PUBLIC HEALTH HAZARDS OF MECHANICALLY DEBONED POULTRY MEAT (MINCED CHICKEN MEAT)

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ABSTRACT

Several pathogens have increased in prevalence associated with new food vehicles. Mechanically deboned poultry meat (MDPM) is a new product introduced to Egyptian markets with lack of Egyptian standard specifications (ESS). To assess the microbial load of this product, twenty frozen samples and their bag swabs (20 samples of each) were collected from the local markets in Cairo & Giza Governorates. They were bacteriolagically examined, especially for microorganisms of public health concern. The examination revealed that the total aerobic and psychrotrophic counts of this product were 7.4×10^5 and 3.7×10^4 respectively. The most probable number (MPN) for coliforms and faecal coliforms of this product were 4.9×10^3 and 4.5×10^3 respectively, Staphylococcus aureus count was 7.9×10^3 and total yeast and mould counts were 1.6×10^6 and 3.9×10^5 respectively. The microbial quality was evaluated in relation to microorganisms implicated as food poisoning agents as, *Staphylococcus aureus*, *Salmonella species*, *Clostridium species*, *Campylobacter species* and *E.coli* biotype I. They were isolated from the product and its bag swabs. None was contaminated with *E.coli O157*. The obtained results evidenced significant correlation between the microorganisms recovered from the examined samples and those isolated from their bag swabs. The present study emphasized that MDPM harbors high burden of pathogenic microorganisms, having the possibility of transmission from or/ to this product to seller hands as well as to the consequent food products. The potential public health hazards and the recommended hygienic measures to ensure the safety and quality of this product were discussed.

INTRODUCTION

Mechanically deboned poultry meat (MDPM) is produced by mechanical deboning of leftover undergrade poultry parts such as backs, frames, necks and wings (**Raccach & Baker, 1979**).

The mechanical deboning process has increased the utilization of poultry meat in further processed products, especially with the world shortage of protein, providing increased food products for a hungry world (**Greenwood and Swaminathan, 1981**). Moreover, MDPM may be consumed as ground poultry meat (**Dawson, 1975**).

Raccach & Baker (1979) stated that the tissue maceration allows for the release of cellular fluids rich in nutrients, this highly- comminuted nature, lends itself to microbial problems. However, (**Scientific Committee on Animal Health and Animal Welfare, 1997**) recommended that MDPM must be regarded as potential health risk as it is a source of pathogens like *salmonella species*, *campylobacter*, enterohaemorrhagic *E.coli O157: H7*, *Listeria*, *Yerisinia*, *enterocolitica* and *Staphylococcus aureus*.

It is necessary to mention that, the previous isolated microorganisms in this product implicated as food borne bacterial infections, which have emerged as important public hazard problems in developed and developing countries all over the world and affecting economy of industrialized countries (**Schlundt, 2001**).

Thorns (2000), mentioned that bacterial food borne zoonotic infections are the most common cause of human intestinal diseases. **Zhao *et al.*, (2001)**, mentioned that, nearly 2.4 million cases are caused by *Campylobacter spp.*, 1.4 million cases are caused by nontyphoidal *Salmonella* serovars and 270.000 cases are caused by pathogenic *Escherichia coli* including *E.coli O 157:H7*.

Although most food borne gastrointestinal infections are self-limiting, in a subset of patients they can cause severe complications and increased risk of death (**Helms *et al.*, 2003**). Moreover the person infected with a food borne pathogen can act as a carrier and source of infection to others.

Upon close examination of most foodborne outbreaks, the evidence strongly suggests that, the majority of problems are associated with improper food handling practice such as inadequate temperature control and poor personal hygiene (**Schmidt *et al.*, 2003**).

However, no real attempt in Egypt has so far been made in microbiological evaluation and keeping quality of this product as compared to other raw poultry products. The present work aims at determining the microbial populations, especially those of public health significance in this new poultry product (MDPM), taking in consideration that there are no Egyptian permissible limits for this product. Moreover, the role of seller's

hands in cross contamination of this product with zoonotic microorganisms will be assessed.

MATERIAL AND METHODS

Sampling:

Twenty random samples of frozen mechanically deboned chicken meat (closed bags each sample of 1 Kg) were collected from local markets in Cairo and Giza Governorates in sterile polyethylene bag and immediately transferred to the laboratory in icebox. In addition, each sample bag was swabed using sterile swabs soaked in sterile peptone water (representing hand swabs of sellers).

All collected samples were subjected to bacteriological examination as follows:

Preparation of product homogenate:

According to the technique recommended by ICMSF (1978), ten grams of each sample was homogenized with 90 ml. Ringer's solution for 1 min. using stomacher (lab-blender 400, seward, UAC House Black Friars Road, London SE 19 UG-Model No.6021), to provide dilution 10^{-1}, then ten fold decimal serial dilution up to 10^{-6} were prepared.

Determination of Aerobic plate counts (APC):

As the spreading technique recommended by ICMSF (1978), Standard Plate Count agar plates were used and incubated at 32 °C for 48 hrs. The average number of colonies was determined and the Aerobic plate count /gram was calculated as follows:

Bacterial count = number of colonies x dilution factor

Determination of Psychrotrophic count:

The technique recommended by APHA (1992) was applied, where the prepared product homogenate was spreaded onto Standard Plate Count agar plates. Then after incubation at 5-7 °C for 10 days, the number of psychrotrophs per gram was calculated.

Determination, isolation and identification of *Staphylococcus aureus*:

The technique recommended by ISO (1997) for *S. aureus* count was conducted using Baird Parker agar medium. The number of colonies was determined and *S. aureus* count was calculated. Suspected colonies were purified for further identification according to APHA (1992) through the following tests, microscopic examination, catalase activity, oxidation-fermintation test, coagulase test and thermonuclease test.

Determination of total yeast and mould counts:

According to **Cruickshank *et al.*, (1975)**, using Sabouraud's Dextrose agar medium. Yeast and Mould colonies were enumerated and the total counts / gram were calculated.

Coliforms and faecal coliforms count (MPN):

The method recommended by **APHA (1992)** was applied by using Lauryl sulphate tryptose broth (LST). LST tubes showing turbidity and gas production were considered positive and coliforms count was estimated. For faecal coliforms count, positive LST broth tubes were subcultured into *E.coli* (E.C) broth, then positive tubes were recorded and faecal coliforms count / gram was estimated.

Isolation and identification of enteropathogenic *Escherichia coli (EPEC)*:

The technique recommended by **APHA (1992)** was adopted, where direct plating from each positive E.C. tube onto Eosin Methylene Blue agar (EMB) plates and incubated at 37 °C for 24 hrs.

Then typical colonies were picked up, purified and identified through applying the following tests, IMViC (Indole, Methyl red, Voges Proskauer and citrate), 4-methyl umbelliferyl-beta-D-glucuronic acid (MUG activity) and Gram stain. Conventionally identified isolates as IMViC, + + - - with positive MUG activity, were subjected to further identification by API 20E system (BioMerieux ref. 20/110. 129190; ref. 70/380,100).

Isolation and identification of enterohaemorrhagic EHEC, *E.coli (O157)*:

According to **De Boer and Heuvelink, (2000)**. A loopful of LST positive tube was streaked onto Sorbitol MacConkey agar (SMA) plates. Sorbitol negative (colourless colonies) were picked up purified and identified by the following tests, Gram stain, IMViC and MUG activity. Conventionally identified isolates as E.coli + + - - and negative MUG activity were subjected to further identification using E.coli O157 latex agglutination test (Oxoid, DR 620 M test kit) and API 20 E system.

Isolation and identification of *Salmonellae*:

The technique recommended by **APHA (1992)** was conducted through pre-enrichment on sterile Buffered Peptone Water (BPW) and enrichment on Rappaport Vasiliadis (RV) broth. Then selective plating was done onto Xylose Lysine Desoxycholate (XLD) agar and MacConkey agar plates. Suspected colonies were picked up and purified for further identification by Gram stain, Triple sugars iron (TSI) agar, hydrolysis of urea. Suspected isolates which did not hydrolyze urea and giving suspected reactions of salmonellae on TSI agar slant were subjected for further identification by API 20 E system.

Isolation and identification of Thermotolerant *Campylobacter*:

The technique recommended by **APHA (1992)** was performed by enrichment on Preston broth then selective plating onto Preston blood free agar plates. Suspected colonies were purified for further identification through applying following tests, Gram stain, oxidase, motility, catalase, sensitivity to cephalotine and nalidixic acid and hydrolysis of hippurate.

Isolation and identification of *Clostridium perfringens*:

The technique recommended by **APHA (1992)** was applied using Cooked Meat Broth (CMB) as enrichment medium. Inoculated tubes were anaerobically incubated at 37 °C for 24 hr. Loopfull from positive tubes which show turbidity and gas production streaked onto Tryptose Sulphite Cycloserine agar (TSC agar) plates containing egg yolk. Suspected *Cl. perfringens* colonies were picked up and purified for further identification as follows, motility test, nitrate reduction test, gelatin liquefaction test and fermentation of lactose, salicin and raffinose.

RESULTS AND DISCUSSION

Numerous epidemiological reports have implicated foods of animal origin as the major vehicles associated with illness caused by food-borne pathogens (**Todd, 1997**). Moreover, the environment plays a major role for zoonotic food-borne agents in the food chain by direct or in-direct ways. In order to study the epidemiology of these agents in one of the new meat product (MDPM) recently introduced to Egyptian markets as an environmental niches, there is need to carry out different auxiliary tests as total colonies count, total coliforms count, faecal coliforms count, staphylococcal count, yeast and mould count.

Table (1) illustrates the number of different microorganisms in MDPM samples. It was found that, these samples were endowed with a large number of microflora as aerobic plate count APC (cfu/g) ranged from 8×10^3 to 2.3×10^6 with an average of $7.4 \times 10^5 \pm 1.7 \times 10^5$.

These values were similar to the results previously reported by **Maxcy *et al.*, (1973)**, but it somewhat lower than that reported by **Ostovar *et al.*, (1971)**. Such a difference can be attributed to various factors including the varieties of microorganisms originally present in raw materials, variation of hygienic conditions under which the food article has been produced, handled and stored.

In this respect the acceptable range of bacteriological guidelines for MDPM at 25 °C up to 3 days must be ranged from 5×10^5 to 5×10^6 (Scientific Committee on Animal Health and Animal Welfare ,1997). They

added that if number of bacteria on the surface of meat exceeds 10^8 cfu /g it will be unfit for human consumption.

Concerning psychrotrophic count (cfu/g), it ranged from 10^4 to 1.2×10^5 with an average $3.7 \times 10^4 \pm 1.1 \times 10^4$. The obtained results were somewhat lower than that recorded by **Ostovar *et al.*, (1971)**.

Psychrotrophic bacteria are generally non-pathogenic to man but they are considered the most probable causative organisms of spoilage, which adversely affect shelf life and keeping quality of meat as mentioned by **McMeekin, (1982)**.

Regarding Staphylococcus aureus count (cfu/g) were, $7.9 \times 10^3 \pm 4.0 \times 10^3$, 2×10^2 and 6×10^4 for mean, minimum and maximum values respectively. The achieved results disagreed with that recorded by **Ostovar *et al.*, (1971)** who failed to isolate *S.aureus* from MDPM. This arises questions about the origin of this organism which may be attributed to that mechanically recovered meat is prone to contamination with *S.aureus*, partly because of the handling, which occurs at the previous stages, a finding which is also suggested by **Adams and Mead, (1983)**.

Total yeast count (cfu/g) revealed that the minimum value was 8×10^3, maximum value was 1.5×10^7, and mean value was $1.6 \times 10^6 \pm 8.3 \times 10^5$ while total mould count (cfu/g) were $3.9 \times 10^5 \pm 8.7 \times 10^4$, 10^3 and 2×10^6 for mean, maximum and minimum values respectively as in Table (1).

It is necessary to mention that, some food borne yeast and mould are undesirable because they are opportunistic spoilage organisms, also they constitute a potential hazard to human health as they may be responsible for some human infections specially in immuno-compromised persons as mentioned by **Davies and Board, (1998)**. Moreover certain food borne yeast and mould have the ability to elicit allergic reactions and produce mycotoxins, **(Pitt, 1998)**.

The total Coliforms count for the collected samples was expressed in table (2) by MPN/g. The minimum value was 2.4×10^2, maximum was 2.4×10^4 and the average value was $4.9 \times 10^3 \pm 1.3 \times 10^3$. These findings were in agreement with that reported by **Maxcy *et al.*, (1973)**.

On the other hand faecal coliforms count (MPN/g) for the collected samples as noticed in Table (2) was $4.5 \times 10^3 \pm 1.4 \times 10^3$ (mean), 0.93×10^2 (minimum) while maximum value was 2.4×10^4. The obtained results are considered high as recorded by **Maxcy *et al.*, (1973)**. The high MPN faecal coliforms count obtained throughout this study does not agree with findings of **Walker & Ayres, (1956)**, who reported that coliforms represented only a small percentage of the total microflora and their number decreases during the

storage. Such disagreement is probably due to the initial level of contamination of products, usually reflecting the sanitation conditions under which the products have been processed, (**Tompkin, 1983**).

Microorganisms have successfully been adapted to changes in food production, processing and preservation technique, resulting in a number of new and emerging food borne pathogens and the re-emergence of organisms that have been problematic in the past. In this aspect the results achieved in Table (4) summarized the incidence of isolated microorganisms in MDPM. *E. coli* biotype I and Salmonella arizonae figured up to 20 %. While Salmonella species were 5 %. Similar results were recorded by **Greenwood and Swaminathan, (1981)**. The high incidence of Salmonella from MDPM disagreed with the results obtained by **Ostovar *et al.*, (1971)** who recorded 11.1% of Salmonellae in MDPM. This is not surprising considering the fact that 42 % of Salmonella isolations have been reported from poultry products according to **Salmonellae Surveillance Report, (1966)**.

The existence of these zoonotic food borne agents may have a public health significance as **Wagner, (2002)** reported that, Enteropathogenic E.coli is a significant cause of diarrhea in developing countries and localities of poor sanitation. Furthermore, some strains can cause spoilage of meat, however infectious with class I (adherent) EPEC strains may cause severe small intestine enteropathy (**Varnam and Evans, 1991**).

Regarding public health significance of *Salmonella arizona*, **Catani *et al.*, (2004)** reported that it causes severe systemic infections, especially in patients with immune system impairment.

Concerning incidence of *Campylobacter jejuni*, *Campylobacter coli* and *Campylobacter lari* it was 50, 25 & 20 % respectively as shown in table (4). These expected high-recorded percentage of *Campylobacter species* was referred to the prevalence of *Campylobacter* in uncooked poultry products at the retail level upwards of 50 %. Meanwhile the prevalence of Campylobacter in chicken carcasses and livers from factories is also high, indicating that cross contamination is widespread during processing (**Lake *et al.*, 2003**).

In the instant of public health importance of *campylobacter*, it causes symptoms ranging from brief insignificant enteritis to a severe case of enterocolitis. Extra-intestinal complications such as meningitis, cholecystitis, urinary tract infection and reactive arthritis may occur. In addition to Guillain –Barre Syndrome (GBS), a subacute inflammatory, demyelinating polyneuropathy, has been associated with *Campylobacter* gastroentritis (Olsen and Pinckney, 2002). They added that, its pervasiveness in animal populations and even low infective dose assures continued infections.

It is necessary to mention that, *campylobacter*, *salmonella* and pathogenic *E.coli* all colonize the gastointestinal tracts of a wide range of wild and domestic animals, especially animals raised for human consumption (**Meng and Doyle, 1998**).

On the other hand *Staphylococcus aureus* was isolated from 25 % of the examined MDPM samples. The highly recorded incidence of S.aureus disagreed with findings of **Ostovar *et al.*, (1971)**, who failed to isolate this organism. In this respect, presence of *S.aureus* in processed poultry was an indication of contamination from human sources (**Notermans *et al.*, 1982**). This organism also occurs among the normal flora of live poultry as mentioned by **Patterson (1969)**. *S.aureus* is important in relation to poultry meat hygiene due to its ability to produce enterotoxins which may cause food poisoning in humans (**Notermans *et al.*, 1982**).

Clostridium absonum was isolated from 10 % of the MDPM samples, while *Cl.perfringens* was not recorded in this product, as in Table (4). These unexpected findings disagreed with those of **Ostovar *et al.*, (1971)**, who determined the incidence of *Cl.perfringens* in MDPM as 7.4 %. This may be due to variation in the examined number with probability of addition of some preservatives affecting growth of this organism. It is worthy to mention that *clostridial* microorganisms are implicated in spoilage of food (**Gracey and Collines, 1992**).

In a trail to assess the role of seller in spreading of these microorganisms detected in MDPM to themselves and to surrounding environment, 20 bag swabs were bacteriologically examined. The obtained results as shown in Table (4), evidenced that the incidence of *E.coli* biotype I was 30 %, *S.arizona* and *C.jejuni, C.coli & C.lari* were 10, 15 and 15 % respectively, while *S.aureus* and *Cl.perfringens* figured up to 10 %.

It is worthy to mention that Cl.perfringens was isolated only from bag swabs, which emphasizes the fact that *Cl. Perfringens* is common in the intestinal microflora of man, other warm-blooded animals and in soil and dust **Varnam and Evans, (1991)**. *Cl.perfringens* toxicity causes gastrointestinal symptoms as intestinal gas, diarrhoea, cramps, occasional nausea and rarely fever or vomiting (**Olsen and Pinckeny, 2002**).

The highly unexpected incidence of the diversity of microorganisms isolated from these bags is indicating the hygienic conditions of processing and cross contamination of this product. These came in agreement with those mentioned by **Hobbs and Roberts, (1998)**, who reported that the hands may be responsible for transference of intestinal pathogens such as salmonellae, *campylobacter* and *E.coli* from raw food utensils, as well as faecal matter to

food. Also transfer of nose and skin organisms such as staphylococci from the person of the food handlers to cooked food. Furthermore, **Fein *et al.*, (1995)**, found that 17 % of consumers attributed food borne illness to mishandling at the supermarket.

Detection of EHEC in the examined samples was very important from the zoonotic point of view due to the low infectious dose as reported by CDC, 1993, with fewer than 70 bacteria. Also **Robins- Browne (1995)**, reported that, contamination of food or water with even a small quantity of faeces put consumers at risk.

From the obtained results and as shown in Tables (3 & 4), it was found that all samples (MDPM & bag swabs) were free from *E.coli O157*. This may be due to the presence of a large number of background bacteria in the ground meat inhibiting the growth of *O 157*, as mentioned by **Vold *et al.*, (2000)**.

It is evident that the bacterial strains recovered from bag swabs are similar to those isolated from the MDPM, a matter which may be attributed to the nature of food handlers daily work being handling the meat products. Moreover, the improper packaging and leakage in the packaging material facilitate transmission of pathogenic microorganisms to this product.

It was concluded that this product endowed with diversity of bacterial and fungal strains of public health hazard indicating a mixed source of contamination especially in the absence of Egyptian standard specifications (ESS) for it as well as the product could be an important cause of food poisoning. Consequently incorporation of MDPM into other food products serve as an inoculum of a variety of microorganisms. Such pathogens could be transmitted from or / to the sellers handling such product.

Recommendations:

Strict hygienic criteria must be undertaken during handling and processing of this product. It is also important to have bacteriological guidelines for MDPM before it can be used either in heat-treated products or as raw poultry products, however in both cases it must be indicated in the labeling. Additionally, consumption of undercooked meat products and cross-contamination during food handling and preparation must be avoided to ensure food safety at home and in the food services industry.

Finally it is advisable to provide those sellers with special protective cloths and gloves and to adopt the hygienic measures to minimize the bacterial and fungal loads on this product.

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Table (1): Microbial load of the examined mechanically deboned poultry meat samples.

	positive		Min.	Max.	Mean	*SEM±
	No.	%				
Aerobic plate count (cfu/g)	20	100.0	8×10^{3}	2.3×10^{6}	7.4×10^{5}	1.7×10^{5}
Psychrotrophic count (cfu/g)	20	100.0	10^{4}	1.2×10^{5}	3.7×10^{4}	1.1×10^{4}
Staphylococcus aureus count (cfu/g)	18	90.0	2×10^{2}	6×10^{4}	7.9×10^{3}	4.0×10^{3}
Total yeast count (cfu/g)	20	100.0	8×10^{3}	1.5×10^{7}	1.6×10^{6}	8.3×10^{5}
Total mould count (cfu/g)	20	100.0	2×10^{6}	10^{8}	3.9×10^{5}	8.7×10^{4}

*: Standard error of mean N = 20

Table (2): Coliforms, fecal Coliforms and *E.coli* in MDPM samples

	positive		Min.	Max.	Mean	*SEM±
	No.	%				
Coliforms count (MPN/g)	20	100.0	2.4×10^{2}	2.4×10^{4}	4.9×10^{3}	1.3×10^{3}
Faecal coliforms count (MPN/g)	20	100.0	0.93×10^{2}	2.4×10^{4}	4.5×10^{3}	1.4×10^{3}
*E. Coli**	4	20.0	-	-	-	-

N = 20 *by using API 20 E ** no count applied for *E.coli*.

Table (3): Identification procedures of *E.coli O157* in examined samples.

Typical colonies on SMA**	Examined samples					
	MDPM			Bag swabs		
	No. Examined	No.+ve	%	No. Examined	No.+ve	%
	20	9	45.0	20	3	15.0
MUG activity	9	4	44.4	3	0.0	0.0
Latex	4	0.0	0.0	3	0.0	0.0
API 20 E	4	0.0	0.0	3	0.0	0.0

**: Sorbitol MacConkey agar

Table (4): Incidence of microorganisms isolated from examined samples.

Examined microrganisms	MDPM		Bag swabs	
	+ve no.	%	+ve no.	%
Escherichia coli biotype I	4	20	6	30
E.coli O157	0	0	0	0
Salmonella arizona	4	20	1	5
Salmonella species	1	5	0	0
Staphylococcus aureus	5	25	2	10
Campylobacter jejuni	10	50	2	10
Campylobacter coli	5	25	3	15
Campylobacter lari	4	20	13	15
Clostridium absonum	2	10	0	0
Clostridium perfringens	0	0	2	10

N = 20

الملخص العربي

الأخطار الصحية للحم الدواجن منزوع العظم ميكانيكيا (مفروم الدواجن)

هيام عبد العال و مها صبرى

مدرس بقسم الرقابة على الأغذية و قسم الأمراض المشتركة - كلية الطب البيطري بالجيزة

يعد لحم الدواجن منزوع العظم ميكانيكيا من المنتجات التي بدأت في الظهور في الأسواق المصرية في الآونة الأخيرة خاصة مع عدم وجود مواصفات قياسية مصرية لهذا المنتج. لذا عنيت هذه الدراسة بفحص هذا المنتج لتقييم الجودة الميكروبية له و كذلك عزل الميكروبات المختلفة الموجودة به مع التركيز على تلك التي تسبب التسمم الغذائي و التى يكون لها أضرار صحية مباشرة أو غير مباشرة على المستهلك.

لذا تم جمع عينات من هذا المنتج من أسواق القاهرة و الجيزة وفحصها من الداخل وكذلك فحص مسحات من عبواتها من الخارج .

و قد أوضحت نتائج الفحص البكتيري على وجود عدد كلى للميكروبات الهوائية و الميكروبات المحبة للبرودة بلغ ٧.٤×١٠ ^{٥} و ٣.٧ × ١٠ ^{٤} على التوالي. أما بالنسبة لعدد ميكروبات الكوليفورم و ميكروبات الكوليفورم البرازية فكانت ٤.٩×١٠ ^{٣} و ٤.٥ × ١٠ ^{٣} على التوالي. بينما كانت نتائج عد الميكروبات المكورة العنقودية الذهبية ٧.٩ ×١٠ ^{٣}. في حين كان العد الكلى للخمائر و الفطريات ١.٦×١٠ ^{٦} و ٣,٩ × ١٠ ^{٥} على التوالي.

على الجانب الأخر كانت نتائج فحص لحم الدواجن منزوع العظم ميكانيكيا و كذلك المسحات الخارجية للأكياس هي عزل العديد من الميكروبات المسببة للتسمم الغذائي مثل المكور العنقودي الذهبي، ميكروبات السالمونيلا، ميكروب الكامبيلوباكتر، ميكروب الكولستريديم و ميكروب القولون النموذجي الأول.

وقد خلصت الدراسة إلى أن هذا المنتج يحتوى على العديد من الميكروبات الممرضة و التي بدورها يمكن أن تنتقل إلى المستهلك و تسبب له أضرار صحية فادحة. هذا علاوه على أن الميكروبات التي تم عزلها من المسحات الخارجية للأكياس و التي يسهل انتقالها من و إلى أيدي البائعين و المستهلكين لهذا المنتج و من ثم يؤثر على الصحة العامة. كما أنة بعتبر مصدر تلوث عند استخدام هذا المنتج في تصنيع منتجات و ذلك لما يحويه من ميكروبات ممرضة.

و قد تم مناقشة تأثير هذه الميكروبات على الصحة العامة و كذلك التركيز على ضرورة اتباع الاشتراطات الصحية في التصنيع و التداول و كذلك توعية البائعين للحد من انتشار هذه الميكروبات من و الى هذا المنتج.