No association between nutrition and body height in German kindergarten children – a pilot study

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With 1 figure and 1 table

Abstract: Anthropologists all over the world are discussing influences on individual height including quantity and quality of nutrition. To examine whether a relationship between nutritional components and height can be found this pilot study has been developed. The research samples consisted of 44 children (age 3–6 years) attending two different kindergartens in Germany. Height measurements were taken for each child. Furthermore the parents had to fill out a 24-hour questionnaire to document their children’s eating habits during the weekend. In order to standardize the measured height values z-scores were calculated with reference to the average height of the overall cohort. The results of correlation analysis indicate that height is not significantly related to any of the main nutritional components as protein (r = –0.148), carbohydrates (r = 0.126), fat (r = 0.107), fibre (r = –0.289), vitamin (r = 0.050), calcium (r = 0.110), potassium (r = 0.189) and overall calorie intake (r = 0.302). In conclusion, it can be stated that the quality of nutrition may not have a strong influence on individual height. However, due to the small sample size further research should be provided with a larger cohort of children to verify the present results.

Keywords: nutritional components; individual body height; children; Germany

Introduction

The secular trend is a complex phenomenon characterized by changes in body dimensions and proportion, and by changes in the developmental tempo. The acceleration of developmental tempo has already been recognized since the early 20th century. Koch (1935) coined the term “secular acceleration”. Later it became obvious that the changes in tempo were paralleled by concomitant changes in body dimensions and proportions. Meanwhile the global nature of secular trends in adult height has been well documented. The NCD Risk Factor Collaboration reports variation in height between and within populations of up to 20 cm (NCD Risk Factor Collaboration 2016). The magnitude of the secular changes in body height amounts to 1–2 cm per decade. The trend can even be stronger in migrants who may completely catch up in height with the host population already within 1–2 generations (Bogin 2013).

Increasing trends in height often coincide with improvements in economy and living conditions. Thus, it has become common wisdom to consider nutritional changes (Fogel 2004), and improvements in health, sanitation and housing major causal factors of this phenomenon (Komlos 2009).

Particularly nutritional protein and vitamin intake has been claimed responsible for trends in body height (Lai 2006). Grasgruber et al. (2014) suggested that the higher quality of proteins in pork, milk and fish contributed to the relatively tall stature of European people, and that the smaller height of South and East Asian populations may be explained by the comparably small amount of milk products they consume (Grasgruber et al. 2016).

Yet, recent evidence suggests that body height may not only depend on nutrition, genetics, health and living conditions, but may significantly relate to height of the other members of the community a person is raised in (Aßmann & Hermanussen 2013). Children and adolescents tend to adjust in height toward the height of their peers. People may simply be short because their friends and neighbours are short; or tall because their friends and neighbours are tall.

Meanwhile the hypothesis of a social target in body height has been extended. Competitive growth and strategic growth adjustments have been demonstrated in meerkats (Huchard et al. 2016). Relative body size is a signal of dominance or subordination within groups of cooperative mammals. Members of a group are able to adjust size according to their social position. Evidence in large sets of historic height