 indicates one agenesis (either left or right side); and 0 indicates two agenesis.

The incidence of two agenesis in the maxilla (0/2) was significantly higher

than that of two agenesis in the mandible (2/0) ($P < 0.01$) though no significant differences were found in unilateral types such as one agenesis (1/2 and 2/1) and three agenesis (0/1 and 1/0) between maxilla and mandible.

No significant difference in the incidence of individuals with fully erupted,

Table 4. Comparison of incidence (%) of third molar agenesis.

Ages: Year: Sex:	Present Study		Kasai	
	17y3m-18y11m		16-35yrs	
	1966-67		1959	
	M	F	M	F
Number:	199	202	1587	1185
$\frac{2}{2}$	57.8	55.9	64.1	58.5
$\frac{1}{2}$	7.0	5.9	7.6	6.2
$\frac{2}{1}$	5.0	3.0	5.3	5.4
$\frac{0}{2}$	7.5	12.9	7.8	10.9
$\frac{2}{0}$	3.0	4.0	3.7	3.3
$\frac{1}{1}$	1.0	2.5	1.9	2.2
$\frac{0}{1}$	4.0	2.0	2.2	3.5
$\frac{1}{0}$	5.5	2.0	1.9	1.9
$\frac{0}{0}$	9.0	11.9	5.6	8.2
Total	99.8	100.1	100.1	100.1

partly erupted and impacted third molar was seen between local samples and between sexes. The third molars in 71.9 % of the subjects without agenesis were impacted in this age category (Table 3).

One or more third molars were missing in 43.1% of 401 subjects. This is higher than any of the rates for other populations so far reported (Table 4).

DISCUSSION

The third molars were equally likely to be missing on either side as shown in Table 1. The incidences of one agenesis both in maxilla and mandible on the left side show exactly the same rate as those on the right side in the samples pooled for areas and sexes.

No significant differences were found in incidence between local samples for type of agenesis and sexes as shown in Table 2.

Insignificant differences in incidence between local samples, despite the geographical distance—the one from southern island and the other from northern mainland of Japan, about 2,000 km apart—seem to indicate the homogeneity of the Japanese population.

No significant sexual differences were found in incidence in each type of agenesis in each local sample and in individuals with fully erupted, partly erupted and impacted third molar. The full eruption category includes those in whom all third molars are fully erupted judging

from the casts. Impaction includes those in whom one or more third molars are recognized on cephalograms but none of them appear on the casts. The partly erupted group indicates the others.

Table 4 compares the results of the present study with those obtained by KASAI (1959). The present study found a higher proportion of subjects with one or more agenesis than did KASAI though the difference was borderline significance ($P=0.06$). However, the incidence of four agenesis (0/0) in the present study, 10.5%, was significantly higher than that of KASAI ($P<0.01$). According to him, x-ray inspection was made only for the subjects who had no third molar through usual inspection. Ages of subjects varied widely ranging from 16 to 35 years old. In the present study, the third molars in 71.9% of the subjects without agenesis were impacted. Consequently the chance of misreading as being congenitally missing instead of having been extracted were considered to be low.

One or more third molars were missing in 43.1% of 401 subjects. This is higher than any of the rates for other populations reported by BROTHWELL *et al* (1923). They reported that the incidence of one or more third molar agenesis ranged from 9.0 to 25.0% in Europeans, from 0.2 to 11.0% in Negros, from 1.5 (Australians) to 32.3 (Chinese) in East Asians and Oceanians, and from 12.6 to 26.6% in Arctic and American Mongoloids.

Besides third molar, two cases of fourth molars were found on cephalogram from Kagosima and Akita samples. Both

were found in maxilla as KOGANEI (1934) described the fourth molar to be seldom found in mandible. Also, bilateral congenital missing of first molar in maxilla was suspected on one female of the Kagosima sample.

CONCLUSION

A high rate of third molar agenesis was found among 401 Japanese adolescents, ranging from 17 years 3 months to 18 years 11 months old. One or more third molars were missing in 43.1% of the subjects confirmed on casts and two-dimensional roentgenographic cephalograms by cross examination of two investigators. This is higher than any of the rates for other populations in the literature. Among the subjects, 10.5% had no third molars.

The third molars were equally likely to be missing on either side but were more likely to be missing bilaterally from the maxilla than the mandible.

No significant differences were found in incidence of each type of the third molar agenesis between local samples and between sexes.

No significant difference in the incidence of individuals with fully erupted, partly erupted and impacted third molar was seen between local samples and between sexes. The third molars of 71.9% of the subjects without agenesis were impacted in this age category.

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日本人青年の第三大臼歯

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異常咬合の疫学的調査の一環として、南北二点の公立高等学校（秋田県立沼館高校と鹿児島県立種子島高校）を選び、三年生全員の口腔診査、アルジネート印象材による硬石膏歯牙模型作製、正側二面の頭部X線規格写真撮影を行った。対象は、男女ほぼ100名ずつの計401名、平均年齢は17才9月（17才3月—18才11月）である。

第三大臼歯の先天的欠如率に左右差を認めなかった。それぞれの欠如型の頻度に対する、有意の地域差、性差ともに認めることができなかった。第三大臼歯の萌出、半萌出、埋伏の頻度についても、地域差、性差を認めなかった。第三大臼歯を持つ者の71.9%の男女の第三大臼歯は、すべて埋伏していた。

一歯以上の第三大臼歯を先天的に欠如している者は、対象の43.1%を占めていた。これは、今まで報告されているどの集団の欠如率よりも高率である。