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Association between Adult's Height and Dentition Status: JPHC Oral Health Study

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ABSTRACT

Objectives: Adult height is reported to be related with the risk of various diseases. Some previous studies also suggest a possible link between height and oral health, but no study has been conducted in Japan. The current study aimed at examining if height was linked with the dentition status in Japanese adults. **Methods:** The subjects were 1,214 adults(mean age: 65.5 ±5.76 years, men: 565, women: 649) who lived in Akita Prefecture, Japan. A self-complete questionnaire survey and clinical dental examination were conducted. **Results:** After adjustment for confounding variables, the number of total teeth (p for trend =0.022), and the sub-categories of anterior (p for trend=0.040) or posterior teeth (p for trend =0.027) significantly increased with an increment of height in men. The increasing trend of prevalence of having fewer than 24 teeth with the decrease of height was not significant but approached the significant level (p for trend=0.073). There was not a significant relationship between height and prevalence of subjects who were edentate. On the other hand, no corresponding significant associations between height and dentition status were found in women. **Conclusion**: A potential positive relationship between adult height and the number of teeth was suggested in men. The current findings imply the importance to promote both oral and general health by improving nutrition and diet as well as preventing and treating problems or diseases at an early age, in achieving good oral health later in life.

Keywords: Dental caries, Dentition status, Height, Oral health, Periodontal disease.

Introduction

Height is determined by many factors including hereditary predisposition, nutrition, insulin or insulin-like growth factor 1, and socioeconomic circumstances, during the period from the fetus to adolescence [1-5]. A person's height is considered a surrogate measure of early childhood development, and has been used as an index presenting physical and social conditions of the person in epidemiological studies [6].Adult height is reported to be related with the risk of various diseases. It has been shown that tall-stature has an associated increasing risk of cancer mortality such as colorectal cancer or breast cancer [1,7,8]. In contrast, adult height was inversely related to the risk of cardiovascular disease; taller-statured adults had lower risk [1,9,10].Height also has a close relationship with growth, development and eruption of teeth [11,12]. As is the case with systemic disease, there are reports that investigated the link between height and oral health. Many researches have been performed regarding the relationship of height with dental caries among children and adolescents [13,14]. Most studies indicate that taller-statured persons tend to have lower risk of dental caries both in primary and permanent teeth,while some reports do not find any relationship [15,16].Compared to studies in children or adolescents, reports in adults, especially investigations for the association of height with periodontal disease, or

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number of teeth, are scarce. A study conducted on 80 years revealed that shorter-statured adults had more periodontal diseases, and lower number of teeth, than taller-statured adults [17]. A study that analyzed the Korea National Health and Nutritional Examination Survey 2008-2011 showed a close link of height with tooth loss in 50,405 subjects, with shorter-statured adults having a greater risk of losing 8 or greater number of teeth and higher proportions of edentulousness than taller-statured adults [18]. Although research has suggested a possible link between height and dental diseases among the younger population, very few studies have been carried out in adults. In particular, no studies have been performed in Japan, therefore it is necessary to test whether the association of height with oral health is observed among Japanese adults. A hypothesis was that shorter-statured Japanese adults would have a fewer number of teeth than taller-statured Japanese. The objective in this study was to examine if height was linked with the number of teeth, an endpoint of dentition status, in Japanese adults.

Materials and Methods

Study subjects

The Japan Public Health Center (JPHC) based Study Cohort I was initiated in 1990 for the purpose of longitudinally monitoring the incidence rates as well as mortality of lifestyle-related diseases like cancer, coronary heart disease and stroke in a sample of large number of people in Japan. An oral health study was conducted in the jurisdiction of Yokote health center, Akita Prefecture, one of the JPHC Study Cohort I areas, in 2005. Recruitment of subjects for the oral health study was implemented by distributing letters of invitation addressing a protocol of the study to 15,782 residents between the ages 55 and 75 years as of May, 2005, who also participated in the JPHC Study Cohort I in 1990. During the period of July 2005 to January 2006, 1,518 residents responded a dental health related self-complete questionnaire and had a dental examination. After excluding subjects with missing data, 1,214 adults (mean age: 65.5 ±5.76 years, men: 565, women: 649) were used for the present analysis.The ethical approval of the study was given by the National Cancer Center Ethical Review Committee as well as the Ethical Review Board of Tokyo Medical and Dental University (Approval Number 833).

Sociodemographic and health relevant information

A self-complete questionnaire used in the JPHC Study Cohort I in 1990 collected data on sociodemographic (sex, age, and educational level) and health relevant information (smoking status, with or without a diabetes history, BMI, alcohol intake, self-perceived stress, and parity). The educational level was categorized as ‘low (junior high school)’, ‘middle (senior high school)’, or ‘high (any college or higher education)’. A smoking status was classified into ‘non-smoker’, ‘past smoker’ or ‘current smoker’, and the BMI was computed with an algebraic expression [weight (kg)/height^2 (m)]. The amount of alcohol intake was divided into ‘nondrinkers or former drinkers’, ‘less than weekly’, ‘<150 g/week’, ‘150−299 g/week’, ‘300−449 g/week’, or ‘≥450 g/week’. The self-perceived stress was divided into ‘low', ‘moderate’ or ‘high’, and parity, only applied to women, into five categories: 0, 1, 2, 3 or 4 and more.

Height

Subjects’ height was self-reported and obtained from the questionnaire used in the JPHC Study Cohort I conducted in 1990. A height was then divided into quintiles for men and women, separately.

Dental health relevant information

The dental health related questionnaire in 2005 collected information about the frequency of consumption of sweet snacks or drinks (rarely, sometimes, or every day) and whether subjects had a family dentist (yes or no). A standardized clinical dental examination that assessed the dentition status (except third molars), was also conducted by 43 dentists in 2005. Calibration and training of the participating dentists were performed prior to the clinical dental examinations following the World Health Organization guidelines [19].Dental hygiene of teeth and prostheses were assessed by inspecting all teeth and prostheses visually. Following scores: 1) good - less than one-third of tooth surfaces covered by plaque; 2) fair - more than one-third but less than two-thirds of tooth surfaces covered by plaque; and 3) poor - more than two-thirds of tooth surfaces covered by plaque, were used for the assessment.

Statistical analysis

All statistical analyses were conducted according to the sex. Linear trends of height with demographic, health and dental health related variables were tested using the linear regression for quantitative data and the Mantel-Haenzel’s chi-square statistics for qualitative data. Associations between height and numbers of teeth were analyzed by a generalized linear model, and prevalence of subjects with fewer than 24 teeth and those with edentate by a logistic regression, adjusting for age, educational level, smoking status, diabetes history, BMI, alcohol intake, self-perceived stress,

parity (women only), sweet snacks, sweet drinks, family dentist and dental hygiene. The analytical procedures were performed with the IBM® SPSS® 23.0 (IBM Japan Corp., Tokyo, Japan).

Results

Sociodemographic, health and dental health relevant information according to height

Mean heights were 164.7 (SD: 6.07) cm in men, and 152.6 (SD: 5.15) cm in women. The quintile (Q) heights according to sex were Q1 (≤159 cm), Q2 (160-162 cm), Q3 (163-165 cm), Q4 (166-169 cm) and Q5 (≥170 cm) in men, and Q1 (≤148 cm), Q2 (149-151 cm), Q3 (152-154 cm), Q4 (155-157 cm) and Q5 (≥158 cm) in women, respectively (Table 1). Mean age was younger (p for trend <0.001 in men and p for trend <0.001 in women), and proportion of high educational level was larger in taller-statured subjects (p for trend <0.001 in men and p for trend <0.001 in women). A proportion of current smokers was smaller in short-statured men (p for trend =0.022). BMI became smaller (p for trend =0.004), and dental hygiene better (p for trend =0.007), as the height incremented in women. Diabetes history, alcohol intake, self-perceived stress, parity, sweet snacks, sweet drinks, and family dentist had no significant relationships to height in either men or women.

Association of height with number of teeth

In men, after adjustment for age, significant linear trends were detected in the number of total teeth (p for trend=0.006), and the sub-categories of anterior (p for trend=0.011) as well as posterior teeth (p for trend=0.009), by height (Table 2). The numbers of all those teeth increased with the rise of height. This relationship persisted after adjustment for educational level, smoking status, diabetes history, BMI, alcohol intake, self-perceived stress, sweet snacks, sweet drinks, family dentist and dental hygiene. Number of total teeth (p for trend =0.022), the anterior (p for trend =0.040) and posterior sub-categories (p for trend =0.027) increased with the increment in height in men. On the other hand, no corresponding significant associations, between numbers of teeth and height, were found in women.

Association of height with prevalence of subjects with fewer than 24 teeth and those who are edentate

After adjustment for age in men, the OR for prevalence of subjects with fewer than 24 teeth was significantly associated with height (p for trend=0.028) (Table 3). The risk of having fewer than 24 teeth decreased with the rise of height. The subjects in the highest quintile heightshowed a significantly lower risk of fewer than 24 teeth (OR=0.55, CI: 0.31-0.99) in comparison with those in the lowest quintile height. By additionally adjusting for educational level, smoking status, diabetes history, BMI, alcohol intake, self-perceived stress, sweet snacks, sweet drinks, family dentist and dental hygiene besides age, the trend was not significant but approached the significant level of 0.05 (p for trend=0.073). There was not a significant relationship between height and prevalence of subjects who were edentate. For women, neither the prevalence of subjects with fewer than 24 teeth nor for those who were edentate was significantly linked with height.

Table 1: Characteristics according to height (men: n=565, women: n=649)

		Height					
		Q1	Q2	Q3	Q4	Q5	P for trend
Men, n		88	98	134	127	118	
Age, mean (SD)		68.0 (4.65)	66.4 (5.50)	65.4 (6.13)	64.4 (5.54)	64.8(5.90)	<0.001
Educational level, n (%)	Low	43 (48.9)	37 (37.8)	37 (27.6)	28 (22.0)	26 (22.0)	<0.001
	Middle	36 (40.9)	44 (44.9)	75 (56.0)	71 (55.9)	60 (50.8)	
	High	9 (10.2)	17 (17.3)	22 (16.4)	28 (22.0)	32 (27.1)	
Smoking status, n (%)	Non smoker	42 (47.7)	41 (41.8)	40 (29.9)	40 (31.5)	40 (33.9)	0.022
	Past smoker	30 (34.1)	36 (36.7)	56 (41.8)	57 (44.9)	46 (39.0)	
	Current smoker	16 (18.2)	21 (21.4)	38 (28.4)	30 (23.6)	32 (27.1)	
Diabetes history, n (%)	Yes	5 (5.7)	4 (4.1)	8 (6.0)	6 (4.7)	2 (1.7)	0.231
BMI, mean (SD)		23.7 (2.73)	23.3 (2.44)	23.3 (2.64)	23.6 (2.77)	23.1 (2.61)	0.240

Alcohol intake, n (%)	>450g/week	37 (42.0)	39 (39.8)	58 (43.3)	57 (44.9)	47 (39.8)	0.261
Self-perceived stress, n (%)	High	18 (20.5)	30 (30.6)	50 (37.3)	51 (40.2)	34 (28.8)	0.118
Sweet snacks, n (%)	Rarely	20 (22.7)	15 (15.3)	26 (19.4)	23 (18.1)	20 (16.9)	0.959
	Sometimes	54 (61.4)	59 (60.2)	82 (61.2)	83 (65.4)	79 (66.9)	
	Everyday	14 (15.9)	24 (24.5)	26 (19.4)	21 (16.5)	19 (16.1)	
Sweet drinks, n (%)	Rarely	27 (30.7)	29 (29.6)	35 (26.1)	42 (33.1)	48 (40.7)	0.216
	Sometimes	41 (46.6)	49 (50.0)	64 (47.8)	64 (50.4)	42 (35.6)	
	Everyday	20 (22.7)	20 (20.4)	35 (26.1)	21 (16.5)	28 (23.7)	
Family dentist, n (%)	Yes	78 (88.6)	87 (88.8)	114 (85.1)	108 (85.0)	100 (84.7)	0.292
Dental hygiene, n (%)	Good	11 (12.5)	15 (15.3)	12 (9.0)	17 (13.4)	13 (11.0)	0.389
	Fair	49 (55.7)	55 (56.1)	94 (70.1)	81 (63.9)	77 (65.3)	
	Poor	28 (31.8)	28 (28.6)	28 (20.9)	29 (22.8)	28 (23.7)	
Women, n		137	132	157	120	103	
Age, mean (SD)		67.4 (5.39)	65.8 (5.82)	65.5 (5.67)	63.6 (5.65)	63.8(5.56)	<0.001
Educational level, n (%)	Low	73 (53.3)	52 (39.4)	59 (37.6)	30 (25.0)	17 (16.5)	<0.001
	Middle	50 (36.5)	63 (47.7)	71 (45.2)	71 (59.2)	64 (62.1)	
	High	14 (10.2)	17 (12.9)	27 (17.2)	19 (15.8)	22 (21.4)	
Smoking status	Non smoker	134 (97.8)	128 (97.0)	155 (98.7)	118 (98.3)	97 (94.2)	0.292
	Past smoker	1 (0.7)	3 (2.3)	1 (0.6)	1 (0.8)	3 (2.9)	
	Current smoker	2 (1.5)	1 (0.8)	1 (0.6)	1 (0.8)	3 (2.9)	
Diabetes history, n (%)	Yes	4 (2.9)	0 (0)	4 (2.5)	1 (0.8)	0 (0)	0.147
BMI, mean (SD)		23.0(2.56)	23.0 (2.73)	23.0 (2.94)	22.5 (2.79)	22.1 (2.68)	0.004
Alcohol intake, n (%)	>450g/week	2 (1.5)	3 (2.3)	1 (0.6)	1 (0.8)	2 (1.9)	0.802
Self-perceivedstress, n (%)	High	34 (24.8)	31 (23.5)	33 (21.0)	33 (27.5)	30 (29.1)	0.324
Parity	≥4	9(6.6)	4 (3.0)	2 (1.3)	4 (3.3)	5 (4.9)	0.192
Sweet snacks, n (%)	Rarely	9 (6.6)	12 (9.1)	8 (5.1)	8 (6.7)	5 (4.9)	0.168
	Sometimes	79 (57.7)	65 (49.2)	84 (53.5)	62 (51.7)	52 (50.5)	
	Everyday	49 (35.8)	55 (41.7)	65 (41.4)	50 (41.7)	46 (44.7)	
Sweet drinks, n (%)	Rarely	72 (52.6)	53 (40.2)	69 (43.9)	59 (49.2)	55(53.4)	0.327
	Sometimes	35 (25.5)	50 (37.9)	64 (40.8)	41 (34.2)	29 (28.2)	
	Everyday	30 (21.9)	29 (22.0)	24 (15.3)	20 (16.7)	19 (18.4)	
Family dentist, n (%)	Yes	123 (89.8)	125 (94.0)	139 (88.5)	111 (91.7)	94 (87.9)	0.580
Dental hygiene, n (%)	Good	14 (10.2)	15 (11.4)	27 (17.2)	28 (23.3)	18 (17.5)	0.007
	Fair	96 (70.1)	90 (68.2)	105 (66.9)	78 (65.0)	68 (66.0)	
	Poor	27 (19.7)	27 (20.5)	25 (15.9)	14 (11.7)	17 (16.5)	

Men: Q1 (-159 cm), Q2 (160-162 cm), Q3 (163-165 cm), Q4 (166-169 cm), Q5 (170 cm-)
Women: Q1 (-148 cm), Q2 (149-151 cm), Q3 (152-154 cm), Q4 (155-157 cm), Q5 (158 cm-)

Table 2: Numbers of total teeth, anterior teeth and posterior teeth according to height

	Height					
	Q1	Q2	Q3	Q4	Q5	P for trend
Men						
Adjusted number of total teeth[a], mean (SD)	17.9 (7.92)	19.1 (7.82)	19.0 (7.81)	20.6(7.85)	20.5(7.83)	0.006
Adjusted number of totalteeth[b], mean (SD)	18.1 (7.81)	19.3 (7.56)	19.1 (7.58)	20.3 (7.63)	20.5 (7.67)	0.022
Adjusted number of anterior teeth[a], mean (SD)	8.6 (3.49)	9.4 (3.45)	9.0 (3.44)	9.9 (3.46)	9.7 (3.44)	0.011
Adjusted number of anterior teeth[b], mean (SD)	8.7 (3.46)	9.5 (3.36)	9.0 (3.36)	9.8 (3.38)	9.7 (3.40)	0.040
Adjusted number of posterior teeth[a], mean (SD)	9.3 (4.92)	9.7 (4.86)	10.1 (4.86)	10.6 (4.88)	10.9(4.87)	0.009
Adjusted number of posterior teeth[b], mean (SD)	9.4 (4.86)	9.8 (4.71)	10.1 (4.72)	10.5 (4.74)	10.8 (4.77)	0.027
Women						
Adjusted number of total teeth[a], mean (SD)	18.2 (8.19)	18.0 (8.08)	17.8 (8.07)	16.4 (8.15)	18.8 (8.12)	0.871
Adjusted number of total teeth[b], mean (SD)	18.5 (8.10)	18.3 (7.93)	17.5(7.92)	16.3 (7.96)	18.6 (8.06)	0.424
Adjusted number of anterior teeth[a], mean (SD)	9.0 (3.84)	9.2 (3.79)	8.8 (3.78)	8.3 (3.82)	9.5 (3.81)	0.958
Adjusted number of anterior teeth[b], mean (SD)	9.1 (3.79)	9.2(3.73)	8.7 (3.71)	8.3 (3.72)	9.4 (3.77)	0.705
Adjusted number of posterior teeth[a], mean (SD)	9.2 (4.89)	8.9 (4.83)	9.0 (4.82)	8.1 (4.87)	9.3 (4.85)	0.755
Adjusted number of posterior teeth[b], mean (SD)	9.4 (4.82)	9.1 (4.72)	8.8 (4.72)	8.0 (4.73)	9.2 (4.79)	0.299

Men:Q1 (-159 cm), Q2 (160-162 cm), Q3 (163-165 cm), Q4 (166-169 cm), Q5 (170 cm-)
Women:Q1 (-148 cm), Q2 (149-151 cm), Q3 (152-154 cm), Q4 (155-157 cm), Q5 (158 cm-)
[a]Adjusted for age
[b]Adjusted for age, educational level, smoking status, diabetes history, BMI, alcohol intake, self-perceived stress, parity (women only), sweet snacks, sweet drinks, family dentist and dental hygiene

Table 3: Prevalence of subjects with fewer than 24 teeth and those who are edentate according to height

	Height					
	Q1	Q2	Q3	Q4	Q5	P for trend
Men						
Fewer than 24 teeth						
% (No. of cases/subjects)	68.2 (60/88)	60.2 (59/98)	52.2 (70/134)	49.6 (63/127)	48.3 (57/118)	
Adjusted OR[a] (95% CI)	1	0.80 (0.43-1.48)	0.62 (0.35-1.10)	0.60 (0.34-1.08)	0.55 (0.31-0.99)	0.028
Adjusted OR[b] (95% CI)	1	0.82 (0.43-1.57)	0.64 (0.35-1.19)	0.68 (0.36-1.27)	0.57 (0.30-1.09)	0.073
Edentate						
% (No. of cases/subjects)	8.0 (7/88)	4.1 (4/98)	5.2 (7/134)	1.6 (2/127)	2.5 (3/118)	
Adjusted OR[a] (95% CI)	1	0.57(0.16-2.07)	0.81 (0.27-2.44)	0.29 (0.06-1.47)	0.42 (0.10-1.70)	0.152
Adjusted OR[b] (95% CI)	1	0.46 (0.10-2.12)	1.12 (0.28-4.43)	0.59 (0.10-3.63)	0.67 (0.11-3.88)	0.786
Women						
Fewer than 24 teeth						
% (No. of cases/subjects)	64.2 (88/137)	66.7 (88/132)	63.1 (99/157)	65.0 (78/120)	57.3 (59/103)	
Adjusted OR[a] (95% CI)	1	1.35(0.80-2.30)	1.19 (0.72-1.96)	1.60 (0.93-2.77)	1.09 (0.62-1.90)	0.598
Adjusted OR[b] (95% CI)	1	1.41 (0.80-2.50)	1.47 (0.86-2.53)	1.86 (1.03-3.34)	1.26 (0.69-2.31)	0.286
Edentate						
% (No. of cases/subjects)	9.5 (13/137)	9.1 (12/132)	7.0 (11/157)	5.8 (7/120)	3.9 (4/103)	
Adjusted OR[a] (95% CI)	1	1.20 (0.51-2.83)	0.96 (0.40-2.29)	1.09 (0.40-2.96)	0.69 (0.21-2.25)	0.519
Adjusted OR[b] (95% CI)	1	1.30 (0.50-3.39)	0.84 (0.31-2.25)	0.94 (0.31-2.90)	0.68 (0.18-2.48)	0.452

Men:Q1 (-159 cm), Q2 (160-162 cm), Q3 (163-165 cm), Q4 (166-169 cm), Q5 (170 cm-)
Women:Q1 (-148 cm), Q2 (149-151 cm), Q3 (152-154 cm), Q4 (155-157 cm), Q5 (158 cm-)
[a]Adjusted for age

[b]Adjusted for age, educational level, smoking status, diabetes history, BMI, alcohol intake, self-perceived stress, parity (women only), sweet snacks, sweet drinks, family dentist and dental hygiene

Discussion

The current study examined the association of height with dentition status in Japanese adults for the first time. Although the finding in the study was not robust enough to allow a strong conclusion, the adult height, as a proxy of early childhood growth and development, might be associated with tooth loss in the current male sample. The result of present study showing that persons with shorter-statured height had fewer teeth, was in line with that of previous studies [17,18]. Although height was suggested to be a factor explaining tooth loss in this study, there is no doubt that other health behaviors and health related factors including nutritional, physiological, environmental, socio-economical, and psychosocial factor from childhood through adulthood in addition to heredity would greatly mediate this relationship [20].Keeping 24 teeth at 60 years old is one of the targets for dental and oral health in Healthy Japan 21 (the second term) [21]. As mean age of the current sample was around mid-60s, this would be a suitable index for evaluating the dentition status. Although a significant relationship of height with the prevalence of persons with fewer than 24 teeth disappeared after the adjustment of co-variates, it still closely approached the significant level. On the other hand, height did not have any association with the prevalence of edentulousness, contrary to the previous study reporting a significant relationship [18]. A very small proportion of edentate persons in this study sample may be one of the reasons for not detecting the significant trend.Age was closely correlated with height in a bi-variate analysis, as taller-statured persons tended to be younger. It is consistent with a Japanese secular trend toward increased height [22]. Age is also an established risk factor for tooth loss because the number of teeth declines with age [23]. Significant associations were also found between height and socioeconomic status measured with educational level, where taller-statured persons were more likely to have higher socioeconomic status. Former studies also reported that tall stature was likely to be associated with a high socioeconomic status and mediated the relationship between height and health outcomes [1,10]. The educational level also independently impacts on dentition status given that higher educational level persons tend to have greater number of teeth [24]. Confounders including age and educational level were significant factors and attenuated a magnitude of relationship between height and number of teeth in the present study, but the possible association existed after adjusting these variables. Smoking status in men, and BMI and dental hygiene in women showed significant associations with height in bivariate analysis, but the differences by height seemed not to be so prominent to make a substantial impact on the relationship, compared to that by age or educational level. Tooth loss occurs mainly by advanced dental caries and periodontal disease. According to the nationwide Japanese survey [25], 32.7% of the tooth loss were due to dental caries, 10.6% due to tooth fracture indirectly related to dental caries, and 41.8% due to periodontal disease. Therefore, about 85% of tooth loss in permanent teeth occurred by dental caries or periodontal disease. Hence, it is rational to assume that most tooth loss in the current study subjects also results from dental caries and periodontal disease. Several plausible mechanisms explaining the relationship of height with oral health are suggested. Poor nutrition strongly influences a person's height, and dental caries is also reported to be negatively affected by nutritional deficiency; children with short stature due to malnutrition therefore have higher caries experience [26].Undernutrition also may cause saliva flow decrease and saliva composition alteration, which may increase dental caries susceptibility [27]. The association of height with periodontal disease is described by the hypothesis that a person who is susceptible to infections is more likely to have inflammation-induced body growth retardation as well as is vulnerable to chronic inflammatory diseases such as periodontal disease [17, 28]. Thus, a shorter-statured person tends to present an increased risk of periodontal diseases [17].A relationship between height and dentition status was not observed in female subjects in this study. Several female-specific factors other than parity might serve a crucial role in attenuating the association. Female hormones like progesterone or estrogen as well as attitudinal changes during pregnancy greatly influence oral health [29-31]. Differences in sex were also demonstrated with regard to oral health knowledge or behavior. Females had better dental knowledge and showed healthier behaviors regarding tooth brushing, dental flossing and dental checkups compared to males [32].The current study has several limitations. First, there is no information about childhood nutrition, health behaviors, socioeconomic status and medical history besides genetic predisposition of the persons, therefore it is impossible to estimate how much such factors affect the association between height and dentition

status. Secondly, since the reason for tooth extraction was not investigated, actual causes of tooth loss were not available.Thus, a longitudinal study to follow up from childhood through adulthood would be necessary in order to further clarify the relationship and mechanism between height and dentition status, including causes of tooth loss.

Conclusion

Adult height was found to be possibly associated with the number of teeth among Japanese men. Since shorter-statured persons were potentially at higher risk of poorer oral health regarding their dentition than taller-statured persons, the influence of height might be taken into account when considering the oral health. Both height and dental diseases are greatly influenced by health related factors including nutrition during the course of living. Therefore, these findings underscore the importance to promote both oral and general health by improving nutrition and diet, as well as preventing and treating problems or diseases at an early age in order to achieve good oral health later in life.

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