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Maternal comprehension of home-based growth chart in Bahrain

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SUMMARY The objectives of this study were to assess Bahrain mothers' understanding and interpretation of currently used home-based growth monitoring chart, and how their education affects their comprehension of it. A sample of 472 mothers of children who were less than 6 years old were selected from 18 health centres in Bahrain. About 73% brought the growth chart with them during their visits. The education of the mothers had a significant effect on the comprehension of the growth chart. Highly-educated mothers were more likely to read the information in the growth chart (69%) than middle (52%) and low-educated mothers (16%) ($P < 0.0001$). Also highly-educated mothers got more benefit from the growth chart ($P < 0.0001$) and more of them understood the reason for the colour in the chart ($P < 0.0001$) than other groups. The majority of husbands (85%) showed no interest in reading the growth chart. Of the mothers, 42% did not know at which age the growth chart should be used. It is important, therefore, that the current growth chart should be reviewed and the mothers and health workers should be involved in the process of designing the chart. Suggestions for improvement of the growth chart currently used were provided.

Introduction

The growth monitoring chart was intended to be one of the important tools in educating mothers on growth, nutrition and the consequences of illness on growth of their preschool children^{1,2}. The World Health Organization (WHO)³ has suggested a home-based growth chart which is widely used in most developing countries as it is,

or in a modified form. The main objective of growth monitoring charts is to promote healthy growth by increasing the level of awareness and knowledge of the family and health workers through graphic presentation of weight and age measurements. In order to achieve this, mothers should be able to understand and correctly interpret the information in the growth charts. While a few studies reported successful understanding and usefulness of growth charts⁴, many studies demonstrated a lack of understanding⁵⁻⁹.

Little information is available from Arab countries on the evaluation of growth monitoring charts. In Saudi Arabia Rasheed *et al.*⁹ found that only 14% of mothers attended mother and child health (MCH) clinics for the purpose of growth monitoring; most attended for immunization of their children. In addition, 65% of mothers thought that the purpose of growth charts was for recording immunization; 75% were not aware of the meaning of standard curves on the chart.

The main objectives of this study were to assess mothers' understanding and interpretation of currently-used home-based growth charts in Bahrain and to assess the impact of education on their comprehension.

Subjects and methods

In Bahrain, the home-based growth-monitoring chart was introduced in the early 1980s and is widely used in all MCH clinics in primary healthcare. The growth chart has three colours – green, yellow and red – corresponding to good nutrition status, moderately malnourished and severely malnourished. This is based on 50th, 10th, and 3rd percentiles (Figure 1). On the back of the growth chart, there are several items of information on immunization schedule, supplementary feeding, child spacing, periodic screening for women and management of diarrhoea. All this information is written in Arabic, except the front page, where the information was written in both Arabic and English. For every child under 6 years attending a MCH clinic, a health record is kept. It is the responsibility of the nursing staff to explain to the mothers the features and importance of the home-based growth chart.

A sample of 472 mothers of children of less than 6 years old who attended the MCH clinics for growth monitoring or immunization in all the 18 health centres in Bahrain were interviewed, and questioned, about their understanding and interpretation of the growth chart. The sample was selected by interviewing only Arab women who attended the MCH clinics between 0800–1200 h for 18 consecutive days. On each day a qualified public health investigator visited an MCH clinic and interviewed the mothers using a presented questionnaire. Non-responding was not counted, and non-Arab mothers were excluded because of the cultural differences. Children are rarely brought in by a relative or a maid in Bahrain. This is because the majority of native mothers are unemployed (77%), and it is easy for working mothers to take permission to attend the health centre. Information on the socio-demographic background of mothers and their understanding of the features of the growth chart were obtained. All the mothers were familiar with the home-based growth chart, because they received a copy of it during their first visit to MCH clinics. However, the investigator had a copy of the growth chart in order to remind them of the features of the chart and to see how they interpreted them.



Table 1 Comprehension of home-based growth chart according to the educational level of Bahraini mothers

	Educational level				P-value
	Low n=104 (%)	Middle n=131 (%)	High n=237 (%)	Total n=472 (%)	
Comprehension					
Brought along the growth chart	61 (59)	98 (75)	185 (78)	344 (73)	<0.0009
Read the information	17 (16)	68 (52)	163 (69)	248 (52)	<0.0001
Found the information clear and easy to understand	15 (14)	66 (50)	158 (67)	239 (51)	<0.0001
Got benefit from growth chart	19 (18)	62 (47)	145 (61)	226 (48)	<0.0001
Understood the colour zones in growth chart	27 (26)	58 (44)	169 (71)	254 (54)	<0.0001
Husband read the information	10 (10)	19 (15)	42 (18)	71 (15)	0.1528
Age perceived by mothers for using growth chart					
Second year	3 (3)	8 (6)	17 (7)	28 (6)	<0.0001
Third year	16 (15)	41 (31)	85 (36)	142 (30)	
Fourth and fifth year	6 (6)	23 (18)	71 (30)	100 (21)	
Don't know	79 (76)	59 (45)	64 (27)	202 (43)	

To assess the impact of education, mothers were grouped into three categories; low level of education, which included illiterate and those who have little ability to read or write; middle level of education, which included those with intermediate and/or primary school education; and high level of education, which included those with university and/or secondary education.

Data were stored in the Dbase file and analysed using the Epi-Info Software Package¹⁰. The χ^2 test was used for assessing the association between the educational level of mothers and their comprehension of the growth chart.

Results

About one-quarter of mothers (23%) were employed, and the employment status was significantly increased with the increase in educational level (1%, 11% and 40% in low, middle and high education, respectively). More than half of mothers (55%) were aged 20–29 years, followed by those aged 30–39 years (36%). The percentages were 5% and 4% for those aged 40+ years and less than 20 years, respectively. Educated mothers were more likely to get married to educated husbands. The number of children decreased as the educational level of mothers rose, indicating the importance of literacy in family planning. Most mothers have a child aged between 4–6 years (41% and 36% of mothers had children aged 49–60 and 61–72 months, respectively); the rest (23%) had children between 1–48 months. The low proportion of mothers with children less than 3 years old is explained by the fact that the majority of mothers prefer to go to private doctors for the health management of their children during the first 3 years. Many mothers bring their children at 3 years or more to MCH clinics in health centres to obtain an official health certificate of immunization so that they can enrol their children in kindergartens.

The association between the educational level of mothers and comprehension of growth charts is given in Table 1. The majority of mothers (73%) brought the growth chart with them during their visits to MCH clinics. Middle and highly-educated mothers were more prone to bring the growth chart with them than low-educated mothers. The effect of education on bringing the growth chart was significantly positive ($P<0.001$). Reading the information written in the growth chart was significantly associated ($P<0.000$) with the educational level of mothers. However, about half of the mothers

(48%) did not read the content in the growth chart. Of those who read the information in the growth chart, only 25% mentioned that they focused on growth monitoring, while the rest focused on child spacing (33%), management of diarrhoea (26%), supplementary feeding (11%), and other health situations of the child or mother (not shown in Table 1).

Only 14% of low-educated mothers found the information provided in the growth chart was clear and understandable, compared with 50% and 67% of middle- and highly-educated mothers. The effect of education on understanding the information on growth chart was statistically significant ($P<0.000$). About half of mothers (52%) answered that they did not get benefit from the growth chart, and the proportion decreased as the educational level of mothers increased. Getting benefit from the growth chart was significantly associated with increase in the education of mothers ($P<0.0001$). For those who mentioned that they benefited from growth charts, 34% stated that the growth chart showed them that their children grew healthily and 4% stated that they found their children had problems in growth – the rest gave answers not related to the growth of the child, such as immunization, supplementary feeding, child spacing and management of diarrhoea (not shown in Table 1).

Interestingly, the majority of husbands of the sample studied (85%) showed no interest in reading the growth chart. There was no statistically significant association between the educational level of mothers and the interest of their husbands in reading the growth chart.

When the mothers were asked to interpret the meaning of the three colours in the growth chart, 54% of them gave correct explanations – the proportion of correct answers increased significantly with their educational level ($P<0.000$). Similarly, highly educated mothers were more likely to give the correct age of the child and indicate what the growth chart should be used for, compared to middle- and low-educated mothers. However, a relatively high percentage of mothers (42%) did not know at which age of the child should the growth chart be used.

Discussion

Although growth monitoring has become an essential activity in primary healthcare in Bahrain, it is time to review the impact of this activity on the growth and nutrition of children. The findings of this study suggest

several important issues. First, a considerable proportion of mothers (27%) did not bring the home-based growth chart with them during their visits to MCH clinics. This was more apparent among low-educated mothers, who were mostly of a low social class, and their children were more susceptible to undernutrition. It is difficult, in this situation, for the health workers to follow up and explain the growth development of their children to these mothers. The relatively high percentage of mothers (48%) who did not read the information in the growth chart and those who believed that the growth chart had no benefit (52%) lead to the conclusion that the mothers did not feel that growth monitoring was useful. Gopalads *et al.*⁶ stressed that the success of growth monitoring is highly dependent on the active involvement in the whole process of growth monitoring, including regular weighing of the child, understanding the growth chart and following the advice of providers.

Secondly, the husband plays a minor role in utilizing the growth chart. Our findings demonstrate that only 15% of the mothers' husbands read the growth chart. This situation is expected in most developing countries, and especially in Arab countries, where the women play the main role in raising and taking care of children, while the men are responsible for earning money for the family. The situation may be worst in the Arab Gulf countries, including Bahrain, as many families depend on foreign housemaids to take care of children, which reduces the use of growth charts, as most of these housemaids do not read the local language (Arabic), and therefore do not understand the information written in the growth chart.

Thirdly, the educational level of mothers has a significant impact on the understanding and interpretation of growth monitoring. The findings of this study showed that highly-educated mothers were more likely to comprehend the growth charts. It is probable that the duration of schooling has a greater effect on the understanding of growth monitoring. Senanayake *et al.*² found that the length of schooling rather than literacy alone is a marker of mothers' understanding of growth monitoring charts. However, several investigations showed that literate mothers understand the growth chart in a better way than illiterate mothers^{2,11-13}. If the growth monitoring is to be more effective, the specific learning needs of mothers will require more attention, especially with the high risk of undernutrition among children of these mothers¹².

Based on the results of this study, it seems that the use of the chart to illustrate the progress of the child's growth is still not fully understood by mothers. Bani¹⁴ indicated that the ability to understand the growth monitoring chart is not only related to the literacy of mothers, but has also to do with early schooling – often school children and adolescents do not learn to use charts. He suggested that the introduction of graphs and histograms in early schooling and a simpler design would solve this problem. Morley¹⁵ added that many individuals who are highly literate also find growth charts difficult to comprehend. Very few primary schools in developing countries have graph paper and a significant proportion lack teachers capable of handling the topic: even many educated women and health workers are unable to understand and interpret even simple graphs. Sohal *et al.*¹⁶ pointed out that most growth monitoring programmes in developing countries have not been successful in reducing malnutrition, due to, at least in part, the exclusion of mothers from the process of growth monitoring.

To achieve a better understanding of growth charts, it has been suggested that direct recording scales^{17,18} which involved the community in monitoring the growth of their children would help to bring about better understanding by health workers and families of weighing and the interpretation of a graph. Meegan and Morley¹⁹ found that with these scales, illiterate or semi-literate mothers were able to complete the growth curve and acquired an understanding of the process and its significance. Several studies have tested these scales in developing countries^{18,20,21}. In Kenya¹⁸, it was found that after 9 months, 90% of mothers who had no schooling, understood why the child was being weighed, and were able to weight and chart the growth curve.

Health authorities should review and modify current home-based growth charts as the present chart may mislead both mothers and health workers about a child's nutritional status. Weight-for-age is considered a poor indicator for assessment of nutritional status. A small-for-dates infant born to genetically small parents may be considered moderately or even severely malnourished according to the Bahrain coloured zones but, in fact, this infant may be well nourished. Therefore, emphasis needs to be placed on the direction of the line not where individual entries lie. The three colours in the Bahraini home-based chart lead the mothers and health workers to put emphasis on each entry rather than the direction (David Morley, personal communication).

The Bahrain home-based growth chart could be modified by utilizing the chart produced by TALC²² (Teaching-Aids at Low Cost). In this chart, which was modified from the growth curve recommended by WHO, the first 3 years were illustrated on the front of the chart and the fourth and fifth years were illustrated on the back. This was devised because the first 3 years are crucial for the health and nutritional status of the child.

We strongly suggest more use should be made of home-based growth monitoring charts in Bahrain and perhaps in other Arab Gulf countries. The growth chart should be introduced into the secondary school curriculum for both boys and girls – perhaps included in such subjects as home economics, science or biology. This will ensure that the concept of growth monitoring is understood by prospective mothers and fathers. Health education through the mass media could focus on both the benefits and the interpretation of growth monitoring charts. Health workers should receive adequate training in their use and comprehension. There is some criticism that health staff lack information and skills to use the growth chart. Harrison *et al.*²³ found that a significant proportion of health personnel did not know how to use the weight-for-age chart. Finally, the involvement of mothers and health workers in the design of the chart is crucial.

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Abstracts

Compiled by the Editors

Typhus

Which antibiotic for mild scrub typhus? Scrub typhus is caused by *Orientia tsutsugamushi* and is transmitted by infected mites or chiggers. It is common in rural Asia and the Western Pacific and over a million cases occur each year. Some are fatal and in Thailand some reports suggest poor response to standard therapy. A Thai/USA-authored study compared doxycycline in a dose of 200 mg daily for 1 week with rifampicin 900 mg or 600 mg daily. Fever clearance times were shorter in those treated with rifampicin (22.5 h on 900 mg daily, 27.5 on 600 mg daily and 52 h on doxycycline.) Two patients had to withdraw from doxycycline due to gastrointestinal side effects and two patients on doxycycline relapsed compared to none on rifampicin.

The authors conclude that rifampicin is superior to doxycycline in Thai scrub typhus.

Watt G, Kantipong P, Jongsakul K, *et al*. Doxycycline and rifampicin for mild scrub typhus infections in Northern Thailand: a randomised trial. *Lancet* 2000; **356**: 1057-61

Herpes

HHV-8 transmission in families Human herpesvirus 8 (HHV-8) is the cause of Kaposi's sarcoma and transmission is known to occur amongst homosexual men. French researchers have investigated the transmission of HHV-8 in French Guiana in rural ethnic Africans. Although 13.2% were seropositive only 1.2% under 5 years were infected. HHV-8 seroprevalence rose to a plateau of 15% between 15 and 40 years and was 27% in those >40 years. There was strong familial aggregation of HHV-8 with high mother-child and sibling-sibling correlations, in contrast to an absence of correlation between spouses.

This study suggests HHV-8 transmission occurs vertically and between siblings in childhood

Planoulaine S, Abel L, van Beveren M, *et al*. Human herpesvirus 8 transmission from mother to child and between siblings in an endemic population. *Lancet* 2000; **356**: 1062-5

HIV

HIV and malaria Twenty-two million Africans are infected with malaria and 500 million suffer from it each year. Previous studies have failed to provide convincing evidence of any link between the two infections despite the clear evidence that cell mediated immunity is important in malaria and is increasingly compromised by progressive HIV infection. A painstaking study conducted in Uganda over 8 years followed nearly 500 participants who made over 7000 clinic visits. HIV-positive participants had higher parasite densities if their CD4 counts were lower and a high rate of clinical malaria episodes correlated with falling CD4 counts.

In a region where HIV prevalence is 30%, and there are plenty of places in Africa where that is the case, the population attributable fraction of clinical malaria could reach 35%, with profound implications for public health. HIV may be doing for malaria what it has already done for tuberculosis.

Whitworth J, Morgan D, Quigley M, *et al*. Effect of HIV-1 and increasing immunosuppression on malaria parasitaemia and clinical episodes in adults in rural Uganda: a cohort study. *Lancet* 2000; **356**: 1051-6

Pregnancy

Folic acid antagonists An American study assessed exposure to folic acid antagonists during pregnancy in nearly 4000 infants with cardiovascular malformations, nearly 2000 infants with oral clefts, 1100 with urinary tract defects, and about 8000 control infants with malformations. The use of folic acid antagonists was associated with a 3.4-fold increase in cardiovascular and oral cleft malformation and an overall increase of 2.2 for all three types of malformation. The risk associated with dihydrofolate reductase inhibitors was reduced by folate supplementation but did not hold for anti-epileptic drugs.

A number of anti-malarials are folate antagonists. Whilst this study did not examine the anti-malarial sub-group it provides powerful support for the use of folate supplements in pregnant women using agents like proguanil.

Hernandez-Diaz S, Werler MM, Walker AM, Mitchell AA. Folic acid antagonists during pregnancy and the risk of birth defects. *N Engl J Med* 2000; **343**: 1608-14

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