

# Health evaluation of the dentist and his wife

## II. Three-hour oral glucose tolerance test

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The classic three-hour oral glucose tolerance test was performed on 149 presumably healthy dentists and their wives. Using conventional criteria for blood glucose, elevated values suggestive of hyperglycemia ranged from 2.0% under fasting conditions to 33.5% at two hours. On the basis of the conventional delineating points, hypoglycemia ranged from 0% under fasting conditions to 23.5% at one hour. Overall, the possible frequency of abnormalities in blood glucose values ranged from a low of 2.0% under fasting conditions to 49.0% of the group at one hour.

Of the 1,227 dentists examined during the 1964 Health Evaluation Program, 43 or 3.5% had blood glucose scores suggestive of hyperglycemia.<sup>1</sup> Of the 1,354 dentists examined during the 1965 Health Evaluation Program, 236 or 17.4% had blood glucose scores suggestive of hyperglycemia.<sup>2</sup> Although several of the men were known diabetics, the majority were unaware of the condition and were referred to their family physician for further tests.

The relatively high incidence of possible hyperglycemia (3.5%) among dentists in 1964<sup>1</sup> and in 1965 (17.4%)<sup>2</sup> from a single blood glucose sample prompted this attempt to report blood glucose findings with the glucose tolerance test in dental practitioners and their wives.

### Method of investigation

One hundred and forty-nine dentists and their wives (members of the Southern Academy of Clinical Nutrition) have been participating in a multiphasic screening program. An earlier report described the results of a self-administered general health questionnaire.<sup>3</sup> The age and sex distribution is summarized in Table 1. Carbohydrate intake in all instances was adequate and prevented the necessity for a preparatory diet. After a 100-gm glucose load, the classic three-hour oral glucose tolerance test was performed. Blood glucose values were measured by the autoanalyzer method.

### Results

Table 2 summarizes the fasting blood glucose scores for the entire group. Utilizing the conventional criterion of 60 to 100 mg/100 ml as a physiologic standard,<sup>4</sup> 2.0% (three persons) of the group had an elevated glucose level. It is generally recognized that blood glucose values should not peak above 150 mg/100 ml at one hour.<sup>4</sup> On this basis (Table 3), one of four (25.5% of the entire group)

Table 1 ■ Age and sex distribution.

| Age groups | Men | %     | Women | %      | Total | %      |
|------------|-----|-------|-------|--------|-------|--------|
| 20-29      | 3   | 3.6   | 8     | 12.1   | 11    | 7.4    |
| 30-39      | 38  | 45.8  | 33    | 50.0   | 71    | 47.7   |
| 40-49      | 36  | 43.4  | 23    | 34.8   | 59    | 39.6   |
| 50-59      | 5   | 6.0   | 2     | 3.0    | 7     | 4.7    |
| 60-69      | 1   | 1.2   | 0     | 0.0    | 1     | 0.7    |
| Total      | 83  | 100.0 | 66    | 100.0* | 149   | 100.0* |

\*Approximate.

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**Table 2 ■ Fasting blood glucose distribution.**

| Blood glucose groups | Men | %     | Women | %     | Total | %     |
|----------------------|-----|-------|-------|-------|-------|-------|
| 60-69                | 2   | 2.4   | 11    | 16.7  | 13    | 8.7   |
| 70-79                | 27  | 32.5  | 31    | 47.0  | 58    | 38.9  |
| 80-89                | 40  | 48.2  | 23    | 34.8  | 63    | 42.3  |
| 90-99                | 12  | 14.5  | 0     | 0.0   | 12    | 8.1   |
| 100+                 | 2   | 2.4   | 1     | 1.5   | 3     | 2.0   |
| Total                | 83  | 100.0 | 66    | 100.0 | 149   | 100.0 |

**Table 3 ■ One-hour blood glucose distribution.**

| Blood glucose groups | Men | %      | Women | %      | Total | %      |
|----------------------|-----|--------|-------|--------|-------|--------|
| 60-69                | 1   | 1.2    | 4     | 6.1    | 5     | 3.4    |
| 70-79                | 0   | 0.0    | 6     | 9.1    | 6     | 4.0    |
| 80-89                | 4   | 4.8    | 4     | 6.1    | 8     | 5.4    |
| 90-99                | 7   | 8.4    | 9     | 13.6   | 16    | 10.7   |
| 100-109              | 11  | 13.3   | 5     | 7.6    | 16    | 10.7   |
| 110-119              | 9   | 10.8   | 7     | 10.6   | 16    | 10.7   |
| 120-129              | 9   | 10.8   | 7     | 10.6   | 16    | 10.7   |
| 130-139              | 10  | 12.0   | 4     | 6.1    | 14    | 9.4    |
| 140-149              | 8   | 9.6    | 6     | 9.1    | 14    | 9.4    |
| 150+                 | 24  | 28.9   | 14    | 21.2   | 38    | 25.5   |
| Total                | 83  | 100.0* | 66    | 100.0* | 149   | 100.0* |

\*Approximate.

**Table 4 ■ Two-hour blood glucose distribution.**

| Blood glucose groups | Men | %      | Women | %      | Total | %     |
|----------------------|-----|--------|-------|--------|-------|-------|
| <60                  | 2   | 2.4    | 6     | 9.1    | 8     | 5.4   |
| 60-69                | 6   | 7.2    | 9     | 13.6   | 15    | 10.1  |
| 70-79                | 17  | 20.5   | 13    | 19.7   | 30    | 20.1  |
| 80-89                | 23  | 27.7   | 8     | 12.1   | 31    | 20.8  |
| 90-99                | 9   | 10.8   | 6     | 9.1    | 15    | 10.1  |
| 100-109              | 7   | 8.4    | 11    | 16.7   | 18    | 12.1  |
| 110-119              | 5   | 6.0    | 4     | 6.1    | 9     | 6.0   |
| 120-129              | 2   | 2.4    | 1     | 1.5    | 3     | 2.0   |
| 130-139              | 3   | 3.6    | 3     | 4.5    | 6     | 4.0   |
| 140-149              | 1   | 1.2    | 2     | 3.0    | 3     | 2.0   |
| 150+                 | 8   | 9.6    | 3     | 4.5    | 11    | 7.4   |
| Total                | 83  | 100.0* | 66    | 100.0* | 149   | 100.0 |

\*Approximate.

**Table 5 ■ Three-hour blood glucose distribution.**

| Blood glucose groups | Men | %      | Women | %      | Total | %      |
|----------------------|-----|--------|-------|--------|-------|--------|
| <40                  | 3   | 3.6    | 0     | 0.0    | 3     | 2.0    |
| 40-49                | 5   | 6.0    | 4     | 6.0    | 9     | 6.0    |
| 50-59                | 9   | 10.8   | 7     | 10.6   | 16    | 10.7   |
| 60-69                | 19  | 22.8   | 10    | 15.1   | 29    | 19.4   |
| 70-79                | 23  | 27.7   | 13    | 19.6   | 36    | 24.1   |
| 80-89                | 16  | 19.2   | 14    | 21.2   | 30    | 20.1   |
| 90-99                | 5   | 6.0    | 11    | 16.6   | 16    | 10.7   |
| 100-109              | 1   | 1.2    | 4     | 6.0    | 5     | 3.3    |
| 110-119              | 0   | 0.0    | 2     | 3.0    | 2     | 1.3    |
| 120+                 | 2   | 2.4    | 1     | 1.5    | 3     | 2.0    |
| Total                | 83  | 100.0* | 66    | 100.0* | 149   | 100.0* |

\*Approximate.

may be classified as hyperglycemic. In this glucose group (>150 mg/100 ml), scores of the men (28.9%) were more suggestive of hyperglycemia than the scores of the women (21.2%). The consensus among authorities is that the blood glucose values at two and three hours should be the same as those at the fasting level.<sup>4</sup> Table 4 summarizes the two-hour determinations for the whole group. On the basis of a physiologic range of 60 to 100 mg/100 ml, one of three subjects shows possible hyperglycemia. The women demonstrate a higher frequency (36.3 versus 30.2%). Finally, Table 5 indicates that about 7% of the group shows values above 100 mg/100 ml at three hours. The figures are twice as high for the women (10.5%) as for the men (3.6%).

## Discussion

The data analysis in this study (and in the Health Evaluation Program of the American Dental Association) uses a dichotomous parameter. The assumption is that the progressively higher blood glucose values are pathologic and the progressively lower blood glucose values are physiologic. Actually, the relationship of blood glucose values to health and disease is represented by a parabola rather than a straight line. Blood glucose levels should be viewed as a trichotomy (hypo-, normo-, and hyperglycemia) rather than dichotomy (hyperglycemia vs nonhyperglycemia). Table 6 summarizes the results in this frame of reference. The frequency of possible hyperglycemia has already been discussed in the light of recognized standards. Shown in Table 6 are the frequencies of hypoglycemia based on these criteria. Hyperglycemia is apparently more common under fasting and two-hour conditions. At one hour, the incidence of hypoglycemia and hyperglycemia is about equal (23.5 and 25.5%). Finally, at three hours, hypoglycemia is more frequent.

**Table 6 ■ Percentage frequency of hypo-, normo-, and hyperglycemia.**

| Condition       | Blood glucose groups |            |             |             |
|-----------------|----------------------|------------|-------------|-------------|
|                 | Fasting (%)          | 1 hour (%) | 2 hours (%) | 3 hours (%) |
| Hypoglycemia*   | 0.0                  | 23.5       | 5.4         | 18.7        |
| Normoglycemia   | 98.0                 | 51.0       | 61.1        | 74.4        |
| Hyperglycemia** | 2.0                  | 25.5       | 33.5        | 6.9         |
| Total           | 100.0                | 100.0      | 100.0       | 100.0       |

\*Defined as &lt;60 mg/100 ml fasting, 2 and 3 hours; &lt;100 mg/100 ml at 1 hour.

\*\*Defined as &gt;100 mg/100 ml fasting, 2 and 3 hours; &gt;150 mg/100 ml at 1 hour.

The frequency of possible hyperglycemia ranges from a low of 2.0% under fasting conditions to a high of 33.5% at two hours. These findings with the glucose tolerance test are consistent with the findings of 3.5 to 17.4% with single blood sample tests performed during the Health Evaluation Program.

In a single sample determination,<sup>5</sup> 21% of 1,771 physicians showed elevated blood glucose values. No comparison can be made for hypoglycemia since this condition was not reported in the Health Evaluation Program. However, an examination of the blood glucose findings in the 1964 Health Evaluation Program of the American Dental Association reveals 26.7% with levels below 80 mg/100 ml.<sup>1</sup>

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### Summary

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The classic three-hour oral glucose tolerance test was performed on 149 presumably healthy den-

tists and their wives. Utilizing conventional criteria for blood glucose, elevated values suggestive of hyperglycemia ranged from 2.0% under fasting conditions to 33.5% at two hours. On the basis of the conventional delineating points, hypoglycemia ranged from 0% under fasting conditions to 23.5% at one hour. Overall, the possible frequency of abnormalities in blood glucose values ranged from a low of 2.0% under fasting conditions to 49.0% of the group at one hour.

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