LACTOFERRIN LEVELS IN MOTHER’S MILK

ABSTRACT… Objective: This study was aimed to see the significance of Lactoferrin in human breast milk among lactating mothers of healthy and sick babies. Place and duration: This study was conducted at pathology and paediatrics departments of Peoples University of Medical and Health Sciences Nawabshah, Shaheed Benazirabad between Jan 2011 to Dec 2011. Design: Cross sectional study. Method: Lactoferrin levels in breast milk of 356 mothers of healthy babies were estimated and similarly lactoferrin levels in breast milk of 318 lactating mothers of sick babies were estimated & these results were analyzed. Results: the mean lactoferrin level in breast milk of 356 lactating mothers of healthy babies was 9.37 mg/ml and the mean lactoferrin level in breast milk of 318 mothers nursing sick babies was 3.73mg/ml. Conclusions: There is decrease in lactoferrin levels of lactating mothers of sick babies in their mature milk, which could account for the susceptibility of their babies to infection.

Key words: Lactoferrin levels, breast milk, lactating mothers, sick babies.

INTRODUCTION
Breastfeeding is the process of feeding the infant with mother’s milk, either by direct nipple-baby mouth contact or by expressed breast milk. It is widely accepted that human milk is good for child health. Breast fed babies have protection against various infectious diseases primarily because of various factors including secretory immunoglobulin A, lactoferrin, lysozyme, affording antimicrobial activity. Substances in breast milk can actively stimulate development of the newborn’s host defenses to provide continued mucosal protection after breast feeding is terminated. Several components of breast milk can reduce the inflammatory response to stimuli in the newborn intestine. These include growth factors, interleukin 10 and lactoferrin.

A relationship between breast-feeding and infant health had been recorded periodically for thousands of years across many disparate civilizations. In 1934, a report on 20,000 mother infant dyads in the United States found that morbidity or mortality due to enteric diseases were several times higher for non breast-fed infants than for breast-fed infants.

Lactoferrin is one of the transferrin proteins that transfer iron to the cells and control the level of free iron in the blood and external secretions. It is present in the milk of humans & other mammals, in the blood plasma and neutrophils and in one of the major proteins of virtually all exocrine secretions of mammals such as saliva, tears and Pancreas. Concentration of lactoferrin in milk varies from 7 g/l in the colostrums to 1 g/l in mature milk. Antibacterial activity of lactoferrin originates from its iron – binding capacity, thus depriving the bacterial flora from an element necessary for its growth. Antibacterial action of lactoferrin is also explained by the presence of specific receptors on the cell surface of micro – organisms. Lactoferrin binds to lipopolysaccharides of bacterial walls, and the Exidized iron part of lactoferrin oxidizes bacteria ia formation of peroxides. This effects the
membrane permeability and result in the cell breakdown. Lactoferrin also stimulates phagocytosis. Lactoferrin is capable of binding certain DNA and RNS Viruses. Its main contribution to antiviral defense consists in its binding to cell membrane glycosaminoglycans. In the manner lactoferrin prevents viruses from entering cells and infection is stopped at an early stage. Lactoferrin acts against parasites in various ways. Lactoferrin breaches parasitic membrane integrity causing subsequent changes in interactions between the host & parasites. Lactoferrin may support the proliferation, differentiation and activation of immune cells and strengthen the immune response. Lactoferrin has a potent anabolic effect on osteocytes. Lactoferrin stimulates osteoblast proliferation, enhance thymidine incorporation into osteocytes and reduces apoptosis of osteocytes.

MATERIAL AND METHOD
The current study was conducted at pathology and paediatric departments of Peoples University of Medical and Health Sciences Nawabshah, Shaheed Benazirabad between Jan 2011 to Dec 2011. Total 674 mothers were included in the study. The inclusion criteria was Lactating mothers, of healthy and sick neonates irrespective of sex and age upto 2 months, the exclusion criteria was, age of baby more than 2 months, neonates born with congenital anomalies and mother have any co-morbidity.

5ml of breast milk from 356 selected mothers having healthy babies was taken and similarly five ml of breast milk from 318 selected mothers of sick babies taken into sterile bottle. The lactoferrin levels were evaluated using ELISA Method.

RESULTS
The mean lactoferrin levels in milk of mothers of healthy babies were 9.37 mg/ml. The mean lactoferrin levels in milk obtained from mothers of sick babies were 3.73 mg/ml (Table-I).

The mean values of lactoferrin in the mothers with sick babies were lower than those obtained from mothers with healthy babies. Considering the various age groups. The lactoferrin levels in mothers with healthy babies upto 20 years the mean value were 8.64 mg/ml. The values for mothers between 21-30 years were 11.43 mg/ml. Similarly in age group over 40 years, the level was 7.82 mg/ml. The mothers with sick babies were revealing low levels. The mothers upto 20 years and below had 3.76 mg/ml. The mothers within 21-30 years group had 4.62 mg/ml, mothers within age group 31-40 years of age had 2.81 mg/ml. The figure for above 40 years age group showed 3.72 mg/ml (Table-II).

<table>
<thead>
<tr>
<th>Mother’s status</th>
<th>No. of cases</th>
<th>Mean lactoferrin level (mg/ml)</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy babies</td>
<td>356</td>
<td>9.37</td>
<td>1.34 ± 0.26</td>
</tr>
<tr>
<td>Sick babies</td>
<td>318</td>
<td>3.73</td>
<td>1.077 ± 0.19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age of mothers in year</th>
<th>No.</th>
<th>Mean lactoferrin (mg/ml)</th>
<th>Mature Milk</th>
<th>St. Deviation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>26</td>
<td>8.64</td>
<td>30</td>
<td>3.76</td>
<td>2.43 ± 0.36 &lt;0.05</td>
</tr>
<tr>
<td>21-30</td>
<td>186</td>
<td>11.43</td>
<td>172</td>
<td>4.62</td>
<td>2.81 ± 0.74 &lt;0.001</td>
</tr>
<tr>
<td>31-40</td>
<td>130</td>
<td>9.61</td>
<td>106</td>
<td>2.81</td>
<td>1.99 ± 0.90 &lt;0.05</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>14</td>
<td>7.82</td>
<td>10</td>
<td>3.72</td>
<td>1.46 ± 0.71 &lt;0.05</td>
</tr>
<tr>
<td>Total/ Mean level</td>
<td>356</td>
<td>9.37</td>
<td>318</td>
<td>3.73</td>
<td>2.57 ± 0.65 &lt;0.05</td>
</tr>
</tbody>
</table>

DISCUSSION
Breast feed infants have demonstrated better iron accessibility than babies on formula. The protective role of lactoferrin has been studied by administration of lactoferrin through drinking water to milk with weakened immune system, that reduced the symptoms of aphthous ulcer and the number of Candida albicans strain in the...
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mouth were also reduced\textsuperscript{18}. Oral administration of lactoferrin to animals also reduces the number of pathogenic organisms in the tissues close to the gastrointestinal tract. Candida albicans could also be completely eradicated with a mixture containing lactoferrin, lysozyme and introakonazol in HIV – Positive patients who were resistant to other antifungal drugs\textsuperscript{19}, the role of lactoferrin in regulation of host immunity is widely accepted\textsuperscript{20,21}, some studies explains the antioxidant and scavenging activity of human milk\textsuperscript{22}. Thus explaining its importance and relative values in babies of healthy mothers and in mothers of sick babies.

In current study the mean lactoferrin levels obtained in breast milk of mothers of healthy babies and sick babies vary, which is in consistent with other international studies\textsuperscript{23}. The lactoferrin level in mature milk of mothers of healthy babies varied from 7mg to 11 mg/ml, and in mother of sick babies from 4 to 8 mg/ml. The low levels of lactoferrin obtained from mothers of sick babies could account for susceptibility of these babies to infection. The increased level of lactoferrin in mothers of healthy babies could be because of its antibacterial properties and its direct bactericidal function.

The increased levels of lactoferrin in mature milk obtained from mothers of healthy babies in contrast to mothers of sick babies clearly indicate the protective role of lactoferrin, which is also indicated in reviewing of the literature. Further research should be carried out which could show on the bare minimum levels of lactoferrin required in protecting the child from infective diarrhea, neonatal sepsis and other sickness.

CONCLUSIONS

The mean lactoferrin level obtained from the mature milk of healthy mothers vary significantly from corresponding levels of mothers of sick babies. The low levels of lactoferrin obtained in mothers with sick babies could account for the susceptibility of their babies to infection.

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REFERENCES

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