

THE GROWTH OF CHILDREN GIVEN STIMULANT DRUGS

Hyperactive children receiving prolonged treatment with methylphenidate or dextroamphetamine grow less well in weight and height than untreated hyperactive children.

Key Words: children, hyperactivity, methylphenidate, dextroamphetamine, growth

"Failure to thrive" is a classic concept in pediatrics, and various aspects of impaired growth due to nutritional and other disease processes are frequently reviewed here. Iatrogenic causes of poor growth are often appreciated later than they should be, possibly because the physician in charge of the patient concentrates on the primary illness. Corticosteroid suppression of growth is perhaps the best-known example of this group. Recently the overenthusiastic treatment of phenylketonuria was shown to be associated with growth retardation¹ and another example of drug-induced growth impairment has recently been reported by D. Safer, R. Allen, and E. Barr.² These authors have reported evidence which suggests that hyperactive children grow less well when treated with dextroamphetamine or methylphenidate.

Two groups of children were studied. Both were treated with stimulant drugs for hyperactivity. One group was studied cross-sectionally, the other longitudinally. The 20 children in the first group were white, approximately seven to 11 years old, and came from a suburban environment. Sixteen of them were in a special education class for children with learning and behavior difficulties. They were all known by the school nurse to be taking methylphenidate or dextroamphetamine for hyperactivity, and 11 of them received their second daily dose under supervision at school. The weight and height of each child were recorded at the start of the school year, immediately before the next summer vacation some nine months later, and on re-entry to school after the summer vaca-

tion. Thirteen of the children had discontinued medication during the vacation, whereas the parents of the other seven had continued to give the stimulant drug.

Nine children received methylphenidate and 11, dextroamphetamine. The dose of methylphenidate varied between 20 to 40 mg. per day, and dextroamphetamine between 10 to 15 mg. per day. No significant difference was noted between the children who continued or stopped medication during the vacation in terms of age, drug dosage or type, or rate of weight gain during the academic year. At school the average weight gain was 0.16 kg. per month. During the vacation the average weight gain was greater in those children who discontinued therapy (0.45 kg. per month) than in those who continued (0.22 kg. per month). The difference is reported to be statistically significant for the group as a whole and for those taking dextroamphetamine, but not for the subgroup who were receiving methylphenidate. No difference in the rate of weight gain was noted between the two doses of dextroamphetamine, but four children who received 20 mg. methylphenidate per day gained weight significantly faster than those receiving 30 or 40 mg. per day. When these subjects were removed from the analysis the effects of the two drugs on weight gain became indistinguishable. The weight gain of children on medication was approximately 60 percent of normal, whereas in the group that discontinued medication for three months the rate of weight gain rose to 130 percent of normal.

Growth in weight and height was measured for two years or more in nine hyperactive children of similar social and racial origin who received medication con-

tinuously and in seven others who, though referred for therapy, did not receive medication owing to parental objection. Weight and height on first admission to school at the age of five or six were obtained retrospectively. In this group height and weight were expressed as centiles of a normal population of the same age and sex. Each of the nine children on drug therapy gained weight, but eight of them grew less well than was expected from their baseline centile, moving on average from the sixty-second centile at the start of treatment to the fortieth centile two years later. In seven of the nine cases the weight expressed in centiles continued to fall in the second and third years of treatment. In five there was a fall in centile height during the period of study. This was not significant for the group as a whole, but when the rank order changes in centile height and weight were compared there was a significant correlation. Furthermore, when the change in the height of the group expressed in centile terms was compared with that of the seven hyperactive children who never received medication the height of the children receiving treatment had fallen, on average, 16.3 ± 20.5 (1 S.D.) centiles, whereas that of the control group had increased by 4.0 ± 10.5 centiles.

Dextroamphetamine has long been known as an appetite suppressant in man, and it is no surprise to find that the drug has the same effect in children as it has in adults. By the same token a rebound in the appetite of the children who stopped therapy during the vacation, followed by a faster than normal rate of weight gain, was to be expected from earlier studies in adults. If changes in weight of the order reported by Safer and his colleagues were the only somatic consequences of stimulant drug therapy the pediatrician might not be unduly alarmed. The differences between the groups continuing or stopping therapy during the summer vacation were small, and the number of observations in each

group were few and not normally distributed, suggesting that parametric statistical analysis might not be the best method of evaluating the data.

It is in the second part of the study that the importance of the work lies. Again, the presentation of the results leaves open some important questions of analysis. The changes in height in the longitudinal study would have been expressed better in terms of standard height³ than in centiles in order to make comparisons between individuals of different ages. Notwithstanding these methodological criticisms, the observations that children on long-term stimulant therapy grew less well in height than others with the same condition who did not receive drugs, and that the impairment of growth in height was significantly related to impairment of weight gain, are striking. If these findings are corroborated by a prospective study of a larger group of children they indicate that several qualifications should be made in the use of stimulant drugs in the treatment of hyperactivity. When possible, therapy should be given discontinuously so that the child has the benefit of treatment while at school and the benefit of a normal appetite during weekends and vacations. In all children on chronic stimulant therapy careful anthropometric measurements should be made regularly. Further studies should be planned to investigate the effects of such treatment on bone growth and the changes occurring at puberty. In view of the apparent lack of effect on weight gain of the lowest dose of methylphenidate it might be profitable to compare the therapeutic effects of this drug and dextroamphetamine further.

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