

Iron intake and iron status of rural Malaysian adolescents

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The iron content of the diet is especially important in the adolescent period because of the growth spurt and to replace losses. A convenience sample of 199 apparently healthy adolescents consisting of 94 males and 105 females aged 12 to 19 years from six fishing villages of Tuaran, Sabah was studied in order to determine iron intakes and dietary iron sources in relation to iron status. A validated food frequency questionnaire (FFQ) containing 62 usual food items of these fishing villages was used to quantify food and nutrients intake. The mean age of subjects was 15.2 years. Half of the subjects lived in medium size households and almost three-quarters of the households were below poverty line (<RM122.65/month). The mean dietary iron intakes of males and females were similar (10.7 ± 2.6 mg/d and 10.0 ± 2.9 mg/d, respectively). A high proportion of the females (90%) had dietary iron intake below the 2/3 Malaysia RDA level compared with their male counterparts (63%). The majority of the subjects derived most dietary iron from foods of plant origin (78%), whereas only 22% was contributed by animal-origin products. Males had a significantly higher intake of dietary iron from rice and rice products ($P < 0.05$), local snack foods ($P < 0.05$), cereals and tubers ($P < 0.001$), fruits ($P < 0.001$), fish and seafood ($P < 0.05$) and chicken and meat ($P < 0.01$). In contrast, female adolescents had a significantly higher iron intakes derived from nutrient fortified milk beverages ($P < 0.05$). Multiple iron status indicators indicated that 18.9% of males and 26.4% of females were iron deficient, while 5.4% of males and 26.4% of females had iron deficiency anemia. The correlation analysis showed that total dietary iron intake was significantly correlated with serum ferritin ($r = 0.457$, $P < 0.001$), serum iron ($r = 0.309$, $P < 0.001$), transferrin saturation ($r = 0.339$, $P < 0.001$), mean corpuscular volume ($r = 0.477$, $P < 0.001$) and hemoglobin ($r = 0.431$, $P < 0.001$), and there was a significant negative correlation with total iron binding capacity ($r = -0.284$, $P < 0.001$). Further, dietary iron intake derived from plant-origin was also found to be significantly correlated with the iron status indicators. The significant correlation between the intake of non-heme iron and iron stores indicates the importance of both haem and non-haem iron in the diet. The low amount of bioavailable heme iron places Malaysian adolescents at risk of iron deficiency. The identification of sources of dietary iron in these adolescents hopefully can serve to formulate food-based dietary guidelines tailored to the specific needs of adolescent population groups.

Key words: iron status, dietary iron intake, adolescents