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ORIGINAL ARTICLE

Anemia and associated factors among Kuwaiti preschool children and their mothers

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KEYWORDS

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Abstract *Background:* Anemia is a major nutritional health problem throughout the world.
Objectives: To determine the prevalence and the factors associated with anemia among Kuwaiti children aged 4–5 years.
Design: A sample of 578 Kuwaiti preschool children (4–5 years of age) and their mothers were selected from ongoing Kuwait Nutrition Surveillance System from September 2003 to June 2004. Mothers participated in an interview where demographic; health and nutrition information was collected. Anthropometrical data and blood sample were also collected for children and mothers; anemia was defined as hemoglobin <11 g/dl for children and <12 g/dl for mothers.
Results: The risk of having anemia was 1.8 times more in children aged 5 years than in children aged 4 years; a moderately/severely stunted child was 2.3 times prone to be anemic than a normal child; a moderately/severely overweight child was less likely to be anemic; a child who was breastfed for less than one month was 2.8 times more at risk of being anemic than a child who was breastfed for more than 6 months; a child who was given cereals as a weaning food was 3.5 times of becoming anemic than a child given meat and egg as a weaning food. Children of mothers whose age was <30 years, and children of anemic mothers were more likely to become anemic.
Conclusions: Anemia remains a common health problem for Kuwaiti preschool children and further studies are needed to focus on etiologies and interventions.

1. Introduction

Anemia is a major nutritional problem throughout the world and it affects 1.62 billion people worldwide. Preschool children are affected most, with a prevalence of 47.4%.[1]

The most prevalent form of anemia worldwide is iron deficiency, and it particularly affects women in reproductive periods and children less than 5 years. It may lead to serious health problems, such as poor cognitive and motor development and behavioral problems in children.

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Kuwait is a small wealthy country with an area of 17,818 km.[2] The discovery of oil in 1940s changed the living standards of Kuwait citizens dramatically with high standard of living, which includes free medical care, education, and other amenities together with increased income. As a result, food habits have changed from traditional to western foods with high energy density meals replacing carbohydrate based staples.[2]

Over the last few decades, there have been a number of studies indicating that anemia is a significant public health problem in the State of Kuwait. Most of these studies have been performed on adult women or children. Surveys suggest that iron deficiency is the most likely cause of anemia in Kuwait.[3–5] Overall, various studies have estimated the prevalence of anemia to be between 25 and 37% among young adult women.[6] The prevalence of anemia among preschool-age children in Kuwait remains relatively high.

The identification of children who are at risk is vital. Determination of the related factors between mothers and children is needed for the development of successful education intervention programs. Only two studies have previously been conducted in Kuwait studying anemia and associated factors; the first was conducted in 1996 and covered the nutritional status of preschool children in general including anemia.[7] The second study was conducted only in one district of Kuwait on children aged 2–10 years[8]

Therefore, the present study had the aims of estimating the prevalence of anemia and identifying the associated factors among Kuwaiti children aged 4–5 years.

2. Material and methods

The State of Kuwait is running a nation-wide Kuwait Nutrition Surveillance System with consultation provided by the World Health Organization [WHO] and Center for Disease Control and Prevention since 2001. It is designed as a sentinel sample of the Kuwaiti population and based on the estimated sample size for each population group from birth to beyond 60 years and reflects the nutritional status of the population and monitors the trends.

A sample of 578 Kuwaiti pre-school children (4–5 years of age) and their mothers were selected from the ongoing Kuwait Nutrition Surveillance System. The recruitment period was from September 2003 to June 2004. The subject information was collected from the kindergarten schools. Qualified dietitians obtained oral consent from the mothers.

Anthropometrical, biochemical and dietary information was collected for the study during the 9 month period.

Biochemical kits were used to test hemoglobin using HemoCue by finger prick. WHO standard cut off point was used to identify anemia.[9] Children less than 5 years with hemoglobin (Hb) values of <11.0 g/dl were considered anemic. Similarly mothers with hemoglobin less than 12 g/dl were considered anemic.

Heights were measured without shoes to the nearest 0.1 cm and weight without shoes and in light clothing to the nearest 0.1 kg, using SECA model 220 electronic balances (SECA, Medical Scales and Measuring Systems, Hamburg, Germany). Body Mass Index [BMI] for age was used to measure overweight and obesity among children. BMI for age was reported, rather than weight by age, as the worldwide accepted standard for screening overweight and obesity in children. Children with Body Mass Index [BMI] $\geqslant 2$ SD were considered overweight and $\geqslant 3$SD as obese.[10]

The BMI (weight in kg/(height in meter)^2) of mothers was classified according to the WHO classification, underweight (BMI < 18.5) normal (BMI $\geqslant 18.5$ to $\leqslant 25$), overweight (BMI $\geqslant 25$ to $\leqslant 30$) and obese (BMI $\geqslant 30$).[11]

A questionnaire was developed and validated.

Data such as birth weights, past breastfeeding practices, duration of breastfeeding, time of starting infant formula, time of starting weaning food, type of weaning food, child's eating habits, (whether the child ate regularly and the frequency of eating with the family) child's chronic illness were collected using questionnaire.

Also the mother's age, education, and occupation information were collected from the questionnaire.

Subjects excluded from the study were very low birth weight (<1500 g, $n = 31$), children's age <4 and >5, pregnant mothers ($n = 10$) and incomplete questionnaire ($n = 20$).

2.1. Statistical methods

Statistical analyses were carried out using Statistical Package for Social Sciences, v.19.0 (SPSS Inc., Chicago, USA). The level of statistical significance was set at 0.05. The chi-square test or Fisher's exact test was used to assess the association between two qualitative variables wherever appropriate. Pearson's correlation was used to test the significant association between two quantitative variables. Natural logarithms of the variables child's weight and mother's weight were used in the analysis to make their distributions nearly normal. Multiple logistic regressions were used to estimate the risk of different factors on the prevalence of anemia (0 for absent and 1 for present) after controlling/confounding between them. The adjusted odds ratios and their 95% CI for significantly associated factors were reported.

3. Results

3.1. Prevalence of anemia among the study population

The studied sample consisted of a total of 578 children (306 girls and 272 boys) aged 4–5 years. A higher proportion (64.7%) of the children was of 4 years age. The overall prevalence of anemia (hemoglobin <11 g/dl for age 4 & <11.5 for age 5) among the studied children was 23.0% (95% CI = 19.6–26.7). The mean Hb concentration was 11.98 (SD = 1.22) ranging from 7.4 to 15.0. Table 1 shows the Hb distribution for the study population. Overall 11.4% of children had their Hb concentration between 10 and 10.9 g/dl, 4.9% between 7 and 9.9 g/dl (12.9% and 7.0% for boys; 12.1% and 5.9% for girls), and none of them below 7 g/dl.

3.2. Associated factors for anemia among the study population

Table 1 shows the prevalence of anemia among the studied children according to child and mother characteristics. The child characteristics that were statistically associated with anemia were: child's age; *Z*-score for height-to-age; duration of