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Determination of Parasitic Contamination at Production Phase in Deep-Redground Pepper (Isot) Produced in Sanliurfa, Turkey

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Abstract: Deep-red ground pepper (Isot), a variety of red ground pepper is a special spices belonging to Sanliurfa and consumed both in Sanliurfa and other provinces of Turkey. The aim of this study was to determine the parasitic contamination levels of deep-red ground pepper produced at home. For this purpose, 82 samples of homemade Isotin Sanliurfa (Turkey) were collected from manufacturers. The occurrence of parasite eggs and protozoon oocysts in the samples was investigated by microscopic examination. Protozoon oocyst and helminth eggs were detected in four of the 82 Isot samples (4.87%). Three of these samples were identified as protozoan oocysts (3.68%) and one of these samples was identified as helminth eggs (1.21%) More hygienic measures should be taken on in order to prevent parasitic contaminations.

Key words: Deep-red ground pepper, Isot, parasite egg, contamination, hygienic measures

INTRODUCTION

Turkey is the third country, following China and Mexico, in the production of red pepper (*Capsicum annuum* L.) with production of 1.84 million metric tonnes (FAO, 2010). Red pepper plays an important role in the economy of the South-Eastern region of Anatolia. It is extensively produced in Sanliurfa, Gaziantep, Kahramanmaras and Kilis provinces in the South-Eastern region of Anatolia and Hatay Province in the Mediterranean region (Abak, 1994; Golge *et al*., 2013). The production of red pepper in these provinces is approximately 180,000 tonnes per annum which accounts for around 95% of the total red pepper production of Turkey (TUIK, 2010).

Red ground pepper (Isot), the dried form of *Capsicum annuum* L. is one of the most important spices and occupies a prominent place among the spices in Turkey. It is consumed by the majority of people and is commonly used for flavouring, seasoning and imparting aroma or colouring of foods. Deep-red ground pepper (Isot) is a variety of red ground pepper. It is a special spices belonging to Sanliurfa and consumed by both Sanliurfa and other provinces of Turkey and also exported to other countries. It is known as Isot in the Sanliurfa and is produced both traditionally at home and commercially in the factory. Traditional deep-red ground pepper is generally produced at homesteads in order to sell or to consume at home (Ardic *et al*., 2008).

The main stages of the traditional production of Isot are as follows: Fresh red peppers are cleaned and divided into four parts with knife. Then, they are spread and kept on concrete surface for a day to evaporate some of its water. In the next stage, they are transferred into plastic bags during daytime to perspire and are kept in plastic bags through out the night. It is kept for 7-10 days in plastic bags until its colour turns into deep-red. Later they are hammered and sieved. Finally, 250-300 mL of olive oil and 500 g salt are added into 100 kg peppers. In the industrial production of deep-red ground pepper, drying is achieved on pulsating trays in a hot air circulated tunnel (Hayoglu *et al*., 2005; Ardic *et al*., 2008).

Intestinal parasitic infections can be transmitted by the fecal-oral route by eating intrinsically contaminated food or via up take of free-living parasitic stages from the environment (eggs, cysts and oocysts). Contamination of food products can be introduced via feces, soil, irrigation water, sewage and human handling (Newell *et al*., 2010; Adanir and Tasci, 2013). Like other agricultural products, spices and herbs may be exposed to a wide range of parasitic contamination during pre and post-harvest. Contamination may occur during processing storage,

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distribution, sale and/or use. Isot is usually dried on the ground in the open air in poor hygienic conditions that even more promote the parasitic contamination. Therefore, spices pose health problems because they are often added to foods without further processing or are eaten raw.

The aim of this study was to provide information on parasitic contamination in deep-red ground peppers in Sanliurfa, a Southeastern Province of Turkey. The result of this study can contribute to the evaluation of deep-red ground peppers (Isot) in terms offood safety.

MATERIALS AND METHODS

Sample collection: Between July 2011 and November 2011, a total of 82 samples of Isot including 28 of them dried on the balcony, 26 of them dried on the roof and 28 of them dried on the garden and road side were obtained from Isot producers in Sanliurfa, Turkey. Representative portion of a minimum of 250 g of samples were taken and transported to the laboratory for analysis in sterile nylon bags. Since, it was intended only to determine the contamination in the production phase, sample was not taken from red pepper sales room. In addition, samples were not taken from the factory where production was carried out hygienically.

Determination of helminth eggs and protozoan cysts-oocyst: Each Isot sample was weighted (100 g) into sterile plastic bags and washed with physiological saline solution (0.85% NaCl) and the washing water/saline was left for about 24 h for sedimentation to take place. The top layer was discarded and 5 mL of the remaining washing water centrifuged at 2000 g for 5 min. The supernatant was discarded and the residue carefully collected. The samples were agitated gently by hand in physiological saline solution containing lugol again for further distribution of cysts-oocyst and eggs. Then, the concentration of cysts-oocyst and eggs in residue was examinedin lugol stained through light microscopy using the technique of Te 'le' man Rivas modified by Bailenger (1962). Finally, OPG/EPG counts were performed in positive samples by modified McMaster technique (Thienpoint *et al*., 1986; MAFF, 1986).

RESULTS AND DISCUSSION

Results of parasitic contamination of Isot samples are presented in Table 1. The parasitic contamination was detected in four out of eighty two Isot samples (4.87%). Three of these were identified as protozoan oocysts (3.68%) and one of these was identified ashelminth eggs (1.21%). Parasitic contamination agents could not be identified at the species level.

During Isot production phase, parasitic contamination could not be identified at the species level. Identification of *Eimeria* species are made of sporulation with 2.5% potassium dichromate solution (Soulsby, 1986). Oocysts detected in the samples could not sporulated because of lose their vitality. Likewise, identification of Trichostrongylid eggs aredone with fecal culture (Urquhart *et al*., 1994). Because helminth eggs lose their viability due to the extreme heat their larvae could not be produced in the fecal culture. Red peppers have been dried under direct sunlight at the temperature around 50-60°C in the production phase of Isot. In this case, morphological characteristics and viability of oocysts and eggs have been corrupted. This situation is favourable in terms of public health. However, the bacteria more resistant to heat, fungal spores and parasite eggs or cysts or outlets, parasitic contamination during storage or packaging of food safety and public health terms is risky (Newell *et al*., 2010).

Human intestinal parasitic infections are the most common infections worldwide. Fruits and vegetables, particularly those eaten raw and without peeling have been demonstrated to be the vehicle for transmission of a range of parasites. The case is made for food-borne infection being a problem which should be of increasing concern (Erdogrul and Sener, 2005). There becomes risk of contamination in terms of public health when Isot is consumed unbaked.

In Turkey, parasitic contamination researches have been carried out for a lot of agricultural products which are consumed raw (Erdogrul and Sener, 2005; Kozan *et al*., 2005; Avcioglu *et al*., 2011; Adanir and Tasci, 2013). This study has the feature of 'being first' as there is no other study about parasitic contamination in Isot. Therefore, the study could not make argumentation and comparison.

The drying phase of traditional homemade Isot is carried out in direct sunlight and in open areas. Isot

Table 1: Distribution of parasitic contamination in examined samples

Samples origin	Examined	Contaminated	Percentage	Explanation	EPG/OPG
House balcony	28	-	-	-	-
Roof-terrace	26	1	3.84	*Eimeria* sp. (1)	150
Gardens-open areas	28	3	10.71	*Eimeria* sp. (2), Trichostrongylidae (1)	170,190,60
Total	82	4	4.87	-	-

processed in this way is at the maximum demand of local people. However, open areas are places open to environmental contamination. Especially home gardens, road-field edges are the places where domestic and wild animals wander frequently. Such open places where in the first place cats and dogs then mice, rats like carnivores and rodents, pigeons, poultry such as hens, ducks and geese, mammals such as sheep, goats and cattle wander in an uncontrolled way are the places where parasitic contamination is utmost. Additionally, roof, balcony, terraces and housetops are the areas that carry the risk of contamination.

The reason why there is contamination in Isot produced in gardens and terraces but there is no such contamination in the one produced in balconies is that there is no contact of Isot with animal feces in balconies. There are a lot of pigeon nests in the roof of houses in the region. Also, local people raise domestic hens in small herds in their gardens. It is possible that Eimeriao ocysts that were found are the species settle in winged animals. This could not be proved as oocysts could not be sporulated. However, this can be done in the following researches by molecular technics.

It is difficult to completely prevent exposure to *Echinococcus* sp. eggs from wild animals however, food safety precautions, combined with good hygiene can be helpful (Adanir and Tasci, 2013). After examination, it is figured out that emergence of very low parasitic contamination in Isot results from parasite eggs or oocysts exposure to direct sunlight at a temperature of 50-60°C as long as 8-10 days during drying process and accordingly are destroyed losing their vitality. Hence, homemade Isot does not carry the risk of infection in terms of parasitic contamination. However, eggs which are more resistant to heat and which have thick shell such as *Ascaris lumbricoides* carry potential risks. On the other hand, the fact that most of the parasites found in these animals cannot settle in humans because they show strong host specificity is one of the factors that decrease parasitic contamination. However, the fact that Taeniidae eggs first *Echiococus granulosus* which localize in cats and especially dogs amalgamate Isot and taken by humans cause the level of the prevalence of hydatic cysts in humans in the region to be higher than Turkey's average (Sevgili and Gokcen, 2008).

Spices are exposed to a wide range of microbial contamination as a result of improper production process, extended drying times and poor storage conditions and red pepper flakes is a very sensitive product for aflatoxin formation depending on unsuitable processing conditions because they are usually dried on the ground in the open air (Kursun and Mutlu, 2010). Red pepper flakes are consumed in Turkey by the majority of people, especially for flavouring, seasoning and imparting aroma or colouring foods (Shamsuddin *et al*., 1995; Coksoyler, 1999). When Isot is used in local dishes and foods which require heat for their preparation such as lahmacun-pizza, parasite eggs and oocytes become destroyed. However, because the habit of raw meatball (cig kofte) consumption is very high, Isot which gets contaminated by parasite eggs used in such type of foods which does not require heat for their preparation may create a hazard for public health. So, hydatid disease cases can be seen in people who have never met any dogs in their life (Sevgili and Gokcen, 2008).

Isot which is processed by conventional methods should be processed in closed and isolated areas in balconies in order to prevent the contact with uncontrolled animals and their faeces. If it is dried on housetops or in the gardens, fields and roadsides, it is vital to cover it with a blanket like tulle curtains in order to prevent the contact with wandering animals in terms of food safety. The healtiest way is that Isot be processed in a factory environment and in safe areas all production steps of which can be controlled and is that it should be supplied for consumption by packaged in an untouched and hygienic way.

Food Agriculture and Livestock Ministry is required to make the necessary legal arrangements in order that Isot which is placed in food codex as a semi-fermented spice which has patent registry and which is produced in a huge quantity like approximately 6500 tonnes per year can be processed in hygienic and controlled way from farm (the beginning) to table (the end). It is inevitably necessary that the people who grow Isot by commercial purpose are given manufacturer licence and amount and the manner of production should be recorded.

CONCLUSION

As a result, it is seen that Isot which is produced in Sanliurfa and supplied for consumption is not completely hygienic in parasitological aspect. Although, it is few, it is ascertained that it carries pathogenic and non-pathogenic oocysts and eggs. As it is also consumed raw, it is concluded that it becomes a potential hazard for public health. Therefore, it is understood that in order that hygienic quality of Isot is sufficiently fine, the production should be in factory environment in a hygienic way, the product should be packaged and also, unpackaged sale should be banned.

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