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INCIDENCE OF AFLATOXIGENIC MOLDS AND AFLATOXINS IN INFANT'S MILK POWDER

(With 3 Tables)

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مدى تواجد الفطريات المفرزه للأفلاتوكسين والأفلاتوكسين فى البان الأطفال المجففه

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تعتبر السموم الفطريه من أخطر الملوثات التى يتعرض لها الانسان والحيوان لما لها من تأثيرات سرطانيه وتشوهات خلقيه وتعد مجموعة الأفلاتوكسين من أخطر هذه السموم وينتج الأفلاتوكسين من مجموعة الأسبراجلس والتى تنمو على المواد الغذائيه تحت ظروف ملائمه من حرارة ورطوبه .

لذلك تم جمع ٥٠ عينه من ألبان الأطفال المجففه لمعرفة مدى تلوثهابالفطريات المفرزه للافلاتوكسين بالاضافه الى مدى تواجد الافلاتوكسين بها وقد تبين من الفحص أن فطر الاسبراجلس موجود بنسبة ٥٦ ٪ فى العينات المفحوصه وبتصنيفه وجدت الأنواع الآتيه :

Aspergillus flavus (8%), A. Parasiticus (4%), A niger (10%), A. terreus (14%), A. versicolor (12%) and A. fumigatus (8%).

وأوضحت الدراسه أن الفطريات المفرزه للافلاتوكسين وذلك على المستنبت موجوده بنسبة ٣ ر٣٣ ٪ من عدد الاسبراجلس Aspergillus flavus and A. parasiticus وذلك بمعدل ١٠ ر٤٥ جزء فى البليون للافلاتوكسين ب ١ أما الافلاتوكسين ج ١ فقد وجد بمعدل ١ ر٦ ، ٢٠ ر١١ جزء فى البليون .

وكذلك دلت النتائج على تلوث الالبان المجففه بالافلاتوكسين ب ١ بمعدل ٩ ر٠ والافلاتوكسين م ١ بمعدل ٧ ر١ جزء فى البليون .

واسترشاداً بالتقارير العلميه الصادره من المنظمات العالميه بشأن المستويات المسموح بها فى الألبان ومنتجاتها فاننا نوصى بالاهتمام بتحليل الاغذيه الحيوانيه والمنتجات الحيوانيه بصوره دوريه خصوصاً المستخدمه فى تغذية الاطفال والتأكد من خلوها من هذه السموم .

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SUMMARY

Fifty random samples of imported infant's milk powder obtained from different pharmacies at Assiut Governorate were analyzed for aflatoxigenic molds and aflatoxins. Out of 50 samples tested 28(56%) samples were positive for Aspergillus species, comporising *Aspergillus flavus* (8%), *Aspergillus parasiticus* (4%), *Aspergillus niger* (10%), *Aspergillus terreus* (14%), *Sspergillus versicolor (12%) and Aspergillus fumigatus (8%).* Analysis of media extract of *Aspergillus flavus* and *Aspergillus parasiticus* isolets for aflatoxins production revealed that 33.3% of these species were aflatoxins B1 and G1 producer in levels of 10, 45 ppb for B1 and 6.1, 11.2 ppb for G1. On the other hand, screening of 50 milk powder samples for aflatoxins, two samples were positive, one sample for aflatoxin B1 (0.9 ppb) and the other for M1 (1.7 ppb). Suggestive measures for improving the quality of the product are discussed.

Keywords: Incidence aflatoxigenic molds, aflatoxins infants milk powder.

INTRODUCTION

Molds are widely distributed as environmental contaminants of air, water, soil, dust, etc. Although only a relatively small proportion is responsible for spoilage of food and feed materials, those which cause economic losses. Many of the molds capable of producing mycotoxins are also frequent contaminants of food. These organisms are capable of growth on a variety of substrates and under a diversity of conditions of moisture, pH and temperature. Thus most foods are susceptible to fungal invasion during some stages of production, processing, transport and storage *(BULLERMAN, 1979).*

Aflatoxin is a group of toxic and carcinogenic secondary metabolites produced by some strains of *Aspergillus flavus* and *Aspergillus parasiticus* during growth on food. When feed contaminated with aflatoxin is consumed by dairy animals, the animals can be affected by the toxin. This affection is manifested by unthriftiness, anorexia, reduced feed conversion, decreased milk production and reduced immune responses to infectious agents *(MERTENS, 1979).*

Cooking food containing aflaoxin will not destroy it, it is extremely heat-stable. Among the processed food, milk powder and cheese may serve as substrates to *Aspergillus flavus (Van WALBEEK et al., 1986)*. Aflatoxin can be produced through growth of molds on milk powders that are moistened *(KIERMEIER, 1971)*. *HANSEN and JUNGE (1972)* found a 67% an incidence of aflatoxin M1 in 52 samples of milk powder. A high incidence of aflatoxin M1 has been found in samples of milk powder with a maximum level of 2-7 ug/Kg *(ROMER, 1975)*. *KIERMEIER (1976)* analyzed 160 samples of milk powder and found 24% incidence of aflatoxin M1 and the level was 4 ug/Kg, and one sample was found with a concentration of 0.4 ug/Kg of aflatoxin B1. On the other hand *KIERMEIER and WEISS (1976)*, found aflatoxin in artificially inoculated and moistened milk powder. The amount ranged from 0.06 to 19.2 ng/100 gm of milk powder. The current tolerance level for aflatoxin in foods is 20 ppb. In 1978, a guideline level of 0.5 ng/ml for liquid milk products was established. This level still applies today to all food commodities that are susceptible to direct contamination *(GEORGE, 1989)*.

Because of the greater sensitivity of young children to toxic substances in the diet and their primary dependence on this item in their diets, this study was undertaken to throw light on the occurrence of aflatoxigenic molds and aflatoxins in milk powder.

MATERIAL and METHODS

Fifty random imported samples of milk powder were collected in 1994 from different pharmacies in Assiut City.

- Mycological analysis:

The plating method (on Malt extract agar) was recommended according to *HARRIGAN and McCANCE (1976)*.

Representative colonies of each type of mold present were isolated and stored on Malt extract agar at 5°C. All mold isolates were identified using the kys of *RAPER and FENNELL (1965) and SAMSON (1979)*.

- Screening of milk powdr sampels and recovered mold isolates for aflatoxin production:

Mdia extract of *Aspergillus flavus and Aspergillus parasiticus* isolatd from milk powder samples were analyzed according to the method of the Association of Official Analytical Chemistry methods 1980 (CB methoed). Also representative 50 gm milk powder from each sample were analyzed according to the method of *PONS et al. (1973)*.

RESULTS

The obtained results were recorded in Tables (1, 2, and 3).

Table 1: Incidence of Aspergillus species in the examined milk powder samples.

Aspergillus species	Positive samples Number /50	Percent
A. flaus	4	8
A. parasitics	2	4
A. niger	5	10
A. terreus	7	14
A. versicolor	6	12
A. fumigatus	4	8
Total	28	56

Table 2: Incidence of aflatoxins in media extract of recovered *Aspergillus flavus* and Aspergillus parasiticus from the examined milk powder samples.

No. of examined isolates	positive	percent	Aflatoxin (ppb) B1	B2	G1	G2	M1	M2	Total
6	(two)	33.3							
	first		10	0	6.1	0	0	0	16.1
	second		45	0	11.2	0	0	0	46.2

Table 3: Incidence of aflatoxin in the examined milk powder samples.

No. of examined isolates	positive	percent	Aflatoxin (ppb) B1	B2	G1	G2	M1	M2	Total
50	(Two)	4							
	first		0.9	0	0	0	0	0	0.9
	second		0	0	0	0	1.7	0	1.7

DISCUSSION

Results given in Table (1) reveal that (56%) of the examined milk powder samples contained Aspergillus species. The

isolated aspergilli were classified as *Aspergillus flavus* (8%), *Aspergillus parasiticus* (4%), *Aspergillus niger* (10%), *Aspergillus terreus (14%), Aspergillus versicolor* (12%) and *Aspergillus fumigatus* (8%) Certain Aspergillus species were previously isolated from various dairy products *(BULLLERMAN, 1980; SEHAM* et al., *1983 and IBRAHIM, 1987).*

Aflatoxin appears in some dairy products if toxigenic aspergilli grow on the product during storage at a temperature favorable for aflatoxin production *(APPLEBAUM* et al., *1982).*

It was observed that screening of the recovered isolates for aflatoxin production, two isolates (33.3%) could produce aflatoxin B_1 and G_1 in a level of 10 & 6.1 and 45 & 11.2 ppb respectively.

As stated earlier, aflatoxin B_1, B_2, G_1 and G_2 are the major forms produced by the molds, and are of concern to dairy industry, while B_1 and G_1 are usually synthesized in the largest amounts.

Aflatoxin B1 in the feed of an animal is converted to aflatoxin M1 which appear in milk *(ALLCROFT and CARNAGHAN, 1962).* The other common aflatoxins, B2, G1 and G2 are converted to M2, GM1 and GM2 respectively *(PATTESON and ROBERTS, 1970).* The incidence (4%) and levels (0.9 and 1.7ppb B1 and M1 respectively) of aflatoxin in the examined milk powder samples in comparison with other previous reports were relatively low. *ROMER, (1975)* detected high level of 2-7 ppb aflatoxin M1 in milk powder samples. Also *KIERMEIER (1976)* found level as high as 4 ppb aflatoxin M1.

Since aflatoxins are carcinogenic, introduction of aflatoxins into the human food chain should be avoided *(RICHARD* et al., *1983).* Aflatoxin, remains a threat to health of farm animals and humans due to its continuing intermittent occurrence in both feeds and foods. The results of this study reflect a rather low incidence and level of aflatoxin cotamination in the samples tested in comparison with the highest permissible limit recommended by the FDA as 0.5 ppb for liquid milk products *(GEORGE, 1989).* However the detection of two positive milk powder samples as the main baby food justifies the adoption of measures leading to as an important improvment as possible.

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