

Dietary inadequacy is associated with anemia and suboptimal growth among preschool-aged children in Yunnan Province, China

Noreen D. Willows^{a,b}, Bobbi N. Barbarich^{a,b}, Larry C.H. Wang^c,
Dana Lee Olstad^{a,b}, Michael T. Clandinin^{a,b,d,*}

^aAlberta Institute for Human Nutrition, University of Alberta, Edmonton, Alberta, Canada

^bDepartment of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Alberta, Canada

^cDepartment of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada

^dDepartment of Medicine, University of Alberta, Edmonton, Alberta, Canada

Received 16 October 2010; revised 6 January 2011; accepted 10 January 2011

Abstract

This study documented the relationships among dietary intake, growth failure, and anemia in a convenience sample of 172 children aged 1 to 5 years in rural Yunnan Province, China. We hypothesized that most children would have suboptimal intakes of key nutrients associated with child growth and anemia and that undernutrition would be more common in children with poor growth and in those who were anemic. Nutrient intakes from three 24-hour recalls were compared with the Dietary Reference Intakes. Height/length and weight were compared with World Health Organization Child Growth Standards to determine if children were malnourished (z score < -2 SD median). Blood was tested for anemia (hemoglobin < 110 g/L). Stunting, underweight, wasting, and anemia were present among 44.4%, 15.7%, 1.7%, and 35.4% of children, respectively. The percentage of children not meeting the estimated average requirement for zinc, vitamin A, iron, and protein or the adequate intake for calcium was 87.2%, 80.8%, 66.3%, 7.6%, and 100.0%, respectively. Altogether, 19.2% and 78.5% of children were below the acceptable macronutrient distribution range for percentage of energy from protein and fat, respectively. More stunted than not stunted children were below the estimated average requirement for vitamin A, as were more anemic than nonanemic children. Growth faltering combined with findings of anemia and suboptimal intake of a variety of nutrients suggests a high prevalence of chronic dietary inadequacy among preschool-aged children in Yunnan Province. Consuming more protein-, fat-, zinc-, iron-, and vitamin A-rich foods may improve growth and reduce anemia.

© 2011 Elsevier Inc. All rights reserved.

Keywords:

Growth; China; Malnutrition; Child, Preschool; Anemia; Anthropometry

Abbreviations:

AMDR, acceptable macronutrient distribution range; CGS, Child Growth Standards; EAR, estimated average requirement; HAZ, height/length-for-age z score; RMB, Renminbi; USD, US dollars; WHO, World Health Organization; WAZ, weight-for-age z score; WHZ, weight-for-height/length z score.

1. Introduction

Child growth is an important indicator of health and nutritional status [1–3]. Although child undernutrition is a public health problem in developing countries, rapid economic expansion in some of these nations has led to an increased prevalence of obesity among more affluent

* Corresponding author. 4-10 Agriculture/Forestry Centre, University of Alberta, Edmonton, Alberta, Canada T6G 2P5. Tel.: +1 780 492 5188; fax: +1 780 492 8855.

E-mail address: tom.clandinin@ualberta.ca (M.T. Clandinin).

citizens, such that high levels of underweight and overweight coexist among children in the population [1]. In China, the prevalence of obesity has increased rapidly, whereas rates of poor growth remain high in many rural areas [4–7], which suggests lower socioeconomic status in rural areas and disparities in resource allocation among Chinese citizens [8].

A recent study in a socioeconomically disadvantaged area of China that compared the growth of children younger than 5 years to the 2006 World Health Organization Child Growth Standards (WHO CGS) reported that the prevalence of stunting, underweight, and wasting was 30.2%, 10.2%, and 2.9%, respectively, whereas 4.1% of children were overweight, and 16.8% were at risk for overweight [6]. The dietary intake of children was not reported. Many studies have, however, documented low intakes of energy, essential fatty acids, vitamin A, and calcium in Chinese children [9–15], suggesting that malnutrition is widespread. As economic prosperity increases in China, it is important to monitor the children's nutritional status to identify those regions most in need of nutritional intervention. There is a need for data describing the growth status of children living in rural China in relation to dietary intake.

Yunnan is one of China's poorest provinces [16]. In the 1990s, it was reported that the prevalence of stunting in children younger than 7 years in Yunnan was 51%, with 18.9% classified as underweight and 1.4% as wasted [3]. Given the recent economic growth in the region, the purpose of this study was to investigate the relationship among child growth status (assessed using the 2006 WHO CGS), nutrition, and anemia in a convenience sample of pre-school-aged children in rural Heqing County in Yunnan Province, China. We focused on macronutrients and micronutrients relevant to child growth and anemia status that were likely to be limited in these children's diets. We hypothesized that these nutrients would be limiting in most children's diets and that undernutrition would be more common in children with poor growth and in those with anemia. We previously reported the fatty acid and macronutrient intakes of these children in relation to anthropometric indices derived from the older National Centre for Health Statistics/WHO reference, which may have underestimated poor growth [14]. The larger intent of the current study was to inform the development of public health programs to ensure children living in rural areas of China consume nutritionally adequate diets that support optimal health.

2. Methods and materials

2.1. Subjects

Villagers living in 2 villages in Heqing County were invited to attend public forums in February 2004 jointly hosted by Heqing County Health Bureau officials and the researchers. During these forums, the research was explained, and parents had the opportunity to enroll their 1- to 5-year-old children in the study as previously described

[14]. Based on the tight timelines (completion was targeted before spring harvest in March 2004) and the limited number of health care workers available to assist with the study, the intention was to examine the associations among dietary intake, growth failure, and anemia among the 172 children enrolled by caregivers in the study. These children represented 33% of the children 1 to 5 years of age in the 2 villages.

2.2. Interviewer training

Local health care workers received training in data collection methods including interview techniques, the administration of questionnaires, 24-hour dietary recall procedures, and anthropometric assessments. The workers were each given a handbook in Mandarin containing detailed study protocols adapted from the Micronutrient and Health Program (MICA) guide [17], Gibson and Ferguson's [18] 24-hour dietary recall procedure, and Cogill's Anthropometric Indicators Measurement Guide [19].

2.3. Dietary intake

Dietary intake was captured with 3 nonconsecutive 24-hour recalls based on information provided by mothers on behalf of their child [18]. Interviewers collected bowls and utensils used by the children and weighed the child's typical portion size 3 times to estimate the mean weight of food eaten. Children's food consumption was estimated by multiplying the number of servings consumed by the child by the mean weight for a single portion. Recipes were obtained for combination foods, and mothers were asked to estimate the proportion of the total recipe eaten by the child [20]. The collection of dietary data was simplified by the limited variety of food available and the use of consistent preparation methods in the region.

Based on recall, mothers provided information regarding infant feeding practices including the duration of breastfeeding, the age at which solids were introduced, and the types of solids that were fed to the infant. The research team and Heqing County Health Bureau officials visited the interviewers daily for quality assurance. Missing or unclear data were addressed through repeat visits to the families. Recipes and dietary intakes were analyzed using Food Processor SQL Version 9.1.2 (ESHA Research, Salem, Ore), supplemented by the 2002 Chinese Food Composition Table [21]. Macronutrient and micronutrient intakes were compared with the Dietary Reference Intakes (DRIs) for nutrients [22–25].

2.4. Anthropometric measurements

Anthropometric measurements were performed as described by Cogill [19]. Height was measured for children 24 months or older, and length was measured for children 12 to 23 months old. Children were weighed wearing light clothing [26,27]. Anthropometric z scores for height/length-for-age (HAZ), weight-for-age (WAZ), and,

Download English Version:

<https://daneshyari.com/en/article/5904569>

Download Persian Version:

<https://daneshyari.com/article/5904569>

[Daneshyari.com](https://daneshyari.com)