Nutrition 21 (2005) 32–38

www.elsevier.com/locate/nut

Applied nutritional investigation

Nutritional status and birth outcomes of adolescent pregnant girls in Morogoro, Coast, and Dar es Salaam regions, Tanzania

Candida P. Shirima, M.Sc., Joyce L. Kinabo, Ph.D.*

Department of Food Science and Technology, Sokoine University of Agriculture, Morogoro, Tanzania

Manuscript received May 22, 2004; accepted July 25, 2004.

Abstract

Objective: Studies that link adolescence pregnancies, nutritional status, and birth outcomes in Tanzania are scarce. We examined the nutritional status and birth outcomes of pregnant adolescent girls from rural and urban areas of three regions in Tanzania.

Methods: The study was carried out in the regions of Dar es Salaam (Chamazi and Gezaulole dispensaries and Round Table Maternity Home), Coast (Tumbi Regional Hospital and Mlandizi Health Center), and Morogoro (Regional Hospital, Uhuru Clinic, and Mlali Health Center). One hundred eighty pregnant adolescent girls ages 15 to 19 y were recruited and interviewed, and their nutritional status measurements were taken at the seven health facilities. Information concerning date of birth, marital status, educational status, sex education, and income status was collected with a structured questionnaire. Height, weight, and mid-upper arm circumference were measured according to standard techniques. Hemoglobin concentration was measured with a hemoglobinometer and the HemoCue technique. Nutritional status was assessed by body mass index, and hemoglobin concentration was determined by cutoff points of the World Health Organization. Suitable statistical analysis was done with SPSS 9.0. Weekly weight gain during pregnancy was measured in 123 subjects who kept their appointments and reported back after 2 wk. Fifty-seven subjects did not keep their appointments and were lost to follow-up. Records of infants' birth weights and mode of delivery were obtained from 50 subjects who delivered at the study sites.

Results: The height of about 54% of the subjects was shorter than 151 cm, suggestive of short maternal height. Severe wasting was observed in 27% of subjects. Mean weekly weight gain during pregnancy was 317 ± 110 g (−500 to 500 g). No significant differences were observed between rural and urban settings. Mean infant birth weight was 2600 ± 480 g. About 48% of infants had low birth weight (<2500 g) and only 14% of infants had birth weight greater than 3000 g. About 14% of infants were born by cesarean section. Nearly 86% of the pregnant adolescent girls were anemic. A hemoglobin concentration below 7 g/dL was observed in 5% of subjects. Most subjects (55%) had hemoglobin concentrations from 7 to lower than 10 g/dL. There was a weak correlation between infant birth weight and weekly weight gain of the girls during pregnancy ($r = 0.36$, $P \leq 0.01$). However, a strong correlation was observed between birth weight and hemoglobin level of adolescent girls during pregnancy ($r = 0.67$, $P = 0.01$). Short stature was observed to contribute toward cesarean delivery ($P = 0.05$) because more cesarean deliveries were performed in short girls (<151 cm tall).

Conclusions: The nutritional status of pregnant adolescent girls in the study areas was poor and resulted in poor pregnancy outcome. Girls should be educated about reproductive health at the primary level of education.

Keywords: Adolescent girls; Pregnancy; Nutritional status; Birth outcomes; Tanzania

Introduction

Pregnancy during adolescence puts the adolescent mothers and their children at greater risk of social and health problems. About 10% to 15% of African adolescent girls give birth every year, and many have unintended pregnancies that result in unsafe abortions [1,2]. In Tanzania, the prevalence of unintended pregnancy is about 18% (Shirima and Kinabo, 2002 unpublished data). During adolescence, pubertal growth is still progressing and pregnancy at this age means competition between the growing fetus and the

* Corresponding author: Tel.: +255-23-260-3511-4; fax: +255-23-260-0970.

E-mail address: joykinabo@hotmail.com (J.L. Kinabo)

0899-9007/05/$ – see front matter
doi:10.1016/j.nut.2004.09.006

mother for the scarce nutrients. This often affects pregnant girls' growth potential and increases their risks in pregnancy and delivery complications [3]. Adolescence is a period of great nutritional requirements and growth; therefore, the body of an adolescent girl is inadequately prepared for the additional stress of pregnancy and childbirth. A significant correlation between maternal anthropometric values (height, weight, and body mass index) before and during pregnancy and an infant's birth weight has been reported [4]. Weight gain during pregnancy also has correlated positively with infant birth weight independent of prepregnancy weight when the mother is not excessively overweight [4].

The major social vulnerability of girls during adolescence is the potential for beginning reproduction too soon after maturity [5]. The vast majority of Tanzanian women bear children at a young age before they are physically and psychologically mature [6–9]. In developing countries, the health and nutrition of females throughout their entire life cycle is affected by complex and highly interrelated biological, social, cultural, and health-related factors [10]. In situations in which health services are poor and malnutrition is common, adolescent pregnancies pose a very high risk to the immediate and long-term health status of the mother and child. Frequently reported conditions regarding child health consequences are delivery of premature babies and low birth weight due to intrauterine growth retardation [6,11].

Stunting is a common nutritional problem among adolescent girls in Tanzania and the prevalence is about 70% [12]. Stunting in adolescent girls constitutes a major impediment to safe motherhood. Height growth corresponds to the development of the pelvis. At menarche (10 to 15 y), a young woman has not attained full height and the pelvis has not completed growing; therefore, pregnancy and consequent delivery may cause obstructed birth and damaged internal organs [5]. One of the most serious causes of such complications is cephalopelvic disproportion, a condition in which a woman's pelvis is too small to permit a child's head to pass [13]. Full maturity and adequate height growth contribute to good pregnancy outcomes, i.e., full-term delivery, infant birth weight greater than 2500 g, and uncomplicated delivery [5].

Studies that link adolescence pregnancies, nutritional status, and birth outcomes in Tanzania are scarce. The present study examined the relation between nutritional status of adolescent pregnant girls and pregnancy outcome.

Materials and methods

Study area

The study was conducted in the regions of Morogoro, Coast, and Dar es Salaam, which are situated 5′58″ to 10′0″ south of the equator and 35′ to 40′ east of the Greenwich meridian. Annual rainfall ranges from 600 to 1200 mm and temperatures range from 25°C to 32°C. Common crops include maize, sorghum, sweet potatoes, beans, cassava, millet, groundnuts, peas, banana, and a wide range of fruits and vegetables. The most common causes of morbidity and mortality are malaria, diarrhea, upper respiratory tract infection, anemia, eye and ear diseases, pregnancy complications, schistosomiasis, skin diseases, tuberculosis, malnutrition, and human immunodeficiency virus and acquired immunodeficiency syndrome [14]. Regional seroprevalence data among blood donors are 17% in Morogoro, 10% in Coast, and 19% in Dar es Salaam [15].

Subjects

One hundred eighty adolescent pregnant girls (ages 15 to 19 y) of unknown status for the human immunodeficiency virus were randomly recruited to participate in the study. Subjects were recruited from maternal and child health facilities, namely the Regional Hospital, the Uhuru Clinic, and the Mlali Health Center in the Morogoro region; the Tumbi Regional Hospital and the Mlandizi Health Center in the Coast region; and the Chamazi and Gezaulole Dispensary and Round Table Maternity Home in the Dar es Salaam region. Therefore, the sample included only those pregnant girls who had prenatal care. Those who were not attending prenatal care facilities during the study period could not be reached because it was very difficult to identify them. Therefore, 180 adolescent pregnant girls (60 from each region) were recruited and interviewed, and their nutritional status measurements were taken during the first visit. Subjects who were found to be in their second ($n = 57$) or third ($n = 119$) trimester were given appointments to report back after 2 wk so that their weekly weights gain could be determined. Only 123 subjects reported back. Therefore, the other 57 subjects (30%) were lost to follow-up. Of the 79 subjects who were in their last trimester, only 50 subjects delivered at the selected hospitals or centers for this study. It was not possible to follow-up all other subjects in their homes to record the information on birth weight and method of delivery. Subjects were not taking iron or folic acid supplements and were not tested for the human immunodeficiency virus.

Methods

Hemoglobin concentration

Hemoglobin (Hb) concentrations of all pregnant adolescent girls were determined during the first visit after recruitment. Hb concentration was determined with the HemoCue technique [16]. An electrically operated or battery-operated HemoCue photometer (HemoCue AB, Ängelholm, Sweden) with a disposable cuvette was used. The technique is based on the principle that, when blood is mixed with sodium deoxycholate, the erythrocytes are hemolyzed and Hb is released. Sodium nitrite converts Hb to methemoglobin. Methemoglobin reacts with sodium azide to form azide methemoglobin, which is then measured at two wave-