Mycological Aspects Of Chicken Giblets And Skin With A Trial To Improve Their Sanitary Status

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ABSTRACT

Eighty samples of fresh, manually dressed and prepared chicken giblets (20 each of liver, gizzard, heart) and 20 of skin samples were purchased from different poulterer's shops of different sanitation levels at Zagazig city. Collected samples were mycologically examined to throw a light on their mould contents. In addition a trial was carried out to improve the sanitary status of such chicken giblets through the application of a solution containing 2.5% potassium sorbate.

The obtained results revealed that the mean value of total mould count/ gm. of the examined liver, gizzard, heart and skin samples before any treatment were 1×10^3, 7.6×10^2, 7.2×10^2 and 1.1×10^3 respectively. Such counts were decreased to 4.8 x 10, 4.8 X 10, 0 and 1.6 X 10^2 / gm. of the examined giblet samples after their treatment by immersion in a solution containing 2.5% potassium sorbate for one minute with reduction percentage of 95.2% , 93.7% 100% and 85.5% respectively. *Aspergillus spp., penicillium spp., Mucor spp., Rhizopus spp., Absidia spp., Xylohphae Bantiana* and *Fonsecaae Compacta* could be isolated and identified from the examined samples with varying numbers and percentages before and after their treatment. Moreover, *Aspergillus spp.* were identified into *A.niger*, *A.nidulans*, *A.candidus* and *A.fumigatus*. The obtained results declared the effectiveness of 2.5% of potassium sorbate as decontaminant for fungal contamination on chicken giblets as well as for chicken surface which can be safely used. The public health significance of existed moulds was discussed.

INTRODUCTION

Although poultry meat constitutes an unexpensive source of high quality protein compared with beef, it is easily prepared, cooked and digested animal protein containing essential amino acids beside other growth requirements. Unfortunately, it is liable to harbour different types of microorganisms and constitute the reason why it represent direct health hazards ***(1-4)***.

One of the most common contaminants are mould which widely distributed, and regarded among the sources of dangerous poultry industry and byproducts which may lead to spoilage and/or mycotoxicosis. The main sources of mould contamination of the freshly dressed poultry are air, water, soil, hands of attendants and utensils in addition to the intestinal contents especially when the intestines are cut during evisceration. The significance of such contaminants was intensively discussed by many authors ***(5,6)***.

There are many attempts for decreasing the total mould count and inhibition of some types of mould growth by deceasing water activity and increasing potassium sorbate concentration ***(7)***.

Therefore, the objective of this study was to improve the sanitary status of chicken giblets during their processing through application of potassium sorbate.

MATERLAL AND METHODS

Eighty samples of fresh, manually dressed and prepared chicken giblets (20 each of liver, gizzard and heart) and 20 of skin samples were purchased from different poulterer's shops of different sanitation levels at Zagazig city. Each sample was individually packed in a sterile, impermeable plastic bag, well identified and transferred to the laboratory under complete aseptic condition without undue delay where they were mycologically examined. Chicken giblets and skin samples were investigated without any treatment for enumeration, isolation of existing

moulds by cultivation on acidified malt extract agar and Czapek's dox agar with 6% NaCl *(8)* and identification for the presence of genus *Aspergillus (9)* and other mould species *(10)*. The same collected samples were examined as previously mentioned but after their treatment by immersion in a solution containing 2.5% potassium sorbate for one minute *(11)*. Ten fold serial dilutions were prepared using 0.1% peptone water *(12,13)*.

RESULTS AND DISCUSSION

Table 1. Results of mould count / gm of the examined chicken giblet and skin samples before and after their treatment with 2.5% potassium sorbate.

Samples	Before				After				Reduction %
	Min.	Max.	Mean	±S.E.	Min.	Max.	Mean	±S.E.	
Liver	$1X10^2$	$2X10^3$	$1X10^3$	$0.4X10^3$	1X10	$1X10^2$	4.8X10	2.1X10	95.2%
Gizzard	$2.1X10^2$	$3X10^3$	$7.6X10^2$	$5.6X10^2$	1X10	$1X10^2$	4.8X10	2.1X10	93.7%
Heart	$1X10^2$	$2X10^3$	$7.2X10^2$	$3.6X10^2$	-	-	-	-	100%
Skin	$3X10^2$	$3X10^3$	$1.1X10^3$	$0.5X10^3$	5X10	$4X10^2$	$1.6X10^2$	$0.7X10^2$	85.5%

Table 2. Incidence percentage of mould species and genera isolated from the examined chicken giblet and skin before and after their treatment with 2.5% potassium sorbate.

Giblit / Mould	Liver		Gizzard		Heart		Skin	
	B (%)	A (%)	B (%)	A (%)	B (%)	A (%)	B (%)	A (%)
Aspergillus spp.	60	40	60	40	40	-	100	80
A. niger	20	20	20	20	20	-	100	80
A. nidulans	-	-	20	20	-	-	20	20
A. Candidus	20	20	-	-	20	-	-	-
A. fumigatus	40	20	-	-	-	-	20	20
Penicillium spp.	60	40	60	60	100	-	40	40
Mucor spp.	20	-	20	20	20	-	20	-
Absidia spp.	-	-	-	-	20	-	-	-
Xylohyphae bantiana	-	-	20	-	-	-	-	-
Fonsecaea compacta	-	-	20	-	-	-	-	-

B: Results before treatment A: Results after treatment

Table 3. Summarized number and percentage of isolated mould species and genera from the examined chicken giblet and skin before and after treatment with 2.5% potassium sorbate.

Mould	Liver				Gizzard				Heart				Skin			
	B		A		B		A		B		A		B		A	
	No.	%	No.	%	No.	%	No.	%	No.	%	No	%	No	%	No	%
Aspergillus spp	18	40	9	50	12	36.36	6	33.33	6	22.22	-	-	26	54.2	22	75.86
A. niger	9	20	3	16.6	6	18.18	3	16.66	3	11.11	-	-	17	35.4	13	44.82
A. nidulans	-	-	-	-	6	18.18	3	16.66	-	-	-	-	6	12.5	6	20.68
A. Candidus	3	6.67	3	16.6	-	-	-	-	3	11.11	-	-	-	-	-	-
A. fumigatus	6	13.3	3	16.6	-	-	-	-	-	-	-	-	3	6.25	3	10.34
Penicillium spp	12	26.7	9	50	9	27.27	9	50	15	55.55	-	-	16	33.3	7	24.13
Mucor spp	9	20	-	-	3	9.0	3	16.66	3	11.11	-	-	6	12.5	-	-
Rhizopus spp.	6	13.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Absidia *spp.*	-	-	-	-	-	-	-	-	3	11.11	-	-	-	-	-	-
Xylohyphae bantiana	-	-	-	-	6	18.18	-	-	-	-	-	-	-	-	-	-
Fonsecaea compacta	-	-	-	-	3	9.0	-	-	-	-	-	-	-	-	-	-
Total	45	100	18	100	33	100	18	100	27	100	-	-	48	100	29	100

B: Results before treatment A : Results after treatment

Moulds are considered as a major factor in the spoilage of poultry products leading to great economic losses besides it constitutes a major public health hazards by production of wide variety of mycotoxins.

From the results achieved in Table 1, it is evident that the mean value of total mould count/gm. of the examined liver, gizzard, heart and skin before any treatment were $1X10^3 \pm 0.4X10^3$, $7.6X10^2 \pm 5.6X10^2$, $7.2X10^2 \pm 3.6X10^2$ and $1.1X10^3 \pm 0.5X10^3$ respectively. Such values were decreased to 4.8X10±2.1X10, 4.8X10±2.1X10,0, and $1.6X10^2 \pm 0.7X10^2$/gm. of the examined samples after being treated by immersion in a solution containing 2.5% potassium sorbate for one minute with reduction percentage of 95.2% 93.7%, 100% and 85.5% respectively. These results nearly coincide with that reported previously in Egypt ***(14,15)***. Comparatively, skin samples had the highest mould count followed by liver then gizzard, while; the heart samples had the lowest count.

Mould genera of *Aspergillus, Penicillium, Mucor, Rhizopus, Absidia, Xylohyphae* and *Fonsacaea* could be isolated and identified from the examined samples of chicken giblet before and after their treatment with a varying percentage ranged from 20% to 100%. Moreover, *Aspergillus* was further identified into *A.niger*, *A. nidulans*, *A. candidus* and *A. fumigatus*. (Table2).

Concerning the numbers and percentages of isolated and identified mould genera from the examined chicken giblet before and after their treatment with potassium

sorbate 2.5%, it is varied from 0(0%) in the heart samples after being treated to 22 (75.86%) in skin samples after treatment also (Table 3). These results were nearly simulate what has been previously reported ***(14,15)***. On the other hand, lower reduction counts were mentioned ***(16,17)***.

The present study illustrate the effectiveness of potassium sorbate (2.5%) as decontaminants for microorganisms especially moulds as shown from the results that the isolated mould numbers were decreased from 45, 33, 27 and 48 isolates from liver, gizzard, heart and skin samples before treatment to 18, 18, 0. and 29 isolates after treatment (Table 3).

Concerning the fitness of the examined chicken giblets and skin for human consumption **EOSQC** "Egyptian Organization for Standardization and Quality Control" ***(18)*** prohibit the presence of any mould in the poultry meat, poultry meat products and giblets. So, the all positive samples for moulds in the present investigation are unfit for human consumption.

From the public health point of view, some of the moulds isolated in the present study have been previously regarded as a public health hazard berceuse they produce mycotoxins such as *A.flavus* (Aflatoxin), *A.niger*, ***(19,20)***. On the other hand, *Aspergillus spp.* infected paranasal sinuses, in immune compromised host, lung is the most common site of invasive disease and may leads to brain abscess ***(21)***. Moreover, *Penicillium Spp.* infected central nervous system and intestinal tract **(22)**. *Mucor Spp.* infected immune compressed host and caused gastrointestinal and rhinocerebral symptoms ***(23)***. *Rhizopus spp.* leads to sinus orbital infection ***(24)***. On the other hand, *Absidia spp.* induced rhinocerebral, cutaneous, pulmonary, and disseminated forms of mucormycosis ***(25)***.

As a result of contamination of such giblets with moulds, they may undergo rapid spoilage and could be incriminated in human chromatomycosis ***(26)***. Moreover, high mould count indicates bad hygienic conditions under which these giblets are prepared and sold. Therefore, more studies have to be done, educational program for workers and sellers and even to the consumers them self.

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السمات الفطرية لمخلفات الدواجن المعدة للاستهلاك الآدمي و الجلد مع محاولة لتحسين حالتها الصحية

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أجريت هذه الدراسة علي ثمانين عينة من مخلفات الدواجن المعدة للاستهلاك الآدمي (٢٠ من كل من الأكباد، القوانص، القلوب) و ٢٠ عينة من الجلد جمعت من محلات تجهيز الدواجن ذات مستويات صحية متفاوتة بمدينة الزقازيق و التي تم فحصها لتقدير العدد الكلي للفطريات و كذا عزل و تصنيف ما يوجد بها من هذه الفطريات بعد تقسيمها إلي مجموعتين. المجموعة الأولي (٤٠ عينة "١٠ من كل نوع") فحصت بدون أي معاملة، أما الثانية (٤٠ عينة "١٠من كل نوع") تم معالجة كل عينة علي حدة بالغمس في محلول يحتوي علي ٢,٥% من سوربات البوتاسيوم لمدة دقيقة واحدة. و قد أوضحت النتائج أن متوسط العدد الكلي للفطريات لكل جرام من عينات الأكباد، القوانص، القلوب و الجلد كانت: ١× ١٠^{٣} ، ٧,٦× ١٠^{٢} ، ٧,٢× ١٠^{٢} ، ١,١×١٠^{٣} بعد فحصها بدون أي معالجة . هذه المتوسطات انخفضت إلي ٤,٨×١٠ ، ٤,٨×١٠ ، صفر ، ١,٦× ١٠^{٢} بعد معالجتها بالغمس في محلول يحتوي علي ٢,٥% من سوربات البوتاسيوم لمدة دقيقة واحدة بنسبة انخفاض كلية ٩٥,٢% ، ٩٣,٧% ، ١٠٠% و ٨٥,٥% علي التوالي. هذا و قد أمكن عزل الأسبيراجلس، البنسيليوم، الميوكر، الريزوباس ، ابسيديا، الزيالوهيفي بانتانا و فوسشيا كمباكتا بنسب مختلفة من معظم العينات التي تم فحصها قبل و بعد معالجتها. علاوة علي ذلك قد تم تصنيف جنس الأسبيرجلس إلي أنواعه المختلفة. هذا و قد أثبتت الدراسة الأثر المثبط القوي لسوربات البوتاسيوم علي تواجد الفطريات. لذلك يوصي باستخدامها عند تجهيز و حفظ هذا النوع من الغذاء كما تم مناقشة الأهمية الصحية للفطريات التي تم عزلها و تصنيفها.