

## Occupational Dermatoses among Poultry Slaughterhouse Workers in Sharkia Governorate: An Epidemiological Study

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### ABSTRACT

**Background:** The poultry-processing environment exposes workers to a variety of agents that can produce dermatological injuries and illnesses. These include poultry excreta, feathers, and raw carcasses, as well as chemicals used for processing and sanitation, and the wet work environment in which temperatures vary from tropical to near freezing. **Objectives:** 1- to determine the prevalence and type of dermatoses among poultry slaughterhouse workers. 2- To demonstrate the personal and occupational risk factors associated with the detected skin disorders among poultry slaughterhouse workers. 3- To propose recommendations for occupational safety at poultry slaughterhouse. **Methods:** a comparative cross sectional study was conducted among 117 workers divided in two groups: the exposed group consisted of 57 poultry slaughterhouse workers working in poultry slaughterhouse and comparable control group consisted of 60 workers in ready – made clothes factory in Sharkia Governorate. Data collection: all the exposed and non-exposed workers were personally interviewed at their workplaces using a pre-designed questionnaire (Nordic occupational skin questionnaire) and clinical examination. **Results:** Overall, 57 workers (100%) reported one or more self-reported skin ailments. Itching was the most common self-reported conditions which reported by 57 worker (100%). The frequency of skin rash and scratches reported by 38 worker (66.66%) and cut wounds were reported by 29 worker (50.87%). also blisters, fissures, dandruff and Toe-nail or finger- nail disorders were higher among exposed group (22.8%, 29.82%, 38.59% and 42.1% respectively). All self-reported skin disease manifestations were statistically higher among poultry slaughterhouse workers compared to control group. The frequency of inflammatory disorders was (26.31) and dermatitis was (17.57%). The frequency of infectious skin diseases was (31.57%). While the frequency of Paronychia & Onychomycosis was (22.8%). Also, the frequency of traumatic skin disorders was significantly higher among exposed (22.8%). **Conclusion:** poultry slaughterhouse workers at high risk of developing dermatological injuries and illnesses. **Recommendations:** periodic medical examination, health education program, and use of personal protective equipments and recommendations for further researches.

**Key words:** Poultry slaughterhouse workers, occupational risk factors, skin disorders

### Introduction

Poultry processing industry was considered as a high-risk industry for skin diseases (GAO, 2005; Marks *et al.*, 1983; Hayashi *et al.*, 1989), and work-related dermatological injuries (Quandt *et al.*, 2005), affecting mainly the hands and forearms (Hayashi *et al.*, 1989) The poultry-processing environment exposes workers to a variety of agents that can produce dermatological injuries and illnesses. These include poultry excreta, feathers, and raw carcasses, as well as chemicals used for processing and sanitation, and the wet work environment in which temperatures vary from tropical to near freezing (Quandt *et al.*, 2005) Biological hazards are very frequent. Susceptible workers, mainly atopics, exposed to animals carrying mites like Dermatophagoides sp. or Dermanyssusgallinae (red poultry mite) may suffer acute prurigo mainly of the exposed areas (personal experience) or scabies-like lesions (Yassien *et al.*, 1996). Skin abrasions and minor cuts by sharp objects, and especially by bone fragments, are often secondarily infected by Pyogenic coccus (Staphylococcus aureus and Streptococcus), eventually with sepsis (Rustemeyer *et al.*, 2012), or by Erysipelothrixinsidiosa, the agent of Erysipeloid. Acute pyogenic paronychia or chronic paronychia and onychia, sometimes with interdigitalintertrigo aggravated by Candida albicans, are favored mainly by the wet work, contact with aggressive chemicals, and glove occlusion. More than 40% of the workers, mostly those who handle blood, claws, or skin of raw or unfrozen chicken, develop hand and forearm wart, and wart-like lesions, induced by human papilloma virus (HPV), especially HPV type7 (Stehr-Green *et al.*, 1993; Keefe *et al.*, 1994) .

Wet work with regular hand cleaning with soaps, detergents, and disinfectants favors dry skin and irritant contact dermatitis, mainly in the eviscerating section (Rustemeyer *et al.*, 2012). Direct contact of irritated hands with proteins from the viscera, blood, meat, and skin of these animals favors immediate allergic contact reactions – contact urticaria or protein contact dermatitis (Amaro and Goossens, 2008).

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Poultry processing workers have some of the highest occupational injury rates of all U.S. industries (GAO, 2005). In 2004, close to 20,000 poultry workers nationwide reported occupational injuries or illnesses severe enough to miss work or seek medical care, for a rate of 7.8 per 100 full-time workers. The nonfatal injury rate was 5.5/100 workers (Bureau of Labor Statistics, 2005a), and the illness rate, 2.3/100 (Bureau of Labor Statistics, 2005b). Poultry processing had the sixth highest occupational illness rate of any private industry in the US in 2004 (Bureau of Labor Statistics, 2005c). It is important to wash hands and arms frequently with soap and water and to dry them thoroughly. Protective clothing such as gloves may be required for some operations. Individuals with pre-existing conditions should not work where the disorder could be aggravated (Quandt *et al.*, 2005).

### Objectives

- 1-To determine the prevalence and type of dermatoses among poultry slaughterhouse workers.
- 2-To demonstrate the personal and occupational risk factors associated with the detected skin disorders among poultry slaughterhouse workers.
- 3-To propose recommendations for occupational safety at poultry slaughterhouse.

### Subjects and Methods

To achieve these objectives, a comparative cross sectional study was conducted among (117) workers divided in two groups: the exposed group consisted of (57) poultry slaughterhouse workers and comparable control group consisted of (60) workers in ready – made clothes factory in Sharkia Governorate.

#### Subjects:

This study was carried out during 2012 among poultry slaughterhouse workers who assigned as full time, permanent workers affiliated to the selected workplace and worked for duration not less than one year. Fifty seven poultry slaughterhouse workers were satisfying the inclusion criteria from (73) poultry slaughterhouse workers.

A control group (60) was selected from ready – made clothes factory in Sharkia Governorate to match the poultry slaughterhouse workers regarding age, sex, residence, and marital status. An informed consent was taken from each participant shared in the study.

#### Tools:

##### 1. questionnaire:

All the exposed and non-exposed workers were personally interviewed at their workplaces using a pre-designed questionnaire (Nordic occupational skin questionnaire) was used to identify:

- Socio-demographic data: include age, residence, educational level, marital status and special habits like smoking.
  - Occupational history includes questions about:
    - 1- Current job and nature of jobs
    - 2- Duration of work in the current job in years
    - 3- Previous and another jobs
  - Health complaints: onset, course and duration
- 1- Clinical examination: skin examination was performed with special relevance to the exposed skin (upper and lower limbs) of the studied groups.

#### Statistical analysis

Statistical analysis was done using SPSS software package version 16 using frequency distribution tables, mean and standard deviation for descriptive purposes, chi-square for testing the significance of difference of qualitative variables, t- test for comparing between two means. Logistic regression analysis was carried out to identify the significant risk factors. The level of significance was considered at  $< 0.05$ .

### Results:

Poultry slaughterhouse workers were matched in Socio-demographic characteristics with the control group, as there was no statistically significant difference between both groups. Regarding age, the mean age of Poultry slaughterhouse workers was (34.07±5.96) years old and means age of control group was (36.36±7.55) years old. The mean duration of work was (9.1±5.17) and (10.16±5.5) for Poultry slaughterhouse workers and control group respectively.

Regarding the smoking habit, (68.42%) of Poultry slaughterhouse workers and (78.33%) of control group were smokers compared to (18%) and (13%) non-smokers respectively. About the residence, (71.92%) of poultry slaughterhouse workers and (78.33%) of control group lived in rural areas compared to (28.07%) and (21.66%) lived in urban areas respectively. Also this table show the educational level of both groups, most of Poultry slaughterhouse workers level was Read and write (43.85%), while control group level was School education (53.33%) but with no statistically significant difference. Regarding marital status, (57.89%) of Poultry slaughterhouse workers and (43.33%) of control group were married compared to (42.1%) and (56.66%) unmarried respectively. Table (1).

**Table 1:** Socio-demographic characteristics of poultry slaughterhouse workers and control group

General characteristics	Exposed group n= 57	Control group n=60	p- value
<b>Age (y)</b>			>0.05
X± SD	34.07±5.96	36.36±7.55	
<b>Current job duration (y)</b>			>0.05
X± SD	9.1±5.17	10.16±5.5	
<b>Smoking habit</b>			>0.05
Smoker No (%)	39 (68.42 )	47( 78.33)	
Non-smoker No (%)	18 (31.57 )	13(21.66 )	
<b>Residence</b>			>0.05
Urban No (%)	16 (28.07 )	13( 21.66)	
Rural No (%)	41(71.92 )	47(78.33 )	
<b>Educational level</b>			>0.05
Illiterate No (%)	4( 7.01)	3(5 )	
Read and write No (%)	25( 43.85)	17( 28.33)	
School education No (%)	19( 33.33)	32(53.33 )	
Higher education No (%)	9( 15.78)	7(11.66 )	
<b>Marital status</b>			>0.05
Married No (%)	33(57.89 )	26( 43.33)	
Unmarried No (%)	24(42.1 )	34( 56.66)	

Table (2) shows the Frequency distribution of self-reported skin disease manifestations among poultry slaughterhouse workers and control group. Overall, 57 workers (100%) reported one or more skin ailments. Itching was the most common self-reported conditions which reported by 57 worker (100%). The frequency of skin rash and scratches reported by 38 worker (66.66%) and cut wounds were reported by 29 worker (50.87%). also blisters, fissures, dandruff and Toe-nail or finger- nail disorders were higher among exposed group (22.8%, 29.82%, 38.59% and 42.1% respectively). All self-reported skin disease manifestations were statistically higher among poultry slaughterhouse workers compared to control group.

**Table 2:** Frequency distribution of self-reported skin disease manifestations among poultry slaughterhouse workers and control group

Skin disease manifestation	Exposed group n= 57		control group n=60		x	p-value
	No	%	No	%		
Rash	38	66.66	8	13.33	34.8	<0.001
Itching	57	100	12	20	77.3	<0.001
Blisters	13	22.8	3	5	7.8	<0.05
Fissures	17	29.82	3	5	12.71	<0.001
Dandruff	22	38.59	6	10	13.1	<0.001
Toe-nail or finger- nail disorders	24	42.1	5	8.33	17.8	<0.001
scratches	38	66.66	0	0	59.2	<0.001
cut wounds	29	50.87	4	6.66	28.2	<0.001

Table (3) shows the Frequency distribution of types of skin diseases among poultry slaughterhouse workers and control group. the frequency of inflammatory disorders among exposed group (26.31%) was significantly higher compared to control group(6.66%).dermatitis (17.57%)was the inflammatory disorder with statistically significant difference compared to control group (5%), but there was no statistically significant difference between both groups regarding acne and folliculitis. While no patient of both groups had psoriasis.

Concerning pigmentation disorders, there was no statistically significant difference between both groups regarding melisma and Post inflammatory pigmentation disorders.

The frequency of infectious skin diseases among poultry slaughterhouse workers (31.57%) was significantly higher compared to control group (5%). While the frequency of Paronychia & Onychomycosis and wart (22.8%) was significantly higher among exposed compared to control group (3.33%). But there was no statistically significant difference between both groups regarding Tinea pedis and Wart. Also, the frequency of traumatic skin disorders was significantly higher among exposed (22.8%), the most common traumatic condition with

statistically significant difference among exposed was scratches (14.03%). while there is no statistically significant difference regarding cut wounds and scars.

Table (4) shows Logistic regression analysis of significant risk factors affecting frequency of occupational dermatoses among poultry slaughterhouse workers reveals that, there was higher risk of inflammatory skin diseases among workers who live in rural areas.

**Table 3:** Frequency distribution of types of skin diseases among poultry slaughterhouse workers and control group

Skin diseases	Exposed group n= 57		control group n=60		X	P-value
	No	%	No	%		
<b>Inflammatory</b>	15	26.31	4	6.66	8.29	<0.01
- Acne or folliculitis	10	17.54	6	10	1.4	>0.05
-Dermatitis	10	17.54	3	5	4.6	<0.05
-Psoriasis	0	0	0	0		
<b>Pigmentation disorders</b>	8	14.03	3	5	2.8	>0.05
-Melisma	5	8.77	2	3.33	1.53	>0.05
-Post inflammatory pigmentation disorders	4	7.01	1	1.66	2.04	>0.05
<b>Infection</b>	18	31.57	3	5	14.02	<0.001
-Paronychia & Onychomycosis	13	22.8	2	3.33	9.91	<0.01
-Tinea pedis	9	15.78	4	6.66	2.46	>0.05
-Wart	4	7.01	0	0	4.3	>0.05
<b>Trauma</b>	13	22.8	2	3.33	9.91	<0.01
-Cut wounds	4	7.01	0	0	4.36	>0.05
-Scratches	8	14.03	0	0	9.03	<0.01
-scars	5	8.77	2	3.33	1.53	>0.05

**Table 4:** Logistic regression analysis of significant risk factors affecting frequency of occupational dermatoses among poultry slaughterhouse workers

Variable	B	SE	Wald	P- value
<b>Inflammatory</b>				
Duration of work	-0.407	0.314	1.67	>0.05
Age	-0.404	0.315	1.689	>0.05
Residence	-6.738	2.86	5.53	<0.05
<b>Infection</b>				
Age	0.58	0.178	0.105	>0.05
Duration of work	0.59	0.316	3.49	>0.05
<b>Trauma</b>				
Smoking	-1.36	1.209	1.266	>0.05
Education	-1.734	0.886	3.8829	>0.05

## Discussion

The poultry-processing environment exposes workers to a variety of agents that can produce dermatological injuries and illnesses. These include poultry excreta, feathers, and raw carcasses, as well as chemicals used for processing and sanitation, and the wet work environment in which temperatures vary from tropical to near freezing (Quandt *et al.*, 2005). Several recent reports indicate that work-related dermatological injuries and illnesses are common (GAO, 2005; Marks *et al.*, 1983).

Overall, 57 poultry slaughterhouse workers (100%) reported one or more skin ailments. This is consistent with a study on Immigrant Poultry-Processing Workers in North Carolina that, all workers had at least one dermatological diagnosis as determined by the examining dermatologist (Quandt *et al.*, 2005) <sup>(4)</sup>. Itching was the most common self-reported conditions which reported by 57 worker (100%).but it is higher than the previous research (Quandt *et al.*, 2005).

Skin rash reported by 38 worker (66.66%) also, is higher than a previous research on Latino poultry workers in western North Carolina (23.2%) (Quandt *et al.*, 2006). While, scratches reported by 38 worker (66.66%) and cut wounds were reported by 29 worker (50.87%). this explained by using sharp objects, and especially by bone fragments(Barnham and Kerby,1984), also Live animals (chicken, ducks, turkey) are received in cages, hanged upside down (Keefe *et al.*, 1994).

The frequency of skin blisters, fissures, dandruff and toe-nail or finger- nail disorders were statistically higher among poultry slaughterhouse workers (22.8%, 29.82%, 38.59% and 42.1% respectively) compared to control group which agreed with previous researches(Quandt *et al.*, 2005).

The frequency of inflammatory disorders among exposed group (26.31%) was significantly higher compared to control group (6.66%). The inflammatory disorders were correlated with exposure to wet work, contact with animal fluids, feces and viscera, disinfectants and detergents for hand cleaning and for the hygiene of the working place (Rustemeyer *et al.*, 2012). Dermatitis (17.57%) was the inflammatory disorder with statistically significant difference compared to control group (5%), explained by Wet work with regular hand

cleaning with soaps, detergents, and disinfectants favors dry skin and irritant contact dermatitis, mainly in the eviscerating section (Marks *et al.*, 1983). Direct contact of irritated hands with proteins from the viscera, blood, meat, and skin of these animals favors immediate allergic contact reactions – contact urticaria or protein contact dermatitis (Amaro and Goossens, 2008). Immediate skin reactions from chicken and turkey meat have been mainly referred in food handlers (Amaro and Goossens, 2008; Katchen *et al.*, 1991), but a case of type I and IV allergy to chicken muscle and heart has been described in a poultry eviscerator (Beck *et al.*, 1982). But there was no statistically significant difference between both groups regarding acne and folliculitis, while no patients of both groups had psoriasis. These results disagreed with previous researches (Quandt *et al.*, 2005).

Concerning pigmentation disorders, there was no statistically significant difference between both groups regarding melisma and Post inflammatory pigmentation disorders.

The frequency of infectious skin diseases among poultry slaughterhouse workers (31.57%) was significantly higher compared to control group (5%), it is explained by Biological hazards are very frequent. Susceptible workers, mainly atopic, exposed to animals carrying mites like *Dermatophagoides* sp. or *Dermanyssus gallinae* (red poultry mite) may suffer acute prurigo mainly of the exposed areas (personal experience) or scabies-like lesions (Yassien *et al.*, 1996). While the frequency of Paronychia & Onychomycosis (22.8%) was significantly higher compared to control group (3.33%). This is agreed with a study which reported that, acute pyogenic paronychia or chronic paronychia and onychia, sometimes with inter-digital intertrigo aggravated by *Candida albicans*, are favored mainly by the wet work, contact with aggressive chemicals, and glove occlusion (Stehr-Green *et al.*, 1993; Keefe *et al.*, 1994).

But there was no statistically significant difference between both groups regarding Tinea pedis and Wart which disagreed with a study which reported that, More than 40% of the workers, mostly those who handle blood, claws, or skin of raw or unfrozen chicken, develop hand and forearm wart, and wart-like lesions, induced by human papilloma virus (HPV), especially HPV type 7 (Stehr-Green *et al.*, 1993; Keefe *et al.*, 1994).

Also, the frequency of traumatic skin disorders was significantly higher among exposed (22.8%), the most common traumatic condition with statistically significant difference among exposed was scratches (14.03%). while there is no statistically significant difference regarding cut wounds and scars.

## Conclusions and Recommendations

Based on the findings of this study, it can be concluded that poultry slaughterhouse workers are at great risk of developing dermatological injuries and illnesses. So the current study recommends that periodic medical examination, health education program and the use of personal protective equipments are very important to overcome these problems and recommendations for further researches.

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