Abstract

Introduction:
Growth curve is a simple and inexpensive means used for evaluation of children’s health and nutrition, and growth. There was an attempt in this study to find the relationship between children’s growth and the factors affecting it using growth curves.

Materials and Methods:
This study was analytical. According to other studies and the prevalence of 54% of children under the fiftieth percentile, the sample size was determined 385 and the children were below 6 years of age. Chi-square test was used to examine the existence of an index such as malnutrition and its relationship with maternal milk, formula and other factors. Growth and its relation to other factors were determined by the Linear Mixed Model.

Results:
This study revealed that 63.6% of children who were breastfed had educated fathers, while 38.6% of those who were breastfed had fathers with primary education. This difference was statistically significant. 62.1% of mothers with primary and 39.8% with university education breastfed their baby; the difference was also statistically significant. Maternal job was significantly associated with birth weight (P<0.01). The process of child’s weight gain showed no correlation with nutritional status whereas it showed a relationship with weaning. So, the children were weaned earlier had a lower rate of weight gain.

Conclusion:
This study showed that parental education and awareness play an important role in children’s growth. Although there was no relationship between weaning and the parents’ education, both factors were separately influential on the growth of the children. The mothers’ education was especially important in this regard.

Keywords: Breast Feeding, Infant Formula, Growth Chart, Children
Growth indicators and related factors in

Investigating growth indicators and related factors in

Researchers recommends exclusive breastfeeding for
the first six months of life and weaning off
breastfeeding (breast milk plus
supplementary food) for at least 12 months
as long as both mother and child are
willing. Furthermore, it has effective
physical and mental benefits for both
mother and infant (2, 3). Its known short-
term benefits for infants include improving
nutrition, strengthening gastrointestinal
function and strengthening the immune
system. Also, breastfeeding has long-term
benefits for infants, short-term and long-
term benefits for mothers and economic
benefits for families and society (2, 4).

Today, growth chart has been widely
accepted as a scientific and important tool
to help reach health-for-all goal. Growth
chart is a simple and cheap tool for
evaluating health and nutrition in infants,
which can be simply used for social health
issues (5). Studies conducted in recent
years indicated that promotion of exclusive
breastfeeding in the country has been
successfully done so that instances of
exclusive breastfeeding has reached from
12% in 1991 to 41.5% in 1996 (6,7). A
study indicated that 48.6% of children
have been exclusively fed by breast milk
in the first six months and 15.4% of them
had non-exclusive breastfeeding. In this
study, the beginning time for
supplementary feeding varied from 0 to 9
months and 22% of children received
supplementary food from 0 to 4 months
after birth (8). Mean weight of children in
exclusively breastfed group was higher
than that of children in non-exclusively
breastfed group (7).

Some studies conducted in Iran show lack
of awareness, false cultural beliefs, little
attention and sometimes unawareness of
medical team cause some infants to be
deprived of this divine blessing. Some
others are forced to feed on infant formula
besides breast milk in spite of the belief of
almost all mothers in superiority of breast
milk over baby formula (9). In recent
years, with the development of healthcare
system in Iran, great efforts have been
made to increase awareness, attitude and
performance of mothers toward exclusive
breastfeeding in the first six months of
cradle life. However, because of some
reasons rooted in social, cultural and
biological factors which affect prevalence
of breastfeeding, some mothers lack
required awareness and belief in this
matter. So, it is essential to study this issue
in different societies (10). Children are
considerably exposed to malnutrition due
to their particular food needs for growth.
Investigating the feeding type is one of the
most important measures for implementing
malnutrition prevention methods and its
outcomes. Investigating growth chart is
one of the most appropriate methods for
evaluating nutritional state of children
(11). Standard growth chart is an important
and sensitive index which indicates any
changes in the growth trend.

Several factors such as education and
occupation of parents and kind of milk
used by children can affect children’s
growth trend. Recognition of effective
factors in children’s growth assists health
centers for their educational planning.
Since healthcare of children is important in
prevention of malnutrition and infectious
diseases, and as a result, decrease in
mortality rate, recognition of effective
factors would be crucial in this matter.
This study compared growth in height,
weight and head circumference in children
under six years old and investigated its
effective factors.

Materials and Methods:
This cross-sectional descriptive study was
conducted on children born in 2002 in
Shiraz, who had medical records
healthcare centers. Height, weight and
head circumference of these children were
measured over years and their feeding type
had been recorded during breastfeeding
time. If growth index in the case of the
selected child was not recorded or was
irregularly recorded, it was excluded from
the study and another case was replaced.
In cases of incomplete information in the
records, the required information was asked by phone. This study was conducted in 2008. The information related to mothers’ education and occupation, fathers’ occupation, mothers’ and child’s disease, child’s feeding style and birth order was extracted from their records and included in the questionnaire. According to other studies, the prevalence of about 45% of children was determined below the fiftieth percentile with $\alpha=0.05$ and confidence interval of 95% and the sample volume was specified as 385. For more accuracy, using the coefficient of 1.5 times, the number of samples increased to 600 people. Sampling was performed using stratified random method (12, 13). To this end, from each municipal region which was considered a level, one medical center was selected, from which 149 records of five-year-old children were also randomly selected. More records were selected so that in case of any defect, the record can be excluded from the study. Chi-square test was used for indices such as presence of malnutrition and its relationship with breast feeding and infant formula and other factors including mothers’ education, mothers’ occupation, fathers’ occupation and birth order. Growth trend and its relationship with other factors were determined by linear mixed models.

**Results:**

In this study, it was indicated that 52% of boys and 50% of girls were breast-fed and there was no relationship between gender and feeding type. There was a statistically significant relationship between education of parents and feeding type ($p<0.05$) so that 63.6% of children whose fathers were academic people consumed infant formula while 38.6% of children whose fathers had primary education consumed infant formula. 62.1% of children whose mothers had primary education and 39.8% of those with academic education consumed infant formula. Feeding type also significantly correlated with occupation of mothers ($p<0.05$) so that 66.7% of employed women gave infant formula to their children while the figure was 42.2% for housewives. 39% of housewives and 33% of employed women breastfed their infants for 24 months.

13.8% of babies were born while weighing less than 2.5 kg, 22.3% with short height and 9.5% with below normal head circumference. Birth weight of infants was statistically correlated with mothers’ occupation ($p<0.01$) so that low birth weight was observed in 12.5% of housewives, 35.1% of self-employed women and 6.3% of employed ones. In this study, growth trend of children was determined by standard growth chart and its relationship with other factors was established using standard difference score. There was no relationship between weight improvement of children and feeding type ($p>0.05$) while development of children correlated with weaning from breastfeeding ($p<0.01$). In other words, growth trend was slower in the children who were weaned off breastfeeding earlier. Education of parents was associated with child development. In other words, children of the parents with academic education had better growth trend than those with primary and secondary education.

In this study, it was found that 19% of girls and 8.6 of boys were born weighing less than 2500 g, which was statistically significant ($p<0.001$). 74.6% of boys and 63% of girls had normal height, which was statistically significant at $p<0.001$. 85.4% of boys and 81.4% of girls had normal head circumference, which was statistically significant at $p>0.05$.

Weaning did not show any relationship with gender and it was found that 85.8% of boys and 79.2% of girls were breastfed more than 19 months. This difference was not statistically significant.
Table 1: Factors affecting weight development of children under 6 in Shiraz based on growth chart

<table>
<thead>
<tr>
<th>Factor</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight</td>
<td>0.0000</td>
</tr>
<tr>
<td>Persistence of breastfeeding</td>
<td>0.0000</td>
</tr>
<tr>
<td>Mothers' education</td>
<td>0.0000</td>
</tr>
<tr>
<td>Fathers' education</td>
<td>0.0000</td>
</tr>
<tr>
<td>Gender</td>
<td>0.815</td>
</tr>
<tr>
<td>Birth order</td>
<td>0.256</td>
</tr>
<tr>
<td>Mothers' age</td>
<td>0.355</td>
</tr>
<tr>
<td>Mothers' diseases</td>
<td>0.740</td>
</tr>
<tr>
<td>Child's disease</td>
<td>0.136</td>
</tr>
<tr>
<td>Type of child nutrition</td>
<td>0.833</td>
</tr>
</tbody>
</table>

Level of significance α=0.05

No relationship was found between birth order and weight, height and head circumference of children (p>0.05). Fathers' education showed no relationship with height, weight and head circumference at birth. Also, no statistically significant relationship was observed between maternal education and height, weight and head circumference at birth and during breastfeeding. In all educational groups, most children were breastfed over 12 months. 30.8% of children whose birth weight was less than normal and 12.7% of children with normal weight suffered from various diseases such as diarrhea, cold, acute respiratory infections, etc., which was statistically significant. Children's disease had no relationship with their feeding type. Children's weight growth chart showed no relationship with feeding type, but it was significantly related with time of weaning. In other words, more loss was observed in the growth chart of children who were weaned earlier. This difference was significant between children who were breastfed over 12 months and under 12 months.

Discussion:
The result of this study showed that level of education can be more effectively compared with other indices in terms of child development. Educated and employed fathers and mothers had more tendencies toward using infant formula for their children. Mothers' education showed a significant relationship with breastfeeding (p<0.01). Although these mothers used more infant formula, their children had better growth rates because of their awareness and better child care. Growth trend showed a significant relationship with time of weaning so that children who were weaned earlier than 12 months old had worse growth trend. Educated and uneducated individuals did not differ in terms of time of weaning. A study conducted in 2007 showed that gender was not related to growth (14). The same result was obtained in the present study. Furthermore, it was shown that formula-fed and breast-fed children did not differ in terms of growth. Time of weaning did not differ between educated and uneducated people. A study in 2007 in Jahrom demonstrated that gender was not related to growth trend (14). The same result was obtained in the present study. Furthermore, it was shown that formula-fed and breast-fed children did not differ in terms of growth trend. But the results of the study conducted in city of Semnan in 1995 indicated that mean of head circumference, height, weight of children who had infant formula was less than breast-fed children (15). The mentioned study was conducted 15 years ago and probably more care is given to children today; as a result, children had less malnutrition. Another study carried out in city of Jahrom in 2007 indicated that, in
the first months of birth, weight and height did not differ between formula-fed and breast-fed children, but in the following months, breast-fed children had more weight and height than formula-fed ones (16). One study conducted in the State of Havana in 2005 showed no difference between children under 1 who consumed infant formula and breast milk in terms of height and weight (17). Findings of the study conducted in city of Khorramabad in 2008 indicated a significant difference between mothers’ occupation and education and feeding type of children (18). The result of this study was the same as that of the present work. A study carried out in city of Zahedan showed that persistence of breastfeeding did not correlate with education of parents (19). In the present study, similar results were obtained. Based on the study carried out in city of Bushehr in 2001, occupation and education of parents correlated with children's consumption of milk and the relationship was statistically significant (20). In the present study, similar results were obtained.

In a study in Tehran (2008), a relationship was found between parents’ education and children’s weight loss. According to the obtained results, the higher the parents’ education, the less the children’s weight loss. In the mentioned work, there was a relationship between early weaning and weight loss (21). In the present study, the same results were obtained. In the study conducted in Kerman (2002), no statistically significant difference was found between mothers' education and awareness and children's development (22).

**Conclusion:** The results of present study and other studies showed parents’ occupation and education as important factors in prevention of children's weight loss and consequently decrease of malnutrition and various diseases among them. So, considering continuous education of mothers in healthcare planning is of particular importance which can be very effective in decreasing children's weight loss and as a result their mortality.

**Acknowledgments:** We would like to thank Research Deputy and Student Research Committee on Shiraz University of Medical Sciences for approving and funding this research.

**References:**