



## ORIGINAL ARTICLE

# Occupational dermatitis among construction industry workers in 10<sup>th</sup> of Ramadan City

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### ABSTRACT

**Background:** Occupational dermatitis among construction workers is a major occupational health concern and skin contact with cement has been associated with contact dermatitis, which ranges from cement burns to cumulative irritant contact dermatitis. **Objective:** The objective of this study was to investigate the prevalence and severity of occupational cement contact dermatitis amongst construction workers in 10<sup>th</sup> of Ramadan city. **Methods:** A cross sectional descriptive study amongst workers in construction site hired at two basic construction companies in 10<sup>th</sup> of Ramadan city were examined all. A structured questionnaire was used to evaluate the demographic data and work-related activities of these construction workers. A complete skin examination was conducted and skin manifestations were assessed by a dermatologist using skin patch test to differentiate type of dermatitis. The data collected was presented and analyzed using appropriate statistical tests to find out the significance of variables. **Result:** Out of the total number of workers screened 343/676 (50.7%) had contact dermatitis. All were males and the age ranged from 18-55 years (mean  $29.1 \pm 5.68$  years). The most common occupational disease was irritant contact dermatitis in 261 (38.6%) patients, allergic contact dermatitis (give positive results to patch test) in 82 (12.1%) patients and other less frequent skin diseases found like eczema and dermatophytosis among 7.6% and 3.7% of cases respectively. The most common site of lesion was palms of hand (70.2%), tip and side of fingers (35.1%) and dorsa of hands (40.7%). the most common morphology of lesion found was thickening and lichenification (64.9%). **Conclusion:** The issue of allergic and irritant contact hand dermatitis among cement workers in 10<sup>th</sup> of Ramadan city had a considerable morbidity. Identification of these patients with adequate treatment and test of the suspected allergens could further help the workers involved.

### Key words:

Contact dermatitis, Cement, Construction workers.

### INTRODUCTION

Occupational dermatitis (OD) can be defined as: "Any abnormality of the skin induced or aggravated by the work environment"(1). Also can be defined as: "A pathological condition of the skin related to occupational exposure as a major causal or contributory factor".(2)

The most common work related dermatosis is contact dermatitis reported to be 12.9 per 100,000 workers.<sup>1</sup> Occupational contact dermatitis is most often localized to the

hands.<sup>3</sup> and employees in wet work are at increased risk of this disease.<sup>(3)</sup>

Skin in contact with cement has been associated with irritant cement contact dermatitis and allergic cement contact dermatitis. Cement contains the following substances: silicon dioxide (SiO<sub>2</sub>), aluminium oxide (Al<sub>2</sub>O<sub>3</sub>), iron oxide (FeO<sub>3</sub>), magnesium oxide (MgO), sulfur dioxide (SO<sub>2</sub>) and calcium oxide (CaO). When calcium oxide comes into contact with water, it becomes calcium hydroxide (Ca (OH)<sub>2</sub>),

which is a highly alkaline substance, with a pH value of 11–13. It is a very strong irritant to the skin, and may sometimes produce skin erosion and even skin necrosis (4). The common allergens affecting cement workers are: epoxy resin, colophony, formaldehyde, nickel, rubber gloves and cobalt, but the worst offender is hexavalent chromium (5). Cement workers' hands are regularly in contact with cement, so once they suffer from hand contact dermatitis as a result of exposure to cement, they are susceptible to recurrence and complete recovery is very difficult, which may compromise their work efficiency (6). The necessity to frequently visit a physician makes them lose work time too. (7)

In the work area, irritative contact dermatitis (ICD) is more frequent than allergic contact dermatitis (ACD), with a 4:1 ratio. (8)

Cement burns usually occur as a result of kneeling in wet cement, or getting cement down into work boots. Symptoms may be delayed a couple of hours. Initially, the skin is a dusky red and extremely painful, followed by deep necrotic ulcers.(9, 10).

#### METHODS

A cross sectional descriptive study carried out among workers in construction site hired at two basic construction companies in 10<sup>th</sup> of Ramadan city were examined all (676 workers) during routine periodic medical examination during the period of May till November 2018. A structured questionnaire was used to evaluate the demographic data, and work-related activities. A complete skin examination was conducted and skin manifestations were assessed by a dermatologist. Dermatitis was diagnosed if erythema, maculo-papules, hyperkeratosis, and/or skin thickening were present. Depending on patch skin test the workers were classified to have irritant or allergic contact dermatitis, the testing agent (potassium dichromate) were fixed to the upper back with tape then secured by 3 M tape. The patches were removed after 48 hours and the sites were examined for evidence of reaction. The sites were re-examined at 72 hours by the same dermatologist. The reading at 72 hours was considered positive if the skin reaction was equal to or greater than erythema and

infiltration, possibly with papules and vesicles. All individuals signed an informed consent form before undergoing the skin examination.

Workers proved to have cement dermatitis was diagnosed if erythema, maculo-papules, hyperkeratosis, and/or skin thickening were present, allergic cement contact dermatitis diagnosed in presence of cement dermatitis with a concomitant chromium hypersensitivity, irritant cement contact dermatitis means cement dermatitis without a concomitant chromium hypersensitivity; and chromium hypersensitivity is a positive patch test to potassium dichromate.

The data collected was presented and analyzed using appropriate statistical test to find out the significance of variables (SPSS 16).

#### RESULT

Out of the total number of workers screened 343/676 (50.7%) had contact dermatitis. All were males and the age ranged from 18-55 years (mean  $29.1 \pm 5.68$  years).The duration of the disease ranged from 1-36 months (mean of  $26.5 \pm 3.25$  months). Most of the patients (n=239; 69.7%) had secondary education and (71) 20.7 % of them had only primary education and only 33 patients (9.6%) were illiterate.

Regarding the dermatological diagnosis the most common occupational disease was irritant contact dermatitis in 261 (38.6%) patients, allergic contact dermatitis (give positive results to patch test) in 82 (12.1%) patients and other less frequent skin diseases found like eczema and dermatophytosis among 7.6% and 3.7% of cases respectively. There was no one gave positive patch test with normal skin, (Figure 1).

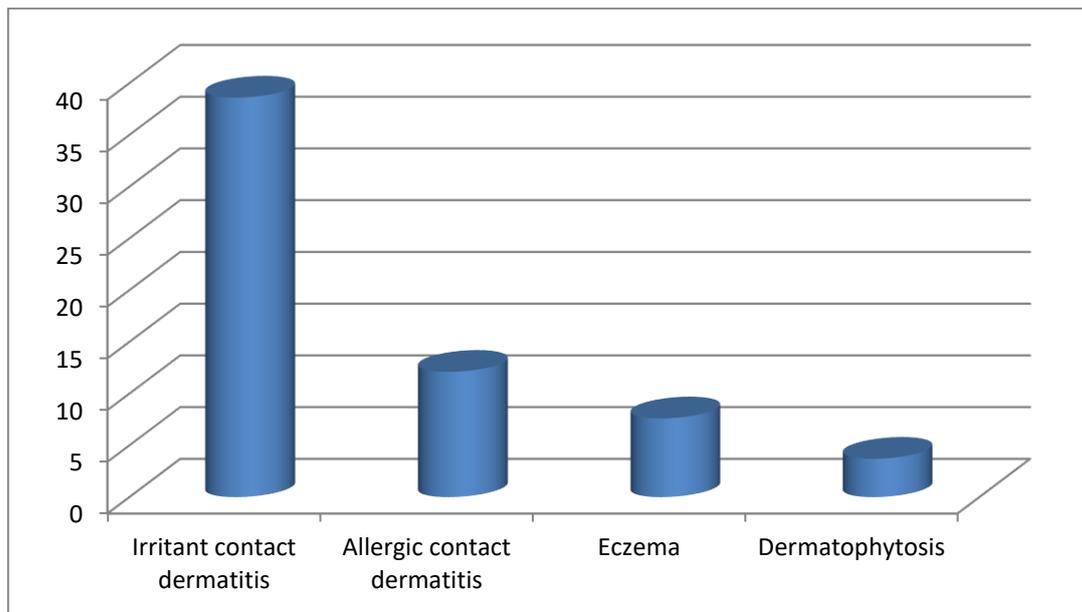
Among the patients with positive dermatitis, most affected area was hands (n=279; 81.3%) followed by feet among 36 workers (10.5%), 6.7% (23 workers) had face lesions with affected hands and only five workers (1.5%) had neck affection.

Among hand dermatitis cases (302 cases) the commonest affected site of lesion was palms of hand (n=212; 70.2%), tip and side of fingers among 106 cases (35.1%) and dorsa of hands among 123 cases (40.7%), (figure 2).

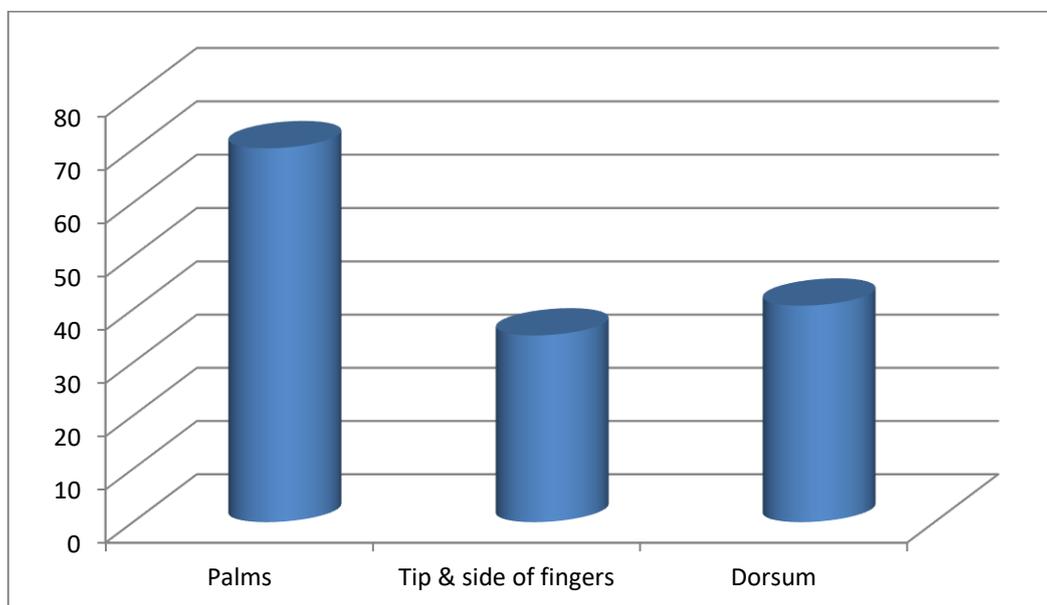
The most common morphology of lesion found was thickening and lichenification seen in 196 cases (64.9%), scaling (n=156; 51.7%), hyperkeratosis (n=122; 40.4%), erythema seen in 39.4% (119 cases), dryness (n=97; 32.1%) and fissures seen in 65 cases (21.5%) (Figure 3).

Depending on their role in construction site, the whole studied group differentiated

according to water contact duration. The patients who had to do wet work in contact with cement using their hands without personal protective equipment for more than 2 hours daily had a higher incidence of CD (n=302; 73.3%) than the patients who worked for less than 2 hours (n= 41; 15.5%) with statistically significant difference (  $p < 0.05$ ).



**Figure 1: Dermatological diagnosis among studied construction workers.**



**Figure 2: Different sites of hand dermatitis among studied construction workers.**

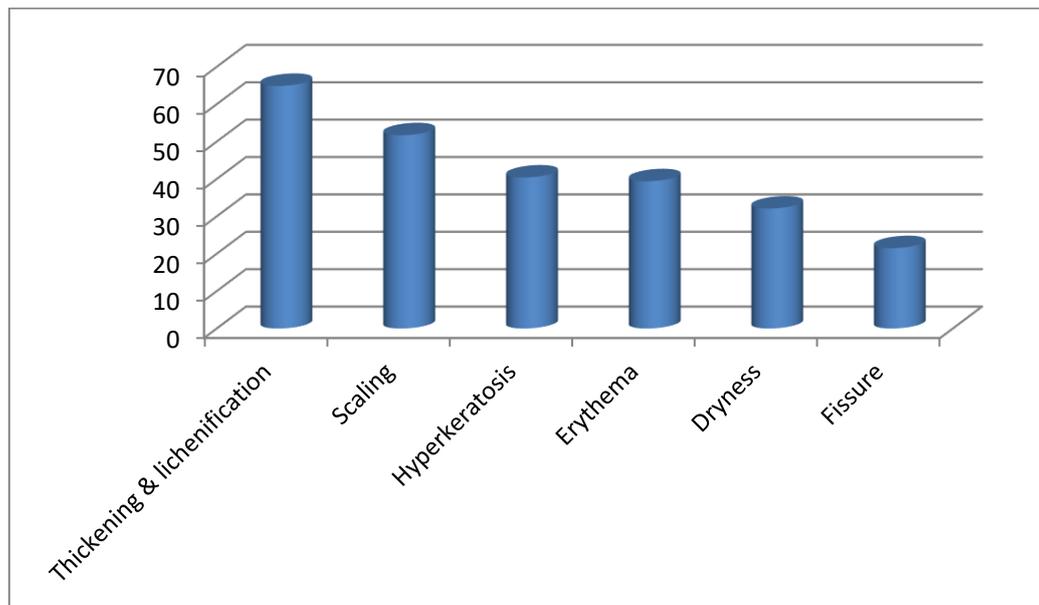


Figure 3: Morphology of the lesion found among studied construction workers.

### DISCUSSION

The Occupational Disease Surveillance System confirmed positive associations for many of the industries and occupations with previously recognized risk of contact dermatitis. With the identification of occupation and industrial information, these findings provide strong and consistent evidence of increased risk of dermatitis in several occupations and industries. These results support the previously published literature, which indicates a need to focus on exposures including wet-work, frictional trauma, metal working fluids and organic solvents (11).

The purpose of this study was to investigate the prevalence and severity of occupational cement contact dermatitis amongst construction workers in 10<sup>th</sup> of Ramadan city. Our results showed that out of the total number of workers screened 343/676 (50.7%) had contact dermatitis. All were males and the age ranged from 18-55 years (mean  $29.1 \pm 5.68$  years). The duration of the disease ranged from 1-36 months (mean of  $26.5 \pm 3.25$  months). Most of the patients (n=239; 69.7%) had secondary education and (71) 20.7 % of them had only primary education and only 33 patients (9.6%) were illiterate.

In agreement with our study **Bhuiyan et al.** (12) reported that the prevalence occupational skin disease among the construction workers

was 59.5%. Exposure to the field in terms of work duration proved to be amongst the factors associated with the occurrence of skin diseases. Prevalence of skin diseases did not differ between male and female workers; there were few female workers on site.

Regarding the dermatological diagnosis, the most common occupational disease was irritant contact dermatitis in 261 (38.6%) patients, allergic contact dermatitis (give positive results to patch test) in 82 (12.1%) patients and other less frequent skin diseases found like eczema and dermatophytosis among 7.6% and 3.7% of cases respectively. There was no one gave positive patch test with normal skin.

In agreement with our study, **Caroe et al., and Friis et al., (13,14)** found that irritant contact dermatitis (ICD) is the most common type of occupational dermatitis, accounting for about 70% of all OCD. ICD is not immune-mediated and requires no prior sensitization, in contrast to allergic contact dermatitis. It results from direct contact with a substance that causes abrasion or injury to the skin. It can be clinically difficult to distinguish ICD from ACD.

Among the patients with dermatitis, most affected area was hands (n=279; 81.3%) followed by feet among 36 workers (10.5%), 6.7% (23 workers) had face lesions with affected hands and only five workers (1.5%)

had neck affection. Among hand dermatitis cases (302 cases) the commonest affected site of lesion was palms of hand (n=212; 70.2%), tip and side of fingers among 106 cases (35.1%) and dorsa of hands among 123 cases (40.7%). The most common morphology of lesion found was thickening and lichenification seen in 196 cases (64.9%), scaling (n=156; 51.7%), hyperkeratosis (n=122; 40.4%), erythema seen in 39.4% (119 cases), dryness (n=97; 32.1%) and fissures seen in 65 cases (21.5%). These results were shown to be comparable with a study reported by **Sharma N** in India on 2009 (15). The most possible reason for commonly affected palms could be pattern of workers done. Most of workers were seen mixing cement with hands without wearing gloves, as dorsum had more thicker skin could result in less irritant reactions when compared to the palms.

**Aloui, et al. (16)** aimed in their study to investigate the epidemiologic profile of occupational ACD in Tunisia. The overall incidence of occupational ACD was 31.65 cases per 100.000 workers in Tunisia. The male-to-female ratio was 3.03:1. Patch tests were positive in (59.67%).

**Saji et al. (17)** found that construction workers were affected with different symptoms and on different body parts in relation to their working area/job tasks. In their study in India, Almost all the skin-related symptoms showed as a high prevalence of skin burns (55%) followed skin irritation (52%).

In the current study, depending on their role in construction site, the whole studied group differentiated according to water contact duration. The patients who had to do wet work in contact with cement using their hands without personal protective equipment for more than 2 hours daily had a higher incidence of CD (n=302; 73.3%) than the patients who worked for less than 2 hours (n=41; 15.5%) with statistically significant difference ( $p < 0.05$ ).

This came in agreement with **Carøe et al. (18)** who found that duration of exposure to wet-work and high frequency of hand washing have been found to be associated with occupational contact dermatitis of the hands.

Frequent exposure to water causes swelling and shrinking of the stratum corneum and can lead to hand dermatitis (hand eczema). Several mechanisms such as osmolarity, pH, mineral content, and temperature might account for the irritancy of water. It has also been argued that another factor in the development of ICD might be the extraction or dilution of the natural moisturizing factors in the stratum corneum. Continual exposure to water may also produce maceration and cutaneous irritation through desiccation of the skin may result from the repeated evaporation of water from the skin (19).

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