

# Prevalence of Caries on Individual Tooth Surfaces and its Distribution by Age and Gender in University Clinic Patients

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## ABSTRACT

**Objectives:** The objectives of the present study were to assess the prevalence rate of caries on individual permanent tooth surfaces, and to compare individual tooth surface caries rates among gender and age groups.

**Methods:** Without drying the teeth, examinations were performed with dental mirrors and blunt, sickle-shaped explorers under a dental chair light, according to WHO recommendations.

**Results:** Caries distribution was higher in the maxillary jaw (62.4%) than in the mandibular jaw (37.6%). Except molars, approximal surfaces of all teeth demonstrated the highest caries rates, ranging from 58.5% to 77.5%. Occlusal fissures on the first and second molars contributed most significantly to caries frequency, from 52.7% to 66.3%. Females (59.1%) showed a higher incidence of caries than males (40.9%). Approximal surfaces of incisors, canines, premolars and occlusal fissure sites in molars showed the highest caries rates in both sexes. Caries were most common among individuals aged 17 to 25 years. Approximal surfaces of incisors, canines, premolars and occlusal surfaces in molars had the highest caries rates in all age groups, except for individuals older than 65 years of age.

**Conclusions:** Gender and age do not affect the prevalence of caries on teeth sites. In addition, more caries are experienced in younger age groups, and their incidence decreases as age increases. (Eur J Dent 2010;4:270-279)

**Key words:** Age; Dental caries; Gender; Tooth surface.

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## INTRODUCTION

To provide the most beneficial treatment tailored to a given level of current risk and probable future risk, dentists must be able to reasonably assess the following: 1) presence and severity of all carious lesions; 2) tooth surface cavitation status; 3) caries risk; and 4) outcome probabilities for treatment regimens.<sup>1</sup> It has been well established that information regarding a subject's caries pattern may provide insight on the etiology of

the disease.<sup>2</sup> Individual tooth surfaces have vastly different susceptibilities to caries, with the pit and fissure (occlusal) surfaces the most susceptible, and the smooth (labial and lingual) surfaces the least susceptible.<sup>3,4</sup> The most frequent sites of attack are the occlusal surfaces of the first and second permanent molars.<sup>4</sup> In addition, it was reported that neighboring approximal tooth surfaces differ in their caries susceptibility,<sup>5-7</sup> implying that one surface may show obvious radiographic signs of caries, while the neighboring surface does not.<sup>8</sup>

Various reasons for the differing caries susceptibilities have been proposed, such as different tooth surface morphology or different post-eruptive enamel maturation of the surfaces.<sup>7</sup> The caries susceptibility of a tooth surface also varies over time.<sup>4</sup> It was found that susceptibility to caries is low during the first post-eruptive year, but rises rapidly to the maximum rate approximately two to three years post-eruption.<sup>9</sup> Information on surface-specific dental caries patterns is a useful source of reference for dental administrators in deciding which preventive strategies to use.<sup>4</sup>

Different age groups and populations exhibit distinct caries prevalence rates, observations of which could provide a useful descriptive measure of caries susceptibility in tooth surfaces.<sup>4</sup> Older adults have considerably more factors that place tooth surfaces at risk for caries than do younger adults, due to the many health conditions faced by this population during the later phases of life, which can last as long as 40 years. During that period, the elderly face a wide spectrum of oral and general health problems.<sup>10</sup>

A technical report by the Fédération Dentaire Internationale<sup>11</sup> also attributed the higher prevalence of caries in women to their earlier eruption of permanent teeth. The observation of significant rates of caries among women, even after adjusting for their greater number of teeth, was attributed to the fact that women's teeth are exposed for longer periods of time to the risk of decay.<sup>12</sup>

The aim of the present study was to assess the caries incidence rates of individual permanent tooth surfaces. This paper also compared these results among various gender and age groups.

## MATERIALS AND METHODS

In this study, patients attending the Department of the Faculty of Dentistry at Istanbul Uni-

versity, located in Istanbul, Turkey, were examined between 2001 and 2004. According to the department's patient treatment protocol, the patients were first examined in the Department of Oral Diagnosis and Radiology. Then, according to their diagnoses, patients were referred to related departments, such as orthodontics, endodontics, oral surgery, periodontology, prosthetic dentistry and pedodontics, for treatment. After the second examination, the conservative treatment (e.g., caries treatment, restoration replacement, sensitivity treatment, prophylaxis, etc.) to be applied was determined by the first author. Without drying the teeth, examinations were performed with dental mirrors and blunt sickle-shaped explorers under a dental chair light, according to WHO recommendations.<sup>13</sup> The examiner applied standardized and routinely used WHO diagnostic criteria. Firstly, caries teeth were identified, and a diagnosis of caries was made only when there was clear evidence of loss of tooth substance. White or brown spots in enamel, the surfaces of which remained intact and glossy, were not considered to be caries. Caries were recorded as present when a lesion in a pit or on a smooth tooth surface had a detectably softened floor, undermined enamel or softened wall. "Sticky" and discolored fissures were accepted as caries only if there was clear evidence of cavitation beginning below the fissure. On approximal surfaces, caries were recorded when the explorer had entered a lesion.<sup>13,14</sup> Then, the borders of caries were drawn on the related tooth figure chart. If the pattern of caries experience was symmetrical between the left and right sides of the mouth for both maxillary and mandibular teeth, the left and right surfaces were combined for each tooth. Therefore, in total, 16 master charts were prepared, one for the upper and lower right teeth, and for the upper and lower left teeth. These charts included five figures: mesial, distal, labial/vestibul, lingual/palatinal and occlusal/incisal surfaces. Furthermore, the age and gender of the patients were recorded on the chart for each caries tooth.

The location of dental caries on the teeth surfaces was recorded as follows: 1, Distal; 2, Mesial; 3, Lingual-Palatinal; 4, Labial-Buccal; 5, Cervical; 6, Incisal-Occlusal; 7, Pit on the palatinal surface of the upper molar and pit on the buccal surface of the lower molar; and 8, Occlusal fissure for statis-

tical evaluation and comparison. Thus, seven sites for molars and six sites for premolars, canines, incisors were coded. If lesions were involved on more than one surface, each impacted surface was recorded separately. In addition, the recorded ages on the chart for each caries tooth were coded in six groups: 1, 17-25 years of age; 2, 26-35 years of age; 3, 36-45 years of age; 4, 46-55 years of age; 5, 56-65 years of age; and 6, over 65 years of age.

Differences in caries incidence between surfaces of individual teeth were assessed for statistical significance using the Friedman test and Dunn's Multiple Comparisons test (if  $P < .05$ ). The Pearson Chi-Square test and Fisher's Exact Test were used to compare differences in caries prevalence of individual tooth surfaces between females and males. We also used the Mann-Whitney U test in order to compare differences in caries rates of individual tooth surfaces between age groups.

## RESULTS

In this study, 11915 caries surfaces (or 17558 caries sites) in 2383 teeth were recorded. The distribution of caries teeth according to jaw (and tooth number) is shown in Table 1. In examined caries teeth, the molars were the most significantly affected at 45%. Regarding the distribution of caries within individual teeth, the first and second maxillary molars were most susceptible to caries at 11.5%, while the mandibular central incisors were least susceptible, at 1.7%. Caries distribution was higher in the maxillary jaw (62.4%) than in the mandibular jaw (37.6%).

Tables 2a and 2b show the distribution of caries on individual tooth surfaces. Mesial surfaces of the maxillary central and lateral incisors had the highest caries rates at 59.3% and 58.5%, re-

spectively. Distal surfaces of mandibular central and lateral incisors demonstrated highest caries frequencies at, respectively, 77.5% and 74.2%. In addition, distal surfaces of maxillary canines and of the first and second premolar teeth showed the highest caries rates, with 74.5%, 68% and 59.4%, respectively. Likewise, the highest prevalence of caries experience was observed on the distal surfaces of mandibular canines and the first and second premolar teeth (67.6%, 67% and 64.1%, respectively). On the other hand, occlusal fissures on the first and second maxillary molars demonstrated highest caries frequencies at 52.7% and 60.9%, respectively. Similarly, in the first and second mandibular molar teeth, occlusal fissures showed the highest caries rates (55.6% and 66.3%, respectively).

Lingual surfaces of maxillary central incisors and mesial surfaces of maxillary lateral incisors and of the second premolar and molar teeth contributed significantly more ( $P < .05$ ) to caries incidence than the same surfaces of mandibular central, lateral incisor, second premolar and second molar teeth. On the other hand, distal surfaces of mandibular central and lateral incisor teeth, and cervical sites of mandibular lateral incisor and second premolar teeth had significantly more caries than the same surfaces of maxillary incisors, lateral incisors and second premolars. Buccal and lingual surfaces of first premolar teeth and pit sites on the buccal surfaces of second mandibular molar teeth showed significantly more caries than the same surfaces of maxillary first premolars and second molar teeth.

Tables 3a and 3b show the distribution of caries according to tooth surfaces in female and male patients. Women showed a higher incidence (59.1%) of caries than males (40.9%). When analyzing data aggregated by gender, lingual surfaces and cervical sites of maxillary central incisors, distal surfaces of maxillary lateral incisors, and mesial surfaces of maxillary second molars in women demonstrated significantly higher rates of caries than men, compared to the equivalent surfaces on maxillary central incisors, lateral incisors and maxillary second molars.

Tables 4a and 4b show the distribution of caries according to age group. The prevalence of caries experience was highest among individuals between the ages of 17 and 25. However, caries

Table 1. Distribution of examined caries teeth according to jaw (Percentage of total caries surfaces).

Tooth number	Maxilla	Mandible	Total
1	241 (10.1)	40 (1.7)	281 (11.8)
2	229 (9.6)	62 (2.6)	291 (12.2)
3	110 (4.6)	71 (3)	181 (7.6)
4	172 (7.2)	97 (4.1)	269 (11.3)
5	187 (7.8)	103 (4.3)	290 (12.2)
6	275 (11.5)	261 (11)	536 (22.5)
7	274 (11.5)	261 (11)	535 (22.5)
Total	1488 (62.4)	895 (37.6)	2383 (100)

prevalence for individual tooth surfaces was found to be inversely related to age. Caries prevalence on distal surfaces of maxillary lateral incisors, second premolars, second molars and mandibular second molars significantly related to increasing age groups. Furthermore, mesial surfaces of maxillary second premolars, first molars, second molars and mandibular canines showed significant caries incidence with increasing age. Caries distribution on lingual surfaces of maxillary first molars, labial surfaces of mandibular first premolars, and occlusal surfaces of mandibular second molars was significantly related to increasing age. Similarly, there were statistically significant relationships between age group and the rate of caries found on pits of buccal surfaces of maxillary first molars and of first and second mandibular molars. At this time, caries prevalence on occlusal fissure sites on first and second maxillary premolars, first and second maxillary molars, and first and second mandibular molars was found to be correlated with increases in age.

## DISCUSSION

The present study was based on determining the rates and incidence patterns of caries on in-

dividual tooth surfaces. Therefore, examinations for the present study were conducted only on patients who applied to our clinic for treatment of their caries teeth. We only recorded tooth or tooth surfaces on charts, also indicating age and gender, as decayed when cavitation was obvious ( $D_3$  diagnostic threshold). The results of the present study showed that mandibular central incisors were least like to be caries teeth, while maxillary and mandibular molars were the most likely. Caries are also more prevalent in maxillary teeth than in mandibular teeth. The results of our study confirm the findings of Luen et al, who evaluated the ten-year incidence of dental caries in adult and elderly Chinese patients.<sup>15</sup> They observed the lowest disease incidence on mandibular anterior teeth, and mandibular molars were apparently most susceptible to caries. In the present study, maxillary molars were slightly more significantly affected than mandibular molars. Manji and Fejerskov reported that the lower molars were the most severely affected teeth in the entire dentition, more commonly affected than upper molars, but otherwise, teeth in the upper jaw were generally more affected than premolars and anterior teeth in the lower jaw.<sup>16</sup> Macek et al investigated

Table 2a. Number of caries surfaces (Percentage of total caries surfaces) according to jaws. Teeth on left and right sites have been combined.

Maxillary tooth	Distal	Mesial	Palatinal	Labial/Buccal	Cervical	Incisal/Occlusal	Pit on the buccal	Occlusal fissur
1	113 (46.9)	143 (59.3)	107 (44.4)	50 (20.7)	11 (4.6)	12 (5)	-	-
2	91 (39.7)	134 (58.5)	106 (46.3)	80 (34.9)	8 (3.5)	14 (6.1)	-	-
3	82 (74.5)	29 (26.4)	40 (36.4)	18 (16.4)	10 (9.1)	5 (4.5)	-	-
4	117 (68)	42 (24.4)	5 (2.9)	7 (4.1)	1 (0.6)	82 (47.7)	-	12 (7)
5	111 (59.4)	75 (40.1)	6 (3.2)	7 (3.7)	0 (0)	65 (34.8)	-	15 (8)
6	36 (13.1)	80 (29.1)	16 (5.8)	17 (6.2)	0 (0)	82 (29.8)	17 (6.2)	145 (52.7)
7	32 (11.7)	37 (13.5)	11 (4)	13 (4.7)	1 (0.4)	62 (22.6)	12 (4.4)	167 (60.9)

Table 2b. Number of caries surfaces (Percentage of total caries surfaces) according to jaws. Teeth on left and right sites have been combined.

Mandibular tooth	Distal	Mesial	Palatinal	Labial/Buccal	Cervical	Incisal/Occlusal	Pit on the buccal	Occlusal fissur
1	31 (77.5)	18 (45)	6 (15)	8 (20)	2 (5)	2 (5)	-	-
2	46 (74.2)	18 (29)	23 (37.1)	20 (32.3)	7 (11.3)	8 (12.9)	-	-
3	48 (67.6)	12 (16.9)	23 (32.4)	15 (21.1)	12 (16.9)	4 (5.6)	-	-
4	65 (67)	16 (16.5)	21 (21.6)	16 (16.5)	13 (13.4)	37 (38.1)	-	2 (2.1)
5	66 (64.1)	28 (27.2)	6 (5.8)	6 (5.8)	3 (2.9)	40 (38.8)	-	7 (6.8)
6	36 (13.8)	43 (16.5)	12 (4.6)	36 (13.8)	1 (0.4)	78 (29.9)	47 (18)	145 (55.6)
7	26 (10)	13 (5)	9 (3.4)	21 (8)	6 (2.3)	53 (20.3)	34 (13)	173 (66.3)

the caries susceptibility of permanent teeth in six categories and found that molars were more susceptible than incisors, canines, or premolars, just as the results of the present study indicated.<sup>17</sup>

More caries were observed on distal surfaces of central and lateral incisors and premolars than on other surfaces, except those of maxillary central and lateral incisors. In contrast, mesial surfaces of maxillary central and lateral incisors showed the highest rate of caries. On the other hand, occlusal surfaces, especially fissures of molars, had more caries than other sites. However, compared to mandibular jaws, caries rates in mesial sur-

faces were higher in maxillary teeth, except for maxillary central and lateral incisors. Generally, caries experience in lingual surfaces of anterior teeth was relatively high. In contrast, occlusal surfaces of premolars exhibited the second highest caries rate. When compared with other teeth, a smaller caries rate was generally observed on all sites, except occlusal surfaces and fissures in molars. Occlusal surfaces in permanent molars seem to have benefited least from the general decline. The reason for this phenomenon could be a combination of complicated surface morphology and difficult access for effective oral hygiene.

**Table 3a.** Number of caries surfaces (Percentage of total caries surfaces) according to gender. Teeth on left and right sites have been combined.

Maxillary tooth	Gender	Distal	Mesial	Palatal	Labial/Buccal	Cervical	Incisal/Occlusal	Pit on the buccal	Occlusal fissur
1	Female	63 (48.8)	82 (63.6)	65 (50.4)	24 (18.6)	2 (1.6)	8 (6.2)	-	-
	Male	50 (44.6)	61 (54.5)	42 (37.5)	26 (23.2)	9 (8)	4 (3.6)	-	-
2	Female	73 (50.7)	79 (54.9)	71 (49.3)	50 (34.7)	4 (2.8)	9 (6.3)	-	-
	Male	18 (21.2)	55 (64.7)	35 (41.2)	30 (35.3)	4 (4.7)	5 (5.9)	-	-
3	Female	51 (71.8)	22 (31)	26 (36.6)	13 (18.3)	5 (7)	3 (4.2)	-	-
	Male	31 (79.5)	7 (17.9)	14 (35.9)	5 (12.8)	5 (12.8)	2 (5.1)	-	-
4	Female	60 (66.7)	26 (28.9)	2 (2.2)	4 (4.4)	0 (0)	47 (52.2)	-	5 (5.6)
	Male	57 (69.5)	16 (19.5)	3 (3.7)	3 (3.7)	1 (1.2)	35 (42.7)	-	7 (8.5)
5	Female	57 (59.4)	38 (39.6)	3 (3.1)	3 (3.1)	-	31 (32.3)	-	7 (7.3)
	Male	54 (59.3)	37 (40.7)	3 (3.3)	4 (4.4)	-	34 (37.4)	-	8 (8.8)
6	Female	20 (12.1)	47 (28.5)	8 (4.8)	7 (4.2)	-	44 (26.7)	8 (4.8)	94 (57)
	Male	16 (14.5)	33 (30)	8 (7.3)	10 (9.1)	-	38 (34.5)	9 (8.2)	51 (46.4)
7	Female	21 (12.7)	13 (7.9)	9 (5.5)	9 (5.5)	1 (0.6)	34 (20.6)	7 (4.2)	108 (65.5)
	Male	11 (10.1)	24 (22)	2 (1.8)	4 (3.7)	0 (0)	28 (25.7)	5 (4.6)	59 (54.1)

**Table 3b.** Number of caries surfaces (Percentage of total caries surfaces) according to gender. Teeth on left and right sites have been combined.

Mandibular tooth	Gender	Distal	Mesial	Palatal	Labial/Buccal	Cervical	Incisal/Occlusal	Pit on the buccal	Occlusal fissur
1	Female	20 (74.1)	14 (51.9)	5 (18.5)	6 (22.2)	2 (7.4)	2 (7.4)	-	-
	Male	11 (84.6)	4 (30.8)	1 (7.7)	2 (15.4)	0 (0)	0 (0)	-	-
2	Female	32 (68.1)	15 (31.9)	19 (40.4)	13 (27.7)	6 (12.8)	6 (12.8)	-	-
	Male	14 (93.3)	3 (20)	4 (26.7)	7 (46.7)	1 (6.7)	2 (13.3)	-	-
3	Female	29 (64.4)	8 (17.8)	18 (40)	9 (20)	10 (22.2)	3 (6.7)	-	-
	Male	19 (73.1)	4 (15.4)	5 (19.2)	6 (23.1)	2 (7.7)	1 (3.8)	-	-
4	Female	45 (66.2)	8 (11.8)	14 (20.6)	11 (16.2)	11 (16.2)	25 (36.8)	-	2 (2.9)
	Male	20 (69)	8 (27.6)	7 (24.1)	5 (17.2)	2 (6.9)	12 (41.4)	-	0 (0)
5	Female	31 (57.4)	15 (27.8)	3 (5.6)	2 (3.7)	3 (5.6)	17 (31.5)	-	4 (7.4)
	Male	35 (71.4)	13 (26.5)	3 (6.1)	4 (8.2)	0 (0)	23 (46.9)	-	3 (6.1)
6	Female	18 (12.5)	27 (18.8)	9 (6.3)	19 (13.2)	1 (0.7)	49 (34)	28 (19.4)	73 (50.7)
	Male	18 (15.4)	16 (13.7)	3 (2.6)	17 (14.5)	0	29 (24.8)	19 (16.2)	72 (61.5)
7	Female	18 (11)	10 (6.1)	8 (4.9)	15 (9.2)	5 (3.1)	36 (22.1)	17 (10.4)	108 (66.3)
	Male	8 (8.2)	3 (3.1)	1 (1)	6 (6.1)	1 (1)	17 (17.3)	17 (17.3)	65 (66.3)

Table 4a. Number of caries surfaces (Percentage of total caries surfaces) according to age groups. Teeth on left and right sites have been combined.

Maxillary tooth	Age group	Distal	Mesial	Palatinal	Labial/ Buccal	Cervical	Incisal/ Occlusal	Pit on the buccal	Occlusal fissur
1	17-25	48 (41.7)	71 (61.7)	45 (39.1)	25 (21.7)	3 (2.6)	2 (1.7)	-	-
	26-35	21 (50)	29 (69)	14 (33.3)	11 (26.2)	3 (7.1)	5 (11.9)	-	-
	36-45	25 (58.1)	25 (58.1)	29 (67.4)	7 (16.3)	0 (0)	2 (4.7)	-	-
	46-55	19 (59.4)	12 (37.5)	18 (56.3)	6 (18.8)	2 (6.3)	3 (9.4)	-	-
	56-65	0 (0)	4 (57.1)	1 (14.3)	1 (14.3)	3 (42.9)	0 (0)	-	-
	>65	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	-	-
2	17-25	16 (20)	54 (67.5)	35 (43.8)	32 (40)	2 (2.5)	4 (5)	-	-
	26-35	27 (46.6)	32 (55.2)	27 (46.6)	18 (31)	3 (5.2)	5 (8.6)	-	-
	36-45	28 (58.3)	25 (52.1)	26 (54.2)	13 (27.1)	0 (0)	4 (8.3)	-	-
	46-55	13 (43.3)	18 (60)	14 (46.7)	13 (43.3)	1 (3.3)	1 (3.3)	-	-
	56-65	7 (58.3)	4 (33.3)	4 (33.3)	3 (25)	2 (16.7)	0 (0)	-	-
	>65	0 (0)	1 (100)	0 (0)	1 (100)	0 (0)	0 (0)	-	-
3	17-25	14 (73.7)	4 (21.1)	6 (31.6)	4 (21.1)	1 (5.3)	0 (0)	-	-
	26-35	23 (74.2)	9 (29)	15 (48.4)	5 (16.1)	2 (6.5)	1 (3.2)	-	-
	36-45	26 (83.9)	6 (19.4)	9 (29)	3 (9.7)	1 (3.2)	1 (3.2)	-	-
	46-55	14 (63.6)	9 (40.9)	7 (31.8)	5 (22.7)	5 (22.7)	3 (13.6)	-	-
	56-65	4 (80)	0 (0)	2 (40)	1 (20)	1 (20)	0 (0)	-	-
	>65	1 (50)	1 (50)	1 (50)	0 (0)	0 (0)	0 (0)	-	-
4	17-25	49 (67.1)	9 (12.3)	1 (1.4)	2 (2.7)	0 (0)	43 (58.9)	-	9 (12.3)
	26-35	29 (70.7)	12 (29.3)	0 (0)	1 (2.4)	0 (0)	12 (29.3)	-	2 (4.9)
	36-45	26 (70.3)	13 (35.1)	2 (5.4)	4 (10.8)	0 (0)	20 (54.1)	-	1 (2.7)
	46-55	8 (57.1)	6 (42.9)	2 (14.3)	0 (0)	1 (7.1)	6 (42.9)	-	0 (0)
	56-65	3 (60)	2 (40)	0 (0)	0 (0)	0 (0)	1 (20)	-	0 (0)
	>65	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	-	0 (0)
5	17-25	38 (50.7)	26 (34.7)	0 (0)	1 (1.3)	-	30 (40)	-	12 (16)
	26-35	29 (60.4)	24 (50)	2 (4.2)	2 (4.2)	-	12 (25)	-	1 (2.1)
	36-45	30 (66.7)	16 (35.6)	4 (8.9)	4 (8.9)	-	14 (31.1)	-	2 (4.4)
	46-55	9 (75)	5 (41.7)	0 (0)	0 (0)	-	7 (58.3)	-	0 (0)
	56-65	4 (66.7)	4 (66.7)	0 (0)	0 (0)	-	2 (33.3)	-	0 (0)
	>65	1 (100)	0 (0)	0 (0)	0 (0)	-	0 (0)	-	0 (0)
6	17-25	19 (10.9)	41 (23.4)	16 (9.1)	15 (8.6)	-	58 (33.1)	15 (8.6)	100 (57.1)
	26-35	7 (12.1)	19 (32.8)	0 (0)	0 (0)	-	11 (19)	1 (1.7)	33 (56.9)
	36-45	7 (22.6)	14 (45.2)	0 (0)	1 (3.2)	-	10 (32.3)	1 (3.2)	11 (35.5)
	46-55	3 (30)	6 (60)	0 (0)	1 (10)	-	3 (30)	0 (0)	0 (0)
	56-65	0 (0)	0 (0)	0 (0)	0 (0)	-	0 (0)	0 (0)	1 (100)
	>65	-	-	-	-	-	-	-	-
7	17-25	6 (4.1)	7 (4.7)	5 (3.4)	6 (4.1)	0 (0)	32 (21.6)	6 (4.1)	110 (74.3)
	26-35	14 (19.7)	19 (26.8)	3 (4.2)	1 (1.4)	0 (0)	18 (25.4)	1 (1.4)	36 (50.7)
	36-45	7 (16.3)	9 (20.9)	2 (4.7)	5 (11.6)	0 (0)	10 (23.3)	4 (9.3)	18 (41.9)
	46-55	4 (50)	1 (12.5)	1 (12.5)	1 (12.5)	0 (0)	1 (12.5)	0 (0)	2 (25)
	56-65	1 (25)	1 (25)	0 (0)	0 (0)	1 (25)	1 (25)	1 (25)	1 (25)
	>65	-	-	-	-	-	-	-	-

Soon after an eruption, a majority of the fissures of occlusal surfaces in molars show early signs of caries.<sup>18</sup> The result of the present study was in agreement with a study conducted by Eklund and Ismail. They reported that occlusal caries exceed all other types and increased most rapidly and to the highest levels in molars.<sup>19</sup> A study by Li et al compared dental caries attack patterns in school-aged children through two national surveys. It was found that the caries attack proportion was highest on occlusal surfaces of maxillary and mandibular permanent first molars, followed by second molars. Unlike the primary dentition, high caries rates in the permanent dentition were limited to pit and fissure surfaces of molars.<sup>20</sup> Comparable to the present study's results, occlusal surfaces of the permanent first molars were the most commonly involved surface, over two-thirds of these being affected according to another study.<sup>3</sup> While occlusal surfaces of permanent second molars contributed most significantly to caries rates, a greater proportion ( $P < .001$ ) of surfaces at risk in permanent first molars became carious in the course of the study.<sup>3</sup> The results of the present study were comparable to those of other studies with respect to approximal caries.<sup>3,8</sup> It was reported that not all interproximal surfaces were equally susceptible, and in particular, distal surfaces of both maxillary and mandibular second premolars were at least three times more likely to decay than other premolar interproximal surfaces.<sup>3</sup> In addition, it was shown in another study that distal surfaces of the first molar were more prone to caries than mesial surfaces of the second molar.<sup>8</sup> The difference between caries rates of adjacent approximal surfaces in the present study has been verified by other studies' results.<sup>3,4,6</sup> It was reported that neighboring approximal tooth surfaces differed in caries susceptibility,<sup>3,4,6</sup> implying that one surface may show obvious radiographic signs of caries, while the neighboring surface does not.<sup>8</sup> It was proposed that the difference in susceptibility to further lesion progression between contacting surfaces must also depend on other factors, such as structural or chemical differences of the enamel.<sup>8</sup> However, researchers can only speculate about such possible differences.<sup>8</sup> According to various studies,<sup>3,4,6,21</sup> the so-called "oldest" tooth surface may be at a disadvantage because it is more readily affected by caries progression up to

a radiographically visible stage.<sup>8</sup> Thus, the post-eruptive maturation of the enamel does not seem to be an advantage for preventing caries on approximal surfaces.<sup>8</sup> Furthermore, an explanation of the difference of caries prevalence among two adjacent approximal tooth surfaces may be as follows. When a tooth erupts, the approximal surface of an already erupted adjacent tooth, which either has not been exposed to the oral environment or has been a self-cleansing surface, becomes a retention area. On this surface, a caries-promoting plaque may become established and then remain in the same area. The surface of the erupting tooth, on the other hand, is not colonized on a fixed location by a caries-promoting plaque until this tooth has come into occlusion. The establishment of caries-inducing plaque may be promoted by temporary high acidity near the gingival margin of an erupting tooth.<sup>6,22</sup>

In the present study, it was found that molar teeth had many more caries than incisors, canines, or premolars in both sexes. Furthermore, approximal surfaces of incisors, canines and premolars showed higher caries rates than other sites in both men and women. Occlusal fissure sites in molars showed the highest caries rates in both sexes as well. The finding that more caries teeth were observed in women than in men is in agreement with findings of other studies.<sup>12,23</sup> Mansbridge<sup>24</sup> reviewed several studies presenting data about the gender gap regarding caries, and most researchers attribute this difference to the fact that, in general, permanent teeth erupt earlier in women than in men. As they are exposed to the risk of caries for a longer period, it is logical to assume that women's teeth would decay more than the teeth of their male counterparts of the same age. The study also found evidence that female patients continue to experience excessive caries, even after adjustments for prior eruptions of permanent teeth. The author of this study also evaluated biological and behavioral differences between women and men in order to explain this observation.<sup>12,24</sup> Many factors affect the prevalence of caries on teeth surfaces in both sexes, and these include education, income, lifestyle, etc. Therefore, further investigation is necessary to explain these factors.

The present study showed that age does not affect caries prevalence in teeth surfaces. Approxi-

**Table 4b.** Number of caries surfaces (Percentage of total caries surfaces) according to age groups. Teeth on left and right sites have been combined.

Mandibular tooth	Age group	Distal	Mesial	Palatal	Labial/ Buccal	Cervical	Incisal/ Occlusal	Pit on the buccal	Occlusal fissur
1	17-25	11 (78.6)	9 (64.3)	2 (14.3)	1 (7.1)	0 (0)	0 (0)	-	-
	26-35	5 (83.3)	3 (50)	0 (0)	1 (16.7)	0 (0)	0 (0)	-	-
	36-45	9 (81.8)	2 (18.2)	2 (18.2)	3 (27.3)	2 (18.2)	1 (9.1)	-	-
	46-55	2 (50)	2 (50)	0 (0)	1 (25)	0 (0)	0 (0)	-	-
	56-65	4 (100)	1 (25)	2 (50)	2 (50)	0 (0)	1 (25)	-	-
	>65	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	-	-
2	17-25	6 (60)	5 (50)	2 (20)	4 (40)	0 (0)	0 (0)	-	-
	26-35	3 (50)	3 (50)	3 (50)	0 (0)	0 (0)	1 (16.7)	-	-
	36-45	17 (77.3)	5 (22.7)	10 (45.5)	9 (40.9)	5 (22.7)	3 (13.6)	-	-
	46-55	10 (76.9)	3 (23.1)	3 (23.1)	3 (23.1)	2 (15.4)	3 (23.1)	-	-
	56-65	7 (100)	2 (28.6)	3 (42.9)	2 (28.6)	0 (0)	1 (14.3)	-	-
	>65	3 (75)	0 (0)	2 (50)	2 (50)	0 (0)	0 (0)	-	-
3	17-25	3 (100)	0 (0)	1 (33.3)	1 (33.3)	0 (0)	0 (0)	-	-
	26-35	7 (58.3)	0 (0)	4 (33.3)	4 (33.3)	5 (41.7)	0 (0)	-	-
	36-45	21 (84)	1 (4)	11 (44)	3 (12)	4 (16)	0 (0)	-	-
	46-55	12 (57.1)	7 (33.3)	6 (28.6)	7 (33.3)	2 (9.5)	4 (19)	-	-
	56-65	5 (55.6)	3 (33.3)	1 (11.1)	0 (0)	1 (11.1)	0 (0)	-	-
	>65	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	-	-
4	17-25	12 (63.2)	5 (26.3)	5 (26.3)	6 (31.6)	3 (15.8)	8 (42.1)	-	0 (0)
	26-35	21 (72.4)	4 (13.8)	5 (17.2)	5 (17.2)	3 (10.3)	14 (48.3)	-	0 (0)
	36-45	21 (63.6)	4 (12.1)	9 (27.3)	5 (15.2)	6 (18.2)	13 (39.4)	-	2 (6.1)
	46-55	8 (66.7)	3 (25)	1 (8.3)	0 (0)	0 (0)	1 (8.3)	-	0 (0)
	56-65	2 (66.7)	0 (0)	0 (0)	0 (0)	1 (33.3)	1 (33.3)	-	0 (0)
	>65	1 (100)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	-	0 (0)
5	17-25	26 (61.9)	11 (26.2)	2 (4.8)	2 (4.8)	0 (0)	19 (42.5)	-	6 (14.3)
	26-35	15 (68.2)	5 (22.7)	1 (4.5)	1 (4.5)	1 (4.5)	7 (31.8)	-	0 (0)
	36-45	17 (60.7)	10 (35.7)	2 (7.1)	3 (10.7)	2 (7.1)	10 (35.7)	-	0 (0)
	46-55	7 (77.8)	1 (11.1)	1 (11.1)	0 (0)	0 (0)	3 (33.3)	-	1 (11.1)
	56-65	1 (50)	1 (50)	0 (0)	0 (0)	0 (0)	1 (50)	-	0 (0)
	>65	-	-	-	-	-	-	-	-
6	17-25	22 (12)	24 (13.1)	10 (5.5)	29 (15.8)	0 (0)	56 (30.6)	39 (21.3)	110 (60.1)
	26-35	4 (8.7)	9 (19.6)	0 (0)	3 (6.5)	0 (0)	11 (23.9)	4 (8.7)	27 (58.7)
	36-45	4 (25.3)	3 (17.6)	2 (11.8)	3 (17.6)	1 (5.9)	5 (29.4)	24 (25.3)	6 (35.3)
	46-55	6 (40)	7 (46.7)	0 (0)	1 (6.7)	0 (0)	6 (40)	0 (0)	2 (13.3)
	56-65	-	-	-	-	-	-	-	-
	>65	-	-	-	-	-	-	-	-
7	17-25	13 (7.6)	5 (2.9)	6 (3.5)	10 (5.9)	1 (0.6)	28 (16.5)	29 (17.1)	123 (72.4)
	26-35	4 (8.2)	4 (8.2)	2 (4.1)	5 (10.2)	3 (6.1)	10 (20.4)	4 (8.2)	31 (63.3)
	36-45	5 (19.2)	0 (0)	1 (3.8)	5 (19.2)	0 (0)	10 (38.5)	0 (0)	13 (50)
	46-55	2 (16.7)	4 (33.3)	0 (0)	0 (0)	1 (8.3)	3 (25)	1 (8.3)	5 (41.7)
	56-65	2 (100)	0 (0)	0 (0)	1 (50)	0 (0)	2 (100)	0 (0)	0 (0)
	>65	0 (0)	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	1 (50)



mal surfaces of incisors, canines and premolars had the highest caries rates in all age groups, except for patients over the age of 65. On the other hand, occlusal surfaces of molars showed the highest caries rate. In addition, it was observed that molar teeth are more prone to caries than incisors, canines, or premolars in all age groups.<sup>25</sup> Previous research, like the study at hand, has confirmed that mandibular second molars are most susceptible to dental caries in individuals between the ages of 4 and 20, employing a method that considered post-eruptive tooth age.<sup>17</sup> However, in contrast to this study's results, caries rates of approximal, buccal and palatal surfaces were very low in all age groups, except for the caries rate of molars found in another study.<sup>25</sup>

It should be noted that most of the world's populations do not have access to organized dental health care, nor is the tradition for maintaining proper oral hygiene widespread in such populations. However, this situation makes it possible to study the natural history of dental caries.<sup>15</sup> There may also be differences in the prevalence of teeth surface caries between countries and with respect to geographic location, occupation, income, social class, ethnic group, education, lifestyle, etc. It was observed that a greater number of caries are experienced in younger age groups, and this rate decreases with age. Observations in the United States indicate that caries rates in adults are similar to those of children.<sup>26,27</sup> This is in accordance with observations of Finnish adults, who had a constant proportion of decayed teeth, regardless of whether they were 35 or 65 years of age.<sup>28</sup> Confirming this study's conclusions, these authors concluded that the 'generally held view of caries experience being reduced with age' may not result from reduced caries activity, but from the reduced number of remaining teeth.<sup>16</sup> It has also been reported that dental caries on a population basis is the predominant cause of tooth loss, even up to the age of 60.<sup>29-34</sup> The cohort effect may be an important factor, i.e., each age cohort is assumed to have a distinct lifestyle, socio-economic background, etc.; therefore, the rate at which caries lesions develop early in life, as a result of particularly favorable or unfavorable life conditions, will strongly influence caries levels later in life.<sup>16</sup> Such cohort effects are certainly of tremendous importance when interpreting caries data from today's populations, where dramatic changes in caries

experience occur even between age groups only separated by a few years.<sup>16</sup>

## CONCLUSIONS

Mandibular central incisors are least likely to experience caries, while maxillary and mandibular molars demonstrate the highest caries rates. Furthermore, maxillary teeth are more susceptible to caries than mandibular teeth. Approximal surfaces of incisors, canines and premolars have higher caries rates than other sites. On the other hand, occlusal fissures sites in molars show the highest caries rates. Gender and age do not affect these caries rates on teeth sites. However, women generally have more caries teeth than men. Furthermore, caries teeth are more common among younger patients, and this rate decreases with age.

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