BIOCHEMICAL STUDIES ON HUMAN MILK FROM ABEOKUTA, NIGERIA

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Biochemical analyses were carried out on the human milk of lactating mothers, aged 15-40 years in Abeokuta. Microbiological sampling showed the human milk to be microbiologically pure in infants' consumption and no viable bacteria growth per ml was found to be nil. The samples had pH values ranging from 5.9 to 6.2, protein ranged from 14.3 to 21.4mg/ml, calcium content ranged from 0.13 to 0.27mg/ml and sugar content range m1.0 to 2.0mg/ml. Women aged, 15-20 years had the most nutritive human milk profile, based on these parameters.< 0.05).

Y WORDS: Biochemical Studies, human milk, Nigeria.

INTRODUCTION

Milk is the natural food of the newborn mammal whom it is the sole source of food and nourishment some period after birth. Milk is the secretion of the mammary glands of animals which suckle their young (Kneebone and Ngoddy, 1985). An increasing number of women are currently choosing to breast feed their infants for longer periods (Martinez and Nelesienski, 79, 1981).

Milk is a good source of protein of high biological value as well as calcium. It therefore plays sound bone and teeth development as well as with in children. Useful vitamins: riboflavin, inositol, biotin, niacin, pantothenic acid and vitamin have been reported in human milk (Casey and Nibnide, 1983).

Milk is known to protect infants against intestinal infection and allergic reactions (Ebrahim, 1983; Unserenya, 1994). Water-soluble vitamins, fatty acid composition and lipid contents of human milk have been shown to reflect maternal food intake (Soderholm, 53; Insull and Ahrens, 1958; Belavady, 1978; Johnson et al, 1992; Ogunseye, 1994). As an ample, Boshel et al (1988) in his comparative study the fatty acid composition of mature human milk of pitan and American women found that breast milk of pitan women contained higher percentages of capric, ric, myristic, linoleic and arachidonic acids while the reverse of higher percentages of stearic and oleic acids breast milk of American women was true. In the me vein, breast milk of American and Australian men were found to contain linoleic acid values of 14.4% and 11% respectively (Jansso et al, 1981; Johnson and Kneebone, 1981; Bitama et al, 1983). The high nutritive value of milk makes it rapidly contaminated by microorganisms and thus given it a short shelf life. The present study was undertaken with the following aims in view: to assess the nutritional value of human milk from Abeokuta, Nigeria; to ascertain the purity of the milk and to compare the nutritive values of human milk produced by lactating mothers of varying ages from this region.

MATERIALS AND METHODS

Human milk collection: Human milk samples were collected from 250 healthy lactating mothers, aged 15 to 40 years by manual expression, from 5 randomly selected hospitals in Abeokuta, the capital of Ogun State of Nigeria. The lactating mothers were within one month of having given birth. Twenty milliliters of human milk were obtained from each lactating mother and delivered into sterile sampling bottles which were immediately frozen prior to analysis. The lactating mother's nipple was thoroughly cleaned with 70% alcohol prior to milk collection.

Microbiological Analysis of Human Milk: Serial dilutions from 10^-1 to 10^-9 of each 1ml milk sample were prepared. For the viable bacterium count, 0,1ml of the stock dilutions, 10^-1 to 10^-9 were plated in triplicate on nutrient agar plates. The inoculum was spread evenly round the plate using pour plate method. The plates were incubated at 37°C for 48h after which bacterial colony presence in the plates was ascertained.

Calcium Content and pH Value of Human Milk: Calcium content was determined by pipetting 1ml of the milk sample into a beaker, diluting it to 100ml, adding 2 drops methyl red and ammonium hydroxide added drop-
wise until a brownish orange colour was obtained. Thereafter, 2 drops of dilute hydrochloric acid were added and the solution diluted with 50 ml of water. The solution was boiled and 10 ml of hot 4.2% ammonium oxalate solution added with stirring until a precipitate was formed. The precipitate was filtered out, washed with 40% ammonium hydroxide solution and dissolved in a mixture of 125 ml water and 5 ml 98% sulphuric acid. The ensuing solution was heated to 70°C using a water-bath and titrated against 0.05N potassium permanganate solution (IIIA 1979). The pH of the milk samples was determined by dipping the electrode of a pH meter against a blank that had 1 ml human milk. A later, the optical density of the resulting solution was noted.

Protein and Sugar Contents of Human Milk: Protein content was determined using Folin Ciocalteau method by adding 3 ml of solution A to 1 ml of human milk (solution A consisted of 50 ml 2% NaCO₃ in 0.1M NaOH mixed with 1 ml of a mixture of 10% CuSO₄·5H₂O and 2% sodium tansartate). At 10 min, after addition, 1 ml of Folin Ciocalteau reagent was added and 30 min later, the optical density of the resulting solution was taken at 570 nm against a blank that had 1 ml human milk replaced with 1 ml distilled water. The protein standard curve was prepared from various concentrations of casein (0.1 M NaOH (Lowry et al, 1951)). Sugar content was determined using Folin Ciocalteau-sulphuric acid method of Dubois et al (1956) by adding 1 ml of 5% phenol and 5 ml concentrated H₂SO₄ to 1 ml of human milk and the optical density taken against a blank at 490 nm. The blank contained 1 ml of distilled water instead of milk extract and the standard curve was prepared using various concentrations of glucose (Dubois et al, 1956).

RESULTS AND DISCUSSION

The pH values of the human milk ranged from 5.9 to 6.3 while the protein contents ranged from 14.3 to 21.4 mg/ml (Table 1). With regards to calcium and sugar contents, the least values of 0.13 mg/ml and 1.68 mg/ml were observed in age group 36-40 years. Age group 15-20 had the highest values of 0.27 mg/ml and 3.0 mg/ml (Table 1). Bacterial growth in the cultured human milk was found to be nil. This result is in agreement with the report of American Academy of Pediatrics which considered human milk to be a clean and optimal source of nutrition for the infants (American Academy of Pediatrics, 1978). Protein, calcium and sugar contents of human milk were observed to decline in quantities with increase in age of the women, while the converse was true with regards to pH values (Table 1).

Table 1: Mean pH, protein, calcium and sugar contents of human milk of lactating mothers, aged 15-40 years

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>pH Level</th>
<th>Protein content (mg/ml)</th>
<th>Calcium content (mg/ml)</th>
<th>Sugar content (mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 20</td>
<td>5.9</td>
<td>21.4</td>
<td>0.27</td>
<td>3.0</td>
</tr>
<tr>
<td>21 - 25</td>
<td>6.1</td>
<td>19.8</td>
<td>0.20</td>
<td>2.6</td>
</tr>
<tr>
<td>26 - 30</td>
<td>6.1</td>
<td>18.5</td>
<td>0.18</td>
<td>2.4</td>
</tr>
<tr>
<td>31 - 35</td>
<td>6.2</td>
<td>17.5</td>
<td>0.16</td>
<td>2.0</td>
</tr>
<tr>
<td>36 - 40</td>
<td>6.2</td>
<td>14.3</td>
<td>0.13</td>
<td>1.9</td>
</tr>
</tbody>
</table>

REFERENCES


