

Vitamin D Studies, 1933-1934

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THESE studies comprise the administration of vitamin D (cod liver oil vitamin D concentrate—Zucker process, 1933) in evaporated milk and dairy milk, in varied unitages; also ultra-violet irradiation of the skin.

The children included in the control and experimental groups numbered about 425, boys and girls, aged 8 to 14 years, at four institutions in and near New York City. The institutions are orphanages and are the permanent homes of the children studied. Two of these institutions are conducted on the cottage plan, thereby making it possible to segregate the children for control and experimental management. Each cottage represents a separate group. In the other homes segregation of the study groups was maintained by rigid discipline and a daily program which provided for the time and place of these administrations.

Controls were run as follows: In each institution one group continued on its regular diet and one group received a specified amount of plain evaporated milk (no extra vitamin D). These were the negative controls. The number chosen was large enough so that if the results were negative, or near negative, the number of control observations would be sufficient and so distributed that a maximum of clarity in the results would be obtained. Since in the past irradiation with ultra-violet lamp has given such apparently striking results for several years in succession,

an irradiated group was included to act in a sense as a positive control.

The experimental groups were given vitamin D milk at three different levels of vitamin D. In a pint of reconstituted milk the following levels were given:

100 units daily
150 " "
300 " "

Last year about 150 units daily of vitamin D in fresh milk was given with apparently definite results which, however, were quantitatively not so good as the results with irradiation. In this year's study several groups on 300 units were included to ascertain whether last year's results were due to insufficient dosage. If vitamin D is a large factor in determining the caries incidence, the spacing of 100, 150, and 300 units per day would show either a graduation or else it must probably be concluded that a larger dose is not more beneficial. If vitamin D is not a large factor in caries, or the distribution of caries in children of this age is too irregular to be subject to such observations as were made here, the facts ought to come out clearly due to the large number and distribution of the controls.

However, the groups were also large enough so that if there was a positive result from vitamin D administration, the three levels would give valuable information. Based on previous experience, the three levels were so distributed that they would show a slight, moderate, and rather marked effect. It was

thought better not to attempt this year to evaluate the possible maximum effect but first to verify the indications of previous years.

To make the milk consumption least burdensome for those children who are not fond of milk, and to secure the best results in regularity of intake, the milk (except the fresh milk furnished by the dairy) was slightly flavored with chocolate. Each milk was repeatedly assayed and found to be of the stated potency well within the limit of error to the method.

The unitage given is in the Steenbock units as described in *New and Non-official Remedies*.

Dental examinations of these chil-

dren were made in November, 1933, February, 1934, and the latter part of April, 1934. All three examinations were made and recorded by the same persons during the entire study. The total number of carious tooth surfaces in each mouth at each examination was recorded as the percentage of the total number of tooth surfaces present in each mouth. The differences in these totals indicate the increases in carious surfaces at the end of each period. The differences in the percentage increases indicate the progress of dental caries during the year of study.

The three dental examinations of the year yielded the findings shown in Table I.

TABLE I
 COD LIVER OIL VITAMIN D MILK NUTRITIONAL STUDIES
 1933-34
 Percentage Carious Surfaces for 1st, 2nd, and 3rd Examinations

	150 Unit Evapo- rated Vitamin D Milk			150 Unit Fluid Vitamin D Milk			Plain Evaporated Milk		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Home A	6.30	7.00	7.38	7.73	8.69	9.51	7.15	8.79	9.47
Home C	7.65	8.40	9.06	6.32	7.00	7.69	5.97	8.49	10.33
Home Z							6.06	8.17	9.51
Home Y							5.21	5.94	7.69
	300 Unit Evapo- rated Vitamin D Milk			100 Unit Evapo- rated Vitamin D Milk			Control Group		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Home A							6.76	8.63	10.52
Home C							5.74	9.44	11.09
Home Z	5.60	6.39	6.62	5.16	6.70	8.03	5.50	8.28	10.31
Home Y	5.00	5.40	5.50	5.15	5.88	7.46	4.91	7.48	9.06
	Ultra-violet								
	1st	2nd	3rd						
Home Z	5.55	6.58	7.00						

TABLE IA

<i>Home A</i>				
Control 23 girls	Plain Evapo- rated Milk 22 boys	150 Unit Evapo- rated Vitamin D Milk 23 boys	150 Unit Fluid Vitamin D Milk 24 girls	
<i>Home C</i>				
Control 18 girls	Plain Evapo- rated Milk 26 girls	150 Unit Evapo- rated Vitamin D Milk 24 girls	150 Unit Fluid Vitamin D Milk 28 girls	
<i>Home Z</i>				
Control 33 boys	Plain Evapo- rated Milk 28 boys	100 Unit Evapo- rated Vitamin D Milk 28 boys	300 Unit Evapo- rated Vitamin D Milk 30 boys	Ultra-violet Lamp 29 boys
<i>Home Y</i>				
Control 32 girls	Plain Evapo- rated Milk 30 girls	100 Unit Evapo- rated Vitamin D Milk 30 girls	300 Unit Evapo- rated Vitamin D Milk 30 girls	

CONCLUSIONS

1. There is possible a nutritional control of dental caries.
2. Vitamin D is an important factor in the nutritional control of dental caries.
3. Clinical observations point to a probable correlation of the degree of control of dental caries with the quantitative dosage of vitamin D.

NOTE: The data in the foregoing paper have been extensively analyzed statistically by Professor Earle B. Phelps Professor of Sanitary Engineering, Columbia University, New York, N. Y., and the results have been found significant.