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Faculty of Medicine

Characterization of the patients with kwashiorkor attended in the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden, Yemen

Caracterización de los pacientes con kwashiorkor en el centro terapéutico de alimentación del Hospital Docente "Al-Sadaqa", de Adén, Yemen

Mohammed Ali Hussein Badi, Ph.D.[I], Bárbara Elena García Triana, Ph.D.[II]

[I] Department of Pediatrician, Faculty of Medicine, University of Aden, Yemen. e.mail: mohamedbadi1@yahoo.com
[II] Department of Physiological Sciences, Faculty of Medicine, University of Aden, Yemen. e.mail: barbaragarciatriana@gmail.com

ABSTRACT

Introduction: each year nine million children under age five years die. Malnutrition contributes to one-third of these deaths, being the mortality rate for kwashiorkor much higher than for marasmus.
Objective: to characterize the patients with kwashiorkor attended in the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden, Yemen.
Material and methods: this cross-sectional study was performed on 95 kwashiorkor children (45 males and 50 females) under 5 years of age, 2010-2013. Data was collected from the charts of children at the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden, Yemen. Kwashiorkor was defined as a very low weight for height with edema.
Results: a total of 1978 children under 5 years were diagnosed with malnutrition in this feeding center during the period of study. The kwashiorkor cases were 95 (4.8%). A high percentage of kwashiorkor (92.6%) was found in children ≤4 years old. Although female cases were higher than male cases (52.6% versus 47.4%), the difference was not statistically significant. Around 50.5% of kwashiorkor cases were from Aden city. The proportion of patients who were cured (72.6%) was markedly higher than the proportions for other groups, being the death rate 8.4%;

there was a significant relationship between kwashiorkor and outcome among studied children.
Conclusions: the prevalence of kwashiorkor at the therapeutic feeding center in Al-Sadaqa Teaching Hospital is 4.8%, which is higher for ≤4 years old children. It is recommended to promote the knowledge and health education and to improve the economic and cultural conditions of families.

Keywords: kwashiorkor, prevalence, malnutrition, children, Al-Sadaqa Therapeutic Feeding Center, Aden.

RESUMEN

Introducción: cada año mueren nueve millones de niños menores de cinco años. La malnutrición contribuye a un tercio de estas muertes, siendo el porcentaje de mortalidad para el kwashiorkor muy superior a la del marasmo.
Objetivo: caracterizar a los pacientes con kwashiorkor atendidos en el centro terapéutico de alimentación del Hospital Docente "Al-Sadaqa", Adén, Yemen.
Material y métodos: este estudio de corte transversal se realizó en 95 niños con kwashiorkor (45 niños y 50 niñas) menores de 5 años, 2010-2013. Los datos se recogieron de las historias clínicas en el centro terapéutico de alimentación del Hospital Docente "Al-Sadaqa", Adén, Yemen. El se definió como muy bajo peso para la talla con edema.
Resultados: un total of 1978 niños menores de 5 años fueron diagnosticados con malnutrición en esta unidad durante el periodo de estudio. Los casos de kwashiorkor fueron 95 (4.8%). Se encontró un alto porcentaje de kwashiorkor (92.6%) en niños ≤4 años. Aunque el número de casos en las hembras fue mayor que en los varones (52.6% versus 47.4%), la diferencia no fue estadísticamente significativa. Alrededor del 50.5% de los casos de kwashiorkor fueron de la ciudad de Adén. La proporción de pacientes curados (72.6%) fue marcadamente superior a la de otros grupos, resultando fallecidos el 8.4%.
Conclusiones: el porcentaje de kwashiorkor en el centro terapéutico de alimentación del Hospital Docente "Al-Sadaqa" es de 4.8%, la cual es mayor para los niños de 4 o menos años de edad. Se recomienda promover el conocimiento y la educación para la salud y mejorar las condiciones económicas y culturales de las familias.

Palabras clave: kwashiorkor, prevalencia, malnutrición, niños, centro terapéutico de alimentación "Al-Sadaqa", Adén.

INTRODUCTION

Severe acute malnutrition (SAM) is defined by a very low weight for height [below -3 Z-scores of the median World Health Organization (WHO) growth standards], by visible severe wasting, or by the presence of nutritional edema in accordance with the last recommendations of the WHO Expert Committee in malnutrition. SAM has two forms: kwashiorkor and marasmus. [1]

Each year nine million children under age five years die; malnutrition contributes to one-third of these deaths. Sustained undernutrition in childhood can lead to distinct clinical syndromes of severe acute malnutrition: edematous(kwashiorkor) and non-edematous (marasmus). The percentage of kwashiorkor is much higher than that for marasmus. There is currently no clear explanation of why some children waste progressively without developing edema, while others waste less but develop edema; it is probable a matter of host's response.[2,3]

The term kwashiorkor is taken from the Ga language of Ghana and means "the sickness of the weaning". Williams first used the term in 1933, and it refers to an inadequate protein intake with reasonable caloric (energy) intake. Edema is characteristic of kwashiorkor but is absent in marasmus. [4]

Increased secretion of anti-diuretic substance (probably antidiuretic hormone), which prevents the normal excretory response to water administration has been associated to the nutritional oedema.[5]

The United Nations Children's Fund (UNICEF) reports that eastern and southern Africa accounts for roughly 20% of child deaths worldwide, and half of these deaths are a result of poor nutrition. Perhaps the public-health consequences of kwashiorkor are difficult to quantify because it occurs most often in rural areas, where monotonous diets are common. Also, it is an acute condition with most cases remaining undetected in nutritional cross-sectional surveys. [6]

In the year 2004, kwashiorkor killed two hundred eighty people in South Africa alone. [7]

In kwashiorkor, adequate carbohydrate consumption and decreased protein intake lead to decreased synthesis of visceral proteins. The mortality in kwashiorkor tends to decrease as the age of onset increases. [8]

It has been shown that kwashiorkor is caused by several factors which include among others poor weaning techniques, poverty, ignorance, diseases which are predisposed by overcrowding and poor hygiene as well as some cultural/religious taboos. [9]

Kwashiorkor is often associated with, or even precipitated by infectious diseases, diarrhea, respiratory infections, measles, whooping cough, intestinal parasites and other infections are common underlying causes of protein energy malnutrition (PEM) and may precipitate children into either kwashiorkor or nutritional marasmus. [10]

Kwashiorkor may initially present as vague manifestations that include lethargy, apathy, and/or irritability. When advanced, there is lack of growth, lack of stamina, loss of muscle tissue, increased susceptibility to infections, vomiting, diarrhea, anorexia, flabby subcutaneous tissues, edema and liver enlargement. Dermatitis is common and also depigmentation; the hair is sparse and thin, it may become streaky red or gray. Eventually, there is stupor, coma and death. [11]

Children with kwashiorkor are more likely to develop metabolic complications, heart failure and death than those with simple wasting. [6]

There is poor population-based data on prevalence of edematous malnutrition. This is due to the fact that large-scale health and nutrition surveys do not make any attempts to detect edema. Case fatality, however, is very high among children hospitalized with edematous malnutrition. These observations indicate the need for

better information on the global, regional and national prevalence of kwashiorkor and other forms of edematous malnutrition.[5] This knowledge is important for providers of care for patients with kwashiorkor as well as for policy makers.

OBJECTIVE

To characterize the patients with kwashiorkor attended in the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden, Yemen**.**

MATERIAL AND METHODS

The study comprised a cross-sectional hospital survey. The setting for the study was at the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden, Yemen, within the period 2010-2013. The studied population included all children under 5 years old, admitted in feeding center within the period of study, with available records and diagnosed with malnutrition (1978 children). The patients were classified into three groups: severe malnourished children (further divided into kwashiorkor and marasmus) and mild-moderate malnourished children, using WHO malnutrition classification.[1] The 95 cases diagnosed with kwashiorkor (45 males and 50 females) were selected for the study. The children were between the ages of 0 and 60 months.

The weight of every child was measured by means of a German Seca scale with the accuracy of ±50 g. The height of every child was measured by means of a height-measurer, the accuracy of which was 0.5 cm in standard situation; while each case had the least clothes and no shoes on (the height of over-two year old children was measured in standing position and that of under-two in supine position).

In order to differentiate between the types of malnutrition, Z-score was used. Severe acute malnutrition was defined as a very low weight for height below -3 Z-scores of the median WHO growth standards; kwashiorkor was below -3 Z-scores with edema, and marasmus was below -3 Z-scores without edema; while mild-moderate malnourished children was defined as weight for height between -1 and -3 Z-scores in accordance with the last WHO growth reference standards. [1]

The studied variables included the age group in years (≤4 and >4), gender (male and female), residency of the children (Aden city and rural areas) and the discharge [cured, discharge against medical advice (DAMA) and dead]. The data were obtained from the charts of the patients.

The written consent was obtained from the administration office of the hospital, the objectives of the study were justified and the information collected was kept totally confidential. Data were processed and analyzed by the SPSS software version 15.

The estimation of the true percentage was done utilizing interval of confidence with 95% of certain.

RESULTS

This study was done on 1978 malnourished children under 5 years old. Among them, 1016 (51.3%) patients were classified as marasmus and 95 (4.8%) were diagnosed as kwashiorkor. From 2010 to 2013 the kwashiorkor cases have slightly decreased (1.6% in 2010, 0.9% in 2013); while marasmus cases have increased (8.7% in 2010, 13.6% in 2013). The total amount of malnourished children admitted at the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden was decreased from 27.8% in 2010 to 21.4% in 2013 (Table 1). The interval of confidence for the percentage of kwashiorkor is (3,84 ; 5,76) with certain of 95%.

Table 1. Distribution of malnourished children according to types of malnutrition.

Year	Severe malnourished children				Mild-moderate malnourished children		Total	
	Kwashiorkor		Marasmic					
	No.	%	No.	%	No.	%	No.	%
2010	32	1.6	172	8.7	346	17.5	550	27.8
2011	21	1.1	253	12.8	203	10.3	477	24.1
2012	23	1.2	321	16.2	184	9. 3	528	26.7
2013	19	0.9	270	13.6	134	6.8	423	21.4
Total	95	4.8	1016	51.3	867	43.9	1978	100

Percentage calculated from the total number of suited children
Interval confidence for kwashiorkor is (3,84 ; 5,76) 95 % certain

A high proportion of kwashiorkor children (92.6 %) were ≤4 years while only 7.4% were over 4 years. A slight higher proportion of females (52.6%) than males (47.4%) were observed (Table 2).

Table 2. Percentages of kwashiorkor by age groups and gender.

Kwashiorkor patients		
Age group (years)		
	No.	%
≤4	88	92,6
>4	7	7,4
Total	95	100
Gender		
Male	45	47,4
Female	50	52,6
Total	95	100

There was no diferences between the percentage of kwashiorkor and the children residency, as kwashiorkor's prevalence was similar in Aden city residency (50.5 %) compared to rural area residence (49.5 %) (Table 3).

Table 3. Percentage of kwashiorkor by residency

Children residence	Kwashiorkor patients	
	No.	%
Aden city	48	50.5
Rural areas	47	49.5
Total	95	100

The results show that for the total kwashiorkor children, the greatest proportion of discharge was found for cured group (72.6%) while death rate was 8.4%; there was a statistically significant relationship (Table 4).

Table 4. Percentage of kwashiorkor according to discharge.

Discharge of kwashiorkor patients							
Cured		DAMA		Dead		Total	
No.	%	No.	%	No.	%	No.	%
69	72.6	18	18.9	8	8.4	95	100

DISCUSSION

This study was conducted to estimate the prevalence and pattern of kwashiorkor at the therapeutic feeding center in Al-Sadaqa Teaching Hospital, Aden, Yemen. TFC is one of the most important center providing services to patients with severe acute malnutrition coming mostly from Aden governorate and other nearby and far governorate. In 2011, WHO rehabilitated the center and expanded the bed capacity in addition to setting up a training room, maternal education and counseling corner, as well as mental development and playing corner.[12]

A population of 1978 malnourished children (age range: 1- 60 months) were studied. The patients were classified into three groups: severe malnourished children (kwashiorkor or marasmus) and mild-moderate malnourished children, using WHO malnutrition classification.[1]

The overall prevalence of kwashiorkor during the four-year period (4.8%), was lower to the findings of children with kwashiorkor in Sudan (16.3%) and Nigeria (28.7%).[13,14] It was also lower compared to studies which were done in other parts of Africa which ranged from 35% to 86%, where common food is maize, yams and banana. Protein was not taken much in their common food which contributes to a higher number of edematous malnutrition than marasmus. [14] In this study, the prevalence of kwashiorkor was not high and this may be explained by the fact that fish is a common type of food found in Aden which is rich in protein.

The decrease in 6.4% of kwashiorkor cases and malnourished children at the feeding center in Aden from 2010 to 2013 was lower compared to studies in India; fatality rates there were reported to be reduced by 25% after following WHO criteria. [15] This outcome was achieved by prompt treatment of all infections in these

children with appropriate antibiotics, correction of the electrolytes, hypothermia, hypoglycemia, micronutrients and macronutrients following WHO criteria. [1]

In the present study, there was no statistically significant difference between genders with respect to kwashiorkor. Kwashiorkor cases were found to be significantly more common among children ≤4 years old (92.6%). Kwashiorkor was slightly and no significantly higher among female children compared to male children (52.6% versus 47.4% respectively), which falls in agreement with a study in Nigeria with kwashiorkor 50.9% for males vs. 49.1% for females.[9] The study also agreed with the present research revealing that there was a higher occurrence of kwashiorkor among children of age ≤4 years than those older than 4 years. Because most mothers begin to wean their children from 4 months to 1½ years and if adequate diet is not given as a substitute due to ignorance, illiteracy, disease/death of mother or poverty, the child becomes malnourished. [8,9]

In this study the prevalence of kwashiorkor in Aden city was 50.5% and in rural areas it was 49.5 %, which revealed no statistically significant difference. This is different from the report of Nigeria's study of 87.6% in urban and 12.4 % in rural. Other study in Malawi revealed that the children from rural communities, particularly those from non-pastoral subsistence farming areas without cattle, are more likely to present with kwashiorkor than other children. The typical age of presentation is 1–3 years; kwashiorkor affects both girls and boys equally, and remains a major problem in food insecure regions of the world. [16]

Most families in Yemen had adopted manners to cope with their limited access to food. These manners included reducing food quantities, combining meals and removing meat from their diets. As Aden is sea land, the families commonly use fish in their meals. The rural population usually use the breast feeding or/and fresh animals milk as goat and cows to feed their children because it's cheap and rather available. On the other hand, the kwashiorkor cases from rural population in the poorest economic and health care conditions, perhaps don't reach the therapeutic feeding center in Al-Sadaqa Teaching Hospital, due to the difficulties in transportation and the lower level of health education and information about the better treatment for the cases of severe malnutrition that this institution can provide.

This study showed significant relationship between kwashiorkor and discharge among study children. The prevalence of kwashiorkor was higher in the cure group compared to the rest. The 8.4% of patients who died is moderately accepted according to WHO criteria (5-15%),[1] and similar to other studies in Malawi, Zaire (8%).[6]

The lower mortality rate in this study may reflect the effective role of doctors and hospital stuff and the services and intervention provided by UNICEF at the therapeutic feeding center in Al-Sadaqa Teaching Hospital.

As this was a retrospective study there could be some misclassification. However, the authors sought to reduce the study bias by reviewing all admission clinical findings and derived independent diagnoses of kwashiorkor and marasmus using the WHO classification. Using the presence of edema alone as the basis of analysis gives a confounding effect of birth weight on later weight or height gain.

The healthy child is the pride of the nation but unfortunately many Yemeni children are not healthy due to malnutrition. This is probably due to the fact that issues bordering on the health of the child have not been adequately addressed in spite of

emphasis laid on this by UNICEF, WHO and other international bodies that see to the wellbeing of children. [9]

Kwashiorkor is devastating when it progresses to the point that requires hospital admission, although if identified early can be treated on an outpatient basis with ready-to-use therapeutic food. [6]

It has been shown that kwashiorkor is caused by several factors which include among others poor weaning techniques, poverty, ignorance, diseases which are predisposed by overcrowding and poor hygiene as well as some cultural/religious taboos. It has a negative impact on the life of the child, thus directly affecting his/her immediate family, the society where he/she lives and ultimately the nation.[9] Carefully review of the circumstances of deaths and identification and solution of related problems should be done in order to reduce the case-fatality rate, to achieve a case-fatality rate of less than 5% according to recommendation of WHO. [1]

CONCLUSIONS

The present study shows that the prevalence of kwashiorkor at the therapeutic feeding center in Al-Sadaqa Teaching Hospital is 4.8%, which is slightly higher for females than males. Kwashiorkor predominance in children ≤4 years old is found. Kwashiorkor is similar in patients from Aden city and rural areas. The greatest proportion of children is cured.

RECOMENDATIONS

It is necessary to promote the knowledge and health education of parents, particularly mothers. It is also recommended to improve the economic and cultural conditions of families. This is mainly the responsibility of the authorities to seek solutions to such problems and to create the clinical feeding center in all hospitals in Yemen.

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