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# INFLUENCE OF GROWTH ON THE SOMATOTYPE OF DOWN'S SYNDROME PATIENTS

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**Abstract:** *The author summarized his studies on the physique and its changes during the growth process of children with Down's syndrome.*
**Keywords:** *Down's syndrome; Growth study; Somatotype.*

## Introduction

The physique of adult patients with Down's syndrome was published by Eiben and Buday in 1982. Here I am going to summarize our studies on the physique and its changes during the growth process of children with Down's syndrome.

## Material and Methods

The majority of children with Down's syndrome examined in Hungary live in childres's homes and special institutions. Most children attend at special schools, the minimum age being 4 but the majority are between 6 and 15. Table 1 shows their sexual and age grouping.

*Table 1.* Number of patient and control according to age.

| | Down's syndrome children | | Control children | |
|---|---|---|---|---|
| Age (years) | Male | Female | Male | Female |
| 4 | 10 | 4 | 60 | 69 |
| 5 | 15 | 7 | 70 | 71 |
| 6 | 19 | 8 | 69 | 70 |
| 7 | 23 | 9 | 71 | 70 |
| 8 | 35 | 20 | 68 | 69 |
| 9 | 30 | 25 | 72 | 71 |
| 10 | 33 | 19 | 70 | 67 |
| 11 | 35 | 21 | 70 | 73 |
| 12 | 31 | 25 | 70 | 70 |
| 13 | 32 | 17 | 69 | 69 |
| 14 | 32 | 14 | 71 | 71 |
| 15 | 21 | 13 | 70 | 69 |
| 16 | 25 | 12 | 69 | 70 |
| 17 | 10 | 6 | 71 | 71 |
| 18 | 7 | 5 | 70 | 70 |

Data selection for examination was made from documents of the institute and from the phenotype of the patients. Persons with the karyotype of mosaicism were excluded from the study.

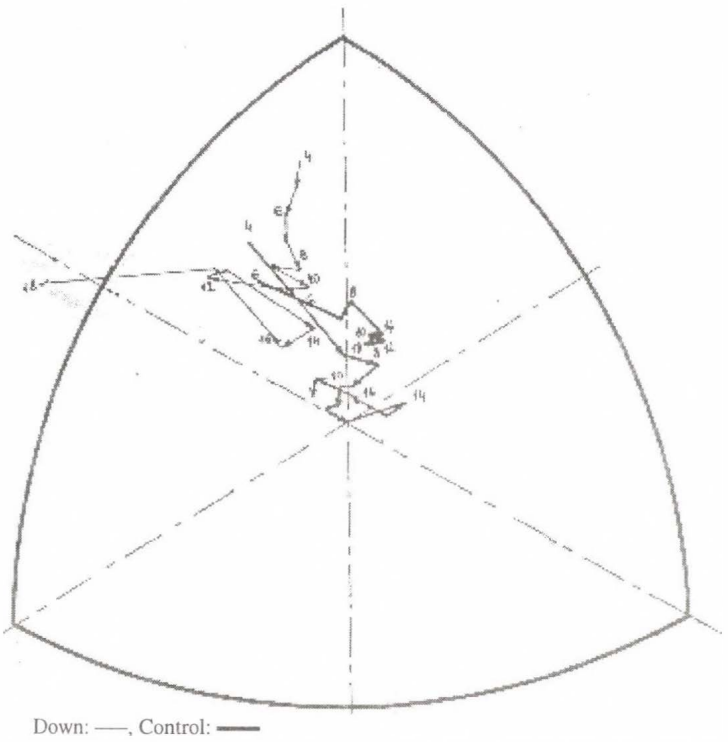
For the control groups children aged from 4 to 18 have been chosen randomly from the First Nationwide Growth Study of Hungarian Children and Youth (Eiben et al. 1991). We ought to thank Professor Eiben for giving this.

The evaluation of physique was based on the Heath–Carter anthropometric somatotype (Carter 1975). The recommended three photographs were also taken of all of the patients. The calculated components have been corrected on the basis of photography in case of necessary. The migration of somatoplots was calculated according to Parízková and Carter (1976).

*Table 2.* Somatotype of patients and control according to age.

| Age | | Male | | | Female | | |
|---|---|---|---|---|---|---|---|
| (yrs) | Group | I | II | III | I | II | III |
| 4 | Down | 1.65 | 5.25 | 0.75 | 2.50 | 4.78 | 1.00 |
| | Control | 3.68 | 5.53 | 1.79 | 3.97 | 5.25 | 2.07 |
| 5 | Down | 2.00 | 5.23 | 1.03 | 1.90 | 4.71 | 1.28 |
| | Control | 3.45 | 5.17 | 2.11 | 3.99 | 4.98 | 2.19 |
| 6 | Down | 2.34 | 5.05 | 1.18 | 2.62 | 5.25 | 1.06 |
| | Control | 3.35 | 4.74 | 2.57 | 4.23 | 4.17 | 2.60 |
| 7 | Down | 2.67 | 4.86 | 1.50 | 3.00 | 4.94 | 1.27 |
| | Control | 3.30 | 4.26 | 3.19 | 4.47 | 4.02 | 3.24 |
| 8 | Down | 3.87 | 4.83 | 1.91 | 3.57 | 5.12 | 1.22 |
| | Control | 3.02 | 4.25 | 3.53 | 4.52 | 3.79 | 3.62 |
| 9 | Down | 3.13 | 4.98 | 1.70 | 3.42 | 4.56 | 1.98 |
| | Control | 3.54 | 4.10 | 3.64 | 4.82 | 3.79 | 3.66 |
| 10 | Down | 3.04 | 4.97 | 2.24 | 3.85 | 4.47 | 1.77 |
| | Control | 3.67 | 4.17 | 3.61 | 5.01 | 3.56 | 3.84 |
| 11 | Down | 3.30 | 4.77 | 2.14 | 4.16 | 4.78 | 1.69 |
| | Control | 3.86 | 4.09 | 3.64 | 5.29 | 3.63 | 3.66 |
| 12 | Down | 4.27 | 5.32 | 1.69 | 4.46 | 4.84 | 1.98 |
| | Control | 4.07 | 4.14 | 3.73 | 4.96 | 3.18 | 4.13 |
| 13 | Down | 3.93 | 5.28 | 1.92 | 4.67 | 4.32 | 2.17 |
| | Control | 3.92 | 3.91 | 3.97 | 5.51 | 3.17 | 3.69 |
| 14 | Down | 3.23 | 4.59 | 2.66 | 6.46 | 5.50 | 1.00 |
| | Control | 3.23 | 4.04 | 3.69 | 5.90 | 3.28 | 3.39 |
| 15 | Down | 3.59 | 4.27 | 2.44 | 5.30 | 5.00 | 1.23 |
| | Control | 2-52 | 4.23 | 3.16 | 6.13 | 3.52 | 3.06 |
| 16 | Down | 3.75 | 4.40 | 2.37 | 5.12 | 4.70 | 1.50 |
| | Control | 2.64 | 4.19 | 3.59 | 6.13 | 3.71 | 2.82 |
| 17 | Down | 4.25 | 5.50 | 1.80 | 5.00 | 4.74 | 1.50 |
| | Control | 3.63 | 4.05 | 3.02 | 3.63 | 4.06 | 3.02 |
| 18 | Down | 6.44 | 5.88 | 0.88 | 6.41 | 6.50 | 1.41 |
| | Control | 3.80 | 3.98 | 3.11 | 6.17 | 3.47 | 2.95 |

Graphically it can be followed by the "migration" of average somatoplots year by year. For this aim we have to blow up the usual diagram because the distance between the average somatoplots are relatively small (Figure 1). The migration of the average somatoplots of boys can be followed.



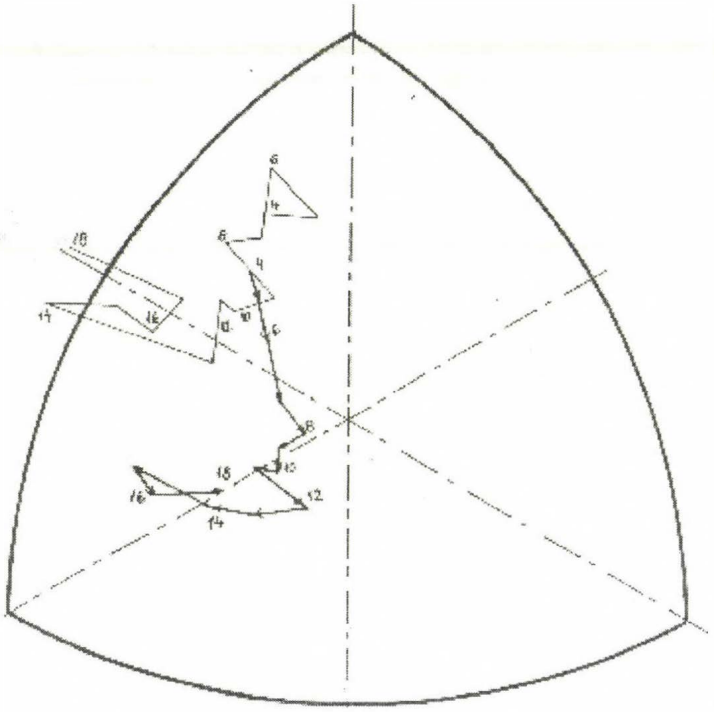
Down: ——, Control: ▬▬

*Figure 1:* Migration of somatoplots of male patients in the growth. Comparison with the control.

For the control boys' figure at 4 years of age the endo-mesomorphy, at 6–7 years the balanced mesomorphy are characteristic. At 8–18 years of age the average somatoplots are in the center of the diagram and their positions change very slightly.

For Down's boys usual somatotype the balanced mesomorphy are charateristic at 4–5 years. Later the changes follow each other in an "irregular" form and the average somatoplots are chacacteristic of endo-ecomorphy or the balanced endo-mesomorphy. After 17 years of age the average somatoplots are in the stripe of balanced endomorphy but out of the circle triangle.

The average somatoplots across the balanced stripe of meso-endomorphy (6 and 7 years) touching the central area (8 years) get to the area of balanced endomorphy and from the limits of the area of ecto-endomorphy to the area of meso-endomorphy they described an arc. From 15–18 years of age they change slightly.



Down: ——, Control: ▬▬

*Figure 2:* Migration of somatoplots of female patients in the growth. Comparison with the control.

The females' physique change more in both groups than the boys (Figure 2). Except the 5 years for the figure of Down's girls (4 and 6–9 years of age) the endo-mesomorphy is characteristic and later the balanced meso-endomorphy. After 10 years of age the average somatoplots are in this stripe, but with aging both the values of meso and endomorphy become higher and higher.

Looking at the tables we have to mention that before the age of 18 years we can detect a physique near to the adult one, thus we can postulate that this changes very slightly during the last years. Greater differences can be observed in younger ages.

With the Down's male patients the migration is greater until 8 years than with the control and the adult figure develops later with great changes.

This observation is supported by the calculated values of migratory distances also (Table 3.). In this table for better demonstration the values of Down's children are shown in 4 groups. The migratory distance is longer for girls than for boys and much longer for Down's children than the control. Comparing the sex groups it is detectable that at 6–16 years of age the changes are much greater for the girls than for the boys and after 16 years the boys' figure changes more definitely.

*Table 3.* Migratory distance of patients and control.

| Age (year) | Down's | Control | Down's | Control |
|---|---|---|---|---|
| 4–6 | 1.59 | 2.81 | 3.19 | 2.20 |
| 6–16 | 12.90 | 8.63 | 20.60 | 12.83 |
| 16–18 | 8.34 | 1.70 | 3.69 | 1.50 |
| Together | 22.83 | 13.14 | 27.48 | 16.53 |

The interpretation of this results is questionable. The first component can be counted by the Heath–Carter method with the addition of the three skinfolds, so it is in close correlation with the amount of body fat.

According to the published data (Benda 1969, Chumlea and Cronk 1981) obesity and in contrast the high value of the first component – appears in very young ages of Down children. Our own data does not justify this statement. The value of the first component of boys from 14, and of girls from 18 years of age reaches this value. With normal girls at 11–12 years, and boys at 13 years this component decreases, it seems because of the pubertal growth velocity. This phenomenon can be detected with Down boys but not with Down girls.

The second component is the lean body mass in the unit of body height. These dimension differences from normal values were much smaller than we described in the units of the body height which were much lower than the normal. With this description the value of mesomorphy will be nearly as high as the endomorphy.

The value of ectomorphy so that the linearity is expressed as the quotient of the body height and the cube root of body weight. This means in reality the ratio of a value which is much more retarded than the normal and another which is nearly the normal value. That is why it is comprehensible that the values of this component are much lower than in the control group.

The value of the third component is greater in connection with the linear growth of puberty. It must be emphasized that the maximum of ectomorphy is at 13 years with Down's girls and 14 years with Down's boys so they follow the control with one year delay. On the other hand these are the ages when the growth of the body height of Down's syndrome patients seems to be ended, and after that little changes were found in both sexes (Buday 1990). We have to take this fact into consideration in the estimate of the first and the second components.

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