The Effects of Breastfeeding Duration on the Frequency of Upper Respiratory Tract Infection in the Advancing Years of Life

Mehmet Ziya Gençer1, Fatih Alicioğlu2, Seçil Arıca3, Ege Ağırman4, Memet Taşkın Eğici5, Vefik Arıca5

1Ankara Province Çankaya Public Health Center, Ankara
2Bingöl Province Adaklı District Integrated Hospital, Bingöl
3Istanbul Province Beyoğlu Association of Public Hospitals Okmeydani Training and Research Hospital, Department of Family Medicine, Istanbul
4Secretary General of Istanbul Province Beyoğlu Association of Public Hospitals, Istanbul
5Istanbul Province Beyoğlu Association of Public Hospitals Okmeydani Training and Research Hospital, Department of Pediatrics, Istanbul

Corresponding Author: Mehmet Ziya Gençer
mehmetziyagencer@hotmail.com

ABSTRACT

Background-Objectives: The purpose of this study is to investigate the antibiotic use rates, breastfeeding duration in children aged 24-72 months and the frequency of upper respiratory tract infections in the advancing years of life.

Methods: It was interviewed through face to face survey method with the parents of 283 children, who applied to Istanbul Province Okmeydani Training-Research Hospital and Bingöl-Adaklı District Integrated Hospital between the dates of May and July 2014.

Results: It was determined that children of highly educated mothers had fewer infections and were breastfed for a longer time. The annual numbers of infections had by the children evaluated under this study, and the boxes of antibiotics used are respectively 4.6±2.4 and 3.0±1.8 in average. Children who had 8 times or more infections annually were accepted as the ones frequently having infections, and two groups were created. The average breastfeeding duration in frequent infections was 10.9±8.8 months, while it was 15.8±7.0 months for children that had infections occasionally (p<0.005). The possibility of having infection was increasing 17 times when mother and father were both smokers (OR: 17.2; p<0.0001).

Conclusion: It was determined that long-term breastfed children had fewer infections in the advancing years of their lives; mother's education level affected the breastfeeding duration and the incidence of infections, and children with smoker parents had more infections.

Keywords: Upper Respiratory Tract Infection, Incidence of Infection, Breastfeeding, Children, Passive Smoking

1. INTRODUCTION

Breast milk is the gold standard nutritional source for newborns and infants(1). Besides being the best nutritional source for babies, breast milk provides protection against many infections as well(2,3). Many studies indicate that breastfeeding reduces the incidence of infection with its antimicrobial effect against many viruses, bacteria, and protozoa(4,5,6). New studies both support the benefits of breastfeeding to mother and child and lay emphasis on exclusive breastfeeding during the first 6 months(7).

The American Academy of Pediatrics points out the necessity of breastfeeding until at least 12 months and the continuation of breastfeeding after 12 months based on the mutual desire of mother and baby(8). Protective mechanisms
of breast milk are quite different and numerous. Immunologic, hormonal, enzymatic, trophic and bioactive factors in breast milk serve passive immunity to the baby.\(^{(9)}\) It is known that breast milk provides intestinal protection with its probiotic effect\(^{(10)}\), and be active in preventing the infection and regulating the immune system in the postpartum period since it contains IgA at a high level\(^{(11)}\). Many factors in breast milk can generate reciprocal synergistic effect with both each other and mucosal and systematic immune response\(^{(12,13)}\).

Today, in addition to the protection that breast milk provides against diarrheal diseases\(^{(13,14)}\), it is seen that it also provides protection against extraintestinal diseases like otitis media\(^{(15,16,17)}\) and respiratory system illnesses\(^{(18,19,20,21)}\). Though the benefits of breast milk in the short term are known and accepted, literature on this topic is scarce in the long term. The limited number of studies have confirmed these findings; breastfeeding is protective against the acquisition of Helicobacter pylori\(^{(22,23,24)}\), wheezing is more occasional in ever breastfed children in contrast with never breastfed children\(^{(25,26,27,28)}\), and breast milk increases the level of protection against Haemophilus influenza type b infections\(^{(29)}\).

Wilson et al. discovered that children who had received breast milk exclusively for 15 weeks were more protected against respiratory illnesses in the following years of life (about the age of 7) in contrast with the ones who had received no breast milk\(^{(30)}\). In the longitudinal research lasting 6 years, Li et al. did base on the data acquired from ‘Infant Feeding Practices Study II IFPS II’ and ‘Year Six Follow-Up Y6FU’, they discovered that the possibility of getting ear, throat and sinus infections is lower for children breastfeed for at least 9 months in contrast to the children breastfed for 0-3 months\(^{(30)}\).

Rational antibiotic use is defined as the usage in an appropriate dose meeting patient’s clinical needs, and in an appropriate period of time and method\(^{(31)}\).

In the first 10 years of life, a child who has a normal immune system is supposed to get 6-8 upper respiratory tract infections in a year, and the one who gets infected more than 8 times is accepted as having frequent infections\(^{(32,33)}\).

Antibiotics are among the most prescribed medicines in Turkey like many other countries. The purpose of our study is to investigate antibiotic use in children aged 24-72 months, breastfeeding duration, and the incidence of infection in the advancing years of life.

### 2. METHODS

In this cross-sectional and descriptive study, a poll investigating the effects of sociodemographic factors on breastfeeding duration in children aged 24-72 months, the effects of breastfeeding duration on the incidence of infection and the frequency of antibiotic use was conducted through face to face meetings by getting oral approvals of 238 patients’ parents applying to İstanbul Province Okmeydani Training and Research Hospital and Family Practice and Pediatric Polyclinics in Bingöl-Adakli Integrated District Hospital for various reasons between the dates of 08.05.2014 and 18.07 2014, and 100% of the participants completed the survey questions. 32 parents declined to take part in the study although being invited.

Children who had a chronic illness or allergy story, children with asthma or iron deficiency anemia, children whose immune system was suppressed or the ones still breastfeeding were excluded. Within the scope of our study, the ones experiencing 8 infections or more in a year were accepted as having frequent infections and divided into two groups. Within the scope of the study, the parents who smoked near their children and caused second-hand smoke exposure were accepted as smokers. While selecting the parents who were invited to take part in the study, age, the number of children and level of income were not taken into consideration. The ones accepting to participate by giving explanatory information about the study before application were included in the study.

**Statistical Analysis:** Data were analyzed using SPSS 15.0 Software with 95% confidence interval. In addition to descriptive statistical analysis, Student T and ANOVA tests were used to compare the data of parametric groups. Chi-square test and Mann-Whitney U tests were used to compare the data of nonparametric groups. Results were given as Mean±SD; the statistical significance level was p<0.05.

### 3. RESULTS

Children who participated in the study were composed of 142 boys and 141 girls. While 132 children participated from Bingöl, 151 children participated from İstanbul. Age average of all of the children was 45.9±13.4 month-old. While the age average was 46.3±13.1 month-old among the boys, it was 45.3±13.7 month-old among the girls.
There was not a significant age gap between the girls and boys participating in our study (p=0.600). The number of infections in average was 4.6±2.4 times in a year. The breastfeeding duration was 15.5 (0-36) months. There was no correlation between the maternal age and the breastfeeding duration (r=0.042; p>0.05). While the breastfeeding duration of children whose mothers worked was 15.3±7.2 months in average, it was 15.2±7.4 months in average for the children whose mothers were housewives. The gap between them was not significant (p>0.05).

In our study, the more educated the mother was, the longer the breastfeeding duration was (r=0.061; p<0.005). There was no correlation between the level of income of the family and the breastfeeding duration (p>0.05). The more educated the mother was, the less the number of infections in average in a year was (r=-0.251; p<0.0001). While the children of working mothers had infection 4.4±2.5 times in a year in average, the children whose mothers did not work had infection 5.0±2.7 times in a year. The gap between them was not significant statistically (p>0.05). There was no correlation between the time when complementary feeding started and the average number of infections (r=0.46; p=0.420). While the average number of infections that the children had in a year was 4.6±2.4, the average number of consumption of antibiotic boxes in a year was 3.0±1.8. The more educated the mother was, the less the number of antibiotic boxes was (r=0.261; p<0.0001).

There was a direct proportion between the annual number of infections and number of antibiotic boxes (r=0.792; p<0.0001).

The ones who had infections 8 or more times in a year were accepted as having frequent infections, and they were divided into two groups. While the average breastfeeding duration was 10.9±8.8 months for the ones having frequent infections, breastfeeding duration for the children having infrequent infections was 15.8±7.0 months (p<0.005).

**Table 1. Comparison of sociodemographic attributes of children who have frequent infections and healthy children.**

<table>
<thead>
<tr>
<th>Sociodemographic Factors</th>
<th>Healthy Child (n:266)</th>
<th>Frequent U.R.T.I* (n:17)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Average (month)</td>
<td>45.8±13.2</td>
<td>47.3±14.9</td>
<td>0.500</td>
</tr>
<tr>
<td>BMI** (percentile)</td>
<td>32.5 (5-97)</td>
<td>27 (7-61)</td>
<td>0.300</td>
</tr>
<tr>
<td>Maternal Age (year)</td>
<td>30.3±4.9</td>
<td>33.8±5.7</td>
<td>0.001*</td>
</tr>
<tr>
<td>Maternal Education Year</td>
<td>8 (0-18)</td>
<td>5 (0-11)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Percentage of Smoking Mothers</td>
<td>%21</td>
<td>%34.6</td>
<td>0.000*</td>
</tr>
<tr>
<td>Percentage of Smoking Fathers</td>
<td>%15,8</td>
<td>%50</td>
<td>0.000*</td>
</tr>
<tr>
<td>Breastfeeding Duration (month)</td>
<td>15.8±7.0 (0-36)</td>
<td>10.9±8.8 (0-30)</td>
<td>0.005*</td>
</tr>
<tr>
<td>Complementary Feeding (month)</td>
<td>6 (1-8)</td>
<td>6 (1-8)</td>
<td>0.900</td>
</tr>
<tr>
<td>Annual Number of Antibiotic Boxes</td>
<td>3 (0-8)</td>
<td>7 (2-10)</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

*Upper Respiratory Tract Infection, **Body Mass Index

There was no correlation between the body mass index (BMI) and the annual number of infections (r=-0.538; p=0.300). Maternal smoking increased the probability of having frequent infections 15 times more in children aged 2-5 years (OR=15.5; p<0.0001). Paternal smoking increased the probability of having frequent infections 5 times more in children aged 2-5 years (OR=5.3; p<0.0001). Parental smoking increased the risk 17 times more (OR=17.2; p<0.0001). There wasn’t any significant difference between the BMI median values of girls and boys statistically (p=0.200).

4. **DISCUSSION**

In our study, it has been detected that children aged 24-72 months had less upper respiratory tract infection in parallel with the extension of breastfeeding duration. In spite of the fact that many immunologic factors included in human milk protect infants against infections, protectiveness of breast milk after discontinuation of breastfeeding are being investigated. There are a number of studies suggesting that immunologic factors in breast milk develop infant’s immune system and as a consequence, it
provides protectiveness against disease pathogenesis. In one of the studies of Hasselbach et al., it was detected that exclusively breastfed infants in the first four months of life have a larger thymus gland in contrast with partially breastfed infants and formula fed infants\(^{(34)}\). Immune modulating factors in breast milk have an impact on both thymus development and thymus gland development in breast milk\(^{(35)}\). In a report published by Jeppesen et al. later on, they did not only verify the fact of increased thymus size found before, but also detected the correlation between breastfeeding and CD8-T-lymphocytes\(^{(36)}\). There are a limited number of studies related to the effects of breastfeeding duration on the incidence of infection in the advancing years of life and an increase in the number of studies in this field will enable to reach new information.

In our study, a correlation has been found between the maternal education year and breastfeeding duration. A significant relation between the maternal education year and the consciousness level has been confirmed in many studies as well\(^{(37,38,39,40)}\). According to our study, children whose mothers were more educated had fewer infections. In a study whose participants consist of 124 children who applied to polyclinics because of respiratory tract infections, it was discovered that the 72% of children were passive smokers\(^{(41)}\). In our study, we found that being exposed to passive smoking increases upper respiratory tract infections. We also found that the annual number of infections and the antibiotic use rates are still high though there are campaigns to prevent unnecessary use of antibiotics in recent years. However, it is a well-known fact that parents living in developing countries like Turkey and Columbia press doctors to give antibiotics in consequence of the belief that their children will ‘not recover without using an antibiotic’\(^{(43,44)}\). It was discovered that antibiotic use is still high in this age group when upper respiratory tract infections frequently based on viral origins are common\(^{(45)}\).

5. CONCLUSION

As a result; in our study, it has been detected that there is a direct proportion between the maternal education year and the breastfeeding duration while an inverse proportion exists between the incidence of infection in coming years and maternal education year. Children whose parents were smokers had more frequent infections. It has been discovered that passive smoking increases the upper respiratory tract infections. In spite of the consciousness-raising campaigns carried on, unnecessary antibiotic use is still high. In addition to this, children who had frequent infections between 24 and 72 months had shorter breastfeeding duration than the ones having fewer infections, and enhancement and expansion of new studies about the effects of breast milk on child’s life in the future are significant in terms of child welfare and preventive medicine and lead to new discoveries.

REFERENCES
