

The Effects of Pyridoxine Supplements on the Dental Caries Experience of Pregnant Women

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A RELATIONSHIP between vitamin B₆ activity and dental disease has been suggested by several observations under different conditions and in different species. Vitamin B₆ deficient dogs¹ and monkeys^{2,3} show, among a variety of lesions in multiple systems, an unusual incidence of dental defects. Administration of pyridoxine appears to offer partial protection to the teeth of rats⁴ and of hamsters⁵ on cariogenic diets. Cuban school children, whose sources of high sugar intake also provide large amounts of vitamin B₆,⁶ generally show less caries as well as higher blood leukocyte concentrations of B₆-phosphate than their North American peers,^{7,8} a phenomenon consistent with observations of good dental structure in other peoples consuming large amounts of unrefined carbohydrates.⁹⁻¹¹ Studies in this country suggest that pyridoxine supplements in the form of lozenges may reduce the increment in DMF§ rating usually noted in preadolescent children, in fluoridated as well as nonfluoridated communities.^{12,13}

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§ DMF = decayed, missing or filled teeth. Differences in DMF rating noted during this study were not attributable to differences in the number of missing teeth.

Although the traditional "tooth-for-every-child" concept seems no longer tenable,¹⁴⁻¹⁶ at least one report indicates greater prevalence of dental disease among women who have borne children.¹⁷ In addition to the increased hormone activity identified with the gingival hypertrophy of pregnancy,^{16,18} nutritional deficiencies, including vitamin B₆,¹⁹ may be suspected of a role in the oral tissue changes that occur during this period of heightened requirements.²⁰ The investigations of Wachstein, in particular, suggest antenatal metabolic derangements responsive to pyridoxine supplements.²¹

In view of the implications that any increment in dental caries during the antenatal months might be related to an altered vitamin B₆ metabolism during this period, the present study was undertaken to determine the effects of pyridoxine administration on the dental experience of pregnant women.

MATERIAL AND METHODS

The subjects for this study originated in the ward maternity service of a voluntary general hospital, serving an urban community, with mixed ethnic representation and a nonfluoridated public water supply. A total of 540 women, not more than four months pregnant, and with an initial DMF rating of not less than 2, were assigned at random to one of three study groups, with a specific daily vitamin-mineral regimen maintained until delivery:

Group I: These women received one vitamin-mineral capsule|| (not containing pyridoxine) plus three placebo lozenges (one, three times daily).

Group II: These women received one vitamin-

|| Each capsule contained vitamin A, 6,000 I.U.; vitamin D, 400 units; thiamin, 1.5 mg.; riboflavin, 2.0 mg.; niacin, 15.0 mg.; pantothenic acid, 5.0 mg.; vitamin B₁₂ 1.0 µg.; folic acid, 0.25 mg.; ascorbic acid, 100.0 mg.; sodium iodide, 0.20 mg.; ferrous iron, 15.0 mg.

TABLE I
Effect of Vitamin B₆ on Average Increase in DMF of Pregnant Women

Group	Treatment		Women (no.)	Average Increase DMF Rating
	Lozenges	Capsules		
I	No vitamin B ₆	No vitamin B ₆	173	1.42
II	No vitamin B ₆	20 mg. vitamin B ₆	198	1.22
III	20 mg. vitamin B ₆	No vitamin B ₆	169	0.89
Total			540	1.18

mineral capsule (containing 20 mg. pyridoxine) plus three placebo lozenges.

Group III: These women received one vitamin-mineral capsule (not containing pyridoxine) plus three lozenges containing pyridoxine (6.67 mg. each).

Food intake was not controlled, but general antepartum management, including diet instruction, was otherwise uniform. Employing the "double-blind" procedure, the DMF rating was assessed by clinical (probe and mirror) and roentgenologic (bitewing film) examination, initially and approximately six weeks postpartum. The examination was performed by one of several dentists from the clinic who participated in the study, and all the DMF ratings were calculated from the recorded observations and films by a single dental consultant, who did not directly perform any of the examinations.

RESULTS

Results are summarized in Tables I and II.

In general, the patients who received the supplementary pyridoxine had a more favorable caries experience than those in the comparison group. The smallest increment in DMF rating was noted in the subjects on the pyridoxine lozenge regimen.

The average increase in DMF rating (Table I) for 173 patients who received no pyridoxine supplement (group I) was 1.42. For 198 subjects whose vitamin B₆ supplement was incorporated in the vitamin-mineral capsule (group II), the average increment was 1.22, while for the 169 gravida provided with the pyridoxine lozenges (group III), it was 0.89. The observed average increase in DMF rating for group II was 14 per cent, and that for group III 37 per cent below the average increase observed in group I.

TABLE II
Effect of Vitamin B₆ on Percentage of Patients Showing No Increase in DMF

Group	Women (no.)	No Increase in DMF (no.)	Percentage
I	173	56	32
II	198	86	43
III	169	91	54
Total	540	233	43.1

The difference between the increment in group III and that in group I had a P value of <0.01. The difference between the increments for groups I and II, and between groups II and III, respectively, were not significant at the 5 per cent level.

The percentage of patients showing no increase in DMF ratio during the period of observation (Table II) was 33 for group I, 43 for group II and 54 for group III. The difference between the percentage for group I and that for group III had a P value of <0.001, and that between the percentages for group I and group II had a P value of <0.05. The difference between the figures for group II and group III were of borderline significance, P@0.05.

COMMENTS

These results are in accord both with observations in experimental animals, suggesting a cariostatic effect of vitamin B₆, and with reports on school children, in whom pyridoxine supplements appeared to exert some protection against dental decay. They are also in accord with the evidence for a reversal of abnormal tryptophan metabolism through the administration of pyridoxine to prenatal patients.

Although the subjects in this study represented several ethnic backgrounds and differed in respect to age and previous reproductive experience, their random distribution among the three study groups would seem to preclude undue influence attributable to any of these variables. Moreover, while the results in the two groups receiving pyridoxine supplements differed in degree, they were consistent in direction. The relatively greater effect apparent in the pa-



tients receiving the lozenges actually may be a clue to the mechanisms whereby pyridoxine exerts its seeming cariostatic action. To the extent that this substance supports the growth of homofermentative bacteria favorable to oral health and reduces acid forming, heterofermentative species conducive to caries formation,²² one of these may be a microbiologically mediated process, with the saliva content of vitamin B₆ an evident critical consideration.

The possibility that the effects of pyridoxine on caries formation may be exerted through mechanisms other than, although not necessarily to the exclusion of, those affecting the oral flora is suggested by the observations of Steinman and Hardinge,²³ who emphasized the influence of dietary as well as nondietary factors on the "circulation" within the dentin. Vitamin B₆ may be among the substances which increase the resistance of the tooth to the cariogenic activity of mouth organisms and their sugar substrate. Conceivably the apparent, greater effects associated with the pyridoxine lozenge regimen, may reflect a more even blood concentration which, induced by divided dosage, might reinforce the suggested advantage of a more intensive and more sustained topical activity. Although elevated blood (leukocyte) concentrations of vitamin B₆-phosphate associated with pyridoxine supplementation did not differ appreciably between subjects on the capsule and lozenge regimens, an attendant increment in serum transaminase levels was greater among patients in the latter group.²⁴

Whatever the mechanism by which this influence is exerted, it appears that the administration of supplementary pyridoxine, notably in the form of lozenges, during pregnancy may afford partial protection against dental caries. Together with similar evidence in school children, these observations suggest the possibility of employing this substance for its possible cariostatic effects, not only during these periods of special nutritional demands, but also whenever the availability of this substance is in question.

SUMMARY

Pyridoxine supplements were given to early

prenatal patients, either in a capsule (one 20 mg. capsule daily), or as lozenges (6.67 mg., three times daily). The dental DMF rating was estimated at the beginning of the treatment period, and again, approximately six weeks postpartum.

The patients who received the pyridoxine supplement showed, on the average, a smaller increase in DMF rating than a comparison group of antenatal patients observed for the same period. The smallest increment in DMF rating was noted in the gravida receiving pyridoxine in the lozenge form.

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