SOCIODEMOGRAPHIC RISK FACTORS OF IRON DEFICIENCY ANEMIA IN YOUNG ADULT MALES OF UPPER EGYPT

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ABSTRACT

OBJECTIVE: to evaluate various socio-demographic risk factors of iron deficiency anemia in young males of Upper Egypt.

METHODS: One thousand Egyptian young males aging from 18 to 25 years were surveyed for prevalence and risk factors of iron deficiency anemia during their visit for medical examination at Outpatient Clinics of Quena University Hospital, Quena, Egypt from September 2012 to September 2013. Blood obtained was subjected to complete blood count by Coulter model STKS hematology analyzer (Coultronics, France) and serum ferritin levels by enzyme linked immunosorbant assay. Respondents of the study were also subjected to complete urine analysis and stool examination.

RESULTS: Out of 1000 respondents, 58 (5.8%) were found anemic during this study. As regards to parasitic infection; young adults with parasitic infection showed six folds increased risk for anemia than those free from parasitic infection (OR=6.05, 95%CI: 2.53-14.47). Considering rural-urban demographic distribution of the population; individuals living in rural areas were at more than two folds increased risk of anemia than those living in urban areas (OR=2.66, 95%CI: 1.12-6.35). Manual workers were significantly at a higher risk of anemia (OR=4.24, 95%CI: 1.58-11.96). Similarly, jobless adults were at higher risk however not statistically significant (OR= 4.12, 95%CI: 0.53-24.99).

CONCLUSION: This study provides a significant association between anemia and education level and social status. Similarly, parasitic infection, rural residency and manual worker are also some other important risk factors.

KEY WORDS: Young Adult (MeSH), Parasitic Infection (Non-MeSH), Anemia, Iron-Deficiency (MeSH), Social class (MeSH), Egypt (MeSH).

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INTRODUCTION

Anemia, according to the World Health Organization (WHO) is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient. It is mainly caused by iron deficiency and is associated with fatigue, weakness, dizziness and drowsiness. Pregnant women and children are particularly vulnerable to iron deficiency anemia.[1]

The WHO 2002 Report, "Preventing Risks, Promoting Healthy Life", named iron deficiency as one of the top 10 preventable risks to disease, disability, and death in the world. Every year almost 800,000 of deaths worldwide are attributable to iron deficiency each year out of which 20% are the reasons of perinatal mortality (combination of fetal death and deaths of infants in their first 28 days) and 10% of maternal mortality.[2]

Due to iron deficiency, more than two billion people are suffering from iron deficiency anemia.[1] A report published on WHO set criteria states that 149 million people residing in the Eastern Mediterranean region (EMRO) are suffering from anemia and the most common type among them is identified as iron deficiency anemia (almost 50% of the total anemic patients).[2-4] The prevalence of anemia is disproportionately high in developing countries due to dietary practices, high disease burden, frequent pregnancies and high fertility rate, and poor access to health services.[2] Although anemia primarily affects women, prevalence rates are also high among both male and female adolescents.[3] Anemia has a serious negative impact on growth and development during adolescence (11-19 years of age). Both boys and girls having anemia are suffering from decreased ability to comprehending during their learning process, feel tiredness with low energy level and physical strength. In boys, especially, iron deficiency status improves during the late adolescence stage though physical growth slows down.[1] Adult men are therefore less at risk of anemia than women who loose blood and as a result loose iron through menstruation.[4] Anemia in adolescence puts a young woman and any future child at risk of premature birth, low birth weight, and perinatal and maternal mortality.5 Iron deficiency anemia adversely affects the cognitive performance, behavior, and physical growth of infants, preschool and school-aged children; the immune status and morbidity from infections of all age groups; and the use of energy sources by muscles and thus the physical capacity and work performance of adolescents and adults of all age groups.[5,6]

In addition to feeling tired and having less energy, the child may have pale skin, gums, nail beds, and eyelid linings. It is pertinent to mention that as anemia gets worsen enough, the heart beat may increase and cause tachycardia, which is often noticed by the patient.[6] The other noticeable symptoms are irritability, weakness, shortness of breath, low blood pressure (especially when changing posture from lying or sitting to standing also called postural hypotension), sore tongue, brittle nails, unusual food cravings (called pica), decreased appetite (especially in children) and headache.[4-6]

The most appropriate time to address anemia and treat is adolescent age because of growing need and preparation for pregnancy. Large numbers of both boys and girls can be approached easily through schools and colleges for dissemination of information about anemia. Adolescent's age group population is always ready to acquire and open to new information and new practices since they are often striving for physical or academic excellence.[4]

A survey conducted in 1972, found that 47% of adolescent girls and boys are anemic.[7] Demographic and Health Survey conducted in 2000 showed that 30% of adolescents were anemic.[8] This affects their growth, general health, and the health of their future children.[4] Poor eating habits are the main reason for the high rates of anemia among adolescents in Egypt.[4,9] There are certain typical Egyptian recipes, which are rich in iron or enhance iron absorption, and some of the foods may inhibit iron absorption like tea and whole-wheat bread.[6,9] According to the Egyptian population out of the thirteen million people almost 22% of are currently adolescents.[8] The Government is seriously concerned about the health of this large number of population and has made efforts to develop a comprehensive and sustainable health policy for youth.[8,9] The Government's National Health Insurance Organization (HIO) has expanded its program to cover all school children.[10-13] It provides preventive and curative health services to the students under the Student Health Insurance Program (SHIP). Headquartered in Cairo, the program has district and governorate administrators. Medical staff provides services at school clinics and HIO healthcare facilities.[9,10] School enrollment varies greatly in Egypt, by rural/urban settings, gender, and the socioeconomic level of the family. For the adolescent population, as a whole, enrollment is highest (90%).[11] At age 14, the beginning of the transition from compulsory education to noncompulsory secondary education (grades 9-11), the national enrollment rate is 73%, with variations by gender and locale.[6-9] As per our literature review it is quite evident that most of the studies on iron deficiency anemia are conducted on females, adolescents and children specially in Egypt but no data available specifically on young male (18-25 years). So this study was planned to evaluate various socio-demographic risk factors of iron deficiency anemia in young males of Upper Egypt.

METHODS

The study was achieved in Quena university hospital from September 2012 to September 2013. The present study comprised a total number of 1000 young males ranging 18-25 years old, attending the medical examinations for different causes. They were selected by proportional allocation among all enlisted persons using the systematic random sample. All the examinations and investigations were performed in the Diagnostic Unit of Mayo Clinic, Quena, Egypt. A written informed consent was taken from each and every respondent prior to answering the questionnaire and the investigation laboratory test. All respondents were provided with details about the study questionnaire and the investigative laboratory tests.

All individuals of the present study were requested to fill a predesigned questionnaire that includes personal and demographic data: age, residence, marital status and occupation, socioeconomic data: educational level, income, sanitation and crowding index. The social standard was assessed according to a score system modified after Fahmy and El-Sherbini.[13] This predesigned questionnaire also includes history about laboratory investigations and therapy, parasitic infections e.g. schistosomiasis, fascioliasis and amoebiasis, GIT e.g. hematemesis and melena, hospital admission e.g. cause and therapy and Family history of similar complaints and problems. The respondent is subjected to general and systematic examinations including temperature, blood pressure, chest, heart and abdomen.

The respondent is then explained the procedure of the laboratory investigation and after explaining them the complete procedure and availing their consent 3 ml of blood was aspirated from each individual under aseptic conditions using disposable syringes fitted with 20-gauge needle out of which 2 ml of the aspirated blood was delivered into a coded test tube containing EDTA to perform complete blood picture[15] including hemoglobin (Hb), RBCs, WBCs and platelets estimated electronically by Coulter model STKS hematology analyzer (Coultronics, France). To diagnose iron deficiency anemia, our clinical staff in the investigations looked for red blood cell size and color, heamtocrit value, hemoglobin and serum ferritin levels. Red blood cell size and color as in iron deficiency anemia the red blood cells are smaller and paler in color. Hematocrit value that is the percentage of your blood volume made up by red blood cells, (normal levels are generally between 34.9 and 44.5 percent for adult women and 38.8 to 50 percent for adult men) and these values may change depending on your age. Hematocrit value was determined using centrifugation method. Hemoglobin values lower than normal levels of hemoglobin indicates anemia and the normal hemoglobin range is generally defined as 13.5 to 17.5 grams (g) of hemoglobin per deciliter (dL) of

blood for men and 12.0 to 15.5 g/dL for women. Ferritin is a protein that helps in storing iron in our body, and a low level of ferritin usually indicates a low level of stored iron. Serum ferritin levels were done by enzyme linked immunosorbant assay (ELISA) using commercially available kits according to manufacturers instruction.

Our respondents of this study were also subjected to urine and stool analyses. Fifty (50) ml of midstream urine sample was collected from every studied subject in pre-labelled dry, tight and clean container for complete urine analysis.[14] Stool samples were examined by direct fecal smear and formal-ether sedimentation techniques to detect parasitic infestations among the studied groups.[15]

The collected data were tabulated and analyzed through computer facilities using the Statistical Package for Social Science (SPSS) version 9.0 and Epi-Info software packages version 6.04. ANOVA was used for comparison of the mean of the age between the different studied groups. Simple bivariate analyses were achieved to assess the influence of different categorized variables (risk factors) on the outcome variables; using the crude Odds Ratio (OR) with 95% confidence interval (CI). Each category of the predictor variable was contrasted with the reference category ®. The association between categorical variables was tested by the Chi square (χ^2) test, the level of significance was set at 0.05 level.

RESULTS

As regards to parasitic infection; young adults with parasitic infection showed six folds increased risk for anemia than those free from parasitic infection (OR=6.05; 95%CI: 2.53-14.47) [Table 1]. Considering residency; individuals living in rural areas were at more than two folds increased risk for anemia than those in urban areas (OR=2.66; 95%CI: 1.12-6.35). Manual workers were at significant higher risk for anemia (OR= 4.24; 95%CI: 1.58-11.96). Similarly, jobless adults were at higher risk however not statistically significant (OR= 4.12; 95%CI: 0.53-24.99). Despite of no significant association was observed between anemia and both educational level and social class, those with low social class were at higher risk for anemia than other classes (OR=3.27; 95%CI: 0.42-69.35).

DISCUSSION

Anemia is a problem of serious public health significance, given its impact on psychological and physical development, behavior and work performance.[16] Globally, Gleason reported that 2150 million people were anemic and added that iron deficiency anemia, the commonest nutritional disorder, contributed for more than half of all anemia worldwide.[17] Dillon described that no population group was spared from anemia; however, it was more prevalent in developing countries (31%) than in developed (6%).18 Unfortunately, very few national studies were performed on the prevalence of anemia in adult males and most studies were applied on children and females. However, Ahmed on his study on 300 adolescent males recorded that 8.7% of them were anemic.[19] In comparison to the Ahmed study this present work revealed that 58 subjects (5.8%) among the studied 1000 subjects were anemic. This finding is relatively low in comparison to work carried out by El-Sahn et al. (2000)[20], who found the prevalence of anemia was 46.6% among 1980 Egyptian adolescents. In addition, Hassan et al. (1999)[21], recorded in his survey on 1049 female clients of family planning

TABLE 1: RISK FACTORS AND THEIR RESPECTIVE CATEGORIES INVESTIGATED

Risk factors			Anemia			
			Absent (n=942)	Present (n=58)		
	Status	Frequency	Frequency (%)	Frequency (%)	OR	95%CI
Parasitic Infection	Absent	634	620 (97.8%)	14 (2.2%)	1.0	2.53–14.47*
	Present	366	322 (88%)	44 (12%)	6.05	
	Residence	446	432 (96.9%)	14 (3.1%)	1.0	1.12–6.35*
	Rural	554	510 (92.1%)	44 (7.9%)	2.66	
Educational Level	>9 Years	698	664 (95.1%)	34 (4.9%)	1.0	0.73–3.84
	<9 Years	302	278 (92.1%)	24 (7.9%)	1.69	
Occupation	Graduates	506	494 (97.6%)	12 (2.4%)	1.0	0.98- 0.024
	Manual	450	408 (90.7%)	42 (9.3%)	4.24	1.58–1.96*
	Jobless	44	40 (90.9%)	4 (9.1%)	4.12	0.53–24.99
Social Class	High	60	58 (96.7%)	2 (3.3%)	1.0	0.97- 0.033
	Moderate	664	634 (95.5%)	30 (4.5%)	1.37	0.18–28.82
	Low	276	250 (89.9%)	26 (10.1%)	3.27	0.42–69.35

® reference category * significant

clinics in Egypt that 49.6% of them were anemic. This difference was declared by El Sayed et al. (1999)[22], who reported that females in reproductive period, pregnant, children and adolescents were the most vulnerable groups due to their increased iron demand and menstrual loss in females, on the other side adult males were more or less out of this risk. Considering residency; this work showed that individuals living in rural areas were at more than two folds increased risk for anemia than those in urban areas (OR=2.66, 95%CI: 1.12-6.35). Similarly, the Egyptian Nutrition Institute (1993)[23], supported this observation and recorded that prevalence of anemia was 38.1% and 17.9% in rural and urban regions respectively. This was explained by many factors including; difference in urbanization level, degree of parasitic infections, socioeconomic conditions and access to health care services which can vary broadly within and across cities. Parasitic infection as a risk factor for anemia is important issue to address; the present study concluded a significant association between anemia and parasitic infection, where 22 out of 29 of anemic were infected by parasites. In parallel, Albonica et al. (1998)[24], described significant relationship between iron deficiency anemia and parasitic infection in 690 children of 7-12 years. The above justification was suggested by the both Ali et al. (1990)[25], and Pawlowski et al. (1991)[26], who justified; that parasitic infections are strongly related to anemia, as they constitute the common cause of chronic blood loss. The role of socioeconomic status and educational level in prevalence of anemia is a matter to be clarified; the present study demonstrated that people of low socioeconomic status and less educational level were at increasing risk of having anemia. In the same trend, Abubaker et al. (1999)[27], reached in community based study on 3150 individuals to the same result. In addition, Soekerjo et al. (2001)[28], supported this link in a survey on 6486 adolescents and explained by lack of both iron food availability and hygiene in addition to prevalence of parasitic infection. The present work discussed the impacts of occupation on the prevalence of anemia; where those of manual jobs were significantly more than four times anemic than others. This was well matched with the result of Curtale et al. (2000)[29], that prevalence of anemia was 34.5% among 355 young male workers of 8-18 years in Alexandria and attributed to many collected factors including: diminished iron intake together with increased their iron requirement due their age, unhealthy diet habits e.g. tea after meals, tobacco smoking and association with parasitic infection.

Strategies to overcome Iron Deficiency Anemia in Egypt:

Strategies to control iron deficiency anemia include daily and intermittent iron supplementation, home fortification with micronutrient powders, fortification of staple foods and condiments are activities to improve dietary diversity. The safety of routine iron supplementation in settings where infectious diseases, particularly malaria, are endemic remains uncertain. The WHO is revising global guidelines for controlling iron deficiency anemia. Implementation of anemia control programs in developing countries requires careful baseline epidemiologic evaluation, selection of appropriate interventions that suit the population, and ongoing monitoring to ensure safety and effectiveness. Fortified bread nationwide in Egypt is a goal to compact anemia from 2012. The annual cost of fortifying bread would be US$10.3 million, and the government will supply special mixing machinery to bakeries. The government is also subsidizing folic acid for pregnant women to ensure that the mothers get the necessary vitamins. Supplementing children after the first year of age with fortified cow's milk and with iron supplements is also important to prevent anemia[2,6,7,8].

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CONFLICT OF INTEREST

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SSZ: Concept & study design, acquisition, analysis & interpretation of data; Drafting the manuscript, final approval of the version to be published

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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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