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ARABIC SUMMARY

LIST OF ABBREVIATIONS

AAS:	Atomic Absorption Spectrophotometry.
ADI:	Acceptable daily intake.
Cd :	Cadmium.
g :	Gram
Hg :	Mercury.
Kg :	Killogram
mg :	Melligram.
ng :	Nanogram.
Pb:	Lead
PL :	Permissible limit.
ppb :	Part per billion.
Ppm:	Part per million
Sn :	Tin.
µg:	Microgram.

CONCLUSION AND RECOMMENDATION

It can be concluded from present investigation that analysis of imported dairy products indicates contamination of infant milk powder, whole milk powder, condensed milk, Feta cheese and processed cheese with heavy metals. This may attributed to environmental pollution of exported countries, which have resulted an over increase of such metals in air, water, soil and finally reached to produced milk. Lead and cadmium were found with high concentration above the permissible limits in all examined samples. The daily intake of lead and cadmium from consumption of infant milk powder exceeded the acceptable daily intake for infants. On the other hand, the daily intake of lead and cadmium from consumption of whole milk powder was relatively low, while daily intake of such metals from consumption of condensed milk, Feta cheese and processed cheese was relatively high and represented high proportion in-compared to ADI. Generally, the daily intake of mercury and tin from consumption of all imported dairy products was relatively low in-compared to ADI.

Also, from this study it can be concluded that examination of imported dairy products indicate presence of nitrate and nitrite in all examined samples. This may be due to addition of such chemicals as preservatives and color stabilizers or from contamination of original cow's milk used for manufacture of such products. Nitrate concentration were exceeded the recommended limits in almost of examined samples. The daily intake of nitrate from consumption of infant milk powder represented large portion in-comparing to ADI. Moreover, daily intake of nitrite from consumption of infant milk powder as well as, daily intake of nitrate and

nitrite from consumption of whole milk powder, condensed milk, Feta cheese and processed cheese were generally low in-comparing to ADI.

Using ascorbic acid seem to be efficient for reducing the concentration of nitrate and nitrite in reconstituted whole milk powder and condensed milk.

In order to protect the Egyptian human health from the hazardous effect of these chemicals in imported dairy products the following recommendations should be applied:

- 1- Strict analysis of imported milk and milk products at different Egyptian ports and presence of heavy metals and preservatives in such products above the recommended permissible limits should be refused and return to the original exported countries.
 - 2- A regular and representative monitoring of heavy metals and preservatives in imported dairy products at different outlets inside the country is recommended at an appropriate frequency to establish the true contribution of imported dairy products to the dietary intake of heavy metals and preservatives.
 - 3- Ascorbic acid could be applied with success in minimizing the concentration of nitrate and nitrite in liquid milk or reconstituted milk powder and condensed milk.
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SUMMARY

A total of 100 imported dairy product samples were collected from different markets from Damietta City, Damietta Governorate during the period from September 2000 to August 2001. The imported dairy product samples includes infant milk powder, whole milk powder, condensed milk, Feta cheese (soft cheese) and processed cheese (20 samples each). All samples were prepared for detection and determination of heavy metal residues (lead, cadmium, mercury and tin) as well as detection and determination of some preservatives (nitrate and nitrite). Moreover, the effectiveness of ascorbic acid on reduction of nitrate and nitrite in reconstituted whole milk powder and condensed milk was experimentally studied.

1- Heavy metals in imported dairy products:

1- Heavy metals in imported milk powder:

Average of lead, cadmium, mercury and tin in infant milk powder were 2.24 ppm, 0.33 ppm, 0.15 ppb 3.08 ppm, respectively. While the average concentration of these metals in whole milk powder were 2.18 ppm, 0.34 ppm, 0.11 ppb and 3.83 ppm, respectively. All examined samples of infant milk powder and whole milk powder had Pb and Cd residues above the permissible limit. Meanwhile, Hg and Sn in all examined samples of milk powder were lower than the permissible limit. The calculated daily intake of Pb, Cd, Hg and Sn from consumption of infant milk powder for infants were 201.6, 29.7, 0.0135 and 277.2 μg , respectively, which represented about 960, 495, 0.31 and 2.31% from the

Acceptable Daily Intake of Pb, Cd, Hg and Sn recommended by FAO/WHO. Moreover, the calculated daily intake of Pb, Cd, Hg and Sn from consumption of whole milk powder for adult person were 54.50, 8.50, 0.027, and 95.75 μg respectively, which represented about 10.9, 12.14, 0.054 and 0.068% of provisional ADI. It is evident from these results that Pb and Cd predominant toxic metals in examined milk powder samples. The public health significance of Pb and Cd was discussed.

2-Heavy metals in imported condensed milk:

Mean level of lead, cadmium, mercury and tin in examined condensed milk were 2.07 ppm, 0.72 ppm, 0.11 ppb and 3.70 ppm, respectively. Examined samples of condensed milk had Pb and Cd residues above the permissible limit. Meanwhile, Hg and Sn in examined samples of condensed milk were lower than the permissible limit. The calculated daily intake of Pb, Cd, Hg and Sn from consumption of condensed milk for adult person were 117.9, 57.60, 0.088 and 296 μg respectively, which represented about 23.58, 82.28, 0.176 and 0.211% of provisional ADI.

3-Heavy metals in imported cheese:

Average concentration of Pb, Cd, Hg and Sn in Feta cheese (soft cheese) were 2.28 ppm, 0.85 ppm, 0.14 ppb and 3.58 ppm, respectively. While the average concentration of these metals in processed cheese were 2.21 ppm, 0.73 ppm, 0.12 ppb and 4.63 ppm, respectively. All examined samples of cheese samples had Pb and Cd residues over the permissible

limit. Meanwhile, Hg and Sn in all examined cheese samples were lower than the permissible limit. The calculated daily intake of Pb, Cd, Hg and Sn from consumption of Feta cheese for adult person were 228, 85, 0.014 and 358 μg , respectively, which represented about 45.60, 121.42, 0.028, 0.255% from the ADI. Moreover, the calculated daily intake of Pb, Cd, Hg and Sn from consumption of processed cheese were 176.8, 58.4, 0.0096 and 370.4 μg for adult person, respectively, which contributed 35.36, 83.42, 0.019 and 0.264% of ADI.

It is obvious from the obtained results that all imported dairy products samples were contained lead and cadmium above the permissible limits.

II-Nitrate and nitrite in imported dairy products:

1-Nitrate and nitrite in imported milk powder:

Mean level of nitrate and nitrite in infant milk powder were 219.98 and 0.21 ppm, respectively. While the average concentration in whole milk powder were 279.90 and 0.30 ppm, respectively. All examined samples of milk powder had nitrate concentration above the permissible limit. While, nitrite in all examined samples of milk powder was lower than the permissible limit. The calculated daily intake of NO_3 and NO_2 from consumption of infant milk powder for infants were 19.79 and 0.018 mg and these quantities representing 89.14% and 5% of ADI. Moreover, the calculated daily intake of NO_3 and NO_2 from consumption of whole milk

powder were 5.75 and 0.0075 mg for adult person and these quantities representing 2.22 and 0.18% of ADI.

2-Nitrate and nitrite in condensed milk:

Average of nitrate and nitrite in condensed milk were 76.89 and 0.18 ppm. 95% of examined samples of condensed milk had nitrate above the permissible limit, while nitrite in all examined condensed milk samples not exceeded the permissible limit. The calculated daily intake of NO_3 and NO_2 from consumption of condensed milk for adult person were 4.38 and 0.010 mg and these quantities representing 1.69 and 0.23% of ADI.

3- Nitrate and nitrite in cheese:

Mean concentration of NO_3 and NO_2 in Feta cheese (soft cheese) were 267.09 and 0.72 ppm. While the average concentration in processed cheese were 291.77 and 0.39 ppm. All examined samples of cheese had nitrate above the permissible limit, while nitrite in all examined samples within the permissible limit. The calculated daily intake of NO_3 and NO_2 from consumption of Feta cheese for adult person were 26.70 and 0.072 mg and these quantities represented 10.30 and 1.71% of ADI. While, the daily intake of NO_3 and NO_2 from consumption of processed cheese for adult person were 23.34 and 0.031 mg and these quantities represented 9.01 and 0.73% of ADI.

It is clear from these results that all imported dairy products samples were contained nitrate above the recommended limit. The public health significance of nitrate was discussed.

4- **The effectiveness of ascorbic acid on reduction of nitrate and nitrite in reconstituted whole milk powder and condensed milk:**

The obtained result revealed that ascorbic acid at concentration of 0.01% gave 40.36 and 52.94% reduction of nitrate in reconstituted whole milk powder after 15 and 30 minutes, respectively. Also, 0.01% ascorbic acid after contact time 15 and 30 minutes gave 72.72 and 74.03% reduction of nitrite respectively. On the other hand, ascorbic acid at the same concentration gave 48.01 and 72.91% reduction of nitrate after 15 and 30 minutes, respectively. Moreover, nitrite was reduced to be 68.52 and 79.63% in reconstituted condensed milk after 15 and 30 minutes, respectively. Thus, ascorbic acid could be applied with success in reduction the concentration of nitrate and nitrite in some milk.
