

COMPARISON OF SOMATOTYPES OF CZECHOSLOVAKIAN AND CANADIAN RHYTHMIC SPORTIVE GYMNASTS

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Abstract: The purpose of this study was to describe secular changes in the physique of elite rhythmic sportive gymnasts occurring over the past 23 years. The study is part of a larger international project, the main focus of which is on the health of these athletes. The highly ectomorphic and prepubescent physique demonstrated by world top rhythmic sportive gymnasts and also the increasing number of reports of retarded growth and potentially dangerous dietary practices in related sports have inspired this study. The sample of Czechoslovakian rhythmic sportive gymnasts dates from 1967–68 and the last sample of Canadian rhythmic sportive gymnasts was obtained in 1991. Over the period of these years sport of rhythmic sportive gymnastics developed internationally and finally it was included into the Olympic Games in Los Angeles. Escalating demands on the technical aspects of the sport were accompanied by demands on the physique of the athletes.

Key words: Somatotypes; Rhythmic sportive gymnasts (Czechoslovakian and Canadian).

Introduction

There is a growing concern about highly ectomorphic and prepubescent physique demonstrated by world top rhythmic sportive gymnasts. There is also an increasing number of studies of retarded growth and potentially dangerous dietary practices in so called aesthetic sports, particularly artistic gymnastics (Lewis and Eisemann 1989, Moffat 1984, Hickson et al. 1986, Loosli et al. 1986, Benson et al. 1990, Bernadot, Schwarz and Heller 1989, Calabrese 1985, Dummer 1987, Brooks-Gunn et al. 1987, Thorton 1990, Claessens et al. 1990, Claessens et al. 1991). Very little information exists on rhythmic sportive gymnastics. The maintenance of low adiposity, whether before or during puberty, requires extreme vigilance and could lead to overtraining, malnutrition, and/or eating disorders. It is well known, that many female athletes in aesthetic sports discontinue their athletic carriers prematurely, mostly due to the extreme requirements of training combined with strict diet. The authors believe that clarifying some trends and lifestyle practices in the sport of rhythmic sportive gymnastics may provide a foundation for maintaining gymnasts' good health as well as lengthen their competitive years.

Material and Methods

Baseline data were collected in Czechoslovakia, between 1967–68 by Brandova and Štěpnička (Štěpnička 1972). The sample of 74 rhythmic sportive gymnasts was measured and somatotypes evaluated first by method of Sheldon and later by that of Heath & Carter (Carter 1980).

Canadian data were collected in 1988 (Alexander 1989) and in 1990 and 1991 by the authors. The sample includes eight top national and sixteen elite provincial rhythmic sportive gymnasts. Comprehensive anthropometric measurements were taken according to the methods of Ross and Marfell-Jones (1990). Somatotypes were evaluated by the Heath – Carter method (Carter & Heath 1990). The sample of provincial elite gymnast

was divided into three arbitrary age groups: less than 13 year-old, N = 7; 13–16, N = 5; 16 and above, N = 4. These groups were also compared with the same age groups of school children from the 1974 Coquitlam growth study (COGRO 1974) N = 107, 138 and 78 and with the University females N = 300 (1967/68) and N = 48 Kinesiology students (1990/91).

Results

Table 1 shows the average age, height and weight of three rhythmic sportive gymnastic samples.

The described samples were measured in a difference of more than twenty years. It is of interest to note that the height of all and especially the national team members is very similar, while the average age of the top rhythmic gymnasts decreased by more than five years and body mass decreased by app. 10 kg.

Table 1. The three samples investigated

Gymnasts	N	Age	Height (cm)	Weight (kg)
Czechoslovakian	74	19.9	163.50	57.05
Canadian National	8	15	164	49.6
Canadian Provincial	16	14	160	46.3

Figure 1 shows the somatotypes of Canadian provincial elite gymnasts (A: age 12.99 year and younger, B: age 13–16 year, C: age 16 year and older). A definite clustering is apparent, without a great deal of overlap among the groups. The age trend is for A to B, level of fatness is maintained but linearity is increasing slightly and musculo-skeletal robustness is dropping. Trend from B to C is much less linear and more ponderous.

Comparison with control groups of the same age children is shown in Somatochart 2 (Cogro groups D, E, F; *Fig. 2*). It is suggested that gymnasts show the physique manifestation of delayed puberty because normal female population is higher in endomorphy even at younger ages.

In *Figure 3* A represents 74 Czech rhythmic sportive gymnasts active in the 1970's, and B represents 16 Canadian provincial rhythmic sportive gymnasts active in the 1990's.

The group of contemporary gymnasts is much less ponderous, in part due to less adiposity and also very much related to less muscularity. The average somatotype of the Czech rhythmic sportive gymnasts in 1967/68 was 3.5–4.5–3.0, the same as the most frequent somatotype of track and field athletes in those years. Somatotypes of both contemporary samples show a great degree of ectomorphy. In evaluation of these findings, consideration was given to: ethnic or national differences; age differences; changes in sport specific requirements.

Figure 4 represents average groups of normal university female students: A: Czech rhythmic gymnasts 1967/68, B: Canadian provincial rhythmic sportive gymnasts 1991, C: Czech students 1967/68, D: Canadian students 1990/91.

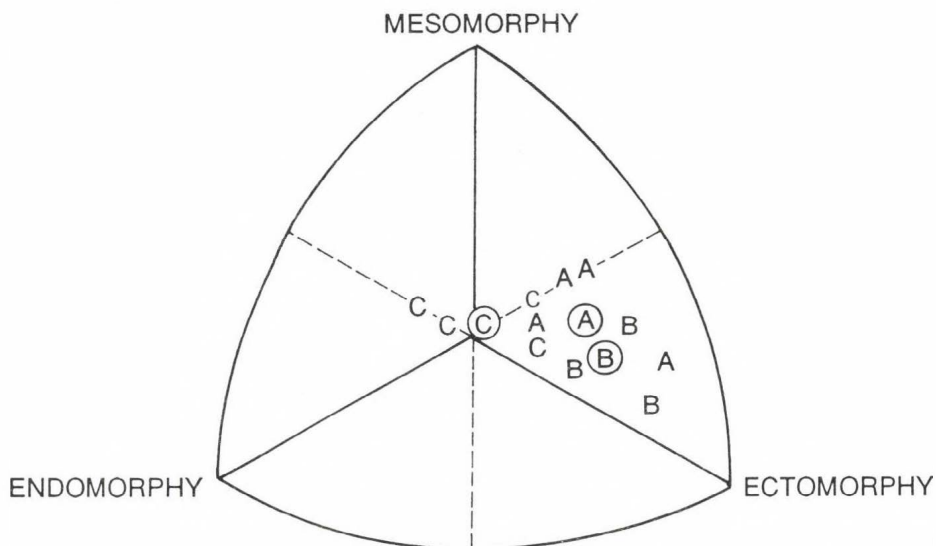


Fig. 1: Somatotypes of Canadian provincial elite female gymnasts. Group A: age 12.99 year and younger, N = 7, mean somatotype: 1.7-3.5-4.4; Group B: age 13-16 year, N = 5, mean somatotype: 1.7-2.8-4.8; Group C: age 16 year and older, N = 4, mean somatotype: 2.7-3.2-3.0. - The letters circled are the groups' means.

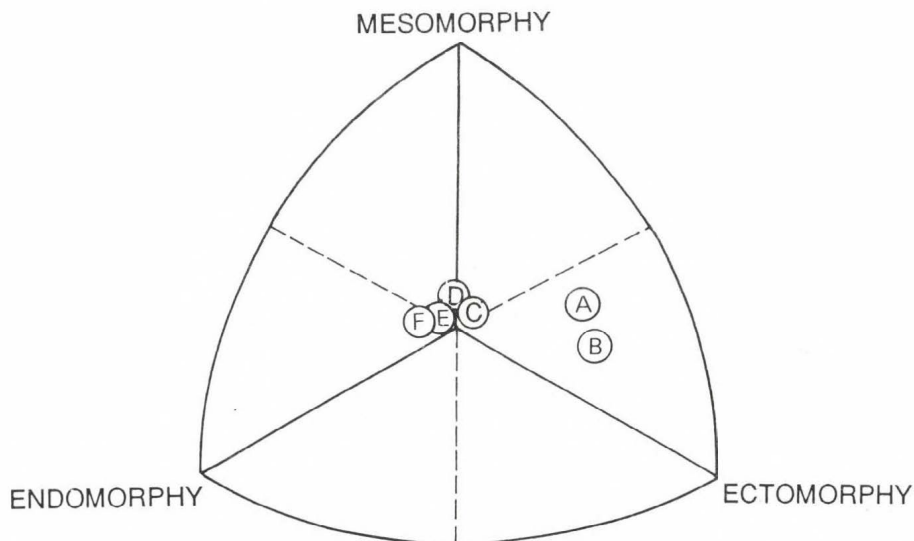


Fig. 2: Somatotypes of Canadian provincial elite female gymnasts and girls of COGRO. Group A: gymnasts, age 12.99 year and younger, N = 7, mean somatotype: 1.7-3.5-4.4; Group B: gymnasts, age 13-16, N = 5, mean somatotype: 1.7-2.8-4.8; Group C: gymnasts, age 16 year and older, N = 4, mean somatotype: 2.7-3.2-3.0; Group D: COGRO girls, age 9-13 year, N = 107, mean somatotype: 3.4-4.0-3.4; Group E: COGRO girls, age 13-16 year, N = 188, mean somatotype: 3.8-3.8-3.3; Group F: COGRO girls, age 16-18 year, N = 78, mean somatotype: 3.9-3.7-3.1

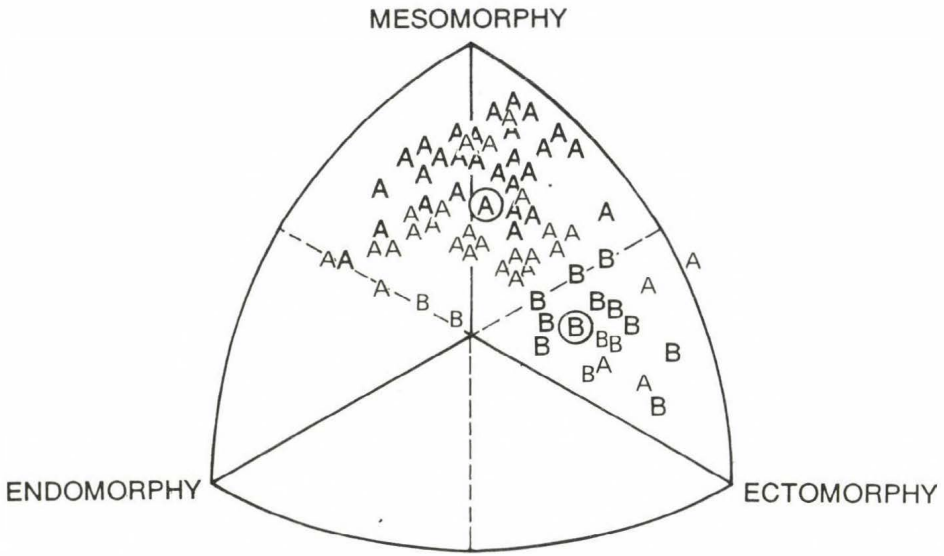


Fig. 3: Somatotypes of Czech and Canadian rhythmic sportive gymnasts. Group A: Czech rhythmic sportive gymnasts from 1967–68, N = 74, mean somatotype: 2.4–5.4–2.8; Group B: Canadian provincial rhythmic sportive gymnast, 1991, N = 16, mean somatotype: 1.7–3.2–4.2

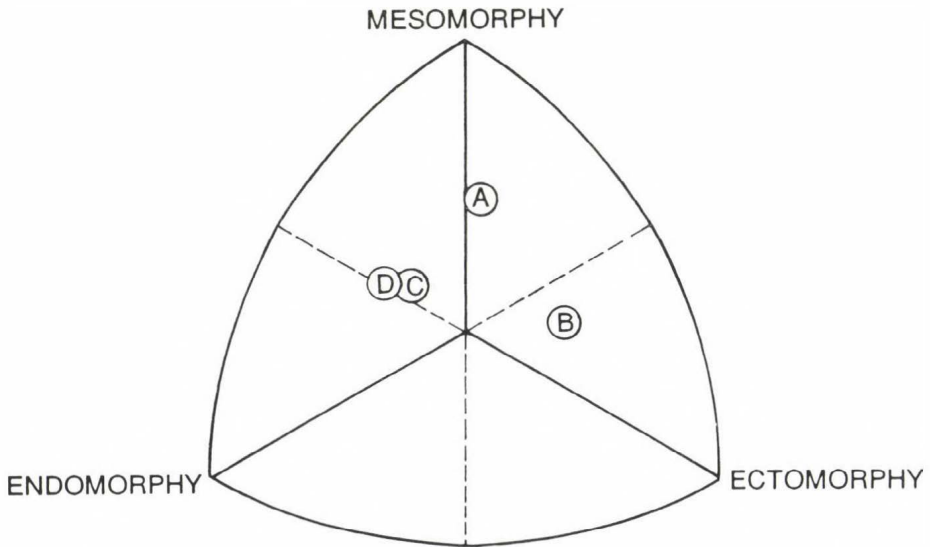


Fig. 4: Somatotypes of Czech and Canadian female university students and Czech and Canadian rhythmic sportive gymnasts. Group A: Czech rhythmic sportive gymnasts from 1967–68, N = 74, mean somatotype: 2.4–5.4–2.8; Group B: Canadian provincial rhythmic sportive gymnasts, 1991, N = 16, mean somatotype: 1.7–3.2–4.2; Group C: Czech female university students, 1967–68, N = 300, mean somatotype: 3.9–4.3–2.7; Group D: Canadian female university (SFU Kinesiology) students, N = 18, mean somatotype: 4.2–4.3–2.3

Both groups of University students have almost identical group averages. This suggests that there are no differences in the student samples which are related to either secular or national/ethnic differences. This is, that there are no large differences between the base populations from which the gymnasts are selected.

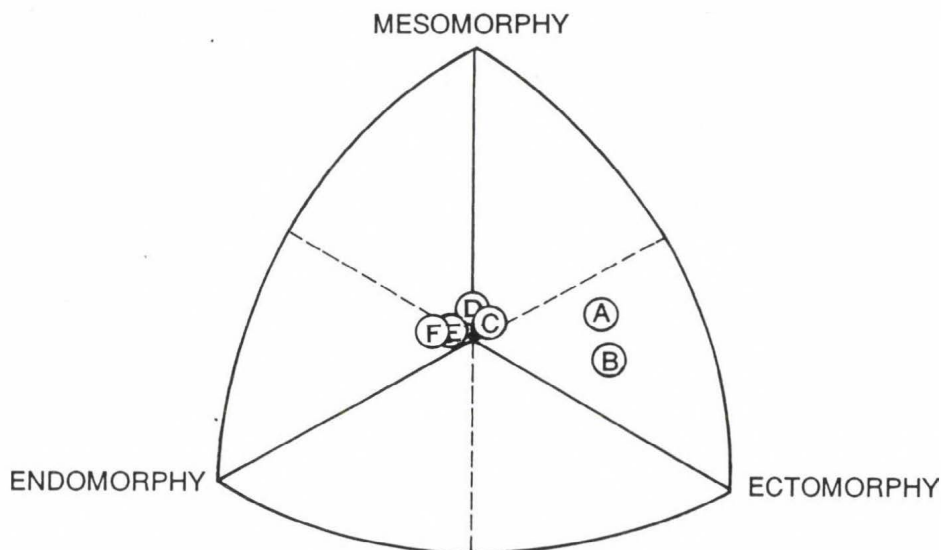


Fig. 5: Somatotypes of Canadian provincial elite female gymnasts and girls of COGRO. Group A: gymnasts, age 12.99 year and younger, N = 7, mean somatotype: 1.7-3.5-4.4; Group B: gymnasts, age 13-16 year, N = 5, mean somatotype: 1.7-2.8-4.8; Group C: gymnasts, age 16 year and older, N = 4, mean somatotype: 2.7-3.2-3.0; Group D: COGRO girls, age 9-13 year, N = 107, mean somatotype: 3.4-4.0-3.4; Group E: COGRO girls, age 13-16 year, N = 188, mean somatotype: 3.8-3.8-3.3; Group F: COGRO girls, age 16-18 year, N = 78, mean somatotype: 3.9-3.7-3.1

In Figure 5 C, D and F are average somatotypes of school children (COGRO 1974) divided into age groups 9-13, 13-16 and 16-19 year-old. A, B and C are average somatotypes of previously mentioned Canadian provincial gymnasts divided into the same age groups. Groups of school children show just slight changes in fatness with age. Physique in all these age groups are very similar. From the groups of gymnasts only the 16 years and older are close to their age-expected physique, though they are still slightly less fat.

Discussion

The differences between the samples of somatotypes of Czechoslovakian and Canadian rhythmic sportive gymnasts described above don't seem to be caused by national/ethnic differences. This was well demonstrated by comparison of both groups of the university students. Although there were some age trends, the differences don't seem to be greatly age related. Therefore, the suggestion is that sport specific demands are a major cause of the differences between both investigated groups. The sport specific

differences identified in this study were premature age of gymnasts, decreased muscularity and emphases on linearity and low adiposity.

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