The Turkish Journal of Pediatrics 28:181 - 190, 1986

CLINICAL EXAMINATION OF THE DEPTH OF THE GINGIVAL SULCUS IN PRIMARY DENTITION*

*Yıldız Batırbaygil DDS**, İlknur Tanboğa DDS***, Güngör Korten DDS****, Berna Serdaroğlu DDS****, Alparslan Gökalp DDS****, Hüseyin Özen DDS*****

Key words: gingival sulcus, primary dentition

Although the architecture and the pathologic conditions of peridontal tissues in adult dentition have been investigated in many clinical studies, the depth of gingival sulcus in primary dentition has not been studied very extensively. During childhood and puberty, the periodontium changes with the exfoliation and the eruption of teeth and for that reason it is difficult to make a description of the periodontium at that period[1,2]. The gingival sulcus is the shallow groove which develops between the surface of the tooth on one side and the gingiva on the other and extends around the circumference of the tooth in the cervical region of the crown. The bottom of the sulcus is located at the junction where the epithelial attachment separates from the tooth surface[3].

Knowledge of the depth of the sulcus is important for several reasons, for instance, with the increasing interest and attention to periodontal conditions in children, the depth of the sulcus is an important clinical indicator in determining if any pathologic condition exists, also, with the increasing use of prefabricated crowns in pediatric restorative dentistry, the depth of the gingival sulcus is important in determining how far below the gingival margin, the margin of the crown should be placed so as to avoid impinging upon the junctional epithelium[4].

---

* From the Department of Pedodontics, Hacettepe University Faculty of Dentistry, Ankara. This article was presented at Marmara University Faculty of Dentistry at the First Dentistry Week of the Islamic Countries, November 17-23, 1985.

** Associate Professor of Pedodontics, Hacettepe University Faculty of Dentistry.

*** Lecturer, Hacettepe University Faculty of Dentistry.

**** Resident in Pedodontics, Hacettepe University Faculty of Dentistry.

Material and Methods

In this study twenty-nine children, twelve girls and seventeen boys, between the ages of 3 and 6 years, were examined. The criteria for selecting the children were as follows:

i. No story of systemic disease.
ii. The presence of an intact maxillary and mandibular primary quadrant, no missing or loose teeth, and no prefabricated crown restorations or other type of restorations.
iii. No evidence of gingival disturbances.
iv. The absence of permanent teeth.
v. Normal occlusal relations.
vi. No evidence of bad habits.

In our study it was assumed that the right and left sides of the jaws are symmetrical and the measurements were made only in the right half of the jaws.

All measurements were taken to the nearest 0.5 mm with the Williams periodontal probe, without applying any force, but depending simply on the weight of the probe itself which was held parallel to the long axis of the tooth. A total of six measurements were made around each tooth: distobuccal, buccal, mesiobuccal, distolingual, lingual, mesiolingual.

From the twenty-nine children, by measuring in each case ten teeth and taking six measurements for each tooth, we made a total of 1740 measurements. The arithmetical average of the six measurements for each tooth is accepted as the mean gingival sulcus depth of that tooth.

Results

According to the 1740 measurements, the mean of the depth of the gingival sulcus for each tooth and for each of the points measured, in millimeters, is shown in Table I. In this study the mean sulcus depth of the entire primary dentition was 1.43 mm. It is seen that gingival sulcus depth is less in the anterior teeth than in the posterior ones (Figure 1). In both jaws, the second primary molars had the greatest sulcus depth, followed by the first primary molars and the cuspids in that order. In maxilla the sulcus depths of the central incisors are greater than those of the lateral incisors, however in mandible the sulcus depths of the central and lateral incisors are the same.

As seen in Table II, when we compare the maxilla and the mandible, we see that the mean sulcus depth is 1.43 mm in both maxilla and mandible.

TABLE I

Mean of the Depth of the Gingival Sulcus for Each Tooth and for Each of the Points Measured (mm)

	Tooth	G	DB	B	MB	DL	L	ML
Maxilla	I	1.35	1.55	1.09	1.57	1.33	1.07	1.47
	II	1.26	1.43	1.00	1.47	1.31	1.10	1.26
	III	1.38	1.62	1.03	1.50	1.45	1.21	1.47
	IV	1.48	1.97	1.00	1.57	1.55	1.26	1.55
	V	1.69	1.69	1.41	2.12	1.69	1.40	1.83
Mandible	I	1.35	1.55	1.00	1.38	1.43	1.21	1.53
	II	1.35	1.55	1.00	1.41	1.48	1.19	1.47
	III	1.37	1.52	1.05	1.53	1.41	1.21	1.52
	IV	1.48	1.55	1.00	1.60	1.79	1.31	1.62
	V	1.62	1.69	1.31	1.72	1.74	1.38	1.86
		General	Distobuccal	Buccal	Mesiobuccal	Distolingual	Lingual	Mesiolingual

TABLE II

Comparison of the Maxillary and Mandibular Sulcus Depths

	n	$\bar{x}$	S	$S\bar{x}$
Maxilla	30	1.432	0.276	0.050
Mandible	30	1.434	0.235	0.043

$t = 0.030$ $P > 0.05$ nonsignificant

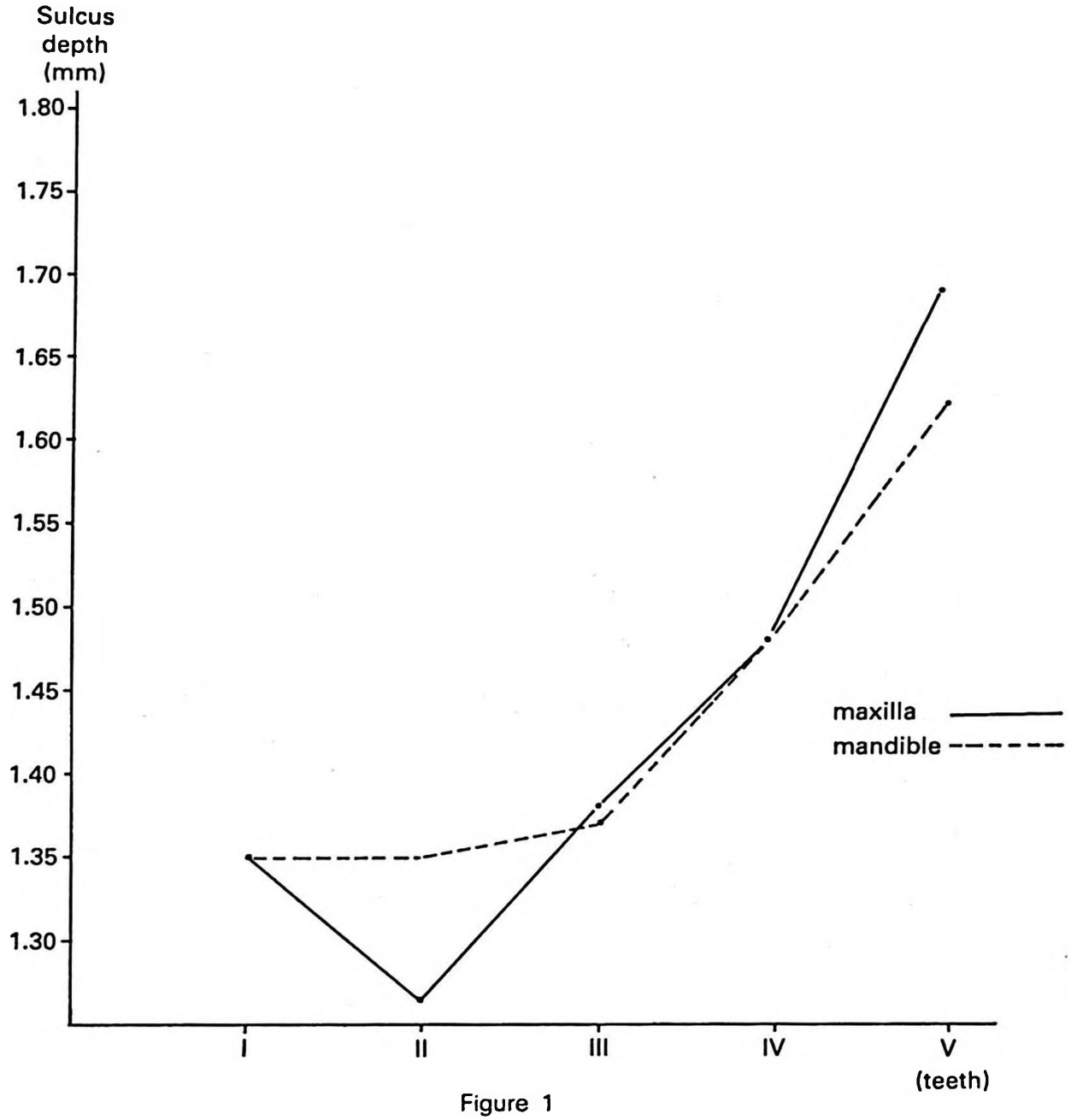

Figure 1

Maxilla and mandible measurements of gingival sulcus of primary teeth

The comparison of anterior and posterior segments in both of the jaws, is shown in Table III. In maxilla the mean depth of gingival sulcus in the anterior segment is 1.33 mm and 1.59 mm in the posterior segment. According to these results the difference between anterior and posterior segments was statistically significant. Similar to this finding, in mandible the mean depth of gingival sulcus is 1.36 mm in the anterior segment and 1.55 mm in the posterior segment and the difference was again statistically significant. There was no statistically significant difference between the maxillary anterior segment and the mandibular anterior segment nor between the maxillary posterior segment and the mandibular posterior segment.

In Table IV, the comparisons between each of the points measured are shown. We compared buccal with lingual, distobuccal with mesiobuccal, distolingual with mesiolingual and distobuccal distolingual with mesiobuccal mesiolingual. When buccal (1.09 mm) and lingual (1.23 mm) points were compared the difference was found to be statistically significant, but when other points were compared the differences were statistically insignificant.

The last parameter of our study was the comparison of the depth of the gingival sulcus according to sex. As seen in Table V there was no statistically significant difference in gingival sulcus depth between boys and girls.

TABLE III

Comparison of Sulcus Depths in Anterior and Posterior Segments

	n	$\bar{x}$	S	$S\bar{x}$
1 Max. Anterior	18	1.329	0.203	0.048
2 Max. Posterior	12	1.587	0.306	0.088
3 Mand. Anterior	18	1.358	0.195	0.046
4 Mand. Posterior	12	1.548	0.251	0.072

	t	P	
1 - 2	2.57	$P < 0.02$	significant
3 - 4	2.21	$P < 0.05$	significant
1 - 3	0.44	$P > 0.05$	nonsignificant
2 - 4	0.34	$P > 0.05$	nonsignificant

TABLE IV

Comparison of Sulcus Depths for Each of the Points Measured

	n	$\bar{x}$	S	$S\bar{x}$
1 DB	10	1.612	0.148	0.047
2 B	10	1.089	0.148	0.047
3 MB	10	1.587	0.211	0.067
4 DL	10	1.518	0.169	0.053
5 L	10	1.234	0.107	0.034
6 ML	10	1.558	0.177	0.056
7 DB + DL	20	1.565	0.162	0.036
8 MB + ML	20	1.5725	0.190	0.042

	t		
B – L	2.51	$P < 0.05$	significant
DB – MB	0.31	$P > 0.05$	nonsignificant
DL – ML	0.52	$P > 0.05$	nonsignificant
DB + DL – MB + ML	0.13	$P > 0.05$	nonsignificant

TABLE V

Comparison of Sulcus Depths in Males and Females for Each Tooth

Tooth	Female				Male				
	n	$\bar{x}$	S	$S\bar{x}$	n	$\bar{x}$	S	$S\bar{x}$	
I	12	1.366	0.290	0.084	17	1.344	0.292	0.071	t : 0.198 P>0.05 nonsignificant
II	12	1.369	0.257	0.074	17	1.269	0.283	0.069	t : 0.993 P>0.05 nonsignificant
III	12	1.417	0.232	0.067	17	1.347	0.276	0.067	t : 0.736 P>0.05 nonsignificant
IV	12	1.494	0.301	0.087	17	1.464	0.275	0.067	t : 0.274 P>0.05 nonsignificant
V	12	1.647	0.332	0.096	17	1.651	0.323	0.078	t : 0.032 P>0.05 nonsignificant

Discussion

In our study the mean depth of the gingival sulcus for the entire primary dentition was found to be 1.43 mm. When we reviewed the literature we came across some conflicting observations about the depth of the gingival sulcus in primary dentition. Glickman[5] observed that in adult dentition there is a deeper gingival sulcus than in primary dentition. Cohen[6], in contrast, stated that in healthy children, the gingival sulcus might be deeper than that observed in adult dentition; Bradley[7] also holds this view. Parfitt[8], reported that the sulcus depth is 1 millimeter or less in primary teeth. For Rosenblum's[3] study, a total of 2900 measurements were taken on 29 children with the help of a special instrument and the mean sulcus depth for primary dentition as a whole was found to be 2.1 mm. These findings are in agreement with those of Kleiner and Garcia-Godoy's[4] study of 44 children. Chawla et al[9] in a study of children from India found that the mean depth of the gingival sulcus for primary dentition as a whole was 1.44 mm; these results are very close to ours. The different results in various populations might reflect the different structural and environmental factors arising from the geographic, nutritional and hereditary differences in various populations.

In our study we found no difference between the mean sulcus depth of maxilla and mandible, however Rosenblum[3] stated that in general, sulcus depths in mandible are greater than in maxilla, but the difference is not statistically significant. In Kleiner and Garcia-Godoy's[4] study similar findings were observed and the differences were statistically significant. Rosenblum[3], suggested that the muscle attachments approximating the teeth in the maxilla and mandible are different and that it is possible that these differences may affect the gingival architecture.

In our study we found that the mean depth of the gingival sulcus increases from the central incisor to the second molar without exception. In both jaws we found statistically significant differences between anterior and posterior segments. Most of the differences between the anterior and posterior segments were detected in the interproximal area. The deeper sulci found in the interproximal areas of the posterior teeth may be related to the fact that there are wider contacting tooth surfaces there than among the anterior teeth. Also the contact areas are nearer to the gingival tissue of the posterior teeth than of the anterior teeth. These two factors could possibly account for some of the differences in the depths of the two segments[3]. These findings in our study are in agreement with those of Rosenblum[3] and Kleiner and Garcia-Godoy[4] in their studies.

Another of our findings is the statistically significant difference between buccal and lingual surfaces. According to our results the mean buccal sulcus depth is 1.09 mm while it is 1.23 mm in lingual surfaces. In Rosenblum's[3] study the figures were 1.91 mm for buccal and 1.97 mm for lingual surfaces; and in Kleiner and

Garcia-Godoy's[4] study they were 1.51 mm and 1.79 mm respectively. In both of these studies the mean sulcus depth in buccal surfaces was less than for lingual surfaces, which is in agreement with our study. Also, as in our study, although the mean sulcus depth in the posterior segment is deeper, in both of the jaws the mean sulcus depth of the first primary molars, especially in the buccal aspect, is shallowest. In both of these studies[3,4], as with the present study, this finding affects the general shallowness of buccal surfaces. Rosenblum[3], suggested that this could be due to the difference in shape of these two teeth compared to the rest of the primary dentition. The buccal surface of the first primary molar has an extreme height of contour, which starts very close to the gingival margin. This morphologic feature might alter the environment sufficiently to account for the difference in sulcus depth in this area.

As stated above we found no difference in sulcus depths between boys and girls.

Although our study gives some idea about general mean sulcus depths, our results must be evaluated with those of other studies on this subject and in this way more reliable figures about mean sulcus depths in primary dentition of Turkish children could be reached.

Summary

In this study a clinical examination was carried out to determine the gingival sulcus depth in the primary dentition. Twenty-nine children aged three to six years were examined. The measurements were made only for the right half of the jaws. Each of the ten teeth were measured in six specific locations, and a total of 1740 measurements were recorded. The gingival sulcus was found to increase in depth gradually, starting with the central incisor and ending with the second molar.

The mean scores of maxilla and mandible were the same. The mean sulcus depth of the entire primary dentition was 1.43 mm. In both of the jaws the posterior segments had a greater depth of sulcus than the anterior segments. The sulcus depth was less in the facial surface, which includes the labial and the buccal surfaces, than in the lingual, mesial and distal surfaces. There was no significant difference between boys and girls as regards gingival sulcus depth.

REFERENCES

1. Stallard RE. Current concepts of periodontal disease. *J Dent Child* 34:204, 1967.
2. Zappler SE, Plains W. Periodontal diseases in children. *J Am Dent Assoc* 37:333, 1948.
3. Rosenblum FN. Clinical study of the depth of the gingival sulcus in the primary dentition. *J Dent Child* 33:289, 1966.
4. Kleiner R, Garcia-Godoy F. Gingival sulcus depth in the primary dentition *J Pedodontics* 6:288, 1982.

5. Glickman A. *Textbook of Clinical Periodontology* (3rd ed). Philadelphia: WB Saunders Co, 1966.
6. Cohen M. *Pediatric Dentistry* (2nd ed). St Louis: CV Mosby, 1961.
7. Bradley RE. Periodontal lesions of children: their recognition and treatment. *Dent Clin North Am* 5:671, 1961.
8. Parfitt GJ. Periodontal diseases in children. In Finn SB (ed). *Clinical Pedodontics* (4th ed). Philadelphia: WB Saunders, 1973.
9. Chawla V, Taneja GC. Clinical evaluation of depth of gingival sulcus of primary teeth. *J Indian Dent Assoc* 45:175, 1973.