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PROTOZOAL FOODBORNE PATHOGENS IN SOME MEAT PRODCUTS

(With 1 Table)

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الطفيليات الأولية الممرضة فى بعض منتجات اللحوم

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اجريت هذه الدراسة على عدد 75 عينة من منتجات اللحوم ممثلة فى لحوم مفرومة وسجق ولنشون بواقع 25 عينة من كل نوع وتم فحص تلك العينات عن مدى تلوثها بالطفيليات الاولية التى تسبب أمراض للمستهلك نتيجة لتناول الغذاء الملوث بتلك الطفيليات الاولية. وتبين من الفحص ان تلك العينات التى تم فحصها كانت ملوثة بالطفيليات الاولية التالية: *Cryptosporidum parvum, Giardia lamblia, Toxoplasma gondii* and *Entamoeba histolytica* وتم مناقشة المخاطر والامراض التى تسببها تلك الطفيليات الاولية الممرضة على صحة المستهلك وكيفية منع تلوث منتجات اللحوم بتلك الطفيليات الاولية الممرضة.

SUMMARY

A total of 75 samples of minced meat, sausage and lunchean (25 of each) were examined for detection of protozoal food borne pathogens. *Cryptosporidum parvum, Giardia lamblia, Toxoplasma gondii*, and *Entamoeba histolytica* could be detected in varying percentages in the examined meat products. The public health significance of the detected protozoal foodborne pathogens and the sources of contamination as well as recommendations to protect meat products from contamination with protozoal foodborne pathogens were discussed.

Key words: *Protozoa, Meat products.*

INTRODUCTION

Protozoa are ubiquitous organisms and are frequently encountered in domesticated animals and man. Some protozoa may be of particular concern where lack of host specificity may lead to zoonotic transmission and infection in man, under this category the most important parasites are Cryptosporidium, Giardia, Toxoplasma and Entamoeba species. Cryptosporidium, Giardia and *Entamoeba histolytica* are increasingly recognized as significant causes of intestinal diseases in animals and man (Meyer and Jarroll, 1980 and Kostrzynska et al., 1999).

Toxoplasmosis is caused by Toxoplasma gondii. Toxoplasmosis is very severe infection for unborn babies. Unborn babies catch this parasite from their mothers, if the mother is infected during pregnancy, especially during the first three months. Unborn babies are at risk of severe infection that may result in mental retardation, blindness or death (Frankel and Ruiz, 1981). So the present investigation was planned out to study the protozoal food borne pathogens in minced meat, sausage and luncheon meat products.

MATERIAL and METHODS

A total of 75 samples of minced meat, sausage and lucnhean (25 of each) meat products were collected from different supermarkets at Kalyobia governorate. The samples were transported as soon as possible under hygienic conditions to the laboratory for their examination for the following:

A. Detection of Cryptosporidium species:

Current laboratory method for detection of Cryptosporidium rely on the direct smear of food concentration and subsequent microscopic examination. Acid fast stain have been used to differentiate cysts from surroudning debris (Baxby et al., 1984 and Weber et al., 1991)

B- Detection of Giardia species:

Giardia cysts can be detected in meat products by smear of meat product or meat concentrate by formalin-ethyl acetate sulphate method and subsequent microscopic examination (Adam, 1991).

Use of fluorogenic dyes such as flouroescin diacetate which is taken up by viable cysts and propidium iodide which is taken up by non viable cysts (Smith and Smith, 1989).

C- Detection of *Toxoplasma gondii:*

Impression smears stained with Giemsa stain may allow identification of tachyzoites or tissue cysts. Diagnosis confirmed by isolation of viable parasites by mouse inoculation (Frankel et al., 1969 and Dorfman and Remington, 1973).

D- Detection of Entamoeba histolytica:

Permanent stained smear with trichrome stain and by culturing on Robinson's medium (Diamond, 1987).

RESULTS

Table 1: Incidence of protozoal foodborne pathogens detected in meat product samples.

Protozoa	Minced meat N=25		Sausage N=25		Luncheon N = 25	
	No. +ve	%	No. +Ve	%	No +ve	%
Cyptosporidium parvum	5	20	3	12	1	4
Giardia lamblia	8	32	7	28	2	8
Toxoplasma gondii	2	8	4	16	1	4
Entamoeba histolytica	5	20	9	36	3	12

DISCUSSION

Cryptosporidiosis may occur sporadically as an outbreak following zoonotic transmission from farm animals, person to person spread or the contamination of water or food supply (*Casemore 1991).*

The data recorded in Table (1) revealed that *Cryptosporidium parvum* could be detected in minced meat (20%), sausage (12%) and luncheon (4%) meat product samples. The incidence of contamination is high in minced meat and sausage may be due to the absence of heat treatment during processing, and the incidence of contamination is low in luncheon samples this may be due to heat treatment during processing. These results are in agreement with those reported by (Harp et al., 1996) who stated that *Cryptosporidium parvum* is of most concern for human and animal health because the ingestion of low number of oocysts can cause severe diarrheal disease (cryptosporidiosis) by invasion of the intestinal tract. *Cryptosporidium parvum* can be transmitted directly amongest different host species via the faecal oral route or indirectly by faecally contaminated food or water.

Wild mammals particularly rodents have been identified as reservoirs of *Cryptosporidium parvum* and *Cryptosporidium muris* (Chalmers et al., 1997).

The results also revealed that *Giardia lamblia* could be detected in minced meat (32%), sausage(28%) and luncheon (8%)meat product samples. These results are in agreement with those reported by Taylor (1995) and Olson et al. (1997) who stated that Giardia duodenalis (intestinalis) and Cryptosporidium species are commonly identified as intestinal pathogens in human and animals.

Outbreaks may occur due to the ingestion of contaminated food by infected or infested food handlers. Cool moist conditions favor the survival of the organism. Giardiasis occurs throughout the population, although prevalence is higher in children than in adults. Chronic symptomatic giardiasis is more common in adults than in children. Transmission of giardiasis occur by ingestion of viable cysts. Although contaminated food or drinking water may be the source, intimate contact with an infected individual may also provide the infection mechanism (Danciger and Lopez, 1975; Craft, 1982 and Kasprzak and Pawlowski, 1989).

The data recorded in Table (1) revealed that *Toxoplasma gondii* and *Entamoeba histolytica* could be detected in minced meat (8%,20%), sausage (4%,9%) and luncheon (4% ,12%), Respectively. The incidence of contamination is relatively high in minced, sausage this may be due to the absence of heat treatment during processing and the incidence of contamination is relatively low in luncheon samples this may be be due to heat treatmen during processing.

These results are in agreement with those reported by Frenkel and Dubey (1972) who stated that human infection with *Toxoplasma gondii* can be a cquired through ingestion of infected meat or through ingestion of infective oocyst which can remain viable within cool, moist soil for a year or longer. However, eating raw or undercooked meat constitutes a risk (Fayer, 1981).

Other infected animals (birds or mice) may shed oocysts in their faeces, so other preventive measures including in the Kitty litter box daily and disinfecting the pan with boiling water have been recommended. Also the faeces should not be placed onto the soil but rather disposed of either in the toilets or within bags (Markell and Voge, 1981).

The human is the reservoir host for *Entamoeba histolytica* and can transmit the infection to other humans, primates, dogs, cats and

possibly pigs. The cyst stages are very resistant to environmental conditions and can remain viable in the soil for 8 days at 28 to 34°C, 40 days at 2 to 6°C and 60 days at O°C (Beaver et al., 1956).

For production of meat products free from protozoal foodborne pathogens, the food handlers, food animals, water supply and the environment inside the meat processing plant must be free from protozoa or protozoal oocysts. A dequate cooking of meat is recommended .

REFERENCES

Adam, R.D. (1991): The biology of Giardia species. Microbiological Review 55, 706-732.

Baxby, D.N.; Blundell and C.A. Hart (1984): The development and performance of a simple sensitive method for the detection of Cryptosporidium oocysts in feces. J. Hyg. 93: 317-323.

Beaver, P.C.; Jung, R.; Sherman, H.; Read, T. and Robinson, T. (1956): Experimental Entamoeba histolytica infections in man. Am. J. Trop. Med. Hyg. 500:1000-1009.

Casemore, D.P. (1991): The epidemiology of human cryptosporidiosis and water route of infection. Water. Sci. Tech. 24: 157-164.

Chalmers, R.M.; Sturdee, A.P.; Bull, S.A.; Miller, A.; Wright, S.E. (1997): The prevalence of Cryptosporidium parvum and Cryptosporidium muris in mus domesticus. A Podemus sylvaticus and Clethrionomys glareolus in an agricultural system. Parasitol Res. 83, 478-482.

Cole, D.J.; Cohen, N.D.; Snowden, K. and Smith, R. (1998): Prevalence of and risk factors for fecal sheding of Cryptosporidium parvum oocytsts in horses. J. Am. Vet. Med. Assoc. 1(9): 1296-1302.

Craft, J.C. (1982): Giardia and giardiasis in children. Pediatr. Infect. Dis. 1: 196-211.

Diamond, L.S. (1987): Entamoeba, Giardia and Trichomonas in: In vitro Methods for parasite cultivation (Ed. E.E.R. Talyor and J. R. Baker). London, Academic Press. P.15.

Danciger, M. and Lopez, M. (1975): Numbers of giardia in feces of infected children. Am. J. Trop. Med. Hyg. 24: 237-242.

Dorfman, R.F. and Remington, J.S. (1973): Value of lymph node biopsy in the diagnosis of acute acquired toxoplasmosis. N. Engl. J. Med. 289: 878-881.

Fayer, R. (1981): Toxoplasmosis and public health implications. Canadian Veterinary Journal 22, 344-352.

Frankel, J.K.; Dubey, J.P. and Miller, N.L. (1969): Toxoplasma gondii: fecal forms separated from eggs of the nematode Toxocara cati. Science 164: 432-433.

Frankel, J.K. and Ruiz. A. (1981): Endemicity of toxoplasmosis inCosta Rica. Am. J. Epidemiol. 113: 254-269.

Frenkel, J.K. and Dubey, J.P. (1972): Toxoplasmosis and its prevention in cats and man. J. Infect. Dis. 126: 664-673.

Harp, J.A.; Fayer, R.; Pesch, B.A. and Jackson, G.J. (1996): Effect of pasteurization on infectivity of *Cryptosporidium parvum* oocysts in water and milk. Appl. Environ. Microbiol. 62(8): 2866-2868.

Kasprzak, W. and Pawlowski, Z. (1989): Zoonotic aspects of Giardiasis: A review. Vet. Parasitol. 23, 101-108.

Kostrzynska, M.; Sankey, M.; Haack, E.; Power, C.; Aldom, J.E.; Chagla, A.H.; Unger, S.; Palmateer, G.; Lee, H.; Trevors, J.T. and De Graudis, S.A. (1999): Three sample preparation protocols for polymerase chain reaction based detection of *Cryptosporidium parvum* in environmental samples. J. Microbiol Methods 35 (1): 65-71.

Markell, E.K. and Voge, M. (1981): Medical parasitology 5th ed. The W.B. Saunders. Co., Philaselphia.

Meyer, E.A. and Jarroll, E.L. (1980): Giardiasis Am. J. Epidemiol. 111: 1-12.

Olson, M.E.; Thorlakson, G.L.; Deselliess, L.; Morck, D.W. and Mcallister, T.A. (1997): Giardia and Cryptosporidium in Canadian farm animals. Vet. Parasitol. 68 (4): 375-381.

Smith, A.L. and Smith, H.V. (1989): A comparison of fluorescein diacetate and Propodium iodide staining and in vitro excystation for determining Giardia intestinalis cyst viability. Parasitology 99, 329-331.

Taylor, M.A. (1995): Protozoan Parasites and water: Veterinary Aspects. In Protozoan parasites and water (Eds. W.B.Betts; D. Casemore; C. Ficker; H.Smith and J. Watkins). Cambridge, UK. The Royal Society of Chemistry P. 246-249.

Weber, R.; Bryan, R.T.; Bishop, H.S.; Wahlquist, S.P.; Sullivan, J. and Juranek, D.D. (1991): Threshold of Detection of *Cryptosporidium oocyst* in human stool specimens: evidence for low sensitviity of current diagnostic methods. Journal of Clinical Microbiology 29: 1323-1327.