Prevalence, risk factors and types of dermatoses among food handlers in Batticaloa MOH area

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Abstract

Introduction: Batticaloa is the capital city of Batticaloa District situated in Eastern Province of Sri Lanka, which harbors various ethnic groups with different religious backgrounds. The ethnic and religious diversity of population is responsible for variety of food items and dishes unique to the area where demand for food has created a rapidly growing food industry. Food safety standards require all persons involved in handling food to be in perfect hygienic condition in order to prevent contamination with microorganisms and to offer a perfect product to the consumer.

Methods: A descriptive cross sectional study was carried out among food handlers who were working in the most populated PHI regions of Batticaloa MOH area. All workers were interviewed and examined at their workplace and relevant further examination and investigations were carried out at the Skin Clinic, Teaching Hospital, Batticaloa.

Results: 69 (42.3%) out of the total 163 workers had occupational dermatoses (OD), and out of them physical injuries (thermal, cuts/ abrasions) was the commonest [22 (31.88%)]. Second commonest OD was paronychia and occupational contact dermatitis (OCD), which was found only among 12 (17.3%) workers. Irritant contact dermatitis (ICD) was more prevalent (11.5%) than allergic contact dermatitis (ACD) (5.7%) among the workers with OCD. Both personal history of atopy and increased frequency of hand washing were positively correlated with the risk of developing OCD. Acne vulgaris was the commonest none occupational dermatoses (NOD).

Conclusions: Both personal history of atopy and increased frequency of hand washing were positively correlated with the risk of developing OCD. Physical injuries remained the commonest OD which may be contributed by lack of experience and substance abuse

Introduction

Food industry which includes restaurants, outdoor catering and fast food outlets is thriving in urban, sub urban and rural areas of Sri Lanka. Batticaloa is the capital city of Batticaloa District situated in the Eastern Province of Sri Lanka. The city harbors various ethnic groups with different religious backgrounds. The ethnic and religious diversity of population is responsible for varieties of food items and dishes unique to the area where demand for food has created a rapidly growing food industry.

In Sri Lanka all establishments dealing with the processing, storage, distribution, transport, handling or sale of food or any other matters related to food industry are being carried out in accordance to the Food Act No. 26 of 1980. The persons involved in food handling should maintain a high degree of personal hygiene, wear protective clothing (gloves, head coverings, masks, aprons, and foot wear), refrain from behaviors which could contaminate food and most importantly should not engage in food handling if they suffer from skin diseases, infected wounds or diarrhea which could contaminate the handled food. Food handlers have an important role in infection prevention as unhygienic food preparation may be a source of food borne infections[1].

The personals involved in handling food require their hands to be kept in good hygienic condition to provide the community with healthy products. They are prone to get work related (occupational) skin diseases and may be suffering from skin diseases which are not related to the occupation but in a way could contaminate the handled food.

The skin is the largest organ in the body and plays a major role in protecting us from various noxious materials and microbes by acting as a physical and a biological barrier. Barrier impairment due to various causes makes the skin more prone to be damaged by irritants[2]. Irritant contact dermatitis has been identified as a common occupational dermatoses among food handlers mainly due to increase exposure to irritants from various occupational tasks that they perform at workplaces[3,4].

The occupational dermatoses (OD) are irritant contact dermatitis (ICD), allergic contact dermatitis (ACD), contact urticaria, protein contact dermatitis, infections (Bacterial, fungal), and physical injuries

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(thermal-hot/cold, cuts, abrasions). The food handlers are more prone to develop above conditions as they are at risk of exposure to irritants (repeated contact with water, detergents, chemicals), allergens (antimicrobial chemicals, food preservatives), extreme changes in environmental and surface temperatures and having pre-existing risk factors for skin barrier dysfunction (sensitive skin, atopic dermatitis).

Prevention is always better than cure of a disease. By preventing direct skin contact with irritants or other harmful factors (heat, cold) will protect the skin barrier and hence will reduce the incidence of OD[5].

The non-occupation related dermatoses (infectious, inflammatory, papulosquamous, autoimmune…etc.) where the statistical data could be the same as in the general population may also affect the quality of the food product as well as the particular occupation may have adverse outcome towards the disease which could alter the prognosis.

Considering the numerous international researches in the literature where the majority has been done in developed countries, carrying out a study in the food industry in a developing country heralds paramount importance.

Methods

A descriptive cross sectional community based study was carried out among food handlers in Batticaloa MOH area. From the existing eight PHI (Public Health Inspector) regions in Batticaloa MOH area, three PHI regions (Puliyanthevu, Veddukadu and Koddaimuai) were selected due to the presence of a large number of food outlets compared to the rest of the PHI regions.

Within the selected PHI regions, the workers involved in processing, storage, distribution, transport and handling of food were recruited to participate. Patients with acute severe systemic illnesses, pregnant women and personals below 16 years of age were excluded from the study group.

An interviewer administered questionnaire, which was structured to gather information regarding demographic factors, risk factors for occupational dermatoses and sanitary practices among food handlers and a visual skin assessment diagram were used to collect data. The participants were assessed at their corresponding work places. Every member was educated about the study and informed written consent was taken from each participant prior to acquiring data.

Only the exposed acral areas were examined at the work place and all the individuals who complained about skin disorders involving covered parts were examined at the Hospital Dermatology Clinic ensuring their privacy.

Statistical Package for the Social Sciences (SPSS) version 25 software was utilized for data analysis. Demographic data, prevalence of skin diseases, types of skin diseases was analyzed and presented using descriptive statistics. Chi square test was utilized to evaluate the factors associated with the skin diseases with the significant p value being <0.05.

The applicable authorization for the investigation was obtained from The Regional Director of Health Services (Batticaloa), and the ethical clearance from Ethics Review Committee, Faculty of Health-Care Sciences, Eastern University, Sri Lanka.

Results

The study included a total of 163 participants in the above mentioned PHI areas. A total of 87 participants (53.4%) were recruited from Pulliyanthivu PHI area followed by Vettukkadu-41 (25.2%) and Koddamunai-35 (21.5%) (Table 1). Majority of the workers were from hotel industry [94 (57.6%)] (Table 1).

145 out of the total 163 participants were males. Majority out of the 18 female participants were between 21 and 40 years of age.

Majority of food handlers in the study were Tamil in ethnicity 90 (55.2%) and the second commonest ethnic group was Muslims [66 (40.5%)] (Table 1). There were six foreign nationals (each from China and Nepal, 4 from India) and a single Sinhalese male who worked as a cook in a restaurant.

The participants had different roles in their corresponding food industry. Majority worked as waiters [57 (35%)] (Table 4).

Any skin condition which occurred after starting the current job and improved while away from work was defined as an occupational dermatoses (OD). 69 (42.3%) out of the total 163 workers had OD, while physical injuries (thermal, cuts/ abrasions) remained the commonest OD [22 (31.88%)] (Table 2).

From the 22 workers who suffered from physical injuries, 20 (90.0%) were males and the rate was highest among the hotel staff and among the workers who worked for an average time of 6-12 hours per day [69.3% (113)]. 15 out of the above 22 (68.1%) were

working as cooks and waiters, and eight workers (36.3%) were used to take abusive substances during their working hours (Table 3).

Out of the above 12 with OCD, 10 workers had clinical evidence more in favor of irritant contact dermatitis (ICD), and 2 workers with clinical features suggestive of allergic contact dermatitis (ACD). All 12 persons underwent patch testing because the possibility of coexistence of both ICD and ACD in the same person. Patch tests were performed with European standard series.

Table 1. Demographic details among food handlers

		Type of food industry					
		Hotel	*Restaurant*	*Catering*	*Bakery*	*Fast food outlets*	*Total*
PHI area	Puliyanthivu	54	19	0	1	13	87
	Koddamunai	22	12	1	0	0	35
	Vettukadu	18	8	0	12	3	41
Total		94	39	1	13	16	163
Age	16-20	11	1	0	1	1	14 (8.6%)
	21-30	23	14	0	5	9	51 (31.3%)
	31-40	30	9	1	2	3	45 (27.6%)
	41-50	18	10	0	2	3	33 (20.2%)
	> 50	12	5	0	3	0	20 (12.3%)
Total		94	39	1	13	16	163 (100%)
Ethnicity	Sinhala	0	1	0	0	0	1 (0.6%)
	Tamil	49	17	0	9	15	90 (55.2%)
	Muslim	44	16	1	4	1	66 (40.5%)
	Foreign	1	5	0	0	0	6 (100%)
Total		94	39	1	13	16	163 (100%)
Working hours per day	< 6 hours	6	2	0	2	1	11
	6-12 hours	59	32	0	8	14	113
	> 12 hours	29	5	1	3	1	39
Total		94	39	1	13	16	163
Duration of work	< 1 year	50	18	1	8	9	86
	2-5 years	27	10	0	4	7	48
	> 5 years	17	11	0	1	0	29
Total		94	39	1	13	16	163
Gloves	No	23	15	0	7	4	49
	Yes	71	24	1	6	12	114
Total		94	39	1	13	16	163

Table 2. Prevalence of occupational dermatoses

	Frequency	*Percent*
None	94	57.7
Irritant contact dermatitis	10	6.1
Allergic contact dermatitis	2	1.2
Paronychia	19	11.7
Milliaria	3	1.8
Callosities	13	8.0
Physical injuries - Thermal	10	6.1
Physical injuries - Cuts/Abrasions	12	7.4
Total	163	100.0

Four workers demonstrated positive results with patch testing. Identified allergens were Para tertiary butyl phenol formaldehyde resin – PTBP (commercial disinfectants), Formaldehyde (commercial disinfectants, household cleaners), Quaternum-15 (commercial disinfectants, household cleaners) in three consecutive workers and both paraphenylene-diamine (PPD) and textile dye mix in a single worker). None of them showed positivity to Thiuram mix or Mercaptobenzothiazole (MBT) which would suggest contact allergy to latex or rubber. Due to lack of convincing clinical evidence none of them underwent patch testing with shoe series.

All 12 workers with OCD were offered advice regarding disease prevention and followed up in the skin clinic.

The number of workers who had occupational contact dermatitis (5 out of 12, 41%) was higher among cooks and pastry makers (Table 4).

Out of the above 12 workers who had OCD, 9 had a personal history of atopy. The total number of atopic individuals was 27 (16.6%) (Table 4).

Correlation between personal history of atopy and OCD was significant (0.443) with a P value of 0.000(<0.05)[odds ratio - 22.167 (95% confidence interval in-between 5.487-89.557)].

Prolong contact with water and detergents can cause impairment of the epidermal barrier which can precipitate development of occupational contact dermatitis. Correlation between excessive hand washing (>20 times a day) and contact dermatitis was significant (0.213) with a P value of 0.006 (<0.05) [odd ratio -10.571 (95% confidence interval in-between 1.332-83.930)].

Wearing gloves as a protective measure was significantly negatively correlated with the risk of development of contact dermatitis (-0.74) with a P value of 0.036 (<0.05) [odds ratio -.275 (95% confidence interval in-between .083-.915)].

114 workers (69.9%) used to wear gloves during their working hours while most of them (99) were using plastic gloves followed by rubber (15). None of the subjects with OCD was wearing rubber gloves, which may be the reason for them to not to have latex contact allergy.

41 participants had non occupational dermatoses (NOD) (Table 5). Acne vulgaris was the commonest NOD (9 workers-5.5%) and other relatively common disorders were tinea infections, androgenic alopecia and viral warts.

There were two males who have been newly diagnosed to be having leprosy.

The questionnaire also assessed few sanitary factors among the food handlers. The sanitary/protective measures they have been using were gloves (114), caps (69), aprons (67) and foot wear (121). 69 (42.3%) out of the total were not used to wash their hands after touching their body parts, and the compliance was good among females [4 (5.79%)] than males [65 (94.2%)].

Usage of abusive substances among food handlers were assessed (Table 6) mainly because of the risk of injuries at the workplace which was evident by physical injuries being the commonest occupational dermatoses among the study group.

29 workers were used to smoke during their working hours and 5 used to take alcohol.

Table 3. Demographic data and physical injuries cross tabulation

		Physical injuries		
		No	*Yes*	*Total*
Gender	Male	125	20	145
	Female	16	2	18
Total		141	22	163
Type of food industry	Hotel staff	82	12	94
	Restaurant staff	32	7	39
	Catering staff	1	0	1
	Bakery	12	1	13
	Fast food outlet	14	2	16
Total		141	22	163
Main job task	Raw food handler	18	4	22
	Cook / pastry maker	46	8	54
	Kitchen assistant	16	3	19
	Kitchen cleaner	11	0	11
	Waiter	50	7	57
Total		141	22	163
Use of protective wear - Gloves	No	41	8	49
	Yes	100	14	114
Total		141	22	163
Working hours per day	< 6 hours	11	0	11
	6-12 hours	97	16	113
	> 12 hours	33	6	39
Total		141	22	163
Duration of work	< 1 year	75	11	86
	2-5 years	43	5	48
	> 5 years	23	6	29
Total		141	22	163
Using abusive substances while working	None	97	14	111
	Smoking	23	6	29
	Alcohol	5	0	5
	Other	16	2	18
Total		141	22	163

Table 4. Contact dermatitis – demographic data

		Contact dermatitis		
		No	*Yes*	*Total*
Main job task	Raw food handler	22	0	22
	Cook / pastry maker	49	5	54
	Kitchen assistant	18	1	19
	Kitchen cleaner	8	3	11
	Waiter	54	3	57
Total		151	12	163
Personal history of atopy	No	133	3	136
	Yes	18	9	27
Total		151	12	163
Type of gloves	None	42	7	49
	Rubber	15	0	15
	Plastic	94	5	99
Total		151	12	163

Table 5. Prevalence of non-occupational dermatoses

	Frequency	*Percent*
None	122	74.8
Acne vulgaris	9	5.5
Tinea Infection	7	4.3
Congenital melanocytic nevus	2	1.2
Androgenic alopecia	5	3.1
Chemical leucoderma following hair dye allergy	1	.6
Vitiligo	1	.6
Viral warts	4	2.5
Melasma	1	.6
Keloid scars	1	.6
Leprosy	2	1.2
Acquired melanocytic nevus	2	1.2
Acquired digital fibrokeratoma	1	.6
Pityriasis versicolor	2	1.2
Toe web intetrigo	1	.6
Nodular prurigo	1	.6
Palmoplanter hyperhidrosis	1	.6
Total	163	100.0

Table 6. Usage of abusive substances during working hours

		Age					
		16-20	*21-30*	*31-40*	*41-50*	*> 50*	*Total*
Using abusive substances while working	None	9	37	32	21	12	111
	Smoking	4	8	7	6	4	29
	Alcohol	0	1	1	2	1	5
	Other	1	5	5	4	3	18
Total		14	51	45	33	20	163

Discussion

Lack of community based studies regarding skin diseases among members in the food industry warranted the paramount importance of doing the study which was carried out in Batticaloa – a suburban area in Eastern province, Sri Lanka.

69 (42.3%) out of the total 163 workers had occupational dermatoses (OD), and out of them physical injuries (thermal, cuts/abrasions) remained the commonest [22 (31.88%)]. Second commonest OD was paronychia and occupational contact dermatitis (OCD), which was found only among 12 (17.3%) workers. Majority of the studies which were done among food handlers concluded to have irritant contact dermatitis (ICD) as the commonest OCD. A Singaporean study which was done among food handlers by Teo S *et al.*, (2009)[4], found to have physical injuries as the second commonest OCD.

52.7% (86) out of the total were working less than a year, where lack of experience would have been a contributing factor to have more physical injuries. Poor concentration and coordination might have contributed to have injuries as 8 out of the 22 workers who had physical injuries were used to take abusive substances during their working hours. Food handlers should be taught and advised regarding safe working practices to minimize work related physical injuries.

ICD was more prevalent than allergic contact dermatitis (ACD) among the workers with OCD where similar findings were obtained in most of the studies in the literature[3,4,9]. At the initial clinical examination 10 workers were recognized to have ICD and 2 to have ACD. Teo S *et al.*, (2009)[4] has also mentioned that not performing patch tests on all OCD cases as a limiting factor which might lead them to under-diagnose cases of ACD. Due to the possibility of coexistence of both conditions together all of the 12 workers underwent patch testing. Patch testing became positive in four individuals, confirming coexistence of both ICD and ACD in two workers (8-ICD, 2-ACD, 2- both ICD and ACD).

Both personal history of atopy and prolong contact with water (>20 hand washings per day) had positive correlations towards the risk of developing OCD. Wearing gloves was protective and negatively correlated towards development of OCD, as it prevents direct skin contact with irritants and allergens.

99 out of the 114 workers who used to wear gloves were using plastic gloves, and the remaining 15 were using rubber gloves. None of the workers with OCD were using rubber gloves.

A cross sectional study done among health care workers in Sweden by Hamnerius N et al., in 2018[10] has concluded that rubber additives as the commonest cause of OCD among the study group. As evident by our study, using plastic as a material in manufacturing gloves instead of rubber would be an important advancement in future towards reducing latex contact allergy. But the tasks which require precise fine movements as with health care workers is a limiting factor to use plastic gloves instead of rubber.

81% of the workers were used to wear gloves occasionally during working hours. Increased sweating due to the relatively high environmental temperature in a tropical country might have discouraged them to wear gloves throughout their working hours.

Acne vulgaris (9 wokers-5.5%) and tinea infections (7 workers-4.3%) were the commonest non-occupational skin disorders among the study group. Two workers found to have leprosy and were offered multi drug therapy with skin clinic follow up. Sri Lanka is still considered as endemic for leprosy[11].

Public awareness campaigns are being carried out by the anti-leprosy campaign (ALC) and the rate of detection of new patients remains high in dermatology clinics thought the country. The study invariably served the community as a leprosy community screening tool which was evident by detecting two food handlers with leprosy among food handlers in the three most populated PHI areas in Batticaloa MOH area.

The personals involved in handling food require their hands to be kept in good hygienic conditions to provide the community with healthy food products. Unfortunately 69 (42.3%) workers were not used to wash their hands after touching their body parts. Under unhygienic conditions the food can be contaminated and also be a potential source of food-borne infections[1]. More health education awareness programs regarding personal hygiene and sanitary practices need to be carried out by the regional health service providers.

52 workers including 5 teenagers were used to take abusive substances during their working hours. The factors which contribute to substance abuse needs to be determined by further evaluation which is far beyond the scope of this study.

Conclusions

Physical injuries remained the commonest OD which may be due to lack of experience and substance abuse. Hence health education programs regarding safe working practices should be carried out and the factors for substance abuse evaluated.

Occupational contact dermatitis (OCD) was the second commonest occupational dermatoses (OD) among food handlers in Batticaloa MOH area. Risk of developing OCD was positively correlated with personal history of atopy and increased frequency of hand washings per day, where both factors contribute to epidermal barrier dysfunction. Wearing gloves was protective against development of OCD.

Two workers with leprosy have been identified during the study and acne vulgaris remained the commonest none occupational dermatoses (NOD).

Limitations

The factors which led workers to abuse substance during working hours and the reasons to implement unhygienic practices need to be evaluated by a further study. Although, all the food handlers with allergic contact dermatitis (ACD) in this study became positive with European standard series patch test kits, it would have been more informative if we patch tested them in addition with food handler series.

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