ABSTRACT

Background: Majority of children living in developing countries depend on a cereal based diet which is limiting in essential amino acid lysine. Lysine requirement of Canadian children is 35 mg/kg/d, and they subsist on a mixed diet including legume based animal protein. Furthermore, intestinal parasites have been shown to increase lysine requirements in undernourished adults, however it is not known, if a similar phenomenon occurs in undernourished children from poor and unsanitary environments. Therefore, determination of lysine requirement in healthy Indian children is essential. Objectives: To determine the lysine requirement in healthy school-aged children in the developing world by using the IAAO method and to measure the lysine requirement of moderately undernourished school-aged children with pre and post anti parasite treatment. Study design: (i) Six healthy school-aged children consumed 7 levels of lysine intakes (5, 15, 25, 35, 50, 65, and 80 mg/kg/d) along with an amino acid mixture providing energy and protein intakes of 1.7 x resting energy expenditure (REE) and 1.5 g/kg/d, respectively. (ii) Twenty one undernourished, school-aged children were studied before and after treatment for intestinal parasites, and were fed any two of seven levels of lysine intakes (5, 15, 25, 35, 50, 65, and 80 mg/kg/d) in random order. The lysine requirements was determined by applying a 2-phase linear regression crossover analysis on the response curve of the fractional oxidation rate of the tracer L-[1-13C] phenylalanine, (F13CO2) to the graded lysine intakes to identify a breakpoint or the minimum lysine requirement. This break point is determined at the nadir of the F13CO2 response. Results: (i) the mean lysine requirement with the upper 95% confidence interval for children were 33.5 mg/kg/d and 46.6 mg/kg/d respectively, by breakpoint analysis of the F13CO2 data. (ii) The lysine requirement of moderately undernourished children with intestinal parasites infestations was 42.8 mg/kg/d and after successful anti parasite treatment, it was found to be 35.5 mg/kg/d. Summary: The mean lysine requirements of Indian children were almost identical to that of Canadian children (35 mg/kg/d). Lysine requirement in undernourished children is similar to that of normally nourished children, and intestinal parasitic infestation increases (~17%) the lysine requirement. Further, there is no evidence found for any adaptation in lysine requirements in Indian children.

Key words: Lysine, indicator amino acid oxidation, requirements, stable isotopes, Indian children, undernourished children, intestinal parasites.