

THE AFRICAN RUNNING PHENOMENON: THE ROLE OF GENETICS, NUTRITION AND DEMOGRAPHIC FACTORS IN EXPLAINING THE SUCCESS OF EAST AFRICAN RUNNERS IN INTERNATIONAL DISTANCE RUNNING

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Kenyan athletes have dominated international distance running in recent years. Explanations for their success include favourable physiological characteristics, which may include favourable genetic endowment and advantageous environmental conditions. The purpose of this study was to analyse the genetic, nutritional and demographic characteristics of elite Kenyan endurance runners. Questionnaires were administered to elite Kenyan runners specializing in distances ranging from the 800 m to the marathon and Kenyan control subjects (C)(n=87). The questionnaires sought information on place of birth, language, motivation for becoming athletes, distance and method of travel to school. Diet logbooks were used to assess the athletes' dietary habits during training. The training regime of the runners was monitored using a training diary. Athletes were separated into two groups according to athletic success: International level athletes (I)(n=97) and national level athletes (N)(n=307). DNA samples were collected from the subjects using buccal swabs. Both qualitative and quantitative research designs were used in this study. Data were presented in bar charts, pie charts, line graphs and tables. Chi-squares were used to establish any significant differences within and between the groups. The level of significance was set at 0.05. Athletes differed from controls in regional distribution, language, and distance and method of travel to school; athletes also differed from each other with the exception of method of travel to school. Most national and international athletes came from the Rift Valley province (C: 20 %, N: 65 %, I: 82 %) (C: n=17: N: n=200: I: n=80), of those who belonged to the Kalenjin ethnic group (C: 8 %, N: 49 %, I: 76 %) (C: n=7: N: n=150: I: n=74) and Nandi sub-tribe (C: 5 %, N: 25 %, I: 45 %) (C: n=4: N: n=77: I: n=44) and who spoke languages of Nilotic origin (C: 20 %, N: 59 %, I: 80 %) (C: n=17: N: n=181: I: n=78). A higher proportion of all athletes ran to school each day (C: 22 %, N: 73 %, I: 83 %) and covered greater distances. Kenyan runners are from a distinctive environmental background in terms of geographical distribution, ethnicity, and also having travelled further to school, mostly by running. Estimated energy intake (EI: 2987 ±293 kcal; mean ±standard deviation) was lower than energy expenditure (EE: 3605 ±119 kcal; p <0.001) and body mass (BM: 58.9 ±2.7 kg vs. 58.3 ±2.6 kg; p <0.001) was reduced over the 7-d intense training period. Diet was high in carbohydrate (76.5%, 10.4 g/kg BM per day) and low in fat (13.4%). Protein intake (10.1%; 1.3 g/kg BM per day) matched recommendations for protein intake. Fluid intake was modest and mainly in the form of water (1113 ±269 mL; 0.34 ±0.16 ml/kcal) and tea (1243 ±348 ml). Although the diet met most recommendations for endurance athletes for macronutrient intake, it remains to be determined if modifying energy balance and fluid intake will enhance the performance of elite Kenyan runners. I/D genotype was not associated with elite endurance athlete status (df = 4, $\chi^2 = 3.5$, p = 0.47)

with no over-representation of the I allele among N (0.42) or I (0.39) athletes relative to controls (0.38). The absence of an association between the I/D polymorphism with elite Kenyan athlete status suggests that the ACE gene does not contribute significantly to the phenomenal success of Kenyan endurance runners in international distance running. These results do not support the hypothesis that ACE gene variation is associated with elite endurance performance.

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