ORIGINAL ARTICLE

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Changes in the awareness of oral health among new students newly enrolled at the University of Tokyo over the past 15 years

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Changes in the awareness of oral health among new students newly enrolled at the University of Tokyo over the past 15 years

Abstract: Objective: The aim of this study was to examine changes in awareness of oral health among Japanese university students. Methods: Between 1990 and 2004, a total of 51 650 students newly enrolled at the University of Tokyo responded to an annual written questionnaire on oral health. Results: (i) Approximately 60% of the students brushed their teeth twice a day. Female students brushed more frequently than male students. (ii) The percentage of students who brushed for 2-3 min per time decreased, while the percentage who brushed four or more minutes increased. (iii) The number of students who had learned how to brush properly increased. This trend was particularly clear-cut among male students, although the proportion of female students who had learned to brush properly remained higher than that of male students. (iv) The percentage of female students who sought treatment for malocclusion was higher than that of male students. The percentage of students who underwent orthodontic treatment increased from 11.6 to 19.7%. The percentage of female students who received orthodontic treatment was approximately twofold that of male students. (v) The percentage of students who had temporomandibular disorders was 0.7% in males and 1.5% in females. (vi) More than 40% of the students had periodontal diseases, with a higher prevalence among male students than female students. (vii) Approximately 20% of the students wanted to consult our service centre. Conclusions: The awareness of oral health among new undergraduates at the University of Tokyo has improved over the past 15 years.

Key words: oral health; university student; questionnaire

Introduction

Newborn infants to senior high school students (younger than 18 years) are required to undergo dental health screening examinations in compliance with the Maternal and Child Health Law as well as the Law of School Health in Japan. In contrast, neither the Law of School Health nor the Adult Health Law requires dental screening of university students. Lack of concern about dental health screening of university students is partially because the Adult Health Law assigns priority to the oral health care of middle-aged and elderly persons (older than 40 years).

A decreasing incidence rate of dental caries among children in Japan suggests that awareness of oral hygiene has recently

Table 1. Number of students surveyed at the University of Tokyo between 1990 and 2004

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole	3393	3453	3546	3627	3647	3596	3550	3547	3494	3415	3299	3321	3304	3336	3122	51 650
Male	2946	2993	3027	3080	3083	3014	2933	2869	2910	2838	2640	2726	2682	2685	2467	42 893
Female	447	460	519	547	564	582	617	678	584	577	659	595	622	651	655	8757

	Table 2.	Question: How man	nv times do '	vou brush	vour teeth	per dav	v?
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	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole (time	es)															
0	5	9	4	8	20	19	24	17	13	21	14	30	17	23	17	241
	(0.1)	(0.3)	(0.1)	(0.2)	(0.5)	(0.5)	(0.7)	(0.5)	(0.4)	(0.6)	(0.4)	(0.9)	(0.5)	(0.7)	(0.5)	(0.5)
1	839	1012	1013	877	1024	851	966	891	956	969	936	1017	972	992	917	14 232
	(24.7)	(29.3)	(28.6)	(24.2)	(28.1)	(23.7)	(27.2)	(25.1)	(27.4)	(28.4)	(28.4)	(30.6)	(29.4)	(29.7)	(29.4)	(27.6)
2	2101	2017	2056	2204	2077	2132	2038	2072	2057	1976	1868	1863	1859	1881	1763	29 964
0	(61.9)	(58.4)	(58.0)	(60.8)	(57.0)	(59.3)	(57.4)	(58.4)	(58.9)	(57.9)	(56.6)	(56.1)	(56.3)	(56.4)	(56.5)	(58.0)
3	416	3/1	421	491 (12.5)	464	532	4/5	499	424	510	431	381	413 (10 E)	404	391	6623
4	(12.3)	(10.7)	(11.9)	(13.5)	(12.7) 51	(14.0) 51	(13.4)	(14.1)	(12.1)	(14.9)	(13.1)	(11.5)	(12.5)	(12.1)	(12.5)	(12.0) 516
4	23 (0.7)	27 (0.8)	32 (0 0)	32 (0 0)	(1.4)) (1 /)	33 (0 0)	(16)	42 (1.2)	20	41 (1.2)	24 (0.7)	29 (0 0)	30 (0 0)	19	(1.0)
More	(0.7) 9	(0.0)	(0.9)	(0.9)	(1.4)	(1.4)	(0.9) 9	(1.0)	(1.2)	(0.7)	(1.2) 9	(0.7)	(0.9) 4	(0.9) 4	(0.0)	131
than 5	(0.3)	(0.4)	(0.4)	(0.4)	(0.3)	(02)	(0.3)	(0.3)	(0 1)	(0.3)	(0.3)	(0 1)	(0 1)	(0 1)	(0.3)	(0.3)
Male	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)	(0.2)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)	(0.0)
0	5	9	4	8	19	19	24	16	13	21	14	30	17	23	16	238
	(0.2)	(0.3)	(0.1)	(0.3)	(0.6)	(0.6)	(0.8)	(0.6)	(0.4)	(0.7)	(0.5)	(1.1)	(0.6)	(0.9)	(0.6)	(0.6)
1	809	965	969	841	985	814	904	842	892	914	876	944	897	910	848	13 410
	(27.5)	(32.2)	(32.0)	(27.3)	(31.9)	(27.0)	(30.8)	(29.3)	(30.7)	(32.2)	(33.2)	(34.6)	(33.4)	(33.9)	(34.4)	(31.3)
2	1796	1717	1720	1871	1728	1769	1654	1627	1671	1596	1450	1476	1471	1472	1329	24 347
	(61.0)	(57.4)	(56.8)	(60.7)	(56.0)	(58.7)	(56.4)	(56.7)	(57.4)	(56.2)	(54.9)	(54.1)	(54.8)	(54.8)	(53.9)	(56.8)
3	314	273	297	333	310	372	324	342	311	384	280	251	274	257	253	4575
	(10.7)	(9.1)	(9.8)	(10.8)	(10.1)	(12.3)	(11.0)	(11.9)	(10.7)	(13.5)	(10.6)	(9.2)	(10.2)	(9.6)	(10.3)	(10.7)
4	16	19	22	15	32	33	1/	34	22	14	16	20	12	18	10	300
Maria	(0.5)	(0.6)	(0.7)	(0.5)	(1.0)	(1.1)	(0.6)	(1.2)	(0.8)	(0.5)	(0.6)	(0.7)	(0.4)	(0.7)	(0.4)	(0.7)
WOre then 5	б (0, 2)	10	(0, 4)	10	(0.2)	4	5	9		9	4		Z (0,1)	3	(0.2)	89
Fomalo	(0.2)	(0.3)	(0.4)	(0.3)	(0.2)	(0.1)	(0.2)	(0.3)	(0.0)	(0.3)	(0.2)	(0.0)	(0.1)	(0.1)	(0.3)	(0.2)
0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	3
0	(0,0)	(0,0)	(0, 0)	(0, 0)	(0.2)	(0, 0)	(0, 0)	(0 1)	(0, 0)	(0, 0)	(0, 0)	(0, 0)	(0, 0)	(0,0)	(0.2)	(0, 0)
1	30	47	44	36	39	37	62	49	64	55	60	73	75	82	69	822
	(6.7)	(10.2)	(8.5)	(6.6)	(6.9)	(6.4)	(10.0)	(7.2)	(11.0)	(9.5)	(9.1)	(12.3)	(12.1)	(12.6)	(10.5)	(9.4)
2	305	300	336	333	349	363	384	445	386	380	418	387	388	409	434	5617
	(68.2)	(65.2)	(64.7)	(60.9)	(61.9)	(62.4)	(62.2)	(65.6)	(66.1)	(65.9)	(63.4)	(65.0)	(62.4)	(62.8)	(66.3)	(64.1)
3	102	98	124	158	154	160	151	157	113	126	151	130	139	147	138	2048
	(22.8)	(21.3)	(23.9)	(28.9)	(27.3)	(27.5)	(24.5)	(23.2)	(19.3)	(21.8)	(22.9)	(21.8)	(22.3)	(22.6)	(21.1)	(23.4)
4	7	8	10	17	19	18	16	23	20	11	25	14	17	12	9	226
	(1.6)	(1.7)	(1.9)	(3.1)	(3.4)	(3.1)	(2.6)	(3.4)	(3.4)	(1.9)	(3.8)	(2.4)	(2.7)	(1.8)	(1.4)	(2.6)
More	3	5	4	3	3	2	4	3	1	2	5	1	2	1	3	42
than 5	(0.7)	(1.1)	(0.8)	(0.5)	(0.5)	(0.3)	(0.6)	(0.4)	(0.2)	(0.3)	(0.8)	(0.2)	(0.3)	(0.2)	(0.5)	(0.5)

Values are given as n (%).



Fig 1. Frequency of brushing teeth.

improved (1). However, awareness of oral health is low among young people in Japan, and the incidence rates of periodontal diseases and dental caries remain high (2–4). The incidence rate of periodontal diseases exceeds 50% and that of dental caries exceeds 80% in teenagers (1). An improved understanding of the current status of oral health in university students approximately 20 years of age may help to identify key areas that should be targeted or studied to enhance awareness of oral



Fig 2. Amount of time spent brushing teeth.

health. A better grasp of the current oral health status of university students would also facilitate prognosis of oral disease and forecasting demand for health care services, important determinants of future medical and dental costs.

Table 3. Question: How long do you brush your teeth each time?

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole (mir	ר)															
0	3	6	1	4	15	13	13	4	9	12	8	21	4	6	9	128
	(0.1)	(0.2)	(0.0)	(0.1)	(0.4)	(0.4)	(0.4)	(0.1)	(0.3)	(0.4)	(0.2)	(0.6)	(0.1)	(0.2)	(0.3)	(0.2)
1	348	461	481	379	578	536	492	440	431	420	404	429	394	363	392	6548
	(10.3)	(13.4)	(13.6)	(10.4)	(15.8)	(14.9)	(13.9)	(12.4)	(12.3)	(12.3)	(12.2)	(12.9)	(11.9)	(10.9)	(12.6)	(12.7)
2–3	2070	2077	2114	2179	2134	2037	2008	1955	1912	1790	1733	1764	1706	1665	1562	28 706
	(61.0)	(60.2)	(59.6)	(60.1)	(58.5)	(56.6)	(56.6)	(55.1)	(54.7)	(52.4)	(52.5)	(53.1)	(51.6)	(49.9)	(50.0)	(55.6)
More	970	906	937	1056	917	1016	1039	1152	1141	1192	1154	1099	1181	1292	1152	16 204
than 4	(28.6)	(26.2)	(26.4)	(29.1)	(25.1)	(28.3)	(29.3)	(32.5)	(32.7)	(34.9)	(35.0)	(33.1)	(35.7)	(38.7)	(36.9)	(31.4)
Male																
0	3	6	1	4	15	13	13	4	9	10	8	20	4	5	7	122
	(0.1)	(0.2)	(0.0)	(0.1)	(0.5)	(0.4)	(0.4)	(0.1)	(0.3)	(0.4)	(0.3)	(0.7)	(0.1)	(0.2)	(0.3)	(0.3)
1	323	419	428	332	522	475	438	388	387	370	345	381	351	317	342	5818
	(11.0)	(14.0)	(14.1)	(10.8)	(16.9)	(15.8)	(14.9)	(13.5)	(13.3)	(13.0)	(13.1)	(14.0)	(13.1)	(11.8)	(13.9)	(13.6)
2–3	1784	1771	1797	1852	1778	1673	1670	1553	1574	1474	1368	1436	1377	1347	1214	23 668
	(60.6)	(59.2)	(59.4)	(60.1)	(57.7)	(55.5)	(56.9)	(54.1)	(54.1)	(51.9)	(51.8)	(52.7)	(51.3)	(50.2)	(49.2)	(55.2)
More	835	794	792	884	765	860	814	928	939	987	919	882	935	1008	900	13 242
than 4	(28.3)	(26.5)	(26.2)	(28.7)	(24.8)	(28.5)	(27.8)	(32.3)	(32.3)	(34.8)	(34.8)	(32.4)	(34.9)	(37.5)	(36.5)	(30.9)
Female																
0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	2	6
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.3)	(0.0)	(0.2)	(0.0)	(0.2)	(0.3)	(0.1)
1	25	42	53	47	56	61	54	52	44	50	59	48	43	46	50	730
	(5.6)	(9.1)	(10.2)	(8.6)	(9.9)	(10.5)	(8.8)	(7.7)	(7.5)	(8.7)	(9.0)	(8.1)	(6.9)	(7.1)	(7.6)	(8.3)
2–3	286	306	317	327	356	364	338	402	338	316	365	328	329	318	348	5038
	(64.0)	(66.5)	(61.1)	(59.8)	(63.1)	(62.5)	(54.8)	(59.3)	(57.9)	(54.8)	(55.4)	(55.1)	(52.9)	(48.8)	(53.1)	(57.5)
More	135	112	145	172	152	156	225	224	202	205	235	217	246	284	252	2962
than 4	(30.2)	(24.3)	(27.9)	(31.4)	(27.0)	(26.8)	(36.5)	(33.0)	(34.6)	(35.5)	(35.7)	(36.5)	(39.5)	(43.6)	(38.5)	(33.8)

Values are given as n (%).

Table 4. Question: Have you ever been trained to brush properly?

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole	1728	1773	1786	1851	1920	1966	1985	1955	1918	1942	1938	2035	2003	2085	2033	28 918
	(50.9)	(51.3)	(50.4)	(51.0)	(52.6)	(54.7)	(55.9)	(55.1)	(54.9)	(56.9)	(58.7)	(61.3)	(60.6)	(62.5)	(65.1)	(56.0)
Male	1462	1467	1467	1495	1572	1589	1569	1499	1539	1545	1493	1615	1548	1636	1572	23 068
	(49.6)	(49.0)	(48.5)	(48.5)	(51.0)	(52.7)	(53.5)	(52.2)	(52.9)	(54.4)	(56.6)	(59.2)	(57.7)	(60.9)	(63.7)	(53.8)
Female	266	306	319	356	348	377	416	454	379	397	445	420	455	449	461	5848
	(59.5)	(66.5)	(61.5)	(65.1)	(61.7)	(64.8)	(67.4)	(67.0)	(64.9)	(68.8)	(67.5)	(70.6)	(73.2)	(69.0)	(70.4)	(66.8)

Values are given as n (%).



Table 5. Question: Are you anxious about the alignment of your teeth?

Fig 3. Receipt of instructions on brushing teeth.

During the past 15 years, we have annually requested students newly enrolled at the University of Tokyo to respond to written questionnaires on oral health care, status and awareness, designed by the Department of Oral and Maxillofacial Surgery, Health Service Center, the University of Tokyo. Data from these surveys were analysed primarily to study trends in students' awareness of oral hygiene. Although this was not an interventional study, our results will hopefully help define more effective interventions for the maintenance of oral health and hygiene.

Study population and methodology

This survey was conducted by means of written questionnaires designed by the Department of Oral and Maxillofacial

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole																
No	2612	2644	2711	2785	2779	2756	2714	2680	2651	2557	2481	2519	2447	2498	2397	39 231
	(77.0)	(76.6)	(76.5)	(76.8)	(76.2)	(76.6)	(76.5)	(75.6)	(75.9)	(74.9)	(75.2)	(75.9)	(74.1)	(74.9)	(76.8)	(76.0)
Appearance	685	709	706	739	769	726	748	791	754	778	733	701	712	720	637	10 908
	(20.2)	(20.5)	(19.9)	(20.4)	(21.1)	(20.2)	(21.1)	(22.3)	(21.6)	(22.8)	(22.2)	(21.1)	(21.5)	(21.6)	(20.4)	(21.1)
Difficulty in biting	81	89	106	86	108	115	111	100	106	114	95	106	118	101	97	1533
	(2.4)	(2.6)	(3.0)	(2.4)	(3.0)	(3.2)	(3.1)	(2.8)	(3.0)	(3.3)	(2.9)	(3.2)	(3.6)	(3.0)	(3.1)	(3.0)
Male	. ,	. ,	. ,	. ,	. ,	. ,		. ,	. ,	. ,	. ,	. ,	. ,	. ,	. ,	. ,
No	2292	2331	2358	2430	2364	2352	2279	2216	2244	2136	2010	2092	2008	2034	1929	33 075
	(77.8)	(77.9)	(77.9)	(78.9)	(76.7)	(78.0)	(77.7)	(77.2)	(77.1)	(75.3)	(76.1)	(76.7)	(74.9)	(75.8)	(78.2)	(77.1)
Appearance	567	578	563	562	634	563	583	588	590	620	566	548	548	547	464	8521
	(19.2)	(19.3)	(18.6)	(18.2)	(20.6)	(18.7)	(19.9)	(20.5)	(20.3)	(21.8)	(21.4)	(20.1)	(20.4)	(20.4)	(18.8)	(19.9)
Difficulty in biting	73 (2.5)	75 (2.5)	87 (2.9)	76 (2.5)	93 (3.0)	100 (3.3)	91 (3.1)	79 (2.8)	88 (3.0)	107 (3.8)	73 (2.8)	90 (3.3)	103 (3.8)	90 (3.4)	82 (3.3)	1307 (3.0)
Female	. ,	. ,	. ,	. ,	. ,	. ,		. ,	. ,	. ,	. ,	. ,	. ,	. ,	. ,	. ,
No	320	313	353	355	415	404	435	464	407	421	471	427	439	464	468	6156
	(71.6)	(68.0)	(68.0)	(64.9)	(73.6)	(69.4)	(70.5)	(68.4)	(69.7)	(73.0)	(71.5)	(71.8)	(70.6)	(71.3)	(71.5)	(70.3)
Appearance	118	131	143	177	135	163	165	203	164	158	167	153	164	173	173	2387
	(26.4)	(28.5)	(27.6)	(32.4)	(23.9)	(28.0)	(26.7)	(29.9)	(28.1)	(27.4)	(25.3)	(25.7)	(26.4)	(26.6)	(26.4)	(27.3)
Difficulty in biting	8	14	19	10	15	15	20	21	18	7	22	16	15	11	15	226
	(1.8)	(3.0)	(3.7)	(1.8)	(2.7)	(2.6)	(3.2)	(3.1)	(3.1)	(1.2)	(3.3)	(2.7)	(2.4)	(1.7)	(2.3)	(2.6)

Values are given as n (%).

Table 6. Question: Have you ever undergone orthodontic treatment?

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole	392	396	440	461	494	531	530	624	548	613	587	600	613	661	615	8105
	(11.6)	(11.5)	(12.4)	(12.7)	(13.5)	(14.8)	(14.9)	(17.6)	(15.7)	(18.0)	(17.8)	(18.1)	(18.6)	(19.8)	(19.7)	(15.7)
Male	299	287	326	322	361	388	370	439	400	467	404	441	433	482	431	5850
	(10.1)	(9.6)	(10.8)	(10.5)	(11.7)	(12.9)	(12.6)	(15.3)	(13.7)	(16.5)	(15.3)	(16.2)	(16.1)	(18.0)	(17.5)	(13.6)
Female	93	109	114	139	133	143	160	185	148	146	183	159	180	179	184	2255
	(20.8)	(23.7)	(22.0)	(25.4)	(23.6)	(24.6)	(25.9)	(27.3)	(25.3)	(25.3)	(27.8)	(26.7)	(28.9)	(27.5)	(28.1)	(25.8)

Values are given as n (%).



Fig 4. Proportion of students receiving orthodontic treatment.

Surgery, Health Service Center, the University of Tokyo. Students newly enrolled at the University of Tokyo were surveyed annually from 1990 to 2004. The questionnaires were mailed to candidates scheduled to take the entrance examination and were collected on the day of the physical checkup from all students newly admitted to the university. Among 51 967 students, 51 650 (99.4%) responded to the survey, of whom 42 893 were male and 8757 were female (Table 1). The surveys consistently included the same nine questions for the past 15 years, while several new questions were added during the last 5 years. The questions (see below) focused on problems such as the incidence rate of periodontal disease and dental caries, health awareness and oral hygiene. This study analyses and summarizes the results of these annual surveys.

Questions included in all questionnaires

- 1 How many times do you brush your teeth per day?
- 2 How long do you brush your teeth each time?
- 3 Have you ever been trained to brush properly?

- 4 Are you anxious about the alignment of your teeth?
- 5 Have you ever undergone orthodontic treatment?
- **6** Do you have problems with your temporal mandibular joint (TMJ)?
- 7 Have you ever consulted a dentist for TMJ problems?
- 8 Do you have any problem with your oral condition?
- **9** Do you want to receive an oral diagnosis and oral hygiene instruction?

Additional questions

1 Have you ever had bleeding from your gums while brushing your teeth?

- 2 Do you have tartar around your teeth?
- 3 Have you ever been treated for decayed teeth?
- 4 Have you left decayed teeth untreated?
- 5 Did you have dental caries in your deciduous teeth?
- 6 Have you ever had permanent teeth extracted?
- 7 Have you ever had pain in your third molars?

The statistical significance of differences in oral health status between sexes and years (between 1990 and 2004) were analysed with the chi-square test. Differences with *P*-values of less than 0.05 levels were considered statistically significant. StatView for Windows (version 5.0) was used to perform all statistical analyses.

Results

The findings of the survey are described below.

1 Frequency of teeth brushing (Table 2): Generally, female students brushed their teeth more often per day than male students (Fig. 1). The majority of respondents (58.0%) brushed their teeth twice a day, followed by once a day (27.6%) and three times (12.8%). These trends remained unchanged over the past 15 years.

2 Amount of time spent brushing teeth (Table 3): The percentage of students who brushed their teeth 2-3 min

Table 7. Question: Do you have problems with your temporal mandibular joint (TMJ)?

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole																
No	3036	3106	3154	3152	3172	3094	3136	3101	3038	2927	2802	2775	2709	2770	2634	44 606
	(89.5)	(90.0)	(88.9)	(86.9)	(87.0)	(86.0)	(88.3)	(87.4)	(86.9)	(85.7)	(84.9)	(83.6)	(82.0)	(83.0)	(84.4)	(86.4)
Click or crepitus	216	211	219	369	353	358	317	350	326	339	349	330	399	422	363	4921
	(6.4)	(6.1)	(6.2)	(10.2)	(9.7)	(10.0)	(8.9)	(9.9)	(9.3)	(9.9)	(10.6)	(9.9)	(12.1)	(12.6)	(11.6)	(9.5)
Pain	9	21	16	15	26	43	41	40	32	44	53	39	31	26	32	468
	(0.3)	(0.6)	(0.5)	(0.4)	(0.7)	(1.2)	(1.2)	(1.1)	(0.9)	(1.3)	(1.6)	(1.2)	(0.9)	(0.8)	(1.0)	(0.9)
Difficulty in mouth	107	104	130	69	131	155	144	131	154	141	145	153	149	123	117	1953
opening	(3.2)	(3.0)	(3.7)	(1.9)	(3.6)	(4.3)	(4.1)	(3.7)	(4.4)	(4.1)	(4.4)	(4.6)	(4.5)	(3.7)	(3.7)	(3.8)
Male																
No	2632	2708	2704	2671	2679	2589	2610	2514	2533	2435	2258	2286	2201	2220	2091	37 131
	(89.3)	(90.5)	(89.3)	(86.7)	(86.9)	(85.9)	(89.0)	(87.6)	(87.0)	(85.8)	(85.5)	(83.9)	(82.1)	(82.7)	(84.8)	(86.6)
Click or crepitus	196	182	190	321	302	301	252	278	272	282	268	328	331	351	282	4136
	(6.7)	(6.1)	(6.3)	(10.4)	(9.8)	(10.0)	(8.6)	(9.7)	(9.3)	(9.9)	(10.2)	(12.0)	(12.3)	(13.1)	(11.4)	(9.6)
Pain	8	17	14	12	21	33	34	32	27	35	39	31	21	17	24	365
	(0.3)	(0.6)	(0.5)	(0.4)	(0.7)	(1.1)	(1.2)	(1.1)	(0.9)	(1.2)	(1.5)	(1.1)	(0.8)	(0.6)	(1.0)	(0.9)
Difficulty in mouth	87	77	96	57	106	130	106	102	127	108	107	108	110	96	86	1503
opening	(3.0)	(2.6)	(3.2)	(1.9)	(3.4)	(4.3)	(3.6)	(3.6)	(4.4)	(3.8)	(4.1)	(4.0)	(4.1)	(3.6)	(3.5)	(3.5)
Female																
No	404	398	450	481	493	505	526	587	505	492	544	489	508	550	543	7475
	(90.4)	(86.5)	(86.7)	(87.9)	(87.4)	(86.8)	(85.3)	(86.6)	(86.5)	(85.3)	(82.5)	(82.2)	(81.7)	(84.5)	(82.9)	(85.4)
Click or crepitus	20	29	29	48	51	57	65	72	54	57	81	2	68	71	81	785
	(4.5)	(6.3)	(5.6)	(8.8)	(9.0)	(9.8)	(10.5)	(10.6)	(9.2)	(9.9)	(12.3)	(0.3)	(10.9)	(10.9)	(12.4)	(9.0)
Pain	1	4	2	3	5	10	7	8	5	9	14	8	10	9	8	103
	(0.2)	(0.9)	(0.4)	(0.5)	(0.9)	(1.7)	(1.1)	(1.2)	(0.9)	(1.6)	(2.1)	(1.3)	(1.6)	(1.4)	(1.2)	(1.2)
Difficulty in mouth	20	27	34	12	25	25	38	29	27	33	38	45	39	27	31	450
opening	(4.5)	(5.9)	(6.6)	(2.2)	(4.4)	(4.3)	(6.2)	(4.3)	(4.6)	(5.7)	(5.8)	(7.6)	(6.3)	(4.1)	(4.7)	(5.1)

Values are given as n (%).

Table 8. Question: Have you ever consulted a dentist for TMJ problems?

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole	39 (1.1)	26 (0.8)	41 (1.2)	45 (1.2)	22 (0.6)	29 (0.8)	20 (0.6)	21 (0.6)	29 (0.8)	34 (1.0)	38 (1.2)	35 (1.1)	29 (0.9)	27 (0.8)	40 (1.3)	475 (0.9)
Male	28 (1.0)	18 (0.6)	27 (0.9)	36 (1.2)	19 (0.6)	20 (0.7)	14 (0.5)	14 (0.5)	21 (0.7)	25 (0.9)	25 (0.9)	26 (1.0)	19 (0.7)	22 (0.8)	30 (1.2)	344 (0.8)
Female	11 (2.5)	8 (1.7)	14 (2.7)	9 (1.6)	3 (0.5)	9 (1.5)	6 (1.0)	7 (1.0)	8 (1.4)	9 (1.6)	13 (2.0)	9 (1.5)	10 (1.6)	5 (0.8)	10 (1.5)	131 (1.5)

Values are given as n (%).

Table 9. Question: Do	you have an	y problem with	your oral condition?
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	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole	304	427	433	442	322	292	288	290	308	280	185	204	187	197	188	4347
	(9.0)	(12.4)	(12.2)	(12.2)	(8.8)	(8.1)	(8.1)	(8.2)	(8.8)	(8.2)	(5.6)	(6.1)	(5.7)	(5.9)	(6.0)	(8.4)
Male	269	366	377	380	275	257	253	247	269	226	147	154	161	160	148	3689
	(9.1)	(12.2)	(12.5)	(12.3)	(8.9)	(8.5)	(8.6)	(8.6)	(9.2)	(8.0)	(5.6)	(5.6)	(6.0)	(6.0)	(6.0)	(8.6)
Female	35	61	56	62	47	35	35	43	39	54	38	50	26	37	40	658
	(7.8)	(13.3)	(10.8)	(11.3)	(8.3)	(6.0)	(5.7)	(6.3)	(6.7)	(9.4)	(5.8)	(8.4)	(4.2)	(5.7)	(6.1)	(7.5)

Values are given as n (%).

per time decreased, while that of students who brushed their teeth for four or more minutes per time increased (Fig. 2).

3 Receipt of instructions on teeth brushing (Table 4): The proportion of female students who received instructions (66.8%) was higher than that of male students (53.8%). The

	Year															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Whole	673	824	904	896	709	643	753	852	875	760	759	928	990	940	777	12 283
	(19.8)	(23.9)	(25.5)	(24.7)	(19.4)	(17.9)	(21.2)	(24.0)	(25.0)	(22.3)	(23.0)	(27.9)	(30.0)	(28.2)	(24.9)	(23.8)
Male	566	693	753	757	588	541	611	681	704	628	600	729	779	732	594	9956
	(19.2)	(23.2)	(24.9)	(24.6)	(19.1)	(17.9)	(20.8)	(23.7)	(24.2)	(22.1)	(22.7)	(26.7)	(29.0)	(27.3)	(24.1)	(23.2)
Female	107	131	151	139	121	102	142	171	171	132	159	199	211	208	183	2327
	(23.9)	(28.5)	(29.1)	(25.4)	(21.5)	(17.5)	(23.0)	(25.2)	(29.3)	(22.9)	(24.1)	(33.4)	(33.9)	(32.0)	(27.9)	(26.6)

Table 10. Question: Do you want to receive an oral diagnosis and oral hygiene instruction?

Values are given as n (%).

number of students who received instructions on teeth brushing increased yearly (Fig. 3).

4 Alignment of teeth (Tables 5 and 6): The percentage of students who were not concerned about their teeth alignment was 77.1% for male students and 70.3% for female students. Concern about teeth alignment was expressed by 19.9% of male students and 27.3% of female students. Female students were thus more concerned about the appearance of their teeth than male students. A poor bite was a concern expressed by 3.0% of male students and 2.6% of female students. These trends remained unchanged over the past 15 years. The proportion of students who received orthodontic treatment increased every year, and the percentage of female students (25.8%) who received such treatment was about twofold higher than that of male students (13.6%; Fig. 4).

5 TMJ status (Tables 7 and 8): The percentage of students who had no TMJ problems was 86.4%. Clicking or crepitus of the TMJ was reported by 9.5% of the students, and other problems involving the TMJ were present in 4.8%. There was a trend towards an annual increase in the percentage of students who had clicking or crepitus of the TMJ.

6 Concern about oral health (Tables 9 and 10): The percentage of students with some oral problems was 8.4%. The percentage of students who wanted to receive an oral diagnosis and instruction on oral hygiene was 23.8%. These rates remained unchanged over the past 15 years.

7 Periodontal diseases and dental caries (Table 11): More than 40% of students had periodontal diseases, with a higher prevalence in male students than female students. The percentage of students who received treatment for decayed teeth has decreased over the past 6 years.

8 Third molar teeth and other permanent teeth (Table 11): The percentage of students who had permanent teeth extracted was 11–12%. A higher percentage of female students than male students had had permanent teeth extracted. This difference may be related to the higher proportion of female students undergoing orthodontic treatment. About 6–7% of the students have had pain in their third molars.

Discussion

This survey demonstrated increased awareness of dental health among new undergraduates at the University of Tokyo over the past 15 years. As data were collected by means of written questionnaires filled in directly by the respondents, the results may be rather subjective. Other surveys using more objective evaluation techniques, such medical or dental examinations, may yield different results. However, we believe that our questionnaire survey accurately reflected yearly changes in students' awareness of dental health. The large number of respondents is another important point, strengthening the reliability of our findings.

Awareness of oral health and hygiene is generally low in Japan, and the incidence rate of oral diseases remains high (2–4). The oral health of Japanese dental students has been reported to be poorer than that of Australian or Finnish dental students (5, 6). However, our results indicated that awareness of tooth care, tooth alignment and TMJ diseases increased among students at the University of Tokyo. Recent increases in health care awareness among children in Japan might have thus led to increased motivation to maintain oral hygiene in later life, i.e. university students.

Our survey showed that awareness of dental health was higher among female students than male students. Our results are consistent with those of other studies reporting sex-related differences in awareness of oral hygiene (7, 8). However, our survey clearly showed that awareness of oral health and hygiene among male students has progressively increased in recent years. Dental caries status is related to oral health behaviour in young Israeli adults (9). Increased awareness of oral hygiene between both sexes of young adults may reduce the incidence of dental caries and periodontal diseases in the future. 1000 mm 1000 h mm 100 h

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Whole						Male						Female					
1999	2000	2001	2002	2003	2004	1999	2000	2001	2002	2003	2004	1999	2000	2001	2002	2003	2004
3415	3299	3321	3304	3336 1393	3122 1271	2838	2640	2726	2682	2685 1160	2467 1066	577	659	595	622	651 (233 2	355 205
				(41.8)	(40.7)					(43.2)	(43.2)					(35.8) ((31.3)
1011	1092	1045	934	1028	993	853	905	904	780	848	811	158	187	141	154	180	182
(29.6)	(33.1)	(31.5)	(28.3)	(30.8)	(31.8)	(30.1)	(34.3)	(33.2)	(29.1)	(31.6)	(32.9)	(27.4)	(28.4)	(23.7)	(24.8)	(27.6) ((27.8)
	2954	2923	2899	2891	2665		2353	2382	2349	2319	2093		601	541	550	572	572
	(89.5)	(88.0)	(87.7)	(86.7)	(85.4)		(89.1)	(87.4)	(87.6)	(86.4)	(84.8)		(91.2)	(6.06)	(88.4)	(87.9)	(87.3)
	613	568	502	653	471		499	462	417	540	367		114	106	85	113	104
	(18.6)	(17.1)	(15.2)	(19.6)	(15.1)		(18.9)	(16.9)	(15.5)	(20.1)	(14.9)		(17.3)	(17.8)	(13.7)	(17.4) ((15.9)
	1822	1860	1863	1822	1657		1425	1519	1500	1463	1297		397	341	363	359	360
	(55.2)	(56.0)	(56.4)	(54.6)	(53.1)		(54.0)	(55.7)	(55.9)	(54.5)	(52.6)		(60.2)	(57.3)	(58.4)	(55.1) ((55.0)
	393	385	366	372	354		266	280	244	266	252		127	105	122	106	102
	(11.9)	(11.6)	(11.1)	(11.2)	(11.3)		(10.1)	(10.3)	(9.1)	(6.6)	(10.2)		(19.3)	(17.6)	(19.6)	(16.3) ((15.6)
258	234	221	195	197	221	206	175	171	152	147	162	52	59	50	43	50	59
(7.6)	(7.1)	(6.7)	(6.9)	(6.9)	(7.1)	(7.3)	(9.9)	(6.3)	(5.7)	(5.5)	(9.9)	(0.6)	(0.6)	(8.4)	(6.9)	(7.7) ((0.0)
	Whole 1999 3415 (29.6) (7.6)	Whole 1999 2000 3415 3299 1011 1092 (29.6) (33.1) (2954 (89.5) 613 (18.6) 1822 (55.2) 393 (11.9) 258 234 (7.1) (7.6) (7.1)	Whole 2000 2001 1999 2000 2001 3415 3299 3321 1011 1092 1045 (29.6) (33.1) (31.5) (29.5) (33.1) (31.5) (29.5) (33.1) (31.5) (29.6) (33.1) (31.5) (29.5) (38.0) 613 558 (17.1) 1822 (11.9) (17.1) 1825 (333 385 (11.9) (11.9) (11.6) (11.6) 258 234 221 (2.6) (7.1) (6.7)	Whole 1999 2000 2001 2002 3415 3299 3321 3304 3(15) 3299 3321 3304 1011 1092 1045 934 (29.6) (33.1) (31.5) (28.3) (29.5) (89.5) (88.0) (87.7) (11 1092 1045 934 (29.5) (33.1) (31.5) (28.3) (29.5) (88.0) (87.7) (87.7) (11.6) (17.1) (15.2) (18.6) (17.1) (15.2) (18.6) (17.1) (15.2) (18.6) (17.1) (15.2) (18.6) (17.1) (15.2) (19.6) (11.6) (11.1) 258 234 221 195 (7.6) (7.1) (6.7) (5.9)	Whole 1999 2000 2001 2002 2003 3415 3299 3321 3304 3336 3115 3299 3321 3336 1393 311 3293 3321 3336 1393 1011 1092 1045 934 1028 2954 2923 2899 2891 (41.8) 2954 2923 2899 2891 (66.7) 613 568 502 653 (105) 613 568 502 653 (196) 1825 (186.0) (17.1) (15.2) (196) 1822 (56.0) (56.4) (54.6) 372 (11.9) (11.6) (11.1) (11.2) 372 258 234 235 365 372 (1.5) (5.9) (5.9) (5.9) (5.9)	Whole 1999 2000 2001 2002 2003 2004 1999 2000 2001 2002 2003 2004 3415 3299 3321 3304 3336 3122 1011 1092 1045 934 1028 993 1011 1092 1045 934 1028 993 2054 2923 2899 2891 2665 (29.5) (33.1) (31.5) (28.3) (31.8) 2254 2923 2899 2891 2665 (18.6) 17.1) (15.2) (19.6) (15.1) (18.6) 187.7) 86.7 (85.4) 656 613 56.8 502 653 471 (15.1) 1822 1860 186.7 (86.7) (85.4) 657 1822 1860 165.4) 656.4) 657 653 471 1822 186.7 (11.6) (11.1) (11.5) <td>Whole Male 1999 2000 2001 2002 2003 2004 1999 3415 3299 3321 3336 3122 2838 3115 3299 3321 3336 3122 2838 31011 1092 1045 934 1028 993 853 2011 1092 1045 934 1028 993 853 2954 2923 2899 2891 2665 471 (13.1) (31.5) (28.3) (30.8) (30.1) 2954 2923 2899 2891 2665 (89.5) (88.0) 87.7) (85.7) (85.7) (89.5) 17.1 (15.2) (19.6) (15.1) (18.6) 17.1 (15.2) (19.6) (15.1) (18.6) 17.1 (15.2) (19.6) (15.1) 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Improved self-care of oral health in young adults may decrease the future incidence of oral diseases in the elderly. However, there are no government-sponsored programmes to promote dental care among young adults in Japan. Only an official health-care survey is performed every 6 years to monitor the oral status of young adults in Japan (1). Our results therefore provide valuable information on yearly trends in oral hygiene among young adults in Japan and will hopefully contribute to a decreased incidence of oral diseases in the future.

Conclusions

Annual questionnaires distributed to 51 650 students newly enrolled at the University of Tokyo showed that the awareness of oral health among this group has increased over the past 15 years.

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