

MATERNAL KNOWLEDGE ON GROWTH MONITORING CHARTS OF THEIR CHILDREN

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Abstract:

Objective: Although growth charts are used frequently as visual aids to aware mothers about their children's growth, many mothers cannot comprehend the data. The objective of this study was to assess the maternal knowledge and perceptions of growth charts in a rural area of Bangladesh.

Methods: A cross-sectional descriptive study was done based on interview of 100 rural mothers attending Integrated Management of Childhood Illness (IMCI) unit of Upazila Health Complex, Amtoli, under Patuakhali district, from June to July 2010. Questions explored awareness and perception of usefulness of growth monitoring chart, as well as the ability to interpret growth chart data.

Results: Overall awareness of growth charts was 36% and ever-use was 10%. Education, parity and number of living children were significantly associated with knowledge. Fifty percent of mothers wanted to monitor their child's growth, but 35 % did not know how. Increased health education in all health care delivery systems is needed. Fifty-five percent of mothers thought it was important to be shown growth charts to see how their child was growing, and 40% expressed the need to see their child's growth chart as confirmation of their health care provider's verbal interpretation. However, when provided with multiple-choice questions and answers, only 36% could identify a child's weight when shown a plotted point on a growth chart. Only 5 mothers had heard of the term "percentile. Up to 64 % interpreted incorrectly charts containing weight measurements in tandem. Twelve percent mothers had good knowledge about growth chart. Education up to or beyond HSC had significantly improved knowledge.

Conclusion: This finding is significant because many mothers prefer to be shown growth charts by their health care provider, and some mothers reported recording their children's measurements on growth charts at home.

Keywords: Child health, growth chart, mothers' education, health education and behaviour.

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Introduction:

The Growth chart or Road to Health Chart (RtHC) is often the only ongoing link between health workers (including doctors) and a child's parent(s)/caregivers. If used properly, it promotes these relationships, improves decisions and helps to focus on those children needing extra care. The whole purpose of growth monitoring is to detect growth flattening. Initially the chart was developed to help health care providers track children's growth and identify potential health problems¹. However, their use is no longer restricted to the realm of health care professionals. Mothers

accept full responsibility for their children's care². Nowadays, growth monitoring charts are expected to function as educational tools whereby mothers gain knowledge of growth, nutrition, and the consequence of illness on child's growth. Mothers often are shown the charts at routine health care visits, and the growth pattern becomes a focal point for discussion. Obviously 'Road-to-health' growth chart can be useful for growth monitoring and public health education, but their effectiveness as an educational tool depends on whether parents and caregivers comprehend the information it offers. Many

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health organizations throughout the world, including the Centers for Disease Control and Prevention USA, the World Health Organization, and a coalition of key pediatric health care organizations in Canada, are encouraging parents to use the growth charts as monitoring tools^{3,4}. However, knowledge of its meaning and usefulness and its acceptance by the mothers who are directly in charge of child care is necessary. In other words for mothers to accept and to use growth charts as educational tools, they must understand the charts. In many countries recent reports, however, have indicated very poor understanding of the growth charts⁵. Even in developed countries like the United States many individuals do not have the literacy and numeracy skills to interpret growth chart effectively⁶⁻⁸.

Understanding a growth chart requires the ability to understand several concepts, including trending over time and graphical presentation. Health care providers may mistakenly assume that parents understand these concepts. The parental capacity to understand and to act on graphically presented health information to make health decisions has not been studied adequately⁹.

One smaller qualitative study conducted in the United States explored maternal perspectives on growth counseling^{10,11}. Some studies found that growth chart use and findings were memorable to mothers but frequently were misunderstood¹¹. Many specific factors could be determinants of maternal understanding of growth chart. In Nigeria, for example, maternal age, education and parity were significantly influential factors in growth chart comprehension¹². In Bangladesh, each child under 5 years of age has a health card containing growth chart that is kept with the mother. This study was carried out to determine the level of knowledge of mothers about the growth charts and identifying maternal characteristics affecting knowledge.

Methods:

Study sample:

All mothers who had attended the IMCI unit of THC during this period formed the study population. Among them a total of 100 mothers, with sole or shared responsibility for their child's health care and with child of 0-5 years of age in the household were recruited for study. The study was carried out during June and July of 2010.

Survey Instrument:

The survey instrument was a semi-structured questionnaire as well as growth chart images. In-depth interviews were conducted to assess maternal awareness and baseline knowledge of growth charts. Three sample growth charts with individual captions were provided to the mothers. One chart showed weight gain every month (normal growth); the second showed no weight gain for six months (growth faltering); and the third showed continuous loss of weight (grade IV malnutrition). The ability to recognise the chart showing the normal growth from three sample growth curves (chart 1; question-1), ability to identify a point on a growth curve where a significant health problem occurred (chart 2; question-2), ability to recognise the growth curve with continuous loss of weight reflecting the impact of diarrhoea (chart 3; question-3 & 4) and ability to interpret correctly a curve showing no weight gain, were judged (chart 2 question-5). The interpretation of the 3 growth charts was judged correct, incorrect, or uncertain and a score ranging from 0-5 was awarded based on one point for each correct answer and zero for each incorrect or uncertain answer. Scores of 0 were considered '0 knowledge', a score of 1-2 'poor knowledge', a score of 3 'satisfactory knowledge', and 4 or 5 'good knowledge'. Informed consent was obtained and the mothers were classified as literate or illiterate by testing their ability to read 'Mother, your milk is best for your baby' written in 'Bangla'. Maternal age, religion, birth order of child, and the level of education were recorded.

Data Analysis:

Data was analyzed with Statistical Package for the Social Sciences (SPSS) version 11.0. Frequency distribution was done to ensure that all variables had valid values. Descriptive statistics were used for qualitative and quantitative variables. Mothers' characteristics were cross-tabulated with maternal knowledge of growth charts. To determine the extent to which demographic features (income, education) predicted graph comprehension, data were analyzed by using a direct-entry (standard), multivariate regression analysis. Specifically, the criterion of graph comprehension was regressed with respect to the following series of dummy-coded predictors: (1) income (5,000 or less; 5,100–10,000; 10,000–15,000; 15,100–20,000; or 20,100–25,000; serving as the base group), (2) education (no education, with primary, secondary, higher secondary or with college education and beyond serving as the base group).

Results:

Understanding of Growth Charts:

Fifty percent of respondents recalled having had the growth chart explained to them by their health care provider, but only 26% thought that the explanation had been very clear. Ten percent reported plotting their children's measurements on growth charts at home.

The knowledge' scores obtained with the mothers from the three sample growth charts with individual captions are shown in table-I. Sixty four mothers were found to have knowledge' scores of 0, despite the study sample having a literacy rate of 40 %.

Table-I
knowledge' scores of parents

Zero knowledge' (scores 0)	64%
Poor knowledge' (scores 1-2)	10%
Satisfactory knowledge' (scores 3)	14%
Good knowledge' (scores 4-5)	12%

Altogether only 12 of literate mothers had 'good knowledge' with the road-to-health chart while none of illiterate mothers had similar knowledge. This difference is statistically significant ($p < 0.0001$). Again mothers whose educational level had not reached higher secondary were found to have poorer level of knowledge compared with those educated up to or beyond HSC. Thirty percent of the mothers were able to interpret flattened growth line as no growth of a child and falling growth line as reduced nutritional status of the child, whereas, 34% of the mothers were able to interpret raising growth line for healthy children.

Table-II shows the demographic characteristics of these mothers by their awareness of the growth chart, their ever-use of it in the home and their perceptions of its usefulness. Table shows that overall awareness and ever-use of the monitoring growth chart were generally poor (36%, 10% respectively). Many mothers (30%) were aged between 30 and 34 years. Only 2.0% of mothers were younger than 20 years and 15% were older than 39 years. There were no statistically significant differences by age in the proportion of mothers with awareness, ever-use or good perceptions of the growth chart ($P > 0.1$). Maternal education was statistically significant in association with awareness of the growth chart ($P < 0.01$). Detailed analysis of the educational levels of mothers who interpreted the chart showed that education beyond higher secondary level significantly improved interpretation of growth charts. Overall, the majority of mothers (90%) perceived the growth chart as a useful monitoring tool for child health and development. But there was no significant association between maternal level of education and their perception ($P > 0.1$). Only 10% reported ever using the growth chart and there was no statistically significant age differential. The trend of use was inconsistent across age groups; however, those aged between 35 and 39 years were more likely to use the growth chart than other mothers.

Table-II

*Influence of mothers' characteristics on their knowledge perceptions and use of the growth chart
Mother's awareness, ever-use, and perception of usefulness of the growth chart by their
demographic characteristics*

Maternal characteristics	No. of mothers	Awareness (%)	Growth chart ever-use at home (%)	Perception of usefulness (%)
Age				
15-19y	2	0	0	100
20-24y	7	28.57	14.29	85.71
25-29y	24	37.5	8.33	91.67
30-34y	30	36.66	5.8	93.33
35-39y	22	40.9	18.18	86.36
40-44y	15	33.33	6.67	86.67
total	100	36	10	90
p value	0.639	0.149	0.855	
Education				
illiterate	60	20	0	90
primary	7	42.86	0	85.71
secondary	15	53.33	6.66	93.33
HSC	8	62.5	37.5	87.5
bachelor	10	80	60	90
total	100	36	10	90
p value	0.0001	0.0001	0.525	
Occupational status				
house wife	75	33.33	9.33	89.33
day laborer	14	28.57	7.14	92.86
service holder	11	63.63	18.18	90.90
total	100	36	10	90
p value	0.035	0.515	0.910	
Parity				
1	18	27.77	5.55	88.89
2	40	45	10	95
3	32	34.38	12.5	87.5
e ⁿ 4	10	20	10	90
total	100	36	10	90
p value	0.04	0.205	0.190	
No of living children				
1	20	25	5	90
2	44	45.45	9.09	93.18
3	30	33.33	13.33	86.67
>4	6	16.6	16.66	83.33
total	100	36	90	
p value	0.015	0.109	0.216	

The mother's occupation was also statistically significant in association with the mother's knowledge of the growth chart ($P < 0.05$; Table-II). Mothers engaged in services were more aware of the growth chart than those who were

day labor or those who were not employed outside the home (63.63%, 28.57% and 33.33% respectively). Total parity and total number of living children as maternal variables related to growth chart use and perceptions were

examined. Both variables were statistically significant in association with mother's knowledge of the growth chart ($P < 0.05$; Table-II). Multiparous women (with children ≥ 4) were less aware of the growth chart (20%) than were women with parity 2 or 3 (45% and 34.38% respectively). A greater proportion of women with 2 living children were also more aware of the growth chart (45.45%) than women with single child (25%) and three (33.33%) or more children. Although only 20 women had single living children, these women were least likely to have ever used the growth chart. Neither parity nor number of living children was statistically significant in association with mothers' use of growth chart or perception of its usefulness. The child's age, sex and recent illness were not statistically significant in association with the mother's awareness, ever-use or perception of the usefulness of the growth chart. Mother's awareness and perception of the usefulness of the growth chart were not statistically associated with child's birth weight also. Almost 80% of mothers reported that doctors did not interfere with nutrition or health care of the child based upon the information recorded in the growth chart. Among mothers who ever used the growth chart at home (10%), only 5 % reported the doctor had recommended a change in health care based upon the reading of the growth chart. Overall 71% of mothers professed enthusiasm to take an active role in monitoring their child's growth with a growth chart, but 20% did not know how to do this.

Discussion:

The involvement of mothers in the health care of their babies is a desired consequence of growth monitoring. Easy interpretation and good understanding of growth monitoring charts by mothers is necessary to achieve this objective. However, as health care providers commonly do not share children's growth chart data with parents, many mothers have a poor understanding of the data. According to a study of Elana Pearl Ben-Joseph of the Alfred I Dupont Hospital for Children in Wilmington, by conducting an online survey of 1,000 parents who represented the demographic distribution of the United States also found the same result.

Difficulties in comprehending the road-to-health chart have been previously reported in India also¹³.

In this study it was found that most mothers thought and believed growth chart was an important confirmation of their health care provider's verbal interpretation. When shown the growth chart with normal growth it was also found that 25% of respondents could identify correctly the child's age on the x-axis of the chart when provided a list of options; in contrast, only 20% identified correctly the weight on the y-axis. Fifteen percent of respondents were able to identify all chart features (age, weight). Only 2 percent could correctly define the term "percentile". A number of maternal demographic characteristics were independently associated with poorer understanding of growth charts. Having a household income of less than BD Taka 5,000 per year, not being a college graduate, being multipara, were all associated with poorer growth chart comprehension. In the total study sample knowledge scores were found to be zero in 64% of mothers. The effect of maternal literacy on knowledge of growth charts is clear. The proportion of mothers who were aware of the growth chart increased from 20% for illiterate mothers to 62.5% for mothers with higher secondary education. Grant and Stone also found that literate mothers in Afghanistan had better knowledge than illiterate mothers regarding growth chart¹⁴. Ruel *et al.* and McAuliffe *et al.* in studies carried out in Lesotho and North-east region of Brazil respectively concluded that illiterate mothers could understand growth monitoring charts after instructions were given¹⁵⁻¹⁶. There were no statistically significant differences by age in the proportion of mothers with awareness, ever-use or good perceptions of the growth chart ($P > 0.1$).

Overall knowledge of the growth chart as indicated by the level of awareness in our study was 36%, which is very low in comparison with nearly 80% in Al-Khobar, Saudi Arabia⁵ and 54% in Ilorin, Nigeria¹². This suggests a need for related health education in PHC settings, maternity centers and other health care

delivery systems in the country. Knowledge of the growth chart would encourage mothers to use it at home and to be completely in charge of monitoring their children's growth¹⁷. The significant influence of the mother's education, job, parity and number of living children on her awareness of the growth chart is consistent with a study report of a semi-urban Nigerian community¹². This may not be surprising as education buys awareness and the more educated a mother is; the more likely she is to appreciate the need to monitor her children's growth. The educated mother understands the consequences of any faltering of growth in her children. Such knowledge also makes the mother an active participant in decisions regarding the diet, feeding and child health practices needed to achieve normal growth.

Maternal age influenced awareness of the growth was not significant in this study. It was, however, indirectly involved in the effect of education, parity and number of living children. Future studies are expected to throw more light on the awareness and the perception of mothers about the use of the growth chart and whether or not proper use and modification of health care actually occurs based upon readings of it. Pediatric growth charts, which were developed originally for use by health care providers as a tool for assessing and tracking the physical growth of children (0-5 years of age), have acquired an additional role in developed countries. Health care Providers now use them routinely as visual aids to educate parents about their children's growth, and parents use them frequently at home. For example, the CDC; USA recommends that "parents should partner with pediatricians to track their child's growth,"¹ and the World Health Organization states that "parents should use growth charts as a tool to better monitor the growth of their child, and "to understand and follow nutritional recommendations, and to seek timely health care for their children"³. A policy statement from key pediatric health care organizations in Canada encourages health care providers to "teach caregivers how to interpret the growth chart and what the target growth pattern should be."⁴. Similar recommendations have been made by the

World Federation of Public Health Associations¹⁸ and the Human Development Department of the World Bank¹⁹. This expanded role should also be endorsed by health organizations in Bangladesh.

Indeed, using a chart as a visual aid has certain theoretical advantages. Tversky and Morrison²⁰ suggested that graphic images facilitate communication by showing things that would require many words to describe, and they suggested that combinations of words and images are better than either alone. This is true, however, only if the intended audience can understand the data. Quantitative information, in the form of numbers, numerical concepts such as risks and probability, or graphs and charts, often is not adequately understood. Therefore, it is not surprising that the majority of this survey's respondents were not able to comprehend growth chart data fully.

Conclusion:

Maternal understanding of growth charts is limited. The findings of this survey demonstrate that the current trend of health care provider's sharing growth chart data with parents does not seem to be effective. A few of the mothers in this study recalled having taught about growth charts by health care providers and only ten percent claimed to have used them at home. Very few mothers understand growth charts and the implications of the data they present.

The results of this survey raise questions about how to maximize the effectiveness of growth chart use in clinical settings. Clearly, better strategies for educating and counseling parents about their children's growth need to be developed. This might involve continued use of growth charts with improved methods of teaching about them. This study had several possible limitations. First, the survey was not a thorough assessment of growth chart knowledge but was focused on the basic growth chart components. However, it assessed many of the knowledge elements needed to understand growth curves for both healthy and sick children. Further studies of the public's understanding of growth charts are needed to

help guide health care providers in their use of growth charts as educational tools.

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