# Growth and Development of Children With Diabetes Mellitus

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Growth and development are manifestations of life in the young and the rate and quality are related importantly to the general health and welfare of the child. For simplification I shall subdivide growth and development into five separate categories and attempt to make pertinent statements regarding each.

## PHYSICAL GROWTH AND DEVELOPMENT

Numerous growth studies of children with diabetes mellitus have been reported.[1-7] These studies reveal that normal growth is compatible with controlled diabetes, but that there are many children with the disease who do not grow normally. The differences in the findings on the status of the height of the child at onset of diabetes by several authors may be accounted for in a large measure by the differences in the appropriateness of the standard used in evaluating the groups and by difference in the opinion of the several authors as to what constitutes a tall or a short child. The importance of an adequate diet has been established for the diabetic as well as the nondiabetic child. The importance of the level of control of the disease has not been given sufficient emphasis in most of the studies and too frequently, when degree of control is considered, objective criteria for establishing degree of control are not given.

In 1946 the records of 120 juvenile diabetic patients in our clinic were reviewed to determine the relationship between the growth of children with diabetes mellitus and the level of control of the disease.[8] The interpretation of the varying degrees of diabetic control is tabulated as follows:

VERY GOOD TO EXCELLENT: Urine specimens are free from sugar except for very occasional traces; very occasional mild insulin reactions.

GOOD: Urine specimens are free from sugar except for occasional minimal glycosuria; occasional mild insulin reactions.

FAIR TO GOOD: More than one-half of the urine specimens free from sugar but minimal glyosuria in remaining specimens; occasional insulin reactions of varying degree.

FAIR: Less than one-half of the urine specimens free from sugar and varying amounts of sugar in remaining specimens; occasional insulin reactions of varying degree.

POOR: Urine specimens contain varying amounts of sugar continuously; occasional insulin reactions.

Since growth in height of the normal child is more predictable during childhood than during pre-puberty and puberty, we studied the growth curves of 54 of the 120 diabetic children who had height observations two or more years prior to ten years of age. The differences in growth of these children, grouped according to level of diabetic control, were statistically significant.

Erratic growth was observed frequently in children with fluctuating degrees of diabetic control.

Growth observations were made on 93 diabetic patients after ten years of age. Despite the difficulty in evaluation and the unpredictable character of growth at this period there appeared to be a consistent tendency for growth to be normal or accelerated for the better

Presented in a panel discussion at the Annual Meeting of the American Diabetes Association in Chicago, June 8, 1952.

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degrees of control, and to be normal or less than expected with fair or poor diabetic control. In this group of older children there were eleven patients who were admitted to our clinic two to nine years after onset of the disease, and during the intervening time they had been in fair to poor diabetic control. Four of these patients accelerated after coming under our regimen of therapy even under fair diabetic control.

**TABLE 1.** Growth in Height Before 10 Years of Age Compared with that of Average Iowa City Children

| Level of control of Diabetes Mellitus | Less | | Erratic | | Normal | | Accelerated | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Per cent | Number | Per cent | Number | Per cent | Number | Per cent | Number |
| Poor | 3 | 38 | 1 | 12 | 3 | 38 | 1* | 12 | 8 |
| Fair | 3 | 25 | 1 | 8 | 8 | 67 | | | 12 |
| Fair to Good | | | 3 | 19 | 10 | 62 | 3 | 19 | 16 |
| Good | 1† | 8 | 1† | 8 | 3 | 25 | 7 | 58 | 12 |
| Very good to excellent | | | | | 2 | 33 | 4 | 67 | 6 |
| TOTAL | 7 | 13 | 6 | 11 | 26 | 48 | 15 | 28 | 54 |

*This patient accelerated the first year of treatment when he was under fair to good diabetic control. He was emaciated at the time treatment was started and had been under poor diabetic control for more than one year.

†These patients failed to keep their appointments at the clinic, and their diets were not increased to satisfy their appetites.

A tendency was observed for the girls in the higher degrees of diabetic control to maturate normally and for those in the lower levels of control to have delayed maturation. A longer than average growing period was generally coexistent with delayed menarche.

With adequate management the diabetic children, on the whole, have maintained normal weight for their age and height and have gained normally during the years of observation included in this study. Twenty-six children showed a tendency to become obese, 21 during the ages 14 to 18 years. This was twice as common among adolescent girls as boys.

Normal growth does not preclude the development of degenerative changes, but when there is definite deceleration or stunting, degenerative changes develop earlier and progress more rapidly.[9]

## EMOTIONAL GROWTH

The emotional pattern of a child and therefore of the adult becomes fairly well established during infancy and the early years of life, and it becomes progressively more difficult with increasing age, to alter this pattern. The emotional status of any patient with diabetes profoundly affects the regulation of his disease.[10, 11, 12] Unwholesome relationships between the child, his parents and others become exaggerated during adolescence. In my experience it is impossible to attain and sustain excellent control of the disease in an emotionally unstable patient. I am confident that few if any, experienced diabeticians will take exception to this statement. The child with diabetes has, if anything, a greater need for security, affection and applause; he must learn to assume responsibilities commensurate with his age. Discipline is essential, and to be effective, punishment must be administered immediately after culpable acts of omission or commission, and of equal importance is forgiving or forgetting after the punishment has been given.

## INTELLECTUAL DEVELOPMENT

The normal child who develops diabetes and is given good physical and emotional care will have normal intellectual growth.[4, 10] Frequent insulin reactions, and particularly severe insulin reactions, can and do cause irreparable damage to the central nervous system and must be avoided at any expense.

## IMMUNOLOGICAL DEVELOPMENT

Gaining active immunity by immunization procedures or by having various types of infections is part of the growing-up process. It is well known that the physical condition of the child is related to his resistance to infection and the incidence of complications of infections. Children whose diabetes is well controlled are, in our experience, no more susceptible to infections than normal children and, providing proper adjustments are made during the time of infections, the degree of control need not be seriously altered. Children whose diabetes is not well controlled are not only more susceptible to infections than normal children, but more frequently develop complications from the infections as well as complications from loss of control of their diabetes. Chemotherapeutic and antibiotic agents have made it possible to combat more effectively intercurrent infections.

## SPIRITUAL DEVELOPMENT

Although this phase of development tends to be overlooked in the secularism of our day, it should be a primary rather than a secondary consideration. The

home, the school and the church have serious responsibilities in this important area of growth. The child who learns to develop virtues rather than vices, has peace of mind and soul' can accept his disease and make unlimited contributions to his fellow men.

REFERENCES

[1] Ladd, W. S.: Growth in children with diabetes mellitus. Am. J. Dis. Child. *32*:812, 1926.

[2] Boyd, J. D., and Nelson, M. V.: Growth studies of children with diabetes mellitus. Am. J. Dis. Child. *35*:753, 1928.

[3] Boyd, J. D., and Kantrow, A. H.: Retardation of growth in diabetic children. Am. J. Dis. Child. *55*:460, 1938.

[4] McGavin, A. P., Schultze, E., Peden, G. W., and Bowen, B. D.: The physical growth, the degree of intelligence and the personality adjustment of a group of diabetic children. New England J. Med. *223*:119, 1940.

[5] Wagner, R., White, P., and Bogan, I. K.: Diabetic dwarfism. Am. J. Dis. Child. *63*:667, 1942.

[6] Fischer, A. E., Mackler, H. S., and Marks, H. H.: Long term growth of diabetic children. Am. J. Dis. Child. *64*:413, 1942.

[7] Barach, H. J.: Importance of adequate nutrition in the care of the diabetic child. Proc. Am. Diabetes Assoc. *4*:169, 1945.

[8] Jackson, R. L., and Kelly, H. G.: Growth of children with diabetes mellitus in relationship to level of control of the disease. J. Pediat. *29*:316, 1946.

[9] Jackson, R. L., Hardin, R. C., Walker, G. L., Hendricks, A. B., and Kelly, H. G.: Degenerative changes in young diabetics in relationship to elvel of control. Proc. Am. Diabetes Assoc. *9*:307, 1949.

[10] Fischer, A. E., and Dolger, H.: Behavior and psychologic problems of young diabetic patients. A ten to twenty year survey. Arch. Int. Med. *78*:711, 1946.

[11] Bruch, H., and Hewlett, I.: Psychiatric aspects of the medical management of diabetes mellitus in children. Am. J. Dis. Child. *73*:237, 1947.

[12] Hinkle, L. E., and Wolf, S.: Importance of life stress in course and management of diabetes mellitus. J. A. M. A. *143*:513, 1952.

## Editing and the Editor

Medical writers, like all others, are not infrequently annoyed by changes made in their papers by the editors of the periodical in which the article is to be published.

Once a manuscript has been accepted, what then are the privileges and duties with respect to revision on the part of the editor and of the author? This is a difficult matter indeed and custom varies widely. Most of the popular magazines, once they have purchased an author's article, feel completely free to alter or rewrite it in any manner the editors see fit. At the opposite extreme are the editors of many medical and scientific journals who may publish an article, once accepted, word for word as submitted, in the obvious expectation that all faults and merits will be assigned to the author rather than to the journal.

This wide difference of practice indicates that there are no definite rules of the game. In my opinion, the editors of medical periodicals should take an intermediate position for papers believed by the editors to have merit but to require extensive changes. Before publication the manuscript should be returned to the author with suggestions by the editor given as specifically as possible, leaving any serious rewriting to the author. If this is done the authors should not be resentful, as is too often the case, but should realize that the editor is trying to assist him to prepare a more readable and better article. Even though the author may not agree with all the suggestions of the editor, he is usually wise to follow them, since the editor by reason of his profession is more likely to be familiar with the reaction of readers.

With manuscripts which are acceptable and which need only minor changes rather than extensive revisions, it is probably best for the editor or his assistants to make the necessary corrections and return to the author not only the proof but the original manuscript. In many of these cases, sentences or paragraphs which are not clear have been altered. Authors justifiably resent it when such editing changes the meaning. Therefore, the conscientious editor or manuscript editor would do well to call the attention of the author to any rewordings introduced which might possibly change the thought the author wished to convey.

Finally, the medical writers should not ordinarily object to the minor editorial revisions which are made by the editors of any periodical or book publishing house in order to bring the manuscript into conformity with the particular style adopted by the publisher. True, the author may not agree with the style adopted, but in submitting his manuscript he has tactily consented to abide by the rules of the periodical or publishers in question.

—From *Rx for Medical Writing*, by Edwin P. Jordan, M.D. and Willard C. Shepard, Philadelphia W. B. Saunders Company, 1952, page 33.