# BREASTFEEDING AND CHILDHOOD CANCER

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**ABSTRACT**

*Total duration of breastfeeding and of exclusive breastfeeding was studied and compared in 99 childhood cancer cases and 90 controls. The difference between the average duration of breastfeeding in cases and controls was significant ($p<0.05$), but when average duration of exclusive breastfeeding was compared in cases and controls the difference was highly significant ($p<0.001$). In lymphoma cases and controls the difference between the average duration of breastfeeding was moderately significant ($p<0.01$). However, when average duration of exclusive breastfeeding was compared in lymphoma cases and controls the difference was highly significant ($p<0.001$). When other cancer groups and controls were compared with respect to their total duration of breastfeeding and duration of exclusive breastfeeding the differences when insignificant ($p>0.05$). Cases and controls were not different with respect to their age, sex, birth year, birth order, age and educational status of mothers, smoking of fathers and socio-economic status. However, a positive family history of cancer was obtained in 4 (4%) of cases whereas in controls it was obtained in only 1 (1.1%).*

**Key words:** *Breastfeeding, Childhood cancer, Exclusive breastfeeding, Lymphoma.*

Studies carried out both in developing and developed countries have documented advantage of breast milk over artificial milk. There are strong evidences that breastfed infants are less severely affected by infections in infancy than are artificially fed infants, thereby lowering infant morbidity and mortality(1-3). Studies have shown that exclusively breastfed infants have significantly fewer episodes of diarrhea than infants who are totally bottle fed(2,4,5). Studies have found an increased risk for insulin dependent diabetes mellitus among children who were never breastfed or who were breastfed for only a short period(6). The type of infant feeding may also affect later obesity, cancer(7), diabetes mellitus or cardiovascular disease. There are also evidences that incidence of eczema in children with a strong family history is reduced if the babies are fed only from the breast for first six months of life(8).

The present study was, therefore, conducted to study the relationship between the total duration of breastfeeding and

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*Received for publication: October 5, 1992; Accepted: January 5, 1993*

duration of exclusive breastfeeding and cancer in childhood.

## Material and Methods

The present study was conducted on 99 childhood cancer cases and 90 controls from 1st April, 1991 to 30th June, 1992. Out of 99 cases, 63 cases were taken from G.S.V.M. Medical College, Kanpur and 25 cases from K.G. Medical College, Lucknow. Cases recorded in the proformas duly filled by Pediatricians from Gorakhpur (6 cases), Baroda (3 cases) and Thiruvananthapuram (2 cases) were also included. Cases were taken if they had any childhood cancer diagnosed before the age of 15 years. They were born between January 1, 1976 and December 31, 1990 and were above 1.5 years. All the cases included in the study were diagnosed on the basis of histopathological examination, blood examination and bone marrow examination.

Controls were randomly selected from the same hospitals from which cases were chosen with various general medical and general surgical conditions. Controls were of the same sex and were born within 2 years of the birth of the case.

Total duration of breastfeeding included the duration of breastfeeding when mother either exclusively provided breast milk or both breast milk and top feeds to her baby for caloric nutrition. Duration of exclusive breastfeeding included the duration when breastfeeding was the only form of caloric nutrition given to the baby, that is, no animal or powder milk to the baby.

A detailed interview schedule was prepared to collect relevant information. The purpose was to collect information about total duration of breastfeeding and duration of exclusive breastfeeding. Information regarding other background variables was also obtained. Most of her relevant answers were reviewed for correctness by rephrasing the questions several times. Assistance of father and close relatives were also taken to enhance reliability.

The data obtained by our observations were recorded in a pretested proforma and observations were tabulated. Background variables and differences were tested in the cases and controls with the Pearson Chi-square and the two-sample Student's 't' test.

## Results

The various types of cancer cases studied are shown in *Table I.* The average total duration of breastfeeding and average duration of exclusive breastfeeding in cases and controls is shown in *Table II.* When

**TABLE I**–*Distribution of Cancer Cases*

| Type of cancer | No. | (%) |
|---|---|---|
| Leukemia (65) | | |
| Acute lymphocytic (ALL) | 48 | (48.5) |
| Acute non-lymphocytic (ANLL) | 14 | (14.2) |
| Chronic myelocytic (CML) | 3 | (3.0) |
| Lymphoma | | |
| Non-Hodgkin | 11 | (11.1) |
| Hodgkin | 8 | (8.1) |
| Wilm's tumor | 3 | (3.0) |
| Bone tumor (3) | | |
| Osteosarcoma | 2 | (2.0) |
| Ewing Sarcoma | 1 | (1.0) |
| Rhabdomyosarcoma | 2 | (2.0) |
| Neuroblastoma | 2 | (2.0) |
| Retinoblastoma | 2 | (2.0) |
| Brain tumors (2) | | |
| Cerebellar astrocytoma | 1 | (1.0) |
| Brain stem glioma | 1 | (1.0) |
| Total | 99 | (100) |

total duration of breastfeeding was assessed as a continuous variable, the difference between the mean for cases (8 mo, SD±5) and controls (10 mon, SD±2.8) was significant ($p<0.05$). However, the difference between the average duration of exclusive breastfeeding in cases (3.2 mo, SD ±2) and controls (4.6 mo, SD ±2.8) was highly significant (<0.001). Cases and controls were not different with respect of their age, sex, birth year, birth order, age and educational status of mothers, smoking of fathers and socio-economic status.

Detailed information regarding 19 lymphoma cases and 90 controls are shown *Table III*. The difference between the mean of lymphoma cases (6.15 months SD±3.2) and controls is moderately significant ($p<0.01$). However, the difference between the average duration of exclusive breastfeeding in lymphoma cases (3.0 months, SD±1.8) and controls (4.6 months

**Table II**—*Background Statistics for all Cancer Cases and Controls*

| Parameters | Cases (n = 99) | | Controls (n = 90) | | p |
|---|---|---|---|---|---|
| Total duration of breast-feeding (mo) | 8 | (±5) | 10 | (±5.8) | <0.05 |
| Duration of exclusive breast-feeding (mo) | 3.2 | (±2) | 4.6 | (±2.5) | <0.001 |
| Age in years | | | | | |
| 1 - 5 | 30 | (30.3) | 27 | 30.0%) | |
| 6 - 10 | 40 | (40.5) | 37 | (41.0%) | |
| 11 - 15 | 29 | (29.2) | 26 | (29.0%) | >0.05 |
| Sex | | | | | |
| Male | 62 | (62.6) | 56 | (62.0) | |
| Female | 37 | (37.4) | 34 | (38.0) | >0.05 |
| Birth year | | | | | |
| 1976-80 | 29 | (29.2) | 26 | (29.0) | |
| 1981-85 | 40 | (40.5) | 37 | (41.0) | |
| 1986-90 | 30 | (30.3) | 27 | (30.0) | >0.05 |
| Birth order | | | | | |
| First | 36 | (36.3) | 35 | (39.0) | |
| Others | 63 | (63.7%) | 55 | (61.0) | >0.05 |
| Maternal age (yrs*) | 34.5 | (±6.5) | 33.7 | (±6.1) | >0.05 |
| Maternal education | | | | | |
| Illiterate | 36 | (36.3) | 35 | (39.0) | |
| Literate | 63 | (63.7) | 55 | (61.0) | >0.05 |
| Smoking of father | | | | | |
| Yes | 13 | (13.1) | 15 | (17.0) | |
| No | 86 | (86.9) | 75 | (83.0) | >0.05 |
| Socio-economic status (Rs.) | | | | | |
| Per capita income < 300 | 55 | (55.5) | 46 | (51.0) | |
| Per capita income ≥300 | 44 | (44.5) | 44 | (49.0) | > 0.05 |

Figures in parantheses indicate percentages or SDs.

**TABLE III**–*Background Statistics for Lymphoma Cases and Controls*

| Parameters | Lymphoma cases (n = 19) | | Controls (n = 90) | | p |
|---|---|---|---|---|---|
| Total duration of breast-feeding (mo)* | 6.15 | (±3.2) | 10 | (±5.8) | <0.01 |
| Duration of exclusive breastfeeding (mo)* | 3.0 | (±1.8) | 4.6 | (±2.5) | <0.001 |
| Age (yrs) | | | | | |
| 1 - 5 | 2 | (10) | 27 | (30) | |
| 6 - 10 | 6 | (32) | 37 | (41) | |
| 11 - 15 | 11 | (58) | 26 | (29) | >0.05 |
| Sex | | | | | |
| Male | 13 | (68) | 56 | (62) | |
| Female | 6 | (32) | 34 | (38) | >0.05 |
| Birth year | | | | | |
| 1976-80 | 11 | (58) | 26 | (29) | |
| 1981-85 | 6 | (32) | 37 | (41) | |
| 1986-90 | 2 | (10) | 27 | (30) | >0.05 |
| Birth order | | | | | |
| First | 6 | (32) | 35 | (39) | |
| Others | 13 | (68) | 55 | (61) | 0.05 |
| Maternal age (yrs)* | 35.1 | (±6.6) | 33.7 | (6.1) | >0.05 |
| Meternal education | | | | | |
| Illiterate | 6 | (32) | 35 | (39) | |
| Literate | 13 | (68) | 55 | (61) | >0.05 |
| Smoking of father | | | | | |
| Yes | 2 | (11) | 15 | (17) | |
| No | 17 | (89) | 75 | (83) | >0.05 |
| Socio-economic status (Rs.) | | | | | |
| Per capita income <300 | 8 | (42) | 46 | (51) | |
| Per capita income ≥300 | 11 | (58) | 44 | (49) | >0.05 |

Figures in parantheses indicate percentages or SDs.

SD±2.5) was highly significant ($p<0.001$). Almost half (58%) of the lymphomas were Non-Hodgkins and rest were Hodgkins lymphoma but because of the small number in each category we restricted significance testing to all lymphomas. When other cancer group and controls were compared with respect to their total duration of breastfeeding and duration of exclusive breastfeeding the differences were insignificant ($p>0.05$).

## Discussion

No work concerning protective effect of breastfeeding and childhood cancer has been done in our country. Few workers have done some studies on this aspect in foreign countries. Davis *et al.* reported a positive association between artificial feeding in infancy and childhood cancer(7). However, McKinney *et al.* found no association between breastfeeding and child-

hood leukemia or lymphoma(9).

Our results may have been due to chance, but the association with all types of cancer cases and specifically for lymphomas make this possibility less likely. Our knowledge about the etiology of childhood cancers is incomplete. Therefore, other etiological factors which have not been examined here may explain the apparent association between breastfeeding and childhood cancer. Another potential source of bias is inaccurate recall of breastfeeding duration because some respondents were finding dificulty in recalling events which took place 15 years back. Parents of cases may have better recall than parents of controls because their children's illness may have made them more aware of details relating to their children's health. However, because breastfeeding duration has not been perceived as a risk factor for childhood cancers, inaccurate recall is unlikely to have resulted in non-random differences between the two groups.

We found that when duration of exclusive breastfeeding was compared in cases and controls as well as in lymphoma subgroup and controls, the difference was more significant then when total duration of breastfeeding was compared. So exclusive breastfeeding provides more beneficial immunological effect than when breastfeeding is supplemented by other artificial feeds. The results in the present study differ from those of McKinney *et al.* who found no association between breastfeeding and childhood leukemia or lymphoma(9) as we also considered duration of breastfeeding which they did not. Many women who were counted as having breastfed a child, breastfeed for a very short period. The breastfed group may therefore be diluted with subjects who breastfeed for only a few weeks. Treating breastfeeding as a dichotomous variable could lead to under estimation of a positive effect. But Davis *et al.* found a positive association between artificial feeding in infancy and childhood cancer and more specifically for lymphomas(7). However, the present study differed from those of Davis *et al.* because we studied duration of exclusive breastfeeding in addition to the total duration of breastfeeding.

Human colostrum and milk have several immunologically active components(10,11). If human milk increases resistance to infections in infancy, breastfeeding for small duration will provide less immunological benefits. Lymphoma is the cancer in our study in which most significant differences in duration of breastfeeding between cases and controls was obtained.

The association between viruses particularly Epstein-Barr Virus (EBV), and lymphoma has been extensively studied(12). Immune responses to EBV infection, governed by sex, socio-economic status, and hereditary factors, influence the outcome of infection; if immune competence is disturbed, there is an increased risk of lymphoproliferative disease. Reactivation of EBV is considered a possible etiological mechanism in lymphoid neoplasia(13). The link between human milk and early infection and the link between lymphoma and infection may themselves be associated.

The incidence of cancer in children varies remarkably among different countries and ethnic groups(14-17). The highest incidence has been reported from Israel (18/100,000 Jewish population) and from Nigeria (17.4/100,000) whereas the lowest figures have come from Szaboles, Hungary (4.7/100,000), Miyagi perfecture, Japan (5.1/100,000) and Bombay, India (6.5/

100,000)(18). The incidence of childhood cancer from other population based cancer registeries in our country include Bangalore (6.3/100,000) and Madras (5.8/100,000)(18). Incidence of luekemia varies widely throughout the world. High rates are found in Denmark, Japan and Whites of United States whereas lower rates are reported from India(14-17). Incidence of lymphoma is high in Brazil (26.2 per million) and Israel (16.0 per million) whereas lower rates are reported from Osaka, Japan(5 per million). In Bombay, India its incidence is 8.8 per million(14-17). Wilm's tumour has less variation in its occurrence than other tumours. Retinoblastoma apparently occurs in excess in India(14-17).

To conclude the present study has shown that breastfeeding has a protective effect on childhood cancer. This protective effect is more pronounced with exclusive breastfeeding. It is not only duration but also quantity of milk ingested which is critical to the beneficial immunological effect. The low incidence of childhood cancer in India is possibly due to breastfeeding being popular in India thereby providing its immunological benefits to the child and thus preventing childhood cancer.

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## NOTES AND NEWS

### PEDIATRICS & NEONATAL EMERGENCIES

The book provides clear guidelines for the diagnosis and management of various problems that constitute emergencies. Prompt recognition of emergencies along with their appropriate and adequate initial management is essential to save lives and prevent complications. In a number of situations the doctors cannot do very much and must send the patient to the casualty services of a hospital. One needs to be aware of such conditions. What not to do is also important. Emergencies in the newborn present very different and often unique problems that require special skills and proficiency for their recognition and management. A group of outstanding contributors have presented the various topics in an informative and lucid manner. The book has 58 chapters spread over 500 pages.

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