

**STUDY OF FACTORS INFLUENCING THE AFLATOXIN
CONTENT OF BREAST MILK**

BY

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ABSTRACT

In Across sectional study concerned with the occurrence of aflatoxins in breast milk in Kaliobia Governorate we examined two hundre breast milk samples collected from twenty-two different localities in the Governorate. We noticed some factors influencing the incidence and concentrations of aflatoxin in breast milk e.g. season of collection, stage of lactation, sex of infant and the amount of breast feeding.

INTRODUCTION

Many infants exposed to aflatoxins prenatally continue to be exposed to these toxins postnatally, where the immature liver may be less efficient than mature organ in handling aflatoxins and/or foetal metabolism of aflatoxins may differ from that of adults.

Aflatoxins in breast milk play a role in the increase of neonated susceptibility to infection and jaundice, increase children susceptibility to malignant diseases and compromise immune responses to prophylactic immunisation. Also, postnatal exposure to aflatoxins in breast milk lead to

low birth weight, frequent infections, jaundice of unknown cause and generally poor survival (Henrick, 1981).

Most research correlated the content of aflatoxins in milk and the amount of the toxins given with the diet e.g. (Goldblatt, 1969; Van der Lind et al., 1965; Lynch, 1972 and others). The present study aimed to find other additional factors influencing the aflatoxin content of breast milk.

MATERIALS AND METHODS

Sampling:

Two hundreds of breast milk samples were collected from 200 lactating mothers in 22 districts of Kalubia Governorate. Samples were collected at different seasonal conditions (May, August, September and October, 1991) and during different stages of lactation.

Case history was taken for each mother including mother's name, address, age of mother and age of infant together with infant sex, sufficiency of mother milk, history of any previous illness, type of food and pattern of its storage.

Extraction and Clean up :

Extraction and clean up of aflatoxins from breast milk was carried out using the methods described by Stubblefield (1979) with slight modifications. Aflatoxin concentration was determined by thin layer chromatographic plates using Fluorodensitometer and standard aflatoxins.

RESULTS AND DISCUSSION

Table (1) showed the relationship between different periods of lactation (stage of lactation) which is represented by infant's age and the presence of aflatoxins in milk where 85 samples were collected from mother's whose infant's age between one to four months old, out of these 85 samples, 13 were found to contain aflatoxins (15.29%). In the period between four and eight months of lactation, two samples contain aflatoxins out of 37 samples. The period between eight to twelve months of lactation was

represented by 40 samples from which three samples were positive (7.50%). Two samples out of 12 ones in the period between 12-16 months were positive (16.66%). One sample found to contain aflatoxins from 16 samples in the period between 16-20 months (6.25%) and from ten samples represented the period between 20-24 months of lactation, one was found to contain aflatoxins (10%). These results indicated that the highest percentage of aflatoxins in breast milk were present in the periods between (1-40) months (15.29%) and 12-15 months (16.66%). The high incidence of aflatoxins in the period between 1-4 months may suggested to be due to increased proportion of protein.

Table (1): The relationship between the content of breast milk of aflatoxins during different periods of location (stage of location).

Infant age (month)	No. of samples	No. of positive samples	Percentage	Concentration in pg/ml (mean ± S.E)
1-4	85	13	15.29	60.85 ± 9.14
4-8	37	2	5.41	100.00 ± 53.01
8-12	40	3	7.50	112.00 ± 31.05
12-16	12	2	16.66	127.00 ± 73.01
16-20	16	1	6.25	95.00 ± 00.00
20-24	10	1	10.00	46.00 ± 00.00
Total	200	22	11.00	78.27 ± 10.35

Table (2) : Seasonal variation and aflatoxins in breast milk.

Season	Months	Total No. of samples	No. of positive samples	Percentage	Concentration in pg/ml (mean ± S.E)
Dry season	May	18	1	5.55	51.00 ± 00.00
	August	84	11	13.09	85.28 ± 16.55
	total	102	12	11.76	94.36 ± 14.85
Wet Season	September	39	2	5.13	42.00 ± 4.00
	October	59	8	13.55	68.63 ± 16.86
	Total	98	10	10.20	70.13 ± 12.58

In colostrum in the first months of lactation therefore, the percentage of aflatoxins which is usually conjugated to proteins is increased, or it may be to the fact that lactation requires greater energy from mothers than does pregnancy and some of this energy may be derived from the fat which may act as a store for aflatoxins in humans from which it can be mobilized and excreted in breast milk (Coulter et al., 1984). In the other hand, the period between 12-16 months is usually associated with introducing of other foods for babies with frequent reduction in the infant's appetite for breast milk. Also this period characterized by the emergence of the infant's upper incisors which may lead to uncomfortable nursing for the mother, so the period between lactation is extended and this is associated with a drop of milk secretion and the stagnated milk will consequently has a higher concentrations of aflatoxins (Findlay, 1984). Our results may be supported by Jelliffe and Jelliffe (1978) who stated that both volum and the composition of milk may vary with duration of lactation. This may be a possible cause for the varied aflatoxin excretion at different periods of lactation. On contrast, Coulter et al., (1984) mentioned that there was no apparent relationship between the duration of lactation and the presence of aflatoxins in milk.

Table (2) showed the effect of seasonal variation on aflatoxins incidence in human breast milk, our samples were collected during dry season represented by May and August, and Wet season represented by September and October. This seasonal selection was similar to that of De yaries et al., (1989).

In dry season, we collected 102 samples from which 12 samples were found to contain aflatoxins (11.76%) with a mean of 94.36 pg/ml while in wet season 98 samples were examined from which ten samples were contaminated with aflatoxins (10.20%) with a mean of (70.13)pg/ml. Therefore we conclude that higher incidence of aflatoxins was noticed in dry season which may suggested to be due to the increased relative humidity and temperature which facilitate fungal growth and consequently

increase the amount of toxin production in food. In contrast, Lamplugh et al., (1988) noticed a higher frequency and concentrations in wet season than in dry season. Our results were similar to that reported by Maxwell et al., (1989). This may be due to the geographical and experimental differences.

The relationship between infant sex and the presence of aflatoxins in human breast milk was illustrated in table (3) where 14 male infants out of 110 (12.72%) whose mother's milk contained aflatoxins and nine female infants out of 90 (10%) mother's breast milk contained aflatoxins. We noticed that the percentage of male infants whose mother's breast milk contained aflatoxins was higher than that in female infants whose mother's breast milk contained aflatoxins.

Table (3) : Relationship between aflatoxins in breast milk and infant sex.

Infant sex	Total No. of samples	No. of positive samples	Percentage	Concentration in pg/ml (mean \pm S.E)
Male	110	14	12.72	82.64 \pm 20.84
Female	90	9	10.00	67.67 \pm 14.63
Total	200	23*	11.00	78.27 \pm 10.35

* One case gave twice one male and one female.

Table (4) : Correlation between amount of breast milk feeding and the presence of aflatoxins in breast milk.

Breast feeding	No. of samples	No. of positive samples	% of positive to total No. of positive samples	Concentration in pg/ml (mean \pm S.E)
Sufficient	97	8	36.36	58.88 \pm 7.52
Not Sufficient	103	14	63.64	89.36 \pm 15.11
Total	200	22	11.00	78.27 \pm 10.35

This observation was unexplained, however it may be due to difference in food contamination or individual variation between mothers with different habits in their life. The suggestion may be supported to ascertain extent after Jelliffe and Jelliffe (1978) who stated that both composition and volume of breast milk may vary with the state of maternal nutrition.

In our case reports, we noticed the amount of milk secreted by mothers and if it is sufficient for their babies or not sufficient and did babies still hungry after breast feeding. Such correlation between amount of breast feeding (sufficient or not sufficient) and the presence of aflatoxins in breast milk was showed in Table (4). We observed that eight cases out of 22 positive cases (36.4%) were given sufficient amount of milk for feeding their babies, while 14 cases (63.6%) gave not sufficient milk for their babies. So we can conclude that the occurrence of aflatoxins was associated with a significant decrease in breast milk feeding, on other term decrease the amount of milk secreted. This observation may suggested to be due to the disruption of lipid metabolism which caused by aflatoxins and decrease production of volatile fatty acids which are necessary for both energy and milk synthesis (Tung et al., 1972).

This study revealed a relationship between the occurrence of aflatoxins in breast milk and stage of lactation, season of collection, sex of infant and amount of breast feeding.

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الملخص العربي

دراسة العوامل المؤثرة على تواجد الأفلاتوكسين في لبن الأم

حاتم بهجري - رجب الشواربي - محمد أبو سالم - سمير المرصاوي -
الهام الشيوحي

تمت هذه الدراسة بهدف الكشف عن الأفلاتوكسينات في لبن الأمهات بمحافظة
القليوبية وقد أجريت هذه الدراسة على مائتين عينة من لبن الأم حيث أخذت من اثنتين
وعشرون مكاناً مختلفاً على مستوى المحافظة . وقد لوحظ أن هناك عوامل تؤثر في تواجد
وتركيز الأفلاتوكسينات في لبن الأم منها المناخ الجوي وقت أخذ العينة . مرات الولادة
(الرضاعه) . كمية اللبن في الثدي .