

# COMPREHENSIVE STUDY REPORT OF R&D SHORT TERM RESEARCH PROJECT

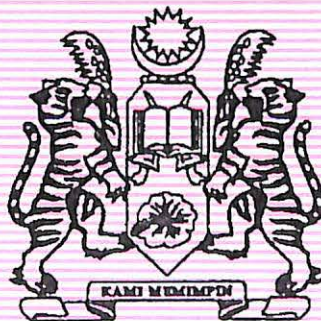
(IRPA Grant Number: 304/PPSP/6131204).

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## A STUDY OF CONTACT DERMATITIS AMONG HOSPITAL CLEANERS IN KOTA BHARU, KELANTAN

Authors:

1. Prof. (Dr) Rusli Bin Nordin
2. Dr. Hasniza Bt Abdullah
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UNIVERSITI SAINS MALAYSIA

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## **LIST OF ABBREVIATIONS**

<b>A</b>	- Attitude
<b>CI</b>	- Confidence Interval
<b>HKB</b>	- Hospital Kota Bharu
<b>HUSM</b>	- Hospital Universiti Sains Malaysia
<b>K</b>	- Knowledge
<b>KAP</b>	- Knowledge, Attitude and Practice
<b>KKM</b>	- Kementerian Kesihatan Malaysia
<b>P</b>	- Practice
<b>ROC</b>	- Receiver Operating Characteristics
<b>SPSS</b>	- Statistical Package for Social Science
<b>VIF</b>	- Variance Inflation Factor
<b>WHO</b>	- World Health Organization

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## ABSTRAK

### **Kajian Penyakit Kulit Dermatitis Kontak Di Kalangan Pencuci Hospital Di Kelantan**

Penyakit kulit adalah antara sepuluh penyakit pekerjaan utama. Kumpulan sokongan dalam industri kesihatan adalah golongan yang sememangnya berisiko disebabkan oleh pekerjaan mereka yang terdedah kepada risiko dan mencuci telah dibuktikan sebagai berisiko tinggi. Kajian ini bertujuan untuk menentukan kadar kejadian dan faktor risiko penyakit dermatitis kontak dan menganalisa tahap pengetahuan, sikap dan amalan berkaitan penyakit kulit kontak dikalangan pencuci hospital. Kajian irisan lintang dijalankan pada bulan Ogos, 2001 dan Jun, 2002. Dua ratus dan sembilan puluh tujuh pencuci hospital dari Hospital Universiti Sains Malaysia (HUSM) dan Hospital Kota Bharu (HKB) mengambil bahagian dalam kajian. Pengumpulan data telah dilakukan menggunakan (1) borang kaji selidik berstruktur terdiri dari 3 soalan sosio-demography, 5 soalan berkaitan pekerjaan, 25 soalan pengetahuan, 14 soalan sikap dan 14 soalan amalan berkaitan penyakit kulit kontak; (2) pengambilan sejarah penyakit, pemeriksaan klinikal oleh pakar dermatology; dan (3) ujian Patch. Penyakit kulit kontak di diagnosis berdasarkan pendedahan terhadap bahan kimia, pemeriksaan klinikal dan ujian patch positif. Ujian Patch positif membezakan kejadian penyakit kontak alahan dan penyakit kulit kontak kerengsaan. Keputusan menunjukkan kadar kejadian penyakit kulit kontak adalah 7.4% ( 95% CI 4.7% - 11.0 ). Kebanyakan penyakit kulit kontak melibatkan paha dan kaki (50%). Penyakit kulit kontak alahan dan penyakit kulit kontak kerengsaan membabitkan 41.2% dan 58.8% masing-masing. Penyebab kepada kejadian penyakit kulit kontak pekerjaan alahan adalah ' nickel sulphate' (5 positif patch) 'rubber chemicals' (1 'mercapto mix'), bahan pengawet dalam sabun (1 'paraben mix') dan penyah dalam sabun dan pencuci (1 'potassium dichromate'). Analisa skor min

pengetahuan, sikap dan amalan tidak menunjukkan perbezaan yang signifikan diantara pencuci hospital yang mendapat penyakit kulit dermatitis kontak dan pencuci hospital yang tidak mendapat penyakit kulit dermatitis kontak. Faktor analisa yang dijalankan terhadap soalan pengetahuan, sikap dan amalan merumuskan 4 faktor umum terhadap pengetahuan: sebab, tanda-tanda penyakit, rawatan dan pencegahan; sikap dan amalan: kesedaran kesihatan, carakerja selamat, polisi keselamatan dan pemakaian pakaian keselamatan. Analisa 'simple logistic regression' menunjukkan sejarah pesakit mengalami masalah kerengsaan tangan terdahulu (Crude OR 8.24, 95% CI 3.31, 20.53) pemakaian sarung tangan lebih dari 2 jam (Crude OR 2.97, 95%CI 1.17, 7.55) dan melibatkan dalam kerja-kerja pencucian yang basah (Crude OR 5.04, 95%CI 1.85, 13.74) merupakan faktor yang signifikan terhadap kejadian penyakit kulit kontak. Berdasarkan ujian 'multiple logistic regression', penggunaan sarung tangan lebih dari 2 jam sehari adalah faktor pelindung (adjusted OR 3.24 95% CI 1.01, 10.39) dan sejarah pesakit mengalami masalah kerengsaan kulit tangan terdahulu didapati faktor risiko yang signifikan (Adjusted OR 8.79, 95% CI 3.15, 24.56). Kami merumuskan penggunaan sarung tangan yang lama semasa bekerja dan sejarah penyakit kulit tangan terdahulu adalah berkait rapat dengan penyakit kulit kontak di kalangan pencuci hospital.

**Katakunci: penyakit kulit kontak, penyakit kulit kontak alahan dan kerengsaan, pencuci hospital, sarung tangan, HKB, HUSM**

## **ABSTRACT**

### **A Study of Contact Dermatitis In Hospital Cleaners In Kota Bahru, Kelantan**

Dermatological disorders are among ten major work-related illnesses. The maintenance and support staff of healthcare industries are particularly vulnerable to occupational exposures and cleaners have been identified as being at high risk for contact dermatitis. This study is aimed at determining the prevalence, knowledge (K), attitude (A) and practice (P), and risk factors of contact dermatitis in hospital cleaners. A cross-sectional study was undertaken in August 2001 to June 2002. A pilot study was undertaken to validate the KAP questionnaire. Two hundred and ninety seven hospital cleaners were recruited from Hospital USM (HUSM) and Hospital Kota Bharu (HKB). Data was collected using a (1) structured questionnaire comprising of 3 socio-demographic, 5 occupational, 25 K, 14 A and 14 P (KAP) regarding contact dermatitis; (2) medical history and clinical examination by a dermatologist; and (3) patch test. Allergic and irritant contact dermatitis was diagnosed based on a history of chemical exposure, clinical examination and patch testing: a positive patch test differentiated allergic from irritant contact dermatitis. Results indicated that the prevalence of contact dermatitis was 7.4% (95% CI 4.7% - 11.0%). Allergic contact dermatitis and irritant contact dermatitis constituted 41.2% and 58.8%, respectively of contact dermatitis. Majority of contact dermatitis involved thigh, leg and feet (50.0%). Putative chemical agents responsible for occupational allergic contact dermatitis were nickel sulphate (5 patch positives), rubber chemicals (1 mercapto mix patch positive), preservatives in soaps (1 paraben mix patch positive) and contaminants in soaps and detergents (1 potassium dichromate patch positive). Factor analysis of the KAP questions extracted the following common factors: K: causes, clinical features, treatment, and prevention; A



and P: health-seeking behavior, safe work practice, safety policy, and use of personal protective equipment (PPE). Reliability analysis indicated that the questions were internally consistent with Cronbach's alpha ranging from 0.46 to 0.97. There was no significant difference in the mean scores of KAP between 22 hospital cleaners with contact dermatitis and 275 hospital cleaners without. Simple logistic regression analysis showed that history of earlier hand eczema (Crude OR 8.24, 95% CI 3.31, 20.53), wearing protective glove for more than 2 hours per day (Crude OR 2.97 95% CI 1.17,7.55) and wet work for more than 2 hours (Crude OR 5.04, 95% CI 1.85,13.74) were significantly associated with contact dermatitis in hospital cleaners. Multiple logistic regression analysis showed that there was a positive association between the duration of use of protective glove for more than 2 hours and contact dermatitis (adjusted OR 3.29, 95% CI 1.03, 10.73). The odds of having contact dermatitis was 8.79 times in hospital cleaners with a history of earlier hand eczema (adjusted OR 8.79, 95% CI 3.15, 24.56). We conclude that prolonged use of protective glove and previous history of hand eczema were associated with contact dermatitis in hospital cleaners.

**Keywords: contact dermatitis, allergic and irritant contact dermatitis, hospital cleaners, glove, hand eczema, HKB, HUSM**

## **CHAPTER ONE**

### **INTRODUCTION**

WHO estimates that every year there are 217 million cases of occupational diseases and 250 million cases of injuries at work, including 330 000 fatal cases. The ten major work-related illnesses are respiratory diseases, musculoskeletal disorders, cancer, injuries, cardiovascular diseases, reproductive disorders, neurotoxic disorders, noise induced hearing loss, dermatological disorders and psychological disorders (The World Health Report, 1998).

Without preventive action, the burden of occupational diseases and injuries will escalate. By the year 2000, the global labour force will grow to 3 billion. Many workers will be exposed to occupational hazards such as toxic chemicals and dusts, allergenic agents, and to serious injuries causing more than one month's absence from work. Most of these conditions lead to reduction of working capacity or permanent disability. The rising costs of occupational illnesses and injuries make health promotion and safety in the workplace a sound investment (The World Health Report, 1998).

The healthcare industry has a number of features which warrant special attention. These are its size and the multiplicity of its occupational hazards. The healthcare industry employs a large sector of the workforce in most countries. In many countries, the healthcare population is about 5% of the total workforce (Harrington, 1990). The range of hazards to which the health care worker may be exposed is vast. It covers a wide range of physical agents such as radiation, noise, slips and fall, needle prick injuries,

back injuries, chemical hazards including detergents, chemotherapeutic agents, formaldehyde and anaesthetic gases, biological hazards such as hepatitis B, HIV/AIDS, tuberculosis and psychosocial factors such as stress and shift-work. Health care workers are covered under OSHA (1994).

Maintenance and support staff of the healthcare industries are the most difficult to identify for epidemiological studies and yet their occupational exposures to a wide range of hazards render them to be a particularly vulnerable group. They are also the least well served by health services and provide a low profile but vital service to the industry (Harrington, 1990). Cleaners constitute a significant proportion of the workforce (Nielsen and Bach, 1999) The hospital work environment was characterized by a high demand for hygiene and disinfectants (Nielsen, 1996). Meyer *et al.* (2000) found that the healthcare industry was the industry with the second greatest number of occupational dermatitis cases seen by dermatologists and occupational health physicians after manufacturing in the United Kingdom. In Singapore, health and pharmaceutical workers made up 4% of all occupational contact dermatitis cases from 1989 to 1998 (Goon. *et al.*, 2000). Several studies have shown that cleaners are at risk of contact dermatitis and the prevalence rate ranges from 15% to 40%. Douglas *et al.* (1999) reported that cleaners were at high risk for contracting occupational dermatitis (a 38% prevalence). This is supported by Malten (1981) who revealed a higher incidence of chronic irritant contact dermatitis among hospital cleaners.

Cleaning materials can affect the skin resulting in toxic or allergic skin problems among cleaners (Nielsen and Bach, 1999). The active components in cleaning agents are surfactants, acidic and alkaline substances, water softeners, disinfectants and solvents

(Nielsen and Bach, 1999). Abrasive cleaners work by 'stripping' off superficial layers of stratum corneum whereas waterless cleaners contain solvents that dissolve oily substances which soil the skin and all these cleaning agents may cause or aggravate work-related dermatitis ( Mathias, 1988).

In Malaysia, notification of occupational and work related diseases is mandatory under the Factory and Machineries Act (1967), mainly to allow investigation of such cases by the Department of Occupational Safety & Health (DOSH). Subsequently the Occupational and Health Act (1994) reinforced this responsibility for both factory managers and doctors to report all cases of occupational and work-related diseases and poisoning to DOSH. Although healthcare workers are covered by the OSHA (1994 ), the system has not worked well since only a few cases have been reported (Sirajuddin *et al.*, 2001)

Thus, the present study should be able to clarify the prevalence and risk factors of contact dermatitis in hospital cleaners in our local setting.

### **1.1 Overview of Contact Dermatitis**

The term 'eczema' and 'dermatitis' are often used synonymously. Eczema represents a polymorphic pattern of inflammation of the skin characterized, in its acute phase, by erythema, vesiculation and pruritis and, in its more chronic phases by dryness, hyperkeratosis and fissuring. Where the difference is implied, the word 'dermatitis' may signify that the eczema is of external origin, i.e. an irritant or allergic contact dermatitis

as opposed to an endogenous or constitutional eczema, or it may denote a broader, less precise pattern of inflammation (Wilkinson & Willis, 1998)

The dermatologist's definition of an occupational skin disease is "a cutaneous disorder caused by or otherwise expressed as the result of factors primarily associated with the workplace." The three operational criteria useful to identify a skin disorder as occupational are as follows:

\*The skin disorder should have developed for the first time while the patient was on a job presumably associated with that skin disorder.

\*The skin disorder should clearly improve when the patient is away from the work environment and flare while on the job.

\*There should be a plausible etiologic agent in the workplace that can be linked to the expression of the skin disorder (Beltrani and Vincent, 1999).

The two commonest forms of occupational skin diseases are irritant and allergic contact dermatitis. Contact dermatitis is a cutaneous inflammatory response to an exogenous agent that has come into direct contact with the skin surface for a long enough time and in sufficient concentration to provoke an alteration of sensation and morphology. Both irritant and allergic mechanisms can result in contact dermatitis (Rietschel and Robert, 1997)

Irritant contact dermatitis results from non-immunologic, physical and or chemical damage to the skin. Irritant contact dermatitis may be acute or chronic. Acute irritant contact dermatitis results from immediate cell damage that is caused by strong irritants such as acids and alkalis. Weaker irritants such as detergents often require recurrent or

prolonged exposure to induce dermatitis (cumulative irritancy). The resulting chronic dermatitis is due to repeated epidermal damage that persists despite the body 's inherent repair mechanism (James *et al.* 1996).

Allergic contact dermatitis is a delayed-type of immunologic reaction of the skin caused by exogenous allergens. Allergic contact dermatitis may be acute or chronic. The acute eruption usually develops 24 to 48 hours after exposure but may be delayed till up to 4 days. The delayed onset of the dermatitis often makes the cause obscure, requiring a detailed history and patch testing to identify the precipitating chemical (James *et al.*, 1996).

The first step in establishing a work exposure as the cause of contact dermatitis is to take a detailed history rather than to look at the morphological abnormalities. A dermatitis that clears during a 2-3 week break from work and recurs within a few days after returning to work is typical of occupational contact dermatitis. Allergic reactions tend to subside over several weeks after the offending agents are withdrawn. A time course of 2-4 days between exposure and recurrence of dermatitis is also typical. Slight improvement during a weekend away from work may occur with weak irritant reactions, but is unlikely with allergens. If improvement occurs within hours of departure from work, the history is not consistent with either irritant or allergic contact dermatitis. The strongest evidence that an allergic dermatitis is of occupational origin is a positive patch test to non-irritating concentrations found in the workplace, which could come into contact with the areas of dermatitis. Negative patch testing are part of the common criteria for diagnosing of irritant contact dermatitis (Rietschel and Robert, 1997).



## 1.2 Epidemiology of Contact Dermatitis

### 1.2.1 Global

Irritant and allergic contact dermatitis are major occupational hazards to the workers. A study by Dickel *et al.* (2001) showed cleaners were among the high risk occupations for occupational skin diseases. In the United Kingdom, a surveillance scheme was started to collect data on contact dermatitis from dermatologists and occupational physicians since 1993 and 1994 respectively. The overall annual incidence of occupational contact dermatitis in the United Kingdom was 12.9 cases per 100,000 workers. Healthcare industries account for the second greatest number of occupational contact dermatitis seen by dermatologists and occupational physicians in United Kingdom. The annual incidence of contact dermatitis among cleaners and domestic workers was 10.3 cases per 100 000 workers in 1993 to 1999, the fourth out of ten industries for commonly reported occupations by both dermatologists and occupational physicians (Meyer *et al.*, 2000).

In Denmark, a comparative cross-sectional study of 541 hospital cleaning women employed at Aarhus County Hospital showed a prevalence rate of 15.3%. Hospital cleaning women in the age group 15-34 years experienced significant risk (OR 2) of contact dermatitis. About 50% of hospital cleaning personnel in Denmark developed skin disease after 6 months of employment. Use of personal protective equipment, in particular, rubber glove was significantly higher among those who developed skin disease compared to those that did not ( $p < 0.01$ ) (Hansen , 1983).

A cross-sectional study of 1011 female cleaners in nursing homes, schools and public offices in Copenhagen and West Zealand revealed that 46% of the cleaners reported at least 1 out of 4 skin symptoms during a year. A statistically significant inverse correlation between age and itchiness was observed. More than one fourth of the working hours in 81% of cleaners involved using wet hands and there was a dose-response relationship between the number of skin symptoms and the number of hours cleaning with wet hands. Personal protective equipment, in particular, gloves have been shown to be used more frequently by those who developed skin symptoms compared to those who did not (Nielsen, 1996).

A population study of 536 hospital personnels in the University Central Hospital, Turku, revealed that the incidence of contact allergy was 21%. Nickel was the most common allergen implicated (9.1%). The majority of exposed workers had a previous history of contact dermatitis to earrings, metal buttons, clasps or necklaces, wrist watches and other clothing accessories. Hand dermatitis was detected in 46% of the cases with the dorsum of the hands as the the primary site (Lammintausta and Kalimo, 1982).

### *1.2.2 South East Asia*

The prevalence of dermatitis in nursing home workers in Southern Taiwan was 8 % (Smith *et al.*, 2000). Dermatitis was diagnosed predominantly on the forearm (50%). Wet work and occupational contact with nursing home patients may have been important risk factors.

A population- based survey conducted in October and November 1999 among 917 villages of 3 rural villages in Riau Province, Sumatra by house-hold interviews and clinical examinations shown the overall prevalence of 28.2% (95% CI 24.6 – 31.8) with dermatitis of 5.1% (Saw *et al.*, 2001)

In Singapore, the latest epidemiological study of occupational skin disease over 10 years period from 1989 to 1998 had shown an incidence of 93.8 cases per year where 97.2% was contact dermatitis. Irritant contact dermatitis (61.2%) was more common than allergic contact dermatitis (36.0%). Health and pharmaceutical made up 4% of all occupational contact dermatitis from 1989 to 1998 (Goon *et al.*, 2000) Younger, less experienced workers are still a risk group due to unfamiliarity and ignorance about industrial hazards (Goon *et al.*, 2000)

### *1.2.3 Malaysia*

In Malaysia, Kementerian Kesihatan Malaysia (KKM) hospitals and Universiti Sains Malaysia Hospital (HUSM) has adopted the International Classification of Diseases-10 (ICD-10) in 2000 and January, 2001 respectively (Zaini, pers comm., 30 June 2002). Diseases of the skin and subcutaneous tissues are coded according to ICD-10 as follows:

Disease	Code
Infection of the skin and subcutaneous tissue	L00-L08
Bullous disorders	L10-L14
Dermatitis and eczema	L20-L30
Irritant contact dermatitis	L 24
Allergic contact dermatitis	L 23
Papulosquamous disorders	L40-45
Urticaria and erythema	L50-L54
Radiation-related disorders of the skin and subcutaneous tissue	L55-L59
Disorders of skin appendages	L60-L75
Other disorders of the skin and subcutaneous tissue	L80-L99

(ICD-10, 1992).

Diseases of the skin and subcutaneous tissues were among the 10 principal causes of new attendances in the Specialist Clinic and Emergency Department in Peninsular Malaysia in 1997-1998, which accounts up to 3.32% and 3.48% of cases in 1997 and 1998, respectively (MOH, 1998). In Kelantan, diseases of the skin and subcutaneous tissues are among 20 main reasons for admissions in Kementerian Kesihatan Malaysia (KKM) hospitals, which account for 1.1% of cases (Health Department, Kelantan, 2000). These diseases are 10 principal causes of new attendances in the Specialist Clinics and Emergency Department of KKM hospitals in Kelantan, which account for 3.83% of cases (Health Department, Kelantan, 2000).

Very few local studies have been conducted in Malaysia regarding contact dermatitis. A study by Rohna & Suraiya (1998) in 1994 -1996 at the Dermatology Clinic, Kuala Lumpur Hospital showed that cleaners made up 7.5% of cases diagnosed as contact dermatitis due to rubber gloves. In 1997, the Ministry of Health introduced a surveillance programme for occupational and work-related diseases including poisoning for cases seen in government health facilities. Between June 1997 and November 1998, there were 36 cases of respiratory diseases and 95 cases of poisoning by chemicals and pesticides while skin diseases accounted for 108 cases; the commonest reported skin disease was contact dermatitis (87%) (Sirajuddin *et al.*, 2001). A summary of the prevalence of contact dermatitis in different populations is shown in table 1.

Table 1 Prevalence of contact dermatitis in different populations

Author (year)	Populations	Description of population and Sample Size (SS)	Study and Sample	Prevalence / Incidence
Meyer <i>et al.</i> , (2000)	Registered workers of surveillance scheme	Data from Surveillance scheme's dermatologists (EPIDERM) and occupational physicians (OPRA) in UK from 1993 to 1999 EPIDERM SS=12,574 OPRA SS=10,136	Overall cases 100,000	12.9 per
Hansen (1983)	Hospital cleaning personnels	Comparative sectional study SS=541	cross-	15.3%
Nielsen (1996)	Female cleaners at nursing homes, schools and public office in Copenhagen and West Zealand	Questionnaire-based cross-sectional study SS=1011		46% reported at least 1 out of 4 skin symptoms during a year

Table 1. Continue

Lammintausta, Kalimo and Havu (1982)	Hospital personnels working in the University Central Hospital, Turku	Population study SS=536	21%-allergic contact dermatitis
Meding and Swanbeck (1987)	Individuals aged 20-65 years from Register of Gothenburg	Population study SS=16, 584	11.8% in 1 year period prevalence
Smith <i>et al.</i> , (2002)	Nursing home workers in Southern Taiwan	Cross-sectional study SS=Not mentioned	8%
Saw <i>et al.</i> , (2001)	917 villagers of 3 rural villages in Riau Province, Sumatra	A population- based survey conducted in October and November 1999 SS=917	5.1%
Goon <i>et al.</i> , (2000)	Patients diagnosed with occupational dermatoses attending the Contact and Occupational Dermatoses Clinic at the National Skin Centre	Epidemiological study of occupational skin disease over 10-year period from 1989 to 1998 SS=965	93.8 cases per year
Rohna <i>et al.</i> , (200 )	Dermatology clinic Hospital Kuala Lumpur from 1994 to 1996.	Cross-sectional study SS=346	7.5%
Sirajuddin <i>et al.</i> , (2000)	Registered workers of surveillance programme	Data from Surveillance programme for occupational and work-related diseases including poisoning in government health facilities between June 1997 and November 1998 SS=Not mentioned	87% of contact dermatitis from 108 cases.



### **1.3 Risk factors for Contact Dermatitis**

The causes of contact dermatitis are many and varied. Individual factors, including age, gender, history of atopy, history of earlier hand eczema, history of asthma or hay fever, history of childhood eczema, occupational exposure and environmental factors tend to influence susceptibility to contact dermatitis.

#### *1.3.1 Age*

Dickel *et al.*, in a population-based study in 5285 cases from the register of Occupational Skin Diseases in Northern Bavaria from 1990 and 1999 has showed that occupational skin diseases were observed relatively in young workers where the median age was 25 years and the peak age for health care workers is also 25 years (Dickel *et al.*, 2001). In another study, women with eczema caused by wet work were mainly affected in their younger years where cleaners showed a higher incidence rate between 16 and 29 years of age (Cherry *et al.*, 2000).

#### *1.3.2 Gender*

In a population study by Meding among 20,000 randomized individuals aged 20-65 years, the one-year prevalence for males and females was 8.8% and 14.6%, respectively. Young women (aged 20-30 years) were most affected, with a one year prevalence of 19% in 20-30 years of age. (Meding, 1990). According to population-based studies in Scandinavia, the female/male ratio of atopic eczema is about 1.4:1, which may also contribute towards the higher prevalence of hand eczema in women (Schultz, 1993).

### *1.3.3 Duration of Work*

Fregert's study of irritant and allergic contact dermatitis in the workplace found that both types of dermatitis tend to start within the first year of employment. Allergy will not manifest at least 2 weeks after the introduction of new allergens in the workplace or exposure of a new worker to new environment. By contrast, reactions to strong irritants do not require an induction period and can be seen within minutes to hours. (Fregert, 1975).

### *1.3.4 Occupational exposure*

Exposure to wetness and irritants are clinically well-known risk factors (Nillsson *et al.*, 1985). A prospective cohort study by Uter *et al.*, (1998) have shown that unprotected wet work for more than 2 hours per day is the major significant risk factor. A Finnish follow-up study of people with atopic eczema in childhood found that 90% of subjects performing wet works for 2 hours or more per day developed hand eczema (Lammintausta. and Kalimo., 1982). In a survey of hand eczema in female cleaners in Denmark, over 80% reported wet hands for over ¼ of their working time, and there was positive correlation between number of hours per week the hands were wet and skin disease symptoms.

### *1.3.5 Protective Gloves*

Glove protection usually is effective for irritants, but gloves must have appropriate chemical resistance, physical resistance, and flexibility for the job task. Dermatitis may be caused or aggravated by protective clothing as a result of non-specific irritation from sweat entrapment and friction of the clothing against the skin, accidental entrapment

and occlusion of chemical substances against the skin and development of contact allergy to protective clothing ( Mathias, 1988).

Nielsen has shown in her study among female cleaners that there is a positive association between the use of protective gloves and the prevalence of skin symptoms (OR 2.8, 3.8, 2.7 and 4.2) for symptoms of redness and rough, itchininess, cracks & vesicles respectively which could be explained by assuming that cleaners with skin symptoms are instructed and motivated to use gloves to a greater extent than others (Nielsen, 1996).

### *1.36 Barrier Creams*

The clinical effectiveness of barrier creams for skin protection is controversial and unsupported by clinical trials. Barrier creams may facilitate personal hygiene efforts by making it easier to wash oils and greases off the skin (Orhard, 1984). Their use should not be overpromoted as this may confer on workers a false sense of security and encourage them to be complacent in implementing the appropriate preventive measures (Bourke, Couson and English, 2001).

### *1.3.7 Atopy*

Atopy is the single greatest risk factor determining host susceptibility to the development of clinical irritation (Toby and Mathias, 2002). A 24 years follow-up study in Stockholm, Sweden in 4 groups of individuals revealed that the prevalence of severe and moderate hand eczema was 41% and 25%, respectively compared to those without any personal or family atopy (4%) (Rystedt , 1985). A prospective study in four hospitals in the county of Vasternorrland in northern Sweden revealed that atopic

dermatitis and atopic mucosal symptoms (history of asthma and hay fever) increased the odds of contact dermatitis by 1.3 times among hospital workers involved in wet works (Nilson and Back, 1986). This finding was similar to another study in selected groups of persons involved with hospital wet work in whom individuals with atopic background had a higher prevalence of hand eczema than non-atopy (Lammintausta and Kalimo, 1982).

#### *1.3.8 Childhood Eczema*

Childhood eczema is also an important determinant of contact dermatitis. A population survey of hand eczema reported a 3-fold increase in the prevalence of hand eczema in individuals suffering from childhood eczema (27.9%) compared to those without similar childhood history (10.0%) (Meding, 1990).

#### *1.3.9 History of Hand Eczema*

In a prospective study in four hospitals in the county of Vasternorrland in northern Sweden, it was reported that a history of hand eczema increased the odds of current hand eczema by 12.9 folds. Thus, a history of hand eczema seems of crucial importance for the occurrence of hand eczema in women in 'wet' hospital work (Nilson and Back, 1986). In another prospective cohort study of 111 office apprentices, it was reported that previous hand eczema is the only significant risk factor for the development of irritant and atopic hand eczema (Uter *et al.*, 1998).

### *1.3.10 Environmental factors*

Environmental factors such as low humidity, high temperatures and sweating are also associated with high prevalence of dermatitis (Douglas *et al.*, 1999) Low ambient humidity is equally associated with a significantly high risk (Uter *et al.*, 1998)

## **1.4 Pathogenesis of Contact Dermatitis**

Irritants evoke dermatitis by directly causing epidermal cell damage. No prior sensitization is required, and the reaction is not immunologically mediated. Irritants can cause rapid cell death or more indolent skin changes such as continual erosion of the stratum corneum, depletion of the protective lipids, or dehydration of the epidermis. The mechanism of skin irritation is largely unknown. Studies have shown that the cellular infiltrate is predominantly composed of helper / inducer T lymphocytes (James *et al.*, 1996).

In contrast, allergic contact dermatitis is a cell-mediated, type IV, delayed immunologic reaction. The first is inductive (sensitization) during which the individual becomes allergic to the chemical. The second, elicitation, occurs with continued or repeat exposure to the allergen and results in allergic contact dermatitis (James *et al.*, 1996)

## **1.5 Knowledge, Attitude and Practice**

Lack of awareness of potential health hazards may contribute towards a more tolerant attitude towards exposure to allergens and irritants. Educational efforts should promote awareness and identify work activities in which exposure to allergens and irritants are likely. Job training should teach recognition of early signs and symptoms of contact dermatitis, proper use of protective clothing and barrier creams, and personal and environmental hygiene. (Mathias, 1990)

Worker education has been shown to be of importance in the management of established cases of occupational dermatitis. In one study, there was poor correlation between the worker's recalled diagnosis and the actual diagnosis, but better concordance with their recollection of patch tests. Those who could not were approximately 2 times as likely to have active dermatitis, and more severe dermatitis and that their skin problem interfered with their work and home activities. Those who had no idea of their diagnosis were 3 times as likely to have these problems. These results raise the possibility that further efforts directed at the patient's education with respect to their condition might improve the outcome of their occupational skin disease (Holness and Nethercott, 1991)

A study by Heron demonstrated the importance of worker education as a tool for primary prevention. Training materials such as video and poster presentation may be used as adjunct to prevention and control of exposure to substances hazardous to the skin. The study suggests that although education may be effective, the retention of knowledge requires reinforcement (Heron RJL, 1997)

## **1.6 Justification of Study**

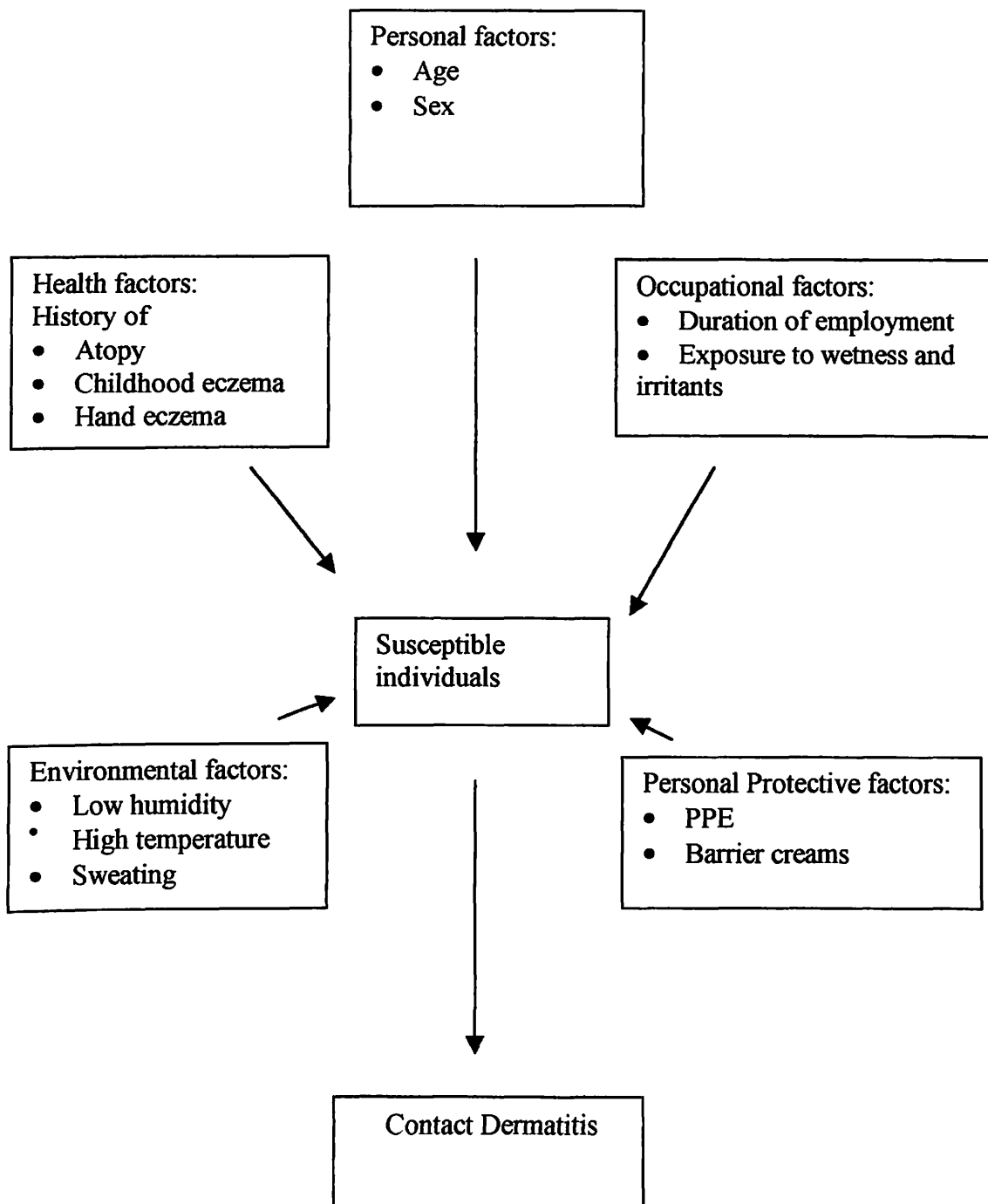
This study attempted to determine the prevalence and risk factors of contact dermatitis as well as knowledge, attitude and practice of hospital cleaners in relation to contact dermatitis. Contact dermatitis is a serious condition that can interfere with the workers' ability to function fully. The results will hopefully provide useful information for the prevention and control of contact dermatitis in hospital cleaners.

## **1.7 Conceptual Framework**

The conceptual framework of this study is shown in Figure 1. Factors influencing contact dermatitis include the following:

- a) Personal factors (age and sex)
- b) Health factors (history of atopy, childhood eczema and hand eczema)
- c) Personal protective factors (PPE and barrier cream)
- d) Environmental factors (low humidity, high temperature)
- e) Occupational factors (duration of employment and exposure to wetness and irritants)

Figure 1 Conceptual Framework of Factors Influencing Contact Dermatitis





## **CHAPTER TWO**

### **OBJECTIVES**

#### **2.1 GENERAL OBJECTIVES**

1. To determine the prevalence and risk factors of contact dermatitis in hospital cleaners in Kelantan.
2. To determine the knowledge, attitude and practice in hospital cleaners in relation to contact dermatitis.

#### **2.2 SPECIFIC OBJECTIVES**

1. To determine the prevalence of contact dermatitis in hospital cleaners.
2. To identify the risk factors for contact dermatitis in hospital cleaners.
3. To determine the validity and reliability of the Knowledge, Attitude and Practice (KAP) Questionnaire regarding Contact Dermatitis.
4. To determine the knowledge, attitude and practice related to contact dermatitis in hospital cleaners.

## **2.2 RESEARCH HYPOTHESIS**

1. The knowledge, attitude and practice in relation to contact dermatitis is higher in hospital cleaners without contact dermatitis compared to those with contact dermatitis.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 STUDY DESIGN**

The research design is cross-sectional.

#### **3.2 TARGET POPULATION**

Workers who work as hospital cleaners in Hospital Kota Bharu (HKB) and in Hospital Universiti Sains Malaysia (HUSM), Kota Bharu, Kelantan between August, 2001 and June, 2002.

#### **3.3 SELECTION OF SUBJECTS**

There are several inclusions and exclusion criteria that must be satisfied before the hospital cleaners could be enrolled as subjects in this study. Inclusion criteria were age more than 18 years, working as cleaners for at least three months and performing the actual cleaning tasks.

#### **3.4 ESTIMATION OF SAMPLE SIZE**

Sample size was calculated using one proportion formula to determine the sample size for the prevalence study.

Single proportion formula:

$$N = \frac{(z)^2 p (1-p)}{(\Delta)^2}$$

P=prevalence of occupational dermatoses in hospital cleaning women (Hansen, 1983)

= 15.3%

Confidence interval=95%

$\Delta$  =5%

$$N = \frac{(1.96)^2 \cdot 0.153 (0.847)}{(0.05)^2}$$

N= 200 subjects

Considering 20% non-response, sample size = 240 Subjects

The sample size was recalculated for risk factors with requirement for significance level ( $\alpha$ ) = 0.05 and power (1- $\beta$ ) = 0.80 by using Epi-info 6 for each possible factor. The largest sample size was taken for this study. Based on the study by Uter *et al.* (1999) mentioned that prevalence of contact dermatitis was 10% among those using PPE (non - exposure group)

The formula for calculating the required number for the study (Joseph, 1981)

$$N = \frac{[Z(1-\alpha/2) - (c+1)p(1-p) + Z(1-\beta) - c \times p_0(1-p_0) + p \times RR \times (1-p_0 \times RR)]^2}{c \times p_0(1-RR)^2}$$

N = required sample size

$$p = [(p_0 \times RR) + (p_0 \times c)] / (1 + c)$$

$$p = [(p_0 + cp_0) / (1+c)]$$

$$q = 1-p$$

RR : relative risk worth detecting

c : ratio of exposed /nonexposed

Z (1-  $\alpha$  /2 ) : alpha risk

Z (1-  $\beta$  ) : desired power

p<sub>0</sub> : disease in non-exposed population