On the Incidence Patterns of PMA Index in the Elementary School Children
—With Reference to its Transition Processes—

by

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1. Introduction

Ever since 1949 when MASSER and SCHOR used a PMA index as denoting the gingivitis in quantatative terms, this method has come to be widely used as a useful epidemiological means.

The PMA index currently in use is a simple one in which 12 anteriors are used as indicative of the entire oral findings but, in the present study, the author agrees with the conclusion of ARITA and YAMADA that the maxillary and mandibular first molars in addition to 12 anteriors, or the maxillary and mandibular first molars combined with 2 11, 11 2, 11 or 11 will better represent the entire oral state. Along this line of thinking, the author modified the previous term as PMA index MA method.

For confirmation of his belief, the author made use of elementary school children who were subjected to regular examinations by this PMA index AM method 6 times at intervals of 2 weeks and, additionally, one more examination after 2 months in terms of different grades, sexes and different kind of teeth for the purpose of learning the fluctuation or mode of incidence of gingivitis in these children.

2. Material and Method

In the majority of cases, the elementary school children under examination were found to suffer from P distally while it was mesially absent in the instances where the neighboring teeth to the first molars yet remained unerupted, this finding accounting for about 50% of the cases examined. However, it was not realistic to regard these cases as being free from PMA and, therefore, it was decided that in applying PMA index AM method to elementary school children P on the mesial as well as distal sides should be adopted.

3. Findings

3.1 The rate of PMA patients.

The rate of PMA patients was observed to increase in proportion to higher grades, reaching the peak curve in the 4th and 6th grades with approximately 93%. The rate tended to decrease in the 6th grade with about 89%. The entire average from the 1st to 6th grades was about 87%.

As for the number of erupted teeth, it was naturally fewer in low grades but

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3.2 PMA indices in the anteriors and molar region.

When classified in terms of the anteriors and molars, PMA indices increased in the molar region between the 1st and 3rd grades, there being noteworthy difference beyond the 4th grade.

As regards the anteriors, on the other hand, the indices increased by about 10 times from the 1st to 6th grade. It was confirmed that an average increase in PMA indices was concentrated in the anteriors.

3.3 The mode of PMA incidence in different classes.

In common with the six grades, it was P that increased in proportion to advance in the grades but an increase in MA was relatively little.

3.4 The Size of PMA indices.

The children with high PMA indices increased proportionately to advance in the grades but this fact was not in agreement with the rate of PMA patients.

3.5 PMA incidence by different teeth.

When examined in terms of different teeth, an incidence of PMA in the right and left homonymous teeth was more or less similar. In all the teeth, incidences of M or M and P were about 1/10 of that of P alone. It was inferred that, proportionately to advance in the grades, an incidence of P in the maxillary central incisors exerted a high degree of influence.

3.6 Fluctuation of PMA indices at different examination periods.

Throughout the 1st to 7th examination periods, fluctuation of PMA indices for the homonymous teeth was similar. On the whole, fluctuation of these indices gave a similar trend for the adjacent teeth and it was different when they were apart.

However, while mesial and distal sides of the mandibular first molars were somewhat similar in the mode, those of the maxillary first molars gave different modes.

In the 1st and 2nd graders, the mode of fluctuation was unstable because of few erupted permanent teeth. This was also true of the 4th graders as compared with the children of higher grades.

The difference in fluctuation between the 1st and 6th examinations and between the 6th and 7th examination was not be definitely established.

The distribution of O (healthy gingiva) from the 1st to 7th examinations in different grades was not clear enough.

Generally speaking, however, there was confirmed the tendency that O was more found in the mandibular first molars and maxillary central incisors, whereas it was much less in the mandibular central and lateral incisors. This finding appears to be contradictory of the general belief that a higher incidence of gingivitis occurs in the maxillary central incisors but, as a matter of fact, after either P or M has become
Here it will easily revert to P or M again.

As regards the cases in which O became P or M during the entire examination period, there were observed three transitional processes at each examination. The majority of cases were O→O, P→O or P with 50% distribution, and M→M or P and O with more or less 1/3 frequency. Using the 4th graders as representative of these transitional processes, the following detailed 10 patterns could be confirmed: 1) O→O, 2) O→P→P, 3) O→P→O, 4) O→P→M, 5) O→M→O, 6) O→P→M→P→O, 7) O→M→MM, 8) O→M→P→O, 9) O→P→M→M→O, 10) O→P→M→M→O, the last pattern being rarely found.

The transition of P was in the order of 1) P→P, 2) P→O, and P→P→O. Of all the cases examined, there were observed only 3 A subjects and, though a definite reason cannot be given, it seems that A does not easily move to M, P or O. In this connection, it may be added that there were no cases in which O or P directly moved to A.

4. Discussion

As endorsed by the foregoing findings, our understanding of the expanding process of gingivitis should be based on a long-range serial examination at short intervals. However, this kind of research effort has been scanty. For instance, Stahl considered an examination of the anteriors alone would provide an accurate PMA index of the entire oral cavity and Brown et al. held that there were cases in which PMA process would change while in others it failed but yet its simple use was advocated even when the conditions of molar buccal surface could not be sufficiently known. Doubt has been expressed concerning the validity of a simple examination of the anteriors alone. Parfitt pointed out the cases in which the transitional process of P→M→A was obscure and a strong degree of inlammation was present in P while it was absent in M but yet progress of an inflammation would not bring about the aggravation of gingivitis, thus advocating 5 scale classificatory scheme of gingivitis by adding O (healthy gingiva).

Suomis et al., who examined 181 female gingival patients 5 times at intervals of 4 weeks, concluded that with slight P→A index could not be adequately determined and in the case of a small number of teeth there was room for errors to creep in.

Yamada, Sakai et al., found the number of elementary school children who had some kind of gingivitis in the anterior region to be 50% and reported a low correlative coefficient of r=0.3 between PMA indices for the anteriors and molars.

For this reason, Arita, Yamada and the present author had previously used 156 lower secondary school pupils and studied various combinations of 6 or 8 teeth out of 28. As a result, it was found that correlative coefficient of PMA index between the anteriors and entire teeth was r=0.74, while the same index gave a high correlative coefficient r=0.96 when the first molars were added to the anteriors.

Thus in the belief that the addition of the first molars to 1 2 | 1 2 or even 1 | 1 would better represent the entire oral conditions, we have modified PMA index as PMA index AM method.