

# **A survey on skin disease and its impact on Quality of life**

*A Project Report to be submitted in the Department of Pharmacy for  
the Partial Fulfillment of the Degree of Masters of Pharmacy*

**Submitted By**

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## **DECLARATION BY THE RESEARCH CANDIDATE**

I, Most. Hajera Khatun, ID: 2012-1-70-021, hereby declare that the dissertation entitled “**A survey on skin disease and its impact on Quality of life**” submitted to the Department of Pharmacy, East West University, in the partial fulfillment of the requirement for the degree of Masters of Pharmacy (Masters) is a genuine & authentic research work carried out by me. The contents of this dissertation, in full or in parts, have not been submitted to any other institute or University for the award of any degree or Diploma of Fellowship.

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## **CERTIFICATION BY THE SUPERVISOR**

This is to certify that the dissertation, entitled “**A survey on skin disease and its impact on Quality of life**” is a bona fide research work done by Most. Hajera Khatun (ID: 2016-3-79-002), in partial fulfillment of the requirement for the degree of Masters of Pharmacy under my supervision.

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## **ENDORSEMENT BY THE CHAIRPERSON**

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## **DEDICATION**

I dedicate this research paper to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. I also dedicate this research paper to my beloved parents for their unconditional support.

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## List of abbreviations

UV	Ultraviolet
SC	Stratum conium
AD	Atopic Dermatitis
AE	Atopic Eczema
NMF	Natural Moisturizing Factor
T-zone	The Nose, Chin and Forehead
KCs	Keratinocytes
PPAR	Peroxisome proliferator activator
DLQI	Dermatology life Quality Index
HRQol	Health Related Quality of Life
IFI	Invasive Fungal Infection
IgE	Immunoglobulin E
IL-13	Interleukin-13
TH2	T-helper 2 Cell
TNF-alpha	Tumor necrosis factor-alpha
NO	Nitric Oxide
SCIT	Subcutaneous Immunotherapy
UVB	Ultraviolet B
RCTs	Randomized Control Trials
HeNe	Helium Neon
SV	Sailing Vessel
BG	Blister Graft
STSG	Split Thickness Skin Graft
PG	Punch Graft

AMST	Autologous Melanocyte Suspension Transplant
CFCs	Chlorofluorocarbons
QoL	Quality of Life
WPAI	Work Productivity Assessment Index
HADS	Hospital Anxiety and Depression
GAGs	Global Acne Grading Scale
CADI	Cardiff Acne Disability Index
OPD	Out Patient Department
PDI	Psoriasis Disability Index
PASI	Psoriasis Area & Severity Index
GBD	Global Burden of Disease

## Abstract

Skin disease is one of the common human illnesses. It is a multidimensional concept that encompasses psychological, social and financial consequences of the skin disease on the patients, their families and on society. Chronic and incurable skin diseases, such as allergy, psoriasis, fungal infection and eczema, are associated with significant morbidity in the form of physical discomfort and impairment of patients' quality of life. The aim of the study was to explore the level of awareness of risk factors related to skin disease and its impact on quality of life (QoL) in different Govt hospital patients in Bangladesh. A pre-structured questionnaire was used to collect data from 181 patients from skin departments in four hospitals of different cities of Bangladesh. In this study purposive sampling technique was followed. The study represents the distribution of the patients according to their age where highest no. of patient (72.92%) were in the age group of 19-45 years followed by <18 year age group (16.02%). The majority (67.95%) of the patients belonged to middle socioeconomic class with monthly income within Tk.10,000-40,000 BDT and observed that major portion (35.91%) of the patients completed their primary education. On the other hand, 16.57% patients studied up to H.S.C and 13.81% patients were Graduate. Majority (63.54%) of the patients were male and 36.46% of the patients were female and maximum (48.07%) patients identified bad hygiene as the risk factors of skin infection followed by wearing tight cloth (27.07%), lack of sleep (17.67%), drinking less water (10.49%) etc. During the study it was seen that 43.65% of patients had oily skin and 35.91% of patient had dry skin. On the other hand, only 11.60% had normal skin. The prevalence of skin disease among adults was found to be 72.92% with allergy, psoriasis & fungal infection being the most common. Among the population 71.27% of the patients were mostly suffered by skin disease during the summer season. Awareness of skin disease is under-researched in Bangladesh, and a deep understanding remains to be achieved. Thus, there is a need for further studies on community health education and treatment individualization for skin disease.

**Keywords-** Skin disease, Awareness, Risk factors, Quality of Life, Epidemiology.

# Chapter 1

# Introduction

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## **1.1 Introduction**

The skin is the largest organ in the body. It has an area of approximately  $16,000\text{ cm}^2$  for an adult and represents about 8% of the body weight. Cells, fibers and other components make up several different layers that give skin a multi-layered structure. Veins, capillaries and nerves form vast networks inside this structure. Skin performs a wide variety of functions resulting from chemical and physical reactions inside these components (Igarashi, Nishino & Naya, 2005). Its primary function is to serve as a barrier protecting the internal organs from physical and chemical attack, invasion of pathogens and excessive water loss (Mann et al, 2012). Skin is a multifaceted biological system which integrates different cells in the area of a tightly organized extracellular matrix. Skin has unique plasticity and regeneration ability (Rosińczuk et al, 2016).

The skin is composed of three layers: the epidermis, the dermis, and subcutaneous tissue. The outermost level, the epidermis, consists of a specific constellation of cells known as keratinocytes, which function to synthesize keratin, a long, threadlike protein with a protective role. The middle layer, the dermis, is fundamentally made up of the fibrillar structural protein known as collagen. The dermis lies on the subcutaneous tissue, or panniculus, which contains small lobes of fat cells known as lipocytes. The thickness of these layers varies considerably, depending on the geographic location on the anatomy of the body (Kanitakis, 2002).

There are two general types of skin, Non-hairy (a skin type on the palms and soles, it has thicker epidermis), Hairy (a type of skin having hair follicles and sebaceous glands). Skin is an extraordinary structure. It is frequently damaged because it is directly in the 'firing line' and, for this reason, skin diseases are very common. There are more than 3000 known diseases of the skin. Skin diseases are among the most common health problems worldwide. The skin disease is a multidimensional concept that encompasses psychological, social and financial consequences of the skin disease on the patients, their families and on society. Chronic and incurable skin diseases, such as psoriasis and eczema, are associated with significant morbidity in the form of physical discomfort and impairment of patients' quality of life (Basra & Shahrukh, 2009).

## **1.2 Skin**

The skin is an organ that separates human body and environment. It acts as a barrier that protects body against UV-radiation, toxic substances, infections (Silpa & Chidvila, 2013).



### 1.2.1 Skin Structure

The skin is the largest organ of the human body, accounting for approximately 16% of total body weight. The various layers of the skin work in concert to provide strength and flexibility and perform the multiple functions of the skin (Wickett & Visscher, 2006). Epidermis is the outermost layer of skin. Keratinocytes, dendritic melanocytes, Merkel and Langerhans cells are different type of cells present in epidermis. The underlying dermis contains connective tissue with antigen presenting dermal dendritic cells, mast cells and memory T-cells (Silpa & Chidvila, 2013).

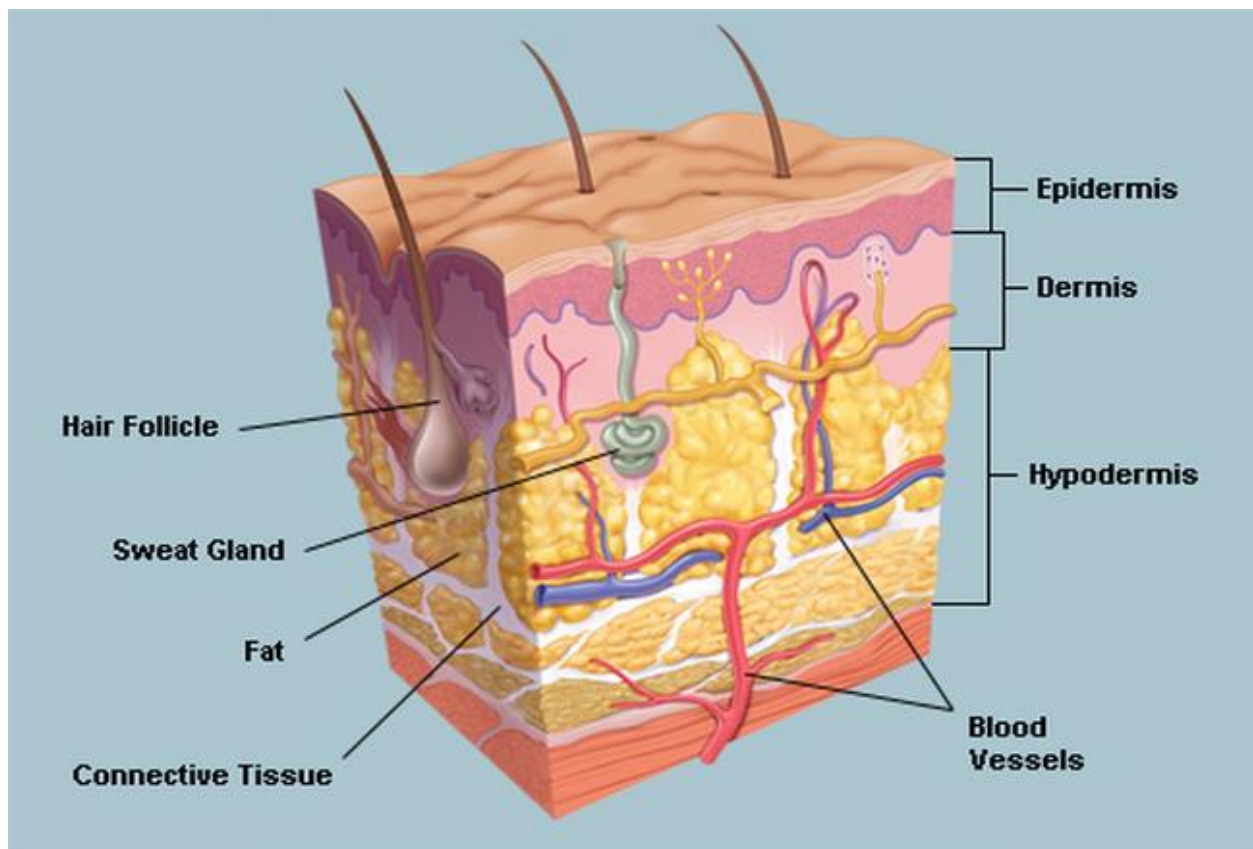


Figure 1.1: Structure of human skin (Gardner, 2017)

### 1.2.2 Layers of skin

There are three main kinds of human skin. Glabrous skin (hairless areas such as the palms of the hands) with its characteristic dermatoglyphics (the grooves on its surface), is found on the palms and the soles. It is characterized by a relatively thick epidermis and by lack of hair follicles. In hairy skin on the other hand, hair follicles are present. The third kind is mucocutaneous (skin areas that border the entrances to the interior of the body). For all three kinds, the skin generally

consists of three layers: epidermis, dermis, and subcutaneous tissue. The thickness of these layers varies depending on the location of the skin. The general structure of human skin is shown in Figure 1.1. The macromolecular components of skin which illustrates the primary macromolecular components of dermis including collagens, proteoglycans (PGs), and hyaluronan (Xu & Lu, 2011).

### **1.2.2.1 Epidermis**

The epidermis is the outer-layer of the skin containing both living and dead cells and is about 75~150µm in thickness. The epidermis is composed of 95% of keratin-synthesizing epithelial cells (keratinocytes) and 5% of non-keratinocytes (cells that do not synthesize keratins). The keratinocytes change in cellular constituents as they move peripherally, which results in a clear distinction between the different cell layers in the epidermis. The well defined layers are shown in Figure 1.1, where the outermost and thickest layer is epidermis (Xu & Lu, 2011).

The epidermis is itself divided into several layers or strata starting with the basal layer or stratum basale just above the dermis proceeding upward through the prickle and the granular layers to the top layer, the SC. There are 2 other important cell types in the epidermis: melanocytes and Langerhans cells. Melanocytes are the pigment-producing cells of the skin and hair in all mammals. In the skin, they are found at the basal layer of the epidermis at which they make pigment granules called melanosomes containing melanin. The melanosomes are transferred from the melanocytes to the epidermal keratinocytes at which they impart some protection to the cell nucleus from ultraviolet (UV) light and give the skin its color. The process of melanin synthesis and transfer of melanosomes occurs continuously as the epidermis renews but can be speeded up in response to UV exposure to produce tanning. Another epidermal cell is the Langerhans cell. Langerhans cells are dendritic immune cells that are the antigen-presenting cell of the skin. They are important to the immune barrier of the epidermis and also participate in contact allergy (Wickett & Visscher, 2006).

The epidermis hydration values vary depending on the anatomical area. The highest values can be found on the facial skin, particular fosse, and lower values – on the forearms whilst the lowest – on the shins. These depend mostly on epidermis thickness and the location of sebaceous and sweat glands. The moisture level changes also depending on the ambient moisture and

temperature. These parameters affect water retention and the degree of its evaporation from the corneal layer, having some influence on the change of hydration gradient between the epidermis and the environment. Moreover, the moisture value may also be affected by the type of consumed foods (Boer et al, 2016).

### **1.2.2.2 Dermis**

The dermis is a more complex structure and is composed of 2 layers, the more superficial papillary dermis and the deeper reticular dermis. The primary function of the dermis is to sustain and support the epidermis. The papillary dermis is thinner, consisting of loose connective tissue containing capillaries, elastic fibers, reticular fibers, and some collagen. The reticular dermis consists of a thicker layer of dense connective tissue containing larger blood vessels, closely interlaced elastic fibers, and coarse bundles of collagen fibers arranged in layers parallel to the surface. The reticular layer also contains fibroblasts, mast cells, nerve endings, lymphatics, and epidermal appendages. Surrounding the components of the dermis is the gel-like ground substance, composed of mucopolysaccharides (primarily hyaluronic acid), chondroitin sulfates, and glycoproteins. The deep surface of the dermis is highly irregular and borders the subcutaneous layer, the panniculus adiposus, which additionally cushions the skin. The fibroblast is the major cell type of the dermis. These cells produce and secrete procollagen and elastic fibers. Procollagen is terminally cleaved by proteolytic enzymes into collagen that aggregates and becomes cross-linked. These tightly cross-linked collagen fibers provide tensile strength and resistance to shear and other mechanical forces. Collagen makes up 70% of the weight of the dermis, primarily Type I (85% of the total collagen) and Type III (15% of the total collagen). Elastic fibers constitute less than 1% of the weight of the dermis, but they play an enormous functional role by resisting deformational forces and returning the skin to its resting shape (Amirlak, 2017).

### **1.2.3 Functions of the Skin**

**Protection and repair:** Protection and repair which is mainly provided by keratinocytes, while UV protection is offered by melanocytes. The subcutaneous layer protects the deeper body organs. Gentle stroking of the skin with a blunt object can result in white line response caused mainly by capillary constriction. A deeper stroke using a tongue blade will lead to the triple cell

response, resulting in a red line, flare and wheal. The wheal is caused by the release of histamine that acts as a vasodilator in local response to injury. The eliciting of the red wheal is known as dermographism that is more pronounced in patients who suffer from hives (urticaria) (Frey & Jencks, 2011).

**Skin color:** Skin color is given by melanocytes that contain melanin (Frey & Jencks, 2011).

**Temperature regulation and excretion of waste products:** Sweat glands produce sweat containing urea and water and play a role in temperature regulation. To facilitate heat loss in hot temperatures, the blood vessels in the skin dilate and sweat glands become active. Alternatively, in cold temperatures skin blood vessels constrict to conserve heat and the body burns fat stored in the adipose tissue. The burning of brown fat under sympathetic stimulation is common in infants. In colder temperatures, the sweat glands become inactive and the erector pili muscles become functional to promote trapping of air for insulation of skin. The adrenergic receptors like innervating the skin blood vessels are responsible for vasoconstriction under sympathetic stimulation (Frey & Jencks, 2011).

**Lubrication:** Lubrication of the skin is provided by sebaceous glands, which produce an oily substance known as sebum. Occlusion and infection of these glands can lead to conditions such as acne (Frey & Jencks, 2011).

**Immunity:** Langerhans cells in the skin are dendritic cells that take up microbial antigens in the skin to transform into antigen presenting cells and provide immunity by interacting with T cells. The name Langerhans comes from the German physician and anatomist that discovered these cells in the skin when he was a medical student (Frey & Jencks 2011).

**Storage:** The skin is an organ which stores fats to provide insulation. This is mainly in the subcutaneous layer (Frey & Jencks, 2011).

**Sensation:** Sensation occurs through specialized structures known as mechanoreceptors:

- Pacinian corpuscle—vibration.
- Meissner's corpuscle—tapping and flicker, point discrimination.
- Ruffini's corpuscle—joint movements and stretch.

- Hair follicle receptor—speed and direction of movement.
- Merkel’s discs—vertical dimpling of the non hairy skin.
- Tactile discs—vertical dimpling of the hairy skin.
- Nociceptors—detection of pain (Frey & Jencks, 2011).

**Vitamin D synthesis:** Skin is a rich source of 7-dehydrocholesterol and under the effect of UV light is converted into Vitamin D (cholecalciferol) that is ingested mainly from diet such as milk and dairy products. Cholecalciferol is converted into 25-hydroxycholecalciferol (25-OH) in the liver and finally to activated 1, 25 hydroxy cholecalciferol (1,25 OH) in the kidneys. The activated 1, 25 hydroxy cholecalciferol plays a vital role in calcium absorption from the intestine and kidneys (Frey & Jencks, 2011).

**Aesthetic:** Skin can be seen as a mode of communication or attraction (Frey & Jencks 2011).

**Absorption:** The skin has the ability to absorb oxygen and water. Certain drugs such as topical steroids that are applied topically could be absorbed through skin surface (Frey & Jencks, 2011).

### 1.3 Types of skin

Skin types include normal, oily, dry and sensitive. Some people also have a combination of skin types in different areas of their skin (Hicks, 2017).

Skin types vary depending upon a combination of factors. They include:

- Water content - affects skin's comfort and elasticity.
- Lipid (oil) content - affects skin's softness and nutrition.
- Level of sensitivity - affects skin's tolerance to certain substances (Hicks, 2017).

#### 1.3.1 Normal skin

Normal skin type is characterized by a radiant complexion. There are very few imperfections, barely visible pores, and no severe sensitivity. It glows with an inner health which indicates good blood circulation. Normal skin is not too dry or too oily. It displays a rosy, smooth texture, and the skin’s elasticity is good. There are no visible blemishes, flaky areas or greasy patches on

the skin. In addition, the production of sebum or oils, moisture content, desquamation and keratinisation are well-balanced. All of these characteristics of normal skin are often found in young individuals. However, it is quite rare to find all these characteristics. Normal skin, in essence, describes a near perfect skin with no to only a few visible skin imperfections. But even if you have normal skin that doesn't mean you are immune to various skin concerns. It is important to take precautionary measures such as a good skin care routine to avoid potential skin related problems (Morganti, 1997).



Figure 1.2: Normal skin is well balanced: neither too oily nor too dry (Hicks, 2017)

When someone has normal skin, they can become quite complacent with its care. Overtime skin will naturally become drier with age. Skin can develop wrinkles, sunspots, and other lesions likely to occur due to a lack of sun protection or failure to implement a daily skin care routine. In women, there may be occasional pimples just before menstruation due to a surge in body hormones. This makes the sebaceous glands produce more oils and clog the pores of the skin. Also, incorrect use of skin-care products, can develop breakouts and other skin problems. Over time, a normal skin type can change due to the aging process as well as additional internal and external factors (Morganti, 1997).

### 1.3.2 Dry skin

Dry skin (xerosis) is a common symptom of a number of skin conditions, including atopic dermatitis/eczema (AD/AE), ichthyosis, irritant contact dermatitis, psoriasis and asteatotic eczema. Dry skin can be aggravated by environmental factors such as frequent washing, use of harsh detergents and exposure to low-humidity (e.g. air-conditioned) environments. Dry skin can be unsightly, and can have severe consequences on the patient's quality of life through itching, discomfort and embarrassment about their appearance. Left untreated, dry skin can lead to a flare of the underlying condition such as AE (Moncrieff et al, 2013).



Figure 1.3: Dry skin can feel tight and rough and look dull (Hicks, 2017)

Dry skin is synonymous with a skin-barrier defect, and is caused by loss of water from the stratum corneum (SC). The healthy SC forms an effective permeability barrier, referred to as the 'skin barrier', which restricts water loss from the body, and prevents the penetration of harmful irritants and allergens. It comprises tightly packed, well-hydrated corneocytes that are enclosed within a matrix of intercellular lipids. The corneocytes contain natural moisturizing factor (NMF), a collection of hygroscopic compounds, which attract and hold water in the cells. Together, these natural humectants are required to maintain the skin's plasticity and development of dehydration of the corneocytes. Such dehydration would lead to the development of cracks between the corneocytes, resulting in inflammation and pruritus. The lipids of the SC are made

up of ceramides, cholesterol and free fatty acids, and are collectively referred to as the lipid lamellae (Moncrieff et al, 2013).

### 1.3.3 Oily skin

Oily skin or seborrhea is a common condition affecting men and women, typically between puberty and about 60 years of age. It is characterized by the production of a quantity of sebum which is excessive for the age and sex of the individual. Although excessive sebum production has minimal physical impact on body function, chronic oily skin can cause significant concern for people who have the condition. Oily skin appears greasy and shiny, contributes to the development of acne, and is frequently accompanied by large pores on the face (Arbuckle, 2008).



Figure 1.4: Oily skin has a glossy shine and visible pores (Hicks 2017)

The consequences of excess sebum may be associated with adverse psychological and social effects resulting from associated acne and the appearance of skin oiliness and shine (Arbuckle, 2008).



### 1.3.4 Combination skin

Combination skin is one type of skin that is a combination of both dry and oily types. This combination of characteristics and problems can make combination skin particularly difficult to deal with. No matter what kind of skin (dry, oily, combination, or sensitive), it's most likely because of genetics. In general, the nose, chin, and forehead of those with combination skin have more active oil glands, which is why these areas may be prone to clogged pores. The cheeks, on the other hand, may have less active oil glands, which is why they may appear dry and flaky (Reed, Ghadially & Elias, 1995).

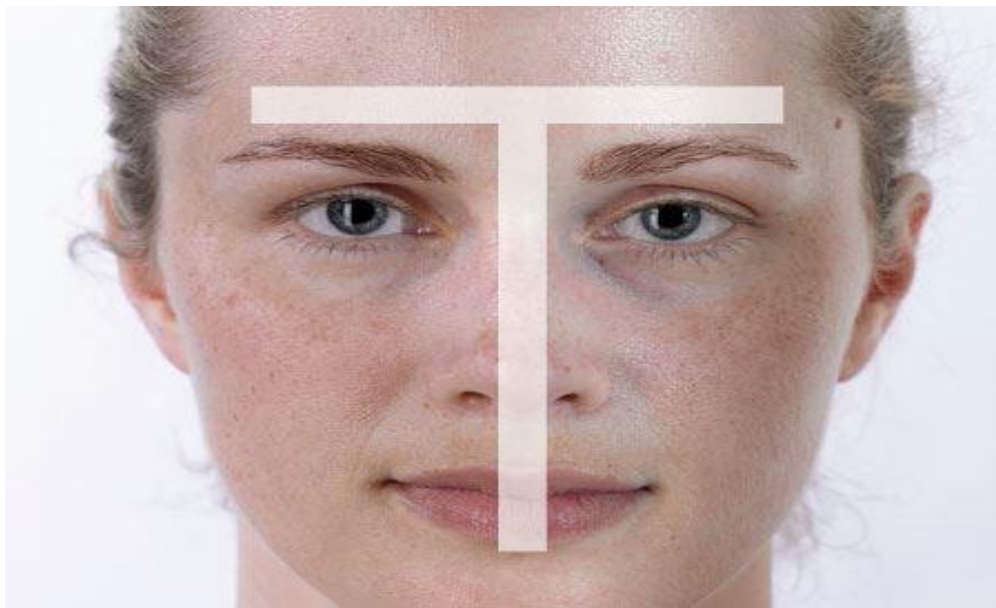


Figure 1.5: Skin types vary between the T-zone and the cheeks on combination skin (Hicks, 2017)

### 1.3.5 Sensitive skin

Sensitive skin is defined as a sensory reaction triggered by contactors and/or environmental factors, usually without a visible clinical manifestation. Sensitive skin is a condition characterized by stinging, burning and itching sensations. These symptoms may occur minutes to hours after contact with a cosmetic product/ environmental stimulant or even after several episodes of use of a topic product, triggering the conduction by cumulative effect (Duarte, 2017).

Patients with sensitive skin often present with subjective complaints that are out of proportion to the objective clinical findings. The condition is often worsened by specific climatic conditions and may affect areas other than the face (Lev-Tov & Maibach, 2012).

#### **1.4 Skin disease**

Skin is the largest and fastest growing organ of the body. In recent years, attention has been directed towards the numerous ways in which immune cells of the skin interact with keratinocytes (KCs) to drive a multitude of skin diseases. They have a wide range of Skin disease. Some of the common diseases are discussed below-

##### **1.4.1 Acne**

Acne is a common inflammatory skin condition characterised by comedones (blackheads and whiteheads) and pus-filled spots (pustules). It usually starts at puberty and varies in severity from a few spots on the face, back and chest, which most adolescents will have at some time, to a more serious problem that may be embarrassing, sap self-confidence and cause scarring. For the majority it tends to resolve by the late teens or early twenties but can persist for longer in some people. Acne can develop for the first time in people in their late twenties or even the thirties (Barankin & DeKoven, 2002).



Figure 1.6: Inflammation in normal facial skin from a patient with acne (Gold, 2009)

### **1.4.1.1 Causes of Acne**

The sebaceous (oil-producing) glands of people who get acne are particularly sensitive to normal blood levels of a hormone called testosterone, which is present in both men and women. This causes the glands to produce an excess of oil. At the same time, the dead skin cells lining the pores are not shed properly and clog up the follicles. These two effects result in a build-up of oil producing blackheads (where a darkened plug of oil is visible) and whiteheads. The acne bacterium (known as *Propionibacterium acnes*) lives on everyone's skin, usually causing no problems, but, in those prone to acne, the buildup of oil creates an ideal environment in which these bacteria can multiply. This triggers inflammation and the formation of red or pus-filled spots (Capitanio et al 2009). It is generally accepted that excess sebum, hormones, bacteria and hyper proliferation of follicular cells are the major etiologic factors for acne (Pappas, 2009).

### **1.4.1.2 Symptoms of Acne**

Acne often associated with the ingestion of chlorinated phenolic agents such as dioxins with subsequent toxicity from these chemicals. Clinically, chloracne can be distinguished from acne vulgaris by the distribution and appearance of the lesions and by taking a detailed history. In some instances, it may be associated with particularly xerotic skin, pigmentation, follicular hyperkeratosis, conjunctivitis, and actinic elastosis. Histologically, the primary lesion is a follicular plug containing keratinous material. Acne is difficult if not impossible to treat adequately and once present, may persist for years. Acne signs and symptoms vary depending on the severity of condition (Chloracne, 1990).

Whiteheads (closed plugged pores)

Blackheads (open plugged pores)

Small red, tender bumps (papules)

Pimples (pustules), which are papules with pus at their tips

Large, solid, painful lumps beneath the surface of the skin (nodules)

Painful, pus-filled lumps beneath the surface of the skin (cystic lesions) (Chloracne, 1990).

### **1.4.1.3 Treatment of Acne**

In topical agents; benzoyl peroxide, antibiotics, retinoids, etc are the mainstay of treatment; can be given in combinations. While systemic therapy includes oral antibiotics, hormonal therapy, and isotretinoin, depending upon the need of patients it has to be selected. Physical treatment in the form of lesion removal, photo-therapy is also helpful in few of them. Since various old and new topical and systemic agents are available to treat acne, it sometime confuse treating dermatologist. Successful management of acne needs careful selection of anti-acne agents according to clinical presentation and individual patient needs (Rathi, 2011).

### **1.4.2 Psoriasis**

Psoriasis is a common chronic inflammatory skin disease with a spectrum of clinical phenotypes and results from the interplay of genetic, environmental, and immunological factors. Psoriasis is an immune-mediated disease that causes raised, red, scaly patches to appear on the skin. It typically affects the outside of the elbows, knees or scalp, though it can appear on any location. Some people report that psoriasis is itchy, burns and stings (Meglio, Villanova & Nestle, 2014).

#### **1.4.2.1 Causes of Psoriasis**

The exact cause remains unknown. A combination of elements, including genetic predisposition and environmental factors, are involved. It is common for psoriasis to be found in members of the same family. Defects in immune regulation (white blood cells called T cells mistakenly target healthy cells instead of attacking foreign substances) and the control of inflammation are thought to play major roles. Despite research over the past 30 years, the "master switch" that turns on psoriasis is still a mystery. Several lines of evidence suggest that the nuclear hormone receptor peroxisome proliferator activator (PPAR)  $\beta/\delta$ , known to regulate epithelial differentiation and wound healing, contributes to psoriasis pathogenesis (Romanowska et al, 2010).



Figure 1.7: Psoriasis causes cells to build up rapidly on the surface of the skin, forming thick silvery scales and itchy, dry, red patches that are sometimes painful (Feldman et al, 2016)

#### **1.4.2.2 Symptoms of Psoriasis**

Psoriasis is a highly symptomatic disease. Symptoms of psoriasis include burning, stinging, inflammation, redness, itching, pain, scaling, and cracking of skin. Some symptoms (itch, soreness, pain, stinging) are included in the Dermatology Life Quality Index (DLQI), a 10-item questionnaire commonly used in clinical trials to assess HRQoL. Although the DLQI is a good indicator of overall HRQoL and has been validated for use in patients with psoriasis, it does not assess all symptoms and does not provide a measure of symptom severity. Psoriasis may not have any associated symptoms but it can be itchy and painful. Certain sites such as the scalp, lower legs and groin can be particularly itchy. If psoriasis affects the hands and feet, painful fissures or cracks can develop and these can affect use of the hands and walking. Severe psoriasis on the body can also develop fissures which are painful and can bleed. Psoriasis can affect the nails and lifting of the nail plate from the nail bed can be painful. Psoriatic arthritis produces pain, swelling and stiffness in one or more joints, particularly in the morning (Globe, Bayliss & Harrison, 2009).

### **1.4.2.3 Treatment of Psoriasis**

There is at present no cure for psoriasis, only suppressive therapy. When they are provided with this information, patients with limited disease will often decide that no treatment is required other than the avoidance of provoking factors. Indications for treatment may arise from local symptoms (pain, itching, the reduction of manual dexterity due to hand involvement, or flexural intertrigo), cosmetic problems (prominent hand, leg, or facial lesions), or both. The goal of treatment is to decrease the severity and extent of psoriasis to the point at which it no longer interferes substantially with the patient's occupation, personal or social life, or well-being. The initial treatment for stable plaque psoriasis, of whatever severity, should be topical. Even patients in whom 10 percent of the skin or more is involved may respond well to topical treatment. In patients with more than 20 percent of body involvement, topical treatment may be impractical and systemic therapy may be indicated at the outset. There are no widely used topical maintenance regimens include Emollients, Keratolytic Agents, Coal Tar, Anthralin Corticosteroids. Systemic treatment should be limited to patients with physically, socially, or economically disabling psoriasis that has not responded to topical treatment. The choices are phototherapy or systemic drug therapy. More aggressive therapy may be indicated when treating large areas (more than 20 percent of the body surface) topically is impractical because of the inconvenience and expense, or when the patient has psoriasis unresponsive to topical therapy, is occupationally disabled, or is affected psychologically by the disease. All these regimens cause some toxic effects, and the therapeutic index of each must be evaluated repeatedly to avoid excessive risk in relation to the benefits. Phototherapy and Systemic Treatments include phototherapy (Ultraviolet B Irradiation), photochemotherapy, methotrexate, etretinate, systemic corticosteroids, cyclosporine (Greaves & Weinstein, 1995).

### **1.4.3 Fungal infection**

Fungus is a microbe that causes infections to mammals. Fungus, in plural called as fungi. Though fungi are the infectious agents producing infection in the human body, there are few beneficial fungi such as edible fungi. One of examples for edible fungi is mushrooms. And some beneficial fungi are used in fermentation. Hence food technology has a greater advantage of fungi. Invasive fungal infections (IFI) have significantly increased due to advances in medical

care in the at risk immunocompromised population. Fungal species are widely distributed in soil, plant debris and other organic substrates, and make up approximately 7 per cent (611,000 species) of all eukaryotic species on earth, although only about 600 species are human pathogens (Badiee & Hashemizadeh, 2014).



Figure 1.8: Athlete's foot is a common infection where the fungus grows in warm and moist environments (Johnson, 2017)

Fungi come in many forms but only three are of our interest as they may cause disease in human being:

- Yeasts – round/oval, unicellular, and reproduce via budding
- Molds – long, floppy, fluffy colonies that microscopically can be seen as long tubular structures called hyphae and reproduce by forming spore-forming structures at the end of hyphae called conidia.
- Dimorphs – most medically important, can change from yeast to mold and back, and grow in environment as molds and in humans as yeast. Fungi can produce toxins but this is not relevant to human infections. Fungi can produce human disease because of their sheer size



(50–100 times larger than bacteria) and by eliciting an immune response as a result of themselves or their by-products (Jain & Rawa, 2010).

#### **1.4.3.1 Causes of fungal infection**

Infection can be transmitted by the inhalation of spores (*aspergillosis*, *cryptococcosis*, *histoplasmosis*), percutaneous inoculation in cutaneous and subcutaneous infections (*dermatophytosis*, madura foot), penetration into the mucosa by commensal organisms such as *Candida albicans*, and the ingestion of a toxin in contaminated food or drink (gastrointestinal disease). Infections may be mild and only superficial or cutaneous (e.g. *dermatophytosis* and *Tinea versicolor*) or may cause life-threatening, systemic illness (e.g. *candidiasis*, *aspergillosis* and *mucormycosis*). The clinical manifestations of the disease caused by a given fungal agent can be highly variable and related to host immunity and physiological condition. For example, *Candida* spp. can invade a local site (*mucocutaneous* or *cutaneous candidiasis*, *onychomycosis*) or cause systemic infections (renal, liver abscess, lung and nervous central system). Allergic symptoms were reported in infections with other fungi such as *Aspergillus* spp. (allergic *bronchopulmonary aspergillosis*) (Badiee & Hashemizadeh, 2014).

#### **1.4.3.2 Symptoms of fungal infection**

Most rare fungi are commonly encountered in the environment but infrequently cause infection in humans. Many of these organisms cause superficial skin infections in normal hosts. Most serious infections occur in immunocompromised hosts and/or in the presence of medical devices, especially intravascular catheters, and usually present as fungemia. Common symptoms of fungal infection are

- Itching, chafing, or burning in the groin or thigh.
- A circular, red, raised rash with elevated edges.
- Redness in the groin or thigh.
- Flaking, peeling, or cracking skin (Byrne & Reboli, 2017).



### **1.4.3.3 Treatment of fungal infection**

Antifungal drugs are used in treatment of curing the fungal infections. Candidiasis is caused by fungus yeast. The timely initiation of antifungal treatment is a critical component in the outcome for the patient. Localized infection is usually treated with topical antifungal agents, whereas disseminated infection requires the use of systemic agents with or without surgical debridement, and in some conditions immunotherapy is also advisable. Fungal infections are difficult to treat because antifungal therapy in *Candida* infections is still controversial and based on clinical grounds, and in molds, the fungus isolated from the culture medium must be assumed to be the pathogen because these organisms are saprophytic in the environment. The management of fungal infections is different depending on the type of infection and aetiologic agents. Antifungal agents have varying spectrums of activity, dosing, safety profiles and costs. Furthermore, many confounding factors such as the aetiologic agent, age, underlying diseases and surgical complications can influence the outcome. For example, for invasive aspergillosis voriconazole is superior to deoxycholate amphotericin B as the primary treatment in most patients. The absorption of some antifungal agents requires special conditions. For example, absorption of itraconazole from capsule formulations is pH-dependent and requires an acidic environment, which is favoured by a full meal or a cola drink. The clinical use of flucytosine is limited due to its gastrointestinal, haematological and neurological toxicity, the rapid development of resistance when used as monotherapy, and the lack of parenteral formulations. Fluconazole is primarily eliminated via renal excretion, with approximately 80 per cent of the unchanged drug appearing in the urine. Routine monitoring methods are available for lipophilic triazoles, itraconazole, voriconazole and posaconazole. The efficacy and safety of antifungal agents are influenced by serum concentrations, clinical factors and the patient's physiological condition (Badiee & Hashemizadeh, 2014).

### **1.4.4 Allergy**

Allergy is as an immune-mediated inflammatory response. Allergies, also known as allergic diseases, are a number of conditions caused by hypersensitivity of the immune system to something in the environment that usually causes little or no problem in most people. These diseases include hay fever, food allergies, atopic dermatitis, allergic asthma, and anaphylaxis (Douglass & O'Hehir 2006).

Allergy has been defined as the result of immune reaction to specific types of mostly protein antigens known as allergens. Atopy, genetically mediated predisposition to produce specific IgE following exposure to allergens, is clinically defined as having evidence of allergic sensitization to at least one environmental allergen (Dave et al, 2011).

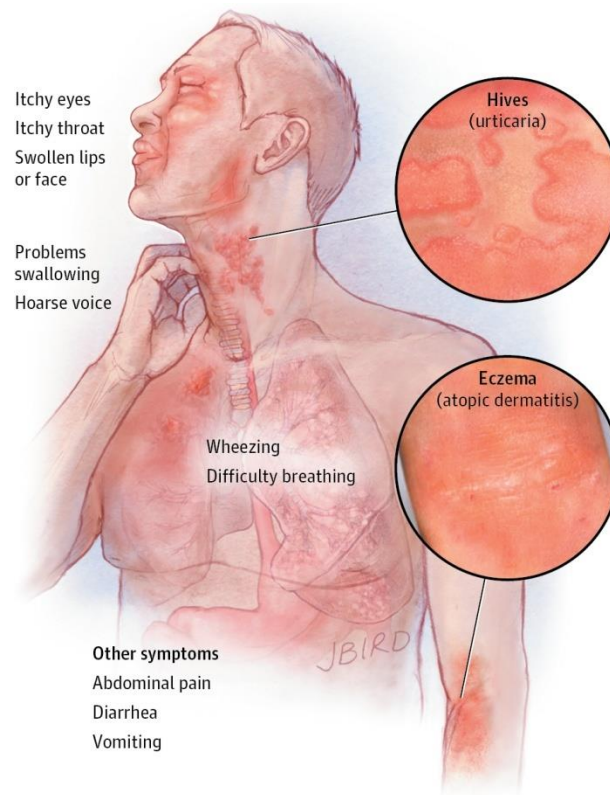


Figure 1.9: Common symptoms of allergy (Goodman, 2013)

#### 1.4.4.1 Causes of allergy

An allergy is a hypersensitivity reaction to stimuli (allergens) which are normally not harmful to the body. Allergic reactions are complex interactions between genetic predisposition and environmental exposure causing inflammation. Common allergic diseases include allergic rhinitis or rhinoconjunctivitis, asthma, atopic dermatitis (AD), and food allergy. The main mechanism of allergy is the abnormal development of T cells into T-helper2 cells ( $T_H2$ ), which increases activation of IgE, mast cells, and eosinophils. The inflammatory process in allergic disease starts from mast-cell degranulation and release of mediators that activate inflammatory cells — eosinophils, monocytes, and neutrophils. These cells consequently release cytokines

which then affect specific organs. One example is interleukin-13 (IL-13) in the bronchi of asthmatic patients; it stimulates goblet cells to produce tumor necrosis factor-alpha (TNF-alpha), which causes spasms of the bronchial smooth muscles (Sitcharungsi & Sirivichayakul 2013). Development of allergic disorders involves multiple factors including genetic components (family history), both indoor (dust mite, molds, animal danders) and outdoor (pollens, ozone and diesel exhaust) environmental exposure – as well as other life style factors including maternal diet, reproductive physiology and birth outcomes, breast feeding, child nutrition and vitamin D level, obesity, physical activity and psychological stress (Dave et al, 2011).

**Hay fever**, also called allergic rhinitis, can cause:

Sneezing, Itching of the nose, eyes or roof of the mouth, Runny, stuffy nose, Watery, red or swollen eyes (conjunctivitis)

**A food allergy** can cause:

Tingling in the mouth, Swelling of the lips, tongue, face or throat, Hives, Anaphylaxis

**An insect sting allergy** can cause:

A large area of swelling (edema) at the sting site, Itching or hives all over the body, Cough, chest tightness, wheezing or shortness of breath, Anaphylaxis.

**A drug allergy** can cause:

Hives, Itchy skin, Rash, Facial swelling, Wheezing, Anaphylaxis

**Atopic dermatitis**, an allergic skin condition also called eczema, can cause skin to:

Itch, Redden, Flake or peel (Sitcharungsi & Sirivichayakul, 2013)

#### **1.4.4.2 Symptoms of allergy**

Allergic disorders may manifest clinically as any combination of conjunctivitis, rhinitis, asthma, atopic dermatitis, food and/or drug intolerance and/or anaphylaxis. It has been well recognized that atopic dermatitis and food allergies are often the earliest manifestation of atopic predisposition in a young child (Dave et al, 2011).

### 1.4.4.3 Treatment of allergy

Clinical principles for managing allergic diseases include of

- Avoidance of exposure to known allergic and non-allergic triggers
- Controlled exposure to allergens that cannot be totally avoided (i.e. airborne pollens, mold spores, dust mite proteins)
- Pharmacotherapy to treat mast cell mediated symptoms and reduce allergic inflammation
- Allergen Immunotherapy for upper and lower airway disease in selected individuals.

Identification of allergens to which an individual is sensitive is typically accomplished by *in vitro* (ImmunoCAP-RAST) or *in vivo* (skin prick or intradermal skin testing) assays when feasible, which is correlated with the clinical history of symptoms. Environmental control, which includes improve symptoms of susceptible patients with allergic diseases. There are many different types of medications used to treat allergy and but corticosteroids are the most effective anti-inflammatory medications. C exert their anti-inflammatory effects by suppressing the expression of a host of inflammatory mediators (growth factors, cytokines, chemokines) and inflammatory enzymes involved in metabolism of arachidonic acid and nitric oxide (NO). Topical forms of corticosteroids (i.e. inhaled steroids for asthma, intranasal steroid sprays for allergic rhinitis and topical steroid crèmes and ointments for allergic dermatitis) represent first line therapy in everyday management of allergic diseases. In addition, short courses of systemic corticosteroids are typically used for acute exacerbations of allergic diseases. Inhaled bronchodilators ( $\beta_2$ -agonist) and anticholinergic are also used in management of acute asthma exacerbations. Antihistamines in oral, intranasal and ocular forms as well as leukotriene receptor antagonists are also used in management of various allergic diseases. Immunotherapy for inhaled allergens induces regulatory T cells that dampen the allergic responses to allergens. Two forms of immunotherapy, Subcutaneous Immunotherapy (SCIT) and Sublingual Immunotherapy (SLIT) are in use currently. Use of recombinant technology in immunotherapy is under development and in experimental phase (Dave et al 2011).

Immunomodulatory therapy with anti-IgE is a major advancement in the field of allergy and immunology. It reduces the rate of clinically significant asthma exacerbations irrespective of

baseline oral corticosteroid use, concomitant treatment with other controller medications and patient characteristics (Dave et al, 2011).

### **1.4.5 Vitiligo**

Vitiligo is a common depigmenting skin disorder, characterized by acquired, idiopathic, progressive, circumscribed hypomelanosis of the skin and hair, with total absence of melanocytes microscopically. It occurs worldwide, with an incidence rate of between 0.1% and 2%. Vitiligo is an important skin disease having a major impact on the quality of life of the patient suffering from it. The causes of this condition are uncertain but seem to be dependent on the interaction of genetic, immunological and neurological factors. Vitiligo coexists with other autoimmune disorders, Sutton or halo nevus, and malignant melanoma (Yaghoobi, Omidian & Bagherani, 2011).

#### **1.4.5.1 Causes of vitiligo**

Melanin is the pigment that gives the skin its characteristic color. Vitiligo is caused by a loss of pigment in the skin, due to destruction of pigment-forming cells known as melanocytes. Although vitiligo affects all races equally, it is more noticeable in dark-skinned people. Vitiligo can cause cosmetic problems. It has three important factors underlying this destruction. There seem to be three major factors involved in the destruction of melanocytes in patients with vitiligo. The first is that vitiligo patients inherit a set of three “vitiligo” genes which predisposes them to destruction of melanocytes. There probably are many different sets of three genes that can cause vitiligo so that not every individual would necessarily inherit the same three. The second abnormality relates to the melanocytes themselves. Melanocytes from patients with vitiligo differ from those obtained from a person without vitiligo. For example, vitiligo melanocytes require different and more fastidious culture conditions than those from normal individuals. Also, vitiligo melanocytes are much more sensitive to phenolic chemicals than normal melanocytes and readily undergo apoptosis when exposed to such agents. The third factor is an environmental agent(s) that activates (or inhibits) the genes involved, thereby setting in motion the process of destruction of the susceptible melanocytes. The vitiligo genes activated (inhibited) by the environmental agents seem to cause an excessive immune reaction that induces melanocytes to undergo apoptosis, and depigmentation of the skin results (Nordlund, 2011).

### 1.4.5.2 Symptoms of Vitiligo

The only symptom of vitiligo is the appearance of flat white spots or patches on the skin. The first white spot that becomes noticeable is often in an area that tends to be exposed to the sun. It starts as a simple spot, a little paler than the rest of the skin, but as time passes, this spot becomes paler until it turns white. The patches are irregular in shape. At times, the edges can become a little inflamed with a slight red tone, sometimes resulting in itchiness. Normally, however, it does not cause any discomfort, irritation, soreness, or dryness in the skin. Vitiligo is photosensitive. The areas that are affected will be more sensitive to sunlight than those that are not. It is hard to predict whether the patches will spread, and by how much. The spread might take weeks, or the patches might remain stable for months or years. If the first white patches are symmetrical, this suggests a type of vitiligo known as non-segmental vitiligo. The development will be slower than if the patches are in only one area of the body. The effects of vitiligo vary between people. Some people may have only a handful of white dots that develop no further, while others develop larger white patches that join together and affect larger areas of skin. The lighter patches tend to be more visible in people with dark or tanned skin (Luo, 2017).



Figure 1.10: Vitiligo causes melanocytes to die, leaving patches of pale skin (Luo, 2017)

### **1.4.5.3 Treatment of vitiligo**

#### **Oral antioxidant**

Oral antioxidant supplementation could be useful in the treatment of vitiligo and the rationale for their use is to counteract the occurrence of cellular oxidative stress. Monotherapy with oral ginkgo biloba significantly decreased disease progression compared to placebo, in a double-blind placebo-controlled trial, also, in a double-blind placebo-controlled trial a mixture of alpha lipoic acid, vitamin C, vitamin E and polyunsaturated fatty acids improved repigmentation rates and promoted dose reduction of narrow band-UVB. Oral polypodium leucotomos significantly improved the repigmentation rates when combined with narrow band UVB phototherapy on the head and neck. Randomized control trials (RCTs) evaluating systemic antioxidant supplementation provide a limited evidence of efficacy, and further confirmation is needed before recommending their prescription in vitiligo (Allam & Riad, 2013).

#### **Topical antioxidants**

Catalase and superoxide dismutase are enzymes with antioxidant properties<sup>5</sup>. Some studies showed noticeable repigmentation response either as monotherapy or in combination with phototherapy, while other studies didn't show such benefit ((Allam & Riad, 2013).

#### **Helium neon laser**

The helium neon (HeNe) laser emits 632.8 nm radiation and is used for the treatment of segmental vitiligo. It modifies adrenergic dysregulation of cutaneous blood flow seen in SV, and promotes melanogenesis, melanocyte growth, migration and survival in the skin ((Allam & Riad, 2013).

#### **Surgical therapy**

Surgical therapy includes: blister graft (BG), split thickness skin graft (STSG), punch graft (PG), and autologous melanocyte suspension transplant (AMST) (Allam & Riad, 2013).

## **1.5 Risk factors of skin disease**

There are many risk factors of skin disease. Some of the risk factors are discussed below-

### **1.5.1 Sunlight**

Non-ionizing radiation, predominantly in the ultraviolet region, from the sun is important in a variety of skin cancers and inflammatory skin diseases. Ultraviolet and visible rays (and the longer infrared rays) reach Earth. The ultraviolet rays are most relevant in causing, triggering, aggravating and relieving skin diseases. There is good evidence that sunlight (particularly ultraviolet B, and to a lesser degree ultraviolet A radiation) plays an important role in the aetiology of the commonest skin cancers, basal cell carcinoma and squamous cell carcinoma and its precursor lesions actinic keratoses and Bowen's intraepidermal neoplasia. There is more controversy about the role of sunlight in the development of malignant melanoma, but it is probable that sunlight exposure, perhaps particularly intermittent exposure in childhood, is important. Non-ionizing radiation from the sun is important in the clinical expression of the idiopathic photodermatoses, the cutaneous porphyrias, and drug-induced photosensitivity. It is also important in the rare genophotodermatoses, such as the many types of xeroderma pigmentosum which share the common feature of impaired ability to repair ultraviolet induced DNA damage. Many other dermatoses can be photoaggravated, including cutaneous lupus erythematosus, Jessner's lymphocytic infiltrate, melasma, pemphigus vulgaris, and actinic lichen planus. The effects of sunlight on the skin are not all adverse, and are beneficial for the majority of those with some common inflammatory skin diseases including psoriasis and atopic dermatitis (English, Dawe & Ferguson, 2003).

### **1.5.2 Climate**

Global temperatures continue to rise, reaching new records almost every year this decade. Although the causes are debated, climate change is a reality. Consequences of climate change include melting of the arctic ice cap, rising of sea levels, changes in precipitation patterns, and increased severe weather events. Although globalization, travel, and trade are also important to changing disease and vector patterns, climate change creates favorable habitats and expanded access to immunologically naive hosts. As temperatures increase, epidemic viral diseases such as



hand-foot-and-mouth disease may develop transmission seasons that are longer and more intense. Skin cancer rates may also be affected indirectly by changes in temperature and associated behaviors (Kaffenberger et al, 2017).

### **1.5.3 Pollutants**

Depletion of ozone in the upper atmosphere (stratosphere), thought largely to be due to human activities particularly the release of chlorofluorocarbons (CFCs), has resulted in an increase in shorter wavelength ultraviolet B reaching the Earth's surface. The actual increase in shorter wavelength UVB reaching ground level has been most marked in the southern hemisphere. In the northern regions studied, counteracting effects of air pollutants in the lower atmosphere have generally limited such an effect, although an increase in UVB at ground level in Scotland did coincide with reduction in stratospheric ozone. Mathematical modelling has estimated that the actual increase in skin cancers seen in the northern hemisphere as a result of ozone depletion will be small, although not insignificant when we consider that non-melanoma skin cancers are the commonest cancers in peoples with constitutively pale skin. Yet the effects of ozone depletion might be expected to cause more problems. Overall, small changes in stratospheric ozone, increasing shorter ultraviolet wavelengths reaching ground level, particularly in the southern hemisphere, may be expected to increase the frequency of sunburn episodes, and skin cancers, although the evidence that this is actually happening is limited (English, Dawe & Ferguson, 2003).

### **1.5.4 Clothes**

An allergic reaction to clothing occurs when antibody cells recognize chemical structures of compounds used and found in clothes, then treat them as foreign objects or even consider them as threatening. Because of that reaction, plasma cells will start producing allergic antibodies which find their way to different systems of the body. These antibodies will integrate with pro-inflammatory cells that line the skin. When they bind together, histamines are released; thereby, causing different symptoms of clothing allergy. Cloths have the longest contact with the human skin and have a major impact on its microenvironment. Hence, specially designed textiles may support medical treatment and improve quality of life of patients (Lopes et al, 2015).

### 1.5.5 Nutritional Deficiency

Skin disorders have long been associated with nutritional deficiencies (Figure 1.12). Nutritional deficiencies can be due to inadequate intake, abnormal absorption or improper utilization. Vitamin A is essential for the maintenance of differentiated epithelia. Deficiency of vitamin A results in hyperkeratinization with reduced number of sebaceous glands and blockage of sweat glands. Hypovitaminosis A also affects the skin by causing xerosis, generalized hyperpigmentation, and sparse and fragile hair. Plugging of the follicular openings with spiny horns is one of the classic signs of vitamin A deficiency as in phrynoderma. Deficiency of other factors, such as Vitamin B, C, and E, calories, and essential fatty acids, have been incriminated in phrynoderma (Basavaraj, Seemanthini & Rashmi, 2010).

Excess of various nutrients can also result in certain diseases. Carotenemia is caused by excessive intake of carotene-rich food such as oranges and carrots. Xanthelasmas may be associated with hyperlipidemia. Phytanic acid is found in food stuffs like dairy products, meat, and fish, (Figure 1.13) and impaired oxidation leads to Refsum's disease causing a rough scaly thickening over the extremities. Pemphigus is an autoimmune disease of the skin and mucous membranes that causes vesicles (blisters), bullae, and raw sores (Basavaraj, Seemanthini & Rashmi, 2010).

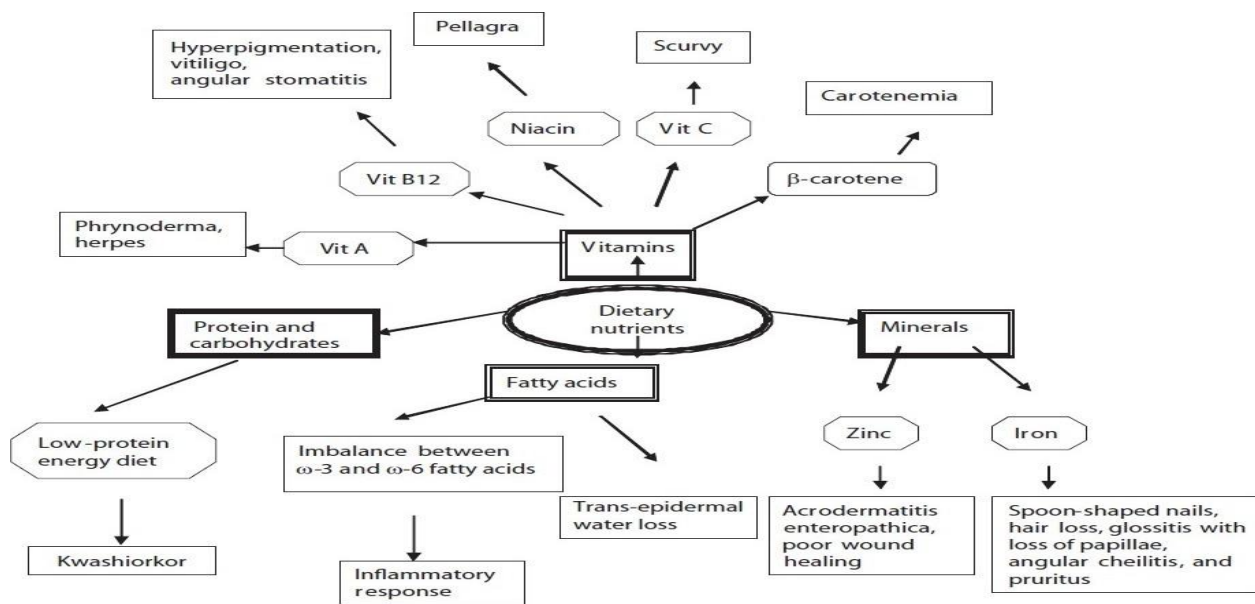


Figure 1.11: Dietary nutrients involved in various dermatologic conditions (Basavaraj, Seemanthini & Rashmi, 2010)

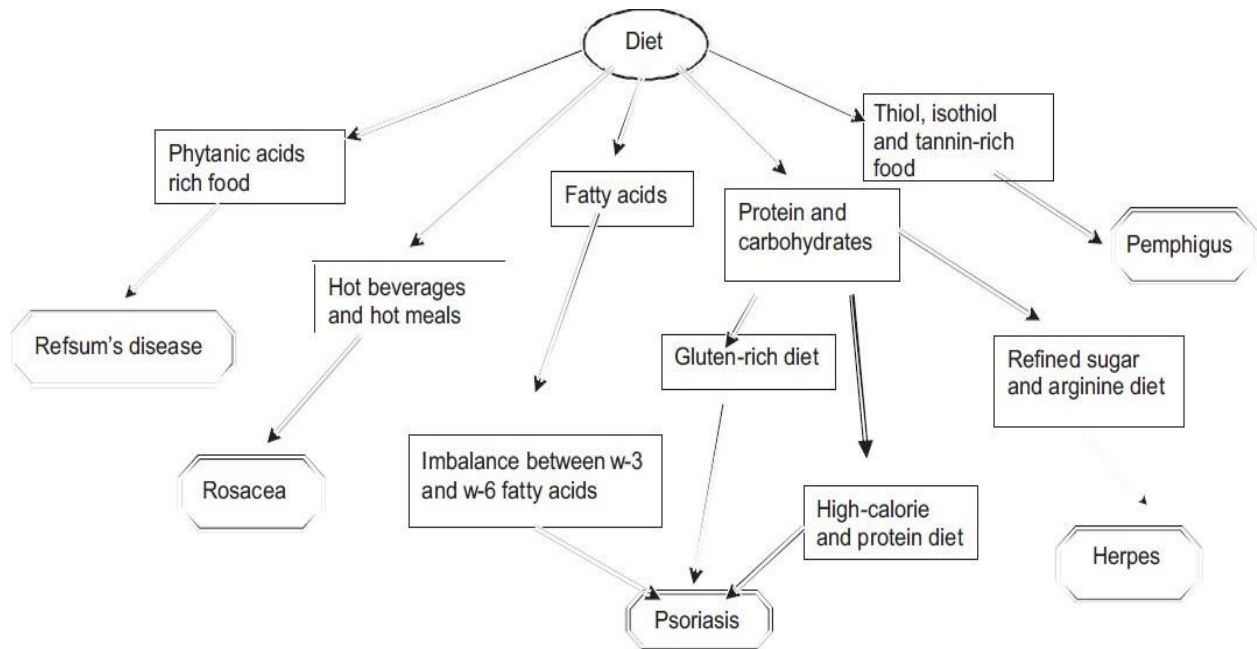


Figure 1.12: Diets known to precipitate various skin diseases (Basavaraj, Seemanthini & Rashmi, 2010)

### 1.5.6 Cosmetics

Cosmetics are the main triggering factors of sensitive skin, especially in women, due to overuse and sometimes inappropriate use. Presence of potentially irritating substances in its composition (alpha-hydroxy acids, propylene glycol, alcohol, fragrances, etc.) increases the possibility of skin infection. The main location is the face, mainly the nasolabial fold. Factors that contribute to this are probably the greater use of cosmetics in this area, the presence of thinner skin barrier and the existence of a greater number of nerve endings on the face. Other regions related to sensitive skin are volar surface of forearms, hands, genital region and scalp (Duarte, 2017).

## 1.6 Epidemiology of skin diseases

Skin disease are very common in all geographical locations and especially so in low and middle income countries. In these settings many of the commonest skin disorders are communicable (Walker et al, 2017). Skin disease pervades all cultures, occurs at all ages, and affects between 30% and 70% of individuals, with even higher rates in at-risk subpopulations. Its detrimental effects on health range from physical incapacity to death. Children and their families often bear the brunt of this disease burden. The International Classification of Disease 10 classification of human disease lists more than 1,000 skin or skin-related illnesses, a pattern dominated by a few conditions accounting for most of the skin disease burden. Yet despite this profound impact, skin disease continues to receive relatively little attention in the national or global health debate. Previous attempts have been made to estimate the prevalence and health impact of skin diseases but these have relied on epidemiological studies, analytical methods, and disability weighting, which had flaws (Hay et al, 2014).

In the same case Bangladeshi peoples are also suffering from skin diseases. A cross sectional study was conducted from May 2016 to July 2016 on tannery workers of the industrial area of Hazaribagh, Dhaka among 276 tannery workers and found that Skin disease prevailed in the following order: Scabies 73.9%, Nail discoloration 69.6%, Urticaria 59.7%, Miliria and folliculities 56.5%. In Bangladesh 31% tannery workers suffer from skin disease (Hasan et al, 2016). A study was done during 1995-96 at the Chatak thana of Sunamgonj district in the rural area of Bangladesh to estimate the prevalence and pattern of infectious skin diseases. A representative sample of 7553 population was surveyed. The prevalence of skin disease and infectious skin disease were 20.4% and 16.5% respectively. The highest prevalence (24.85%) of infectious skin disease was found in the age group of 15-24 years. The commonest infectious skin disease was a superficial fungal infection (39.07%) which was followed by scabies (38.04%). The third common disease was bacterial infections (3.45%). The commonest clinical type of superficial fungal infections was tinea corporis. The commonest non-infectious skin disease was eczema/dermatitis (11.05%). This study indicates that transmissible skin disease in the rural area of Bangladesh is a major public health problem (Islam & Wadud 1999).

The prevalence of skin diseases varies worldwide and information regarding local prevalence of its various causes may help the development of policies towards better management. Skin infection has a prevalence rate of 20–80 % in developing countries. Lack of awareness of risk factors is a major contributor to the development of skin infections (Ramamuthie et al, 2015). Another study was conducted in Dhamrai Upazila under Dhaka district. Out of 2645 patients attending a medical camp showed 410(15.5%) patients with dermatological problems(Ahmed, Islam & Farjana, 2012).

# Chapter 2

## Literature Review

## **2.1 Awareness of Risk Factors for Skin Infections and its Impact on Quality of Life among Adults in a Malaysian City: A Cross-Sectional Study.**

A research was conducted by Ramamuthie et al, in 2015 to determine the level of awareness of risk factors related to skin infection and its impact on quality of life (QoL) in Klang, Malaysia. A cross-sectional study was conducted among adults in Klang, Malaysia using a validated questionnaire and Dermatology Quality of Life Index (DLQI). A stratified and convenient sampling technique was executed. Multivariate analysis was employed to summarize significant relationships between variables. The prevalence of skin infection was 59 %. A majority (51.9 %) of the participants had experienced or claimed to have bacterial infections of the skin. More than 50 % of them were aware of the risk factors for skin infection. Several significant associations ( $p < 0.05$ ) between variables of awareness of risk factors associated with skin infection and QoL were documented. Awareness of the risk factors contributing to skin infection do play a major role in improving basic understanding of skin infections and quality of life among Malaysians in Klang (Ramamuthie et al, 2015).

## **2.2 Pattern of Skin Diseases: Experience from a Rural Community of Bangladesh.**

A research was conducted by Nafiza, Islam & Farjana, in 2012 to determine the pattern of skin diseases in a selected rural community of Dhamrai Upazila under Dhaka district. Out of 2645 patients attending a medical camp showed 410(15.5%) patients with dermatological problems. Among all, 260(63.4%) patients were males and 150(36.6%) were females with a male to female ratio of 1.7:1. Of these patients, 178(43.4%) had cutaneous infections and 234(56.6%) had non-infectious dermatoses. Few patients (2.7%) had more than one dermatoses. Fungal infection was the commonest infection seen (22.9%) and eczemas took an upper hand in non-infectious group (32.2%). Improvement in the standard of living, health education, improvement in the environmental sanitation and good nutritious food may help the people to bring down the skin disease in the rural part of country (Nafiza, Islam & Farjana, 2012).

### **2.3 Quality of life in patients with psoriasis.**

This research paper was conducted by Bhosle et al, in 2006 attempts to outline different quality of life measures available for psoriasis and describes their use in studies examining patient reported outcomes associated with pharmacological interventions for psoriasis. Psoriasis is one of the prevalent skin conditions in the United States. This chronic condition has a significant negative impact on patients' quality of life. Psoriasis has been linked to the depression and suicidal tendencies in the patients. The costs associated with decrements in quality of life, lost productivity, and work absenteeism may be enormous, increasing overall costs associated with the disease management. Factors associated with quality of life in psoriasis patients are described. It further describes physician's role in the psoriasis management to improve patients' overall well-being. Psoriasis has a significant negative impact on patients' health related quality of life (HRQoL). In a survey by the National Psoriasis Foundation almost 75% of patients believed that psoriasis had moderate to large negative impact on their quality of life (QoL), with alterations in their daily activities. Another study reported that at least 20% of psoriasis patients had contemplated suicide. Furthermore, physical and emotional effects of psoriasis were found to have a significant negative impact at patients' workplace as measured by the validated scales including Work Productivity Assessment Index (WPAI), SF-8, Hospital Anxiety and Depression (HADS) and past medical/psoriasis history. Absenteeism is a greater concern for people suffering from psoriasis than their co-workers without psoriasis with nearly 60% patients reporting missing an average of 26 days a year directly related to their psoriasis. Patients with psoriasis have a higher financial burden due to absenteeism in addition to the cost of caring for their disease (Bhosle et al, 2006).

### **2.4 Severity and impact of acne vulgaris on the quality of life of adolescents in Nigeria.**

This study conducted by Ogedegbe & Henshaw, in 2014 and thus seeks to assess the severity of acne vulgaris and determine its effect on the QoL of adolescents in Lagos, Nigeria. Acne vulgaris is a common skin condition, which affects most adolescents at some point in their lives. It has been found to have a significant impact on their psychological well-being and has been associated with depression and suicide ideation. Many studies have assessed the impact of acne vulgaris on the quality of life (QoL) in different population subgroups around the world, but



there is a dearth of reports from the African subcontinent. In a cross-sectional survey employing a two-stage sampling method, the severity of acne vulgaris and its impact on the QoL of adolescents attending a senior secondary school in Lagos, Nigeria was assessed using the Global Acne Grading Scale (GAGS) and the Cardiff Acne Disability Index (CADI), respectively. The correlation between the results of the GAGS and CADI was also determined. One hundred and sixty adolescent students with acne were recruited, with males accounting for 51.9% and females 48.1%. The mean and standard deviation of the GAGS severity scores were  $11.3 \pm 5.4$  for males and  $11.9 \pm 5.4$  for females. Only one student had severe acne vulgaris (GAGS, 31–38), 10% moderate (GAGS, 19–30), and 89.4% mild (GAGS, 1–18). The overall CADI score was  $3.4 \pm 3.0$ , which suggests mild impairment in QoL; however, the solitary student with severe acne had severe QoL impairment. There was a weak positive correlation between the GAGS and the CADI score. Most adolescents in our study had mild acne vulgaris, and the overall impact on their QoL was mild. However, the correlation between the psychosocial impact and acne severity was weak. There is a need for similar studies in other parts of the country and for further studies to determine the adequacy of the existing instruments in assessing the impact of acne vulgaris in Nigerian adolescents (Ogedegbe & Henshaw, 2014).

## **2.5 Quality of life in patients with skin diseases in central Saudi Arabia.**

This study conducted by Abolfotouh et al, in 2012 and the aims of this study were to assess QoL in patients with skin diseases in central Saudi Arabia using the newly validated Skindex-16 instrument and to determine the association between QoL in patients with skin disease, sociodemographic data, and disease characteristics. Previous national and international studies of quality of life (QoL) in patients with skin diseases have revealed different levels of QoL impairment. A cross-sectional study was conducted in 283 adult patients who visited the outpatient dermatology clinics of King Abdulaziz Medical City, Riyadh, Saudi Arabia, over 3 months. The patients were interviewed using a pretested Arabic version of the Skindex-16 to measure the effect of skin disorders on their QoL during the previous 7 days. Patient characteristics, medical history, and clinical findings were collected. The QoL results in this study were generally more optimistic than those of many previous studies. This discrepancy may be due to biases in questionnaire responses or to cultural differences in experience of skin disease and perception of disability. Significant predictors of QoL were not the same for the

three domains of the Skindex scale. Further studies of specific diseases and educational programs targeting patients at higher risk for QoL impairments are recommended (Abolfotouh et al, 2012).

## **2.6 A study of psoriasis and quality of life in a tertiary care teaching hospital of kottayam, kerala.**

The research conducted by Manjula, Sreekiran & Saril, in 2011 to assess the health-related QoL among patients with psoriasis, attending dermatology OPD of Medical College Hospital, Kottayam and To find out the association of QoL with age and gender. Psoriasis is a chronic skin disease which has an impact on health-related quality of life (QoL). The psoriasis disability index (PDI) is a simple 15-item questionnaire which is used to assess overall psoriasis disability. This was a descriptive case series study conducted in Dermatology OPD of Medical College Hospital, Kottayam, Kerala. Psoriasis patients attending the Dermatology OPD of Medical College Hospital for 2 months were assessed. Out of the total 32 patients, 56.2% were males, whose mean age was 45; 72% were married, 47% had education above plus two and were employed. Also, 34% had income above Rs. 3000 per month. Among the PDI subsets, daily activities were affected the most (90.6%), followed by work (84.4%), leisure activities (71.9%), problems with treatment (68.7%) and the least affected was personal relations (62.5%). Overall PDI score (median 14.5, interquartile range 4.5–22) showed that the QoL was affected in 75% of which 9.4% were mild (score < 9), 31.2% were moderate (score 10–18) and 34.4% were severe (score > 18). There was no association between the total PDI score and age or gender. QoL was affected in 75% of psoriasis patients. There was no association between QoL and age or gender (Manjula, Sreekiran & Saril, 2011).

## **2.7 Skindex, a Quality-of-Life Measure for Patients with Skin Disease: Reliability, Validity, and Responsiveness.**

A research was conducted by Margaret Chren et al, in 1996 to determine the skindex, a Quality-of-Life Measure for Patients with Skin Disease: Reliability, Validity, and Responsiveness. To measure the effects of skin disease on patients' quality of life, They developed a 61-item self-administered survey instrument called Skindex. Skindex has eight scales, each of which addresses a construct, or an abstract component, in a comprehensive conceptual framework:

cognitive effects, social effects, depression, fear, embarrassment, anger, physical discomfort, and physical limitations. Construct validity was assessed in two ways: (i) in a comparison of patients with inflammatory dermatoses and patients with isolated lesions, patients with inflammatory dermatoses had higher scale scores, and (ii) in an exploratory factor analysis, 78% of the common variance was explained by seven factors that correlated with the scale scores of Skindex. Most of the *a priori* scale scores changed in the expected direction in patients who reported that their skin conditions had improved or worsened after 6 month. Finally, physicians' judgments of disease severity did not consistently correlate with Skindex scores. These preliminary data suggest that Skindex reliably and responsively measures the effects of skin disease on patients' quality of life and may supplement clinical judgments of disease severity (Chren et al, 1996).

## **2.8 Acne Vulgaris and Quality of Life among Young Adults in South India.**

The study was undertaken by Durai & Nair, in 2015 to detect the impact of acne vulgaris and related factors that may influence the QoL. This was a hospital-based, prospective, cross-sectional, prestructured, questionnaire-based study done on 140 consenting individuals, who attended the Dermatology outpatient department. Acne vulgaris was graded using simple grading system. QoL was measured using a combination of skin disease-specific (Dermatological Life Quality Index (DLQI)) and acne-specific (Cardiff Acne Disability Index (CADI)) questionnaires. Majority of our study population were students (103, 73.6%). Face (139, 99.3%) was the commonest site of acne and comedones 133, 95% were the commonest type of lesion. Most of the individuals 66, 47.1% were observed to have grade 1 acne. The mean DLQI score was 6.91 and the mean CADI score was 5.2. Association between the scores was statistically significant. Age, occupation, marital status, family, and treatment history played a role in affecting the QoL. Diet, smoking, and alcohol did not influence the QoL. Though acne had impact on patient's QoL, it was less severe in our study. It is important for health professionals to incorporate QoL measurements when managing acne patients to provide better and appropriate care (Durai & Nair, 2015).

## **2.9 Quality-of-life Outcomes and Measurement in Childhood Atopic Dermatitis.**

A research was conducted by Chamlin & Chren, in 2010 to measures of the burden of AD can be used to improve the lives of afflicted children and their families. Atopic dermatitis (AD) is the most common skin disease in children, affecting 7% to 17% of children in the United States.<sup>1</sup> Most children with AD develop the disease in the first 5 years of life, a critical time for physical and psychosocial development (see also the article by Jonathan M. Spergel elsewhere in this issue for further exploration of this topic). For example, children establish behavior and sleep patterns early in life, and AD may disrupt the establishment of normal sleep patterns, behavior, and relationships. Such physiologic and psychological effects, which not only change the life of the affected child but also affect the physical, social, and emotional functioning of parents, have been reported in young children with AD. Several quality-of-life instruments have been developed to quantify this multidimensional effect on children and their families. Such measures of the burden of AD can be used to improve the lives of afflicted children and their families (Chamlin & Chren, 2010).

## **2.10 Itch, disease coping strategies and quality of life in psoriasis patients.**

The study conducted by Ograczyk et al, in 2014 to evaluate the relationship between medical (disease severity, itch) and psychological variables (disease coping strategies, QoL) in the psoriasis patients group. Psoriasis is a psychodermatological condition, so psychological factors can trigger and/or exacerbate skin lesions. Additionally, disease can be a source of stress and can worsen patients' quality of life (QoL). The study comprises 60 in-patients of the dermatological ward (30 females and 30 males) with the diagnosis of psoriasis. Methods used: Psoriasis Area and Severity Index (PASI), Itch Severity Evaluation Questionnaire, Coping with Skin Disease Scale-SRS-DER, SKINDEX-29 questionnaire. The study demonstrated significant correlations between disease coping strategies, itch and quality of life. Women presented worse QoL (generally and in physical functioning). The older patients with a longer disease duration revealed QoL impairment. The obtained results could help in identifying patients risk groups which are in the highest danger of decreased QoL. Our data indicate the need for psychological interventions (Ograczyk et al, 2014).

## **2.11 Quality of Life in Psoriatic Patients: A Study Using the Short Form-36.**

A cross sectional study was conducted by Darjani et al, in 2014 describe and compare the impact of different grades of severity of psoriasis on QOL of patients in north of Iran. Quality of life (QOL) is increasingly recognized as an important outcome measure in dermatology. Psoriasis has a great impact on QOL of patients, and has a strong effect on social relations, psychological status, and daily activities. This cross-sectional study was performed on 55 patients diagnosed with psoriasis and 55 healthy controls. The patients were selected by consecutive sampling from April to December 2006. The controls were recruited by simple random sampling among patient escorts. After obtaining written informed consent, all the members were included into the study. The Psoriasis Area and Severity Index (PASI) standard questionnaire was used to determine the severity of the disease. In addition, the short-form-36 questionnaire, which is validated for use in Iran, was employed. The physicians' awareness of the importance of patients' QOL in both physical and emotional aspects could improve and enhance the psychological evaluation of the psoriatic patient, which will promote his/her positive outcome. And, PASI score can't to predict the QOL really (Darjani et al, 2014).

## Significance of the Study

Skin is outer covering and sensitive organ of the body. There are many factors that can create any type of skin disease. Skin diseases are very common among the populations in many developing countries; they have not been regarded as a significant problem that could benefit from public health measures. Indeed, more attention is frequently given to some less common health problems in the same countries. This attitude is due to the assumption that skin diseases are a benign, not life-threatening minor nuisance, and that they do not merit measures that may appear out of proportion to their low priority. Skin diseases in developing countries have a serious impact on people's quality of life, causing loss of productivity at work and school, and discrimination due to disfigurement. Skin changes may also indicate the presence of more serious diseases that need treatment (WHO, 2005).

To achieve optimal resource allocation in health care, it is necessary to value competing resource uses according to the benefit derived from those uses. Skin disease makes as great an impact as other serious medical conditions when assessed by effects on health-related quality of life. There is a great need for standardized recommendations on the treatment of the commonest skin disorders and, eventually, on preventive measures that would take into account the epidemiological characteristics and constraints in developing areas. Public health strategies adapted to this context should be defined and validated (FDA, 2013).

Bangladesh is one of the developing countries where many people are affected by skin disease due to lack of immunity, polluted environment, lack of adequate knowledge, improper treatment and bad hygiene. If most of the people are aware about skin disease and its remedy, the prevalence of such diseases and its impact can be managed. Several studies are being conducted and still ongoing on awareness and knowledge assessment in different countries around the world like India, Iran, Nepal, Kenya, Malaysia, Saudi Arabia etc. To our best knowledge, works have carried out in our country regarding this topic. Therefore major reason for choosing this topic for the study was to identify the current state of knowledge and awareness of the general population regarding priority of skin diseases in our country. The present study was aimed to identify the current state of knowledge and awareness of the patients regarding different aspects of skin diseases in our country.

## **Aims and Objective of the Study**

The aims and objectives of this study were to:

- To determine the common types of skin disease prevailing among the patient of Govt Hospital in different areas of Bangladesh.
- To determine the presence of risk factors of skin disease among patient coming to Govt owned Hospital.
- To assess the awareness, attitudes, and practices associated with common skin disease and its impact on quality of life of the patient coming to Govt owned Hospital.

# Chapter 3

# Methodology

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### **3.1 Type of the Study**

It was a survey based study.

### **3.2 Study Area**

The survey was conducted in four Hospitals in different cities of Bangladesh. The Hospitals were

1. Bangabandhu Sheikh Mujib Medical University Hospital, Dhaka
2. Shaheed Suhrawardy Medical College & Hospital, Dhaka
3. Dhaka Medical College Hospital, Dhaka
4. Belkuchi Upazila Health Complex, Sirajganj

### **3.3 Study Population**

In this study, a total number of 181 patients of skin departments were surveyed with a questionnaire in order to assess the awareness and its impact on quality of life (QoL). Informed consent was obtained from the eligible participants before interviewed and participants who agreed to join the study provided the required information for the studies.

### **3.4 Study Period**

The full duration of the study was about 1 year and data was collected from June to November in 2017.

### **3.5 Questionnaire Development**

The questionnaire was specially designed to collect the simple background data and the needed information. The questionnaire was written in simple English in order to avoid unnecessary semantic misunderstanding. Extra space was however, allowed after some questions for the participants' comments; and in most cases, these were used as qualifying remarks which aided considerably in giving answers to specific questions and in providing additional information which assisted the interviewers in drawing up conclusions.

### **3.6 Sampling Technique**

In this study purposive sampling technique was followed.

### **3.7 Data Analysis**

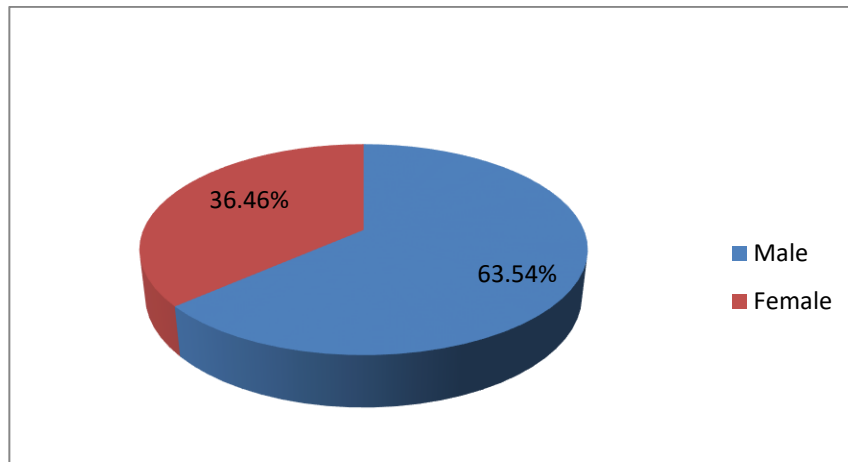
After collecting, the data were checked and analyzed with the help of Microsoft Excel 2010. The result was shown in bar, pie and column chart and calculated the percentage of the awareness and disease regarding skin disease among the patients.

# Chapter 4

## Result

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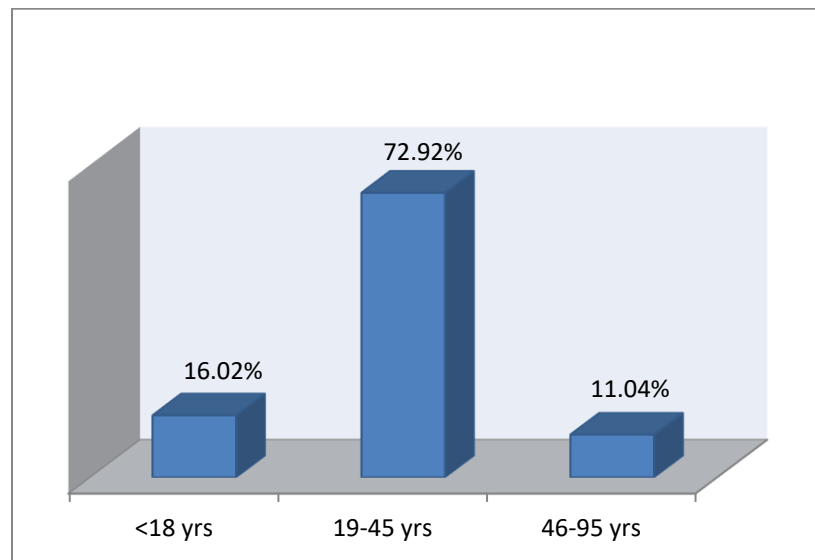
#### 4.1 Gender distribution



**Fig 4.1: Gender distribution**

From the above graphical representation, it can be concluded that majority (63.54%) of the patients were male and 36.46% of the patients were female.

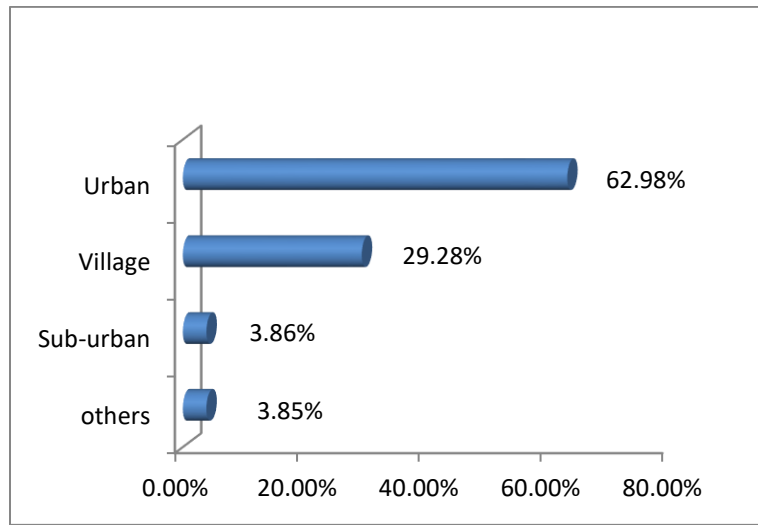
#### 4.2 Age distribution



**Fig 4.2: Age distribution**

Graph represents the distribution of the patients according to their age where highest no. of patient were in the age group of 19-45 years (72.92%), followed by <18 year age group (16.02%).

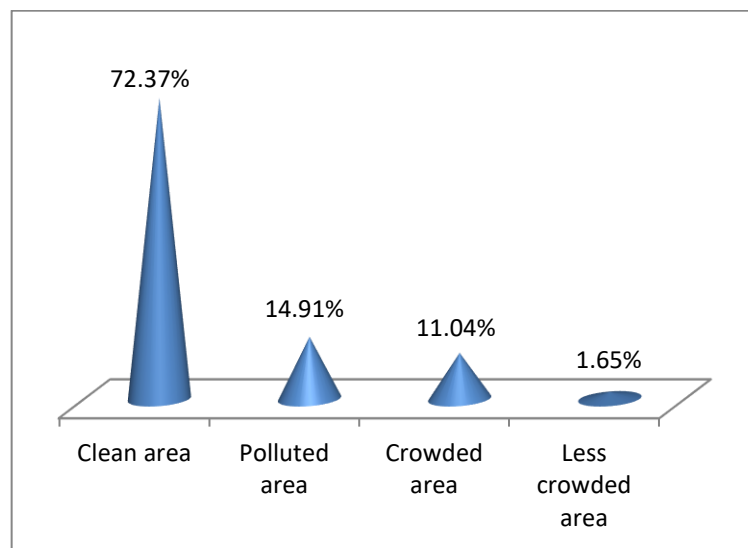
### 4.3 Living area



**Fig 4.3: Living area**

It was found that 62.98% of the patients lived in urban and it was the highest among all. The second highest number of patients lived in village and their percentage was 29.28%.

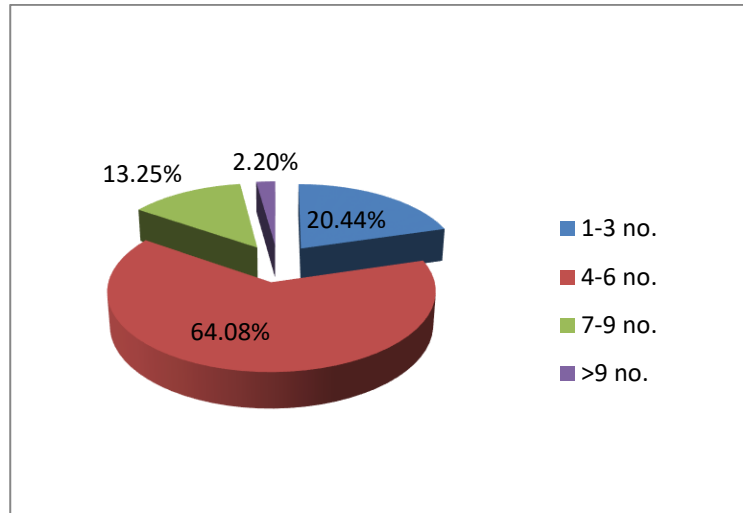
### 4.4 Environment condition



**Fig 4.4: Environment condition**

In the present study highest number of patient live in clean area and their percentage was 72.37%. The second highest (14.91%) numbers of patient live in polluted area.

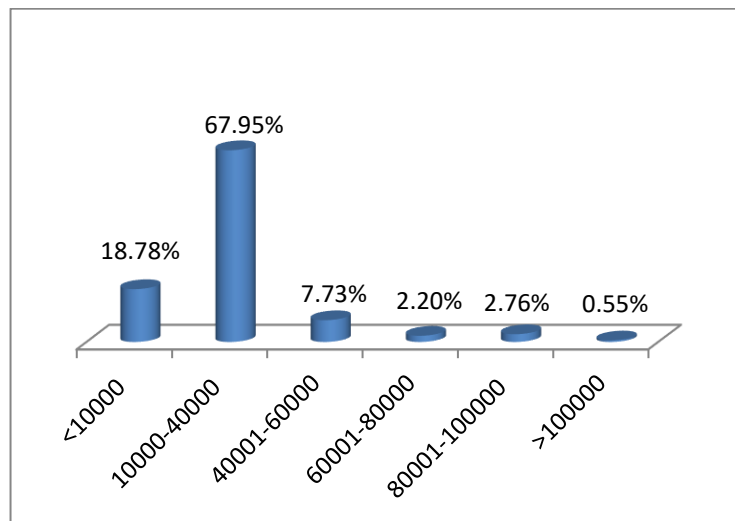
#### 4.5 Number of family members



**Fig 4.5: Number of family members**

In this study it was found that 64.08% of the patients had 4-6 family members and it was the highest among all. About 20.44% of patients had 1-3 members in their family.

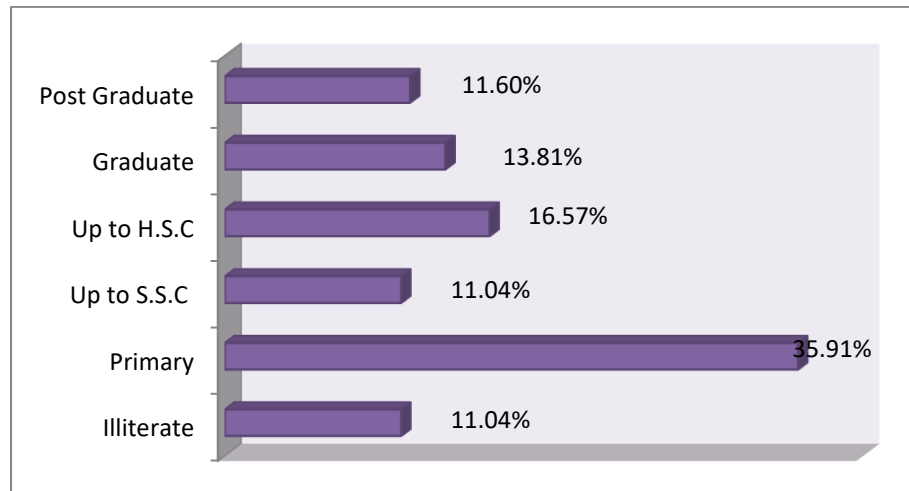
#### 4.5.1 Monthly income of the patient



**Fig 4.6: Monthly of the patient**

The majority (67.95%) of the patients belonged to middle socioeconomic class with monthly income were between 10000-40000 Taka BDT and 18.78% patients were <10000 Taka BDT monthly.

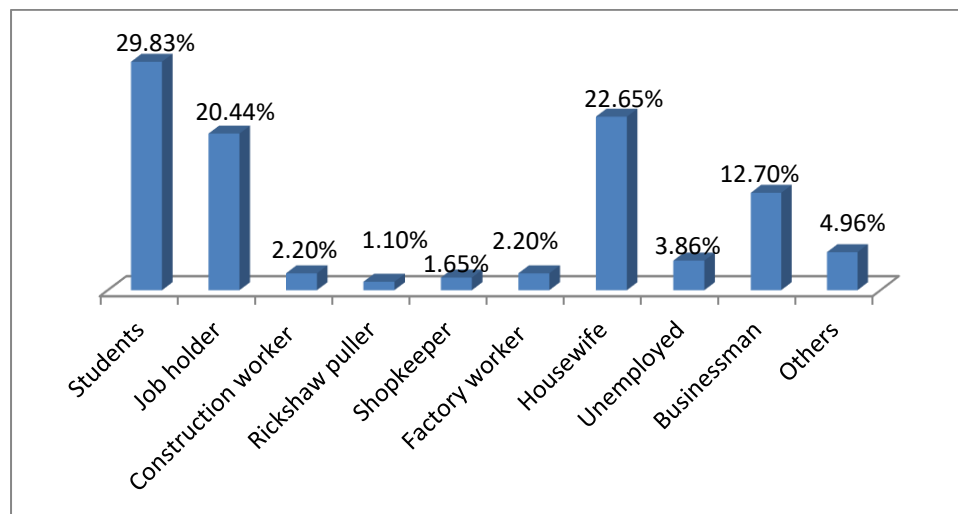
#### 4.5.2 Educational background



**Fig 4.7: Educational background**

It was observed that among 181 patients major portion (35.91%) of the patients completed their primary education. On the other hand, 16.57% patients studied up to H.S.C and 13.81% patients were Graduate.

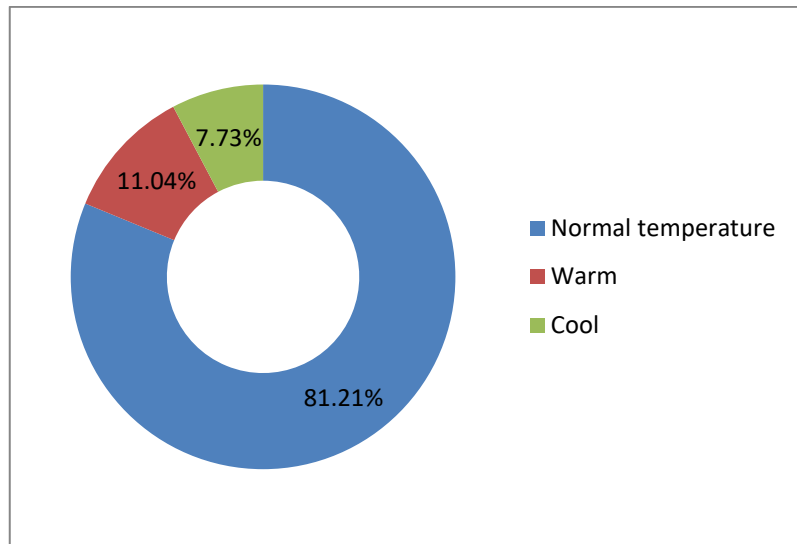
#### 4.5.3 Occupation



**Fig 4.8: Occupation**

In the present research it was observed that majority (29.83%) of the patient was students, 22.65% were housewife and 20.44% patients were job holder.

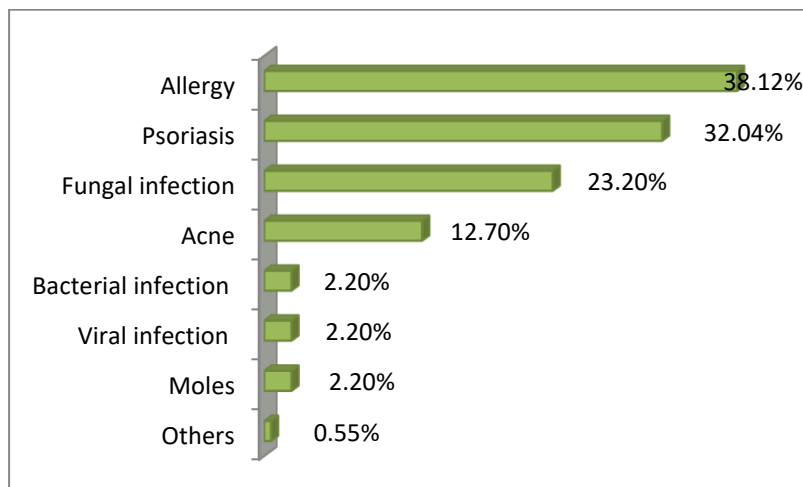
#### 4.5.4 Environment at work place



**Fig 4.9: Environment at work place**

Of the 181 patients, most of the patients (81.21%) worked in normal temperature and the remaining 11.04% and 7.73% worked in warm and cool environment respectively.

#### 4.5.5 Common skin diseases

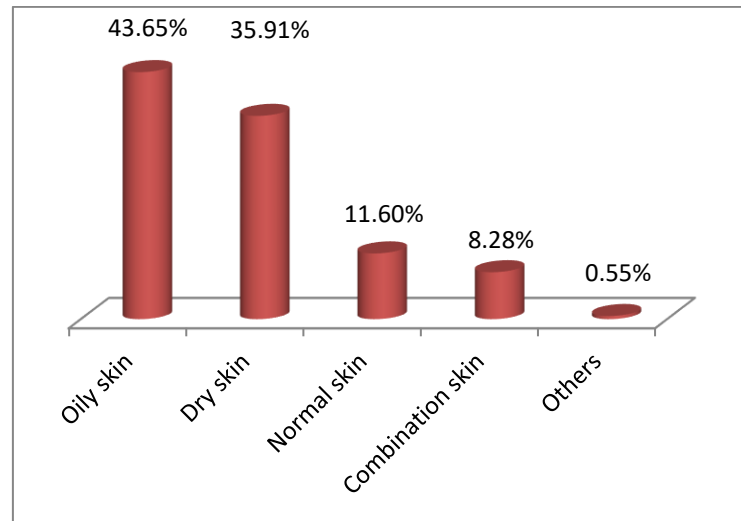


**Fig 4.10: Common skin diseases**

As in Figure 4.10, allergy was most common (38.12%) dermatological disorder followed by psoriasis (32.04%) and fungal infection (23.20%). Very small (12.70%) percentage of patients had acne. Others 0.55% diseases were relatively uncommon.



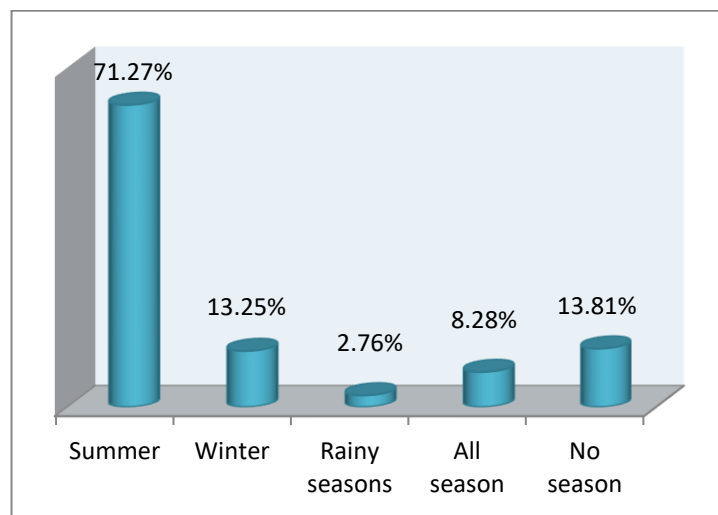
#### 4.5.6 Skin types



**Fig 4.11: Skin types**

During the study it was seen that 43.65% of patient had oily skin and 35.91% of patient had dry skin. On the other hand, only 11.60% had normal skin.

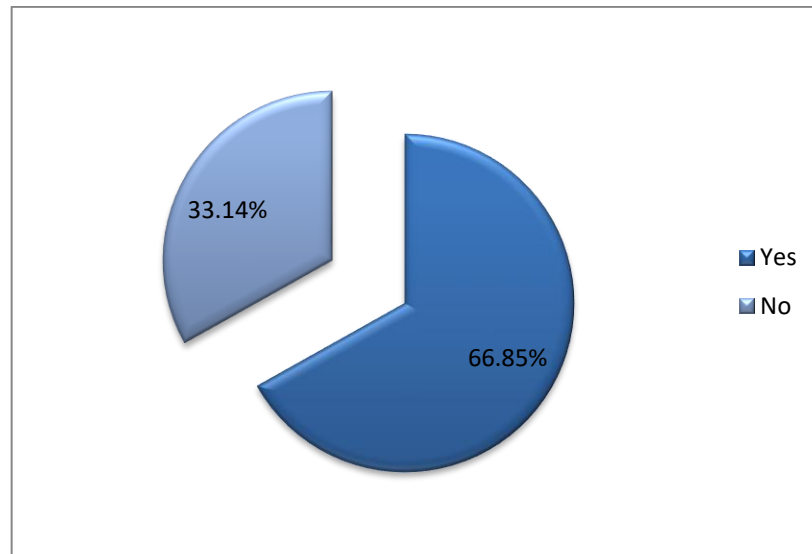
#### 4.5.7 Seasonal influence



**Fig 4.12: Seasonal influence**

In this study it was found that most of the patient suffered mostly in summer season and it was 71.27%. About 8.28% patients suffered from skin problem all the year round and in 13.25% cases, there was not seasonal influence.

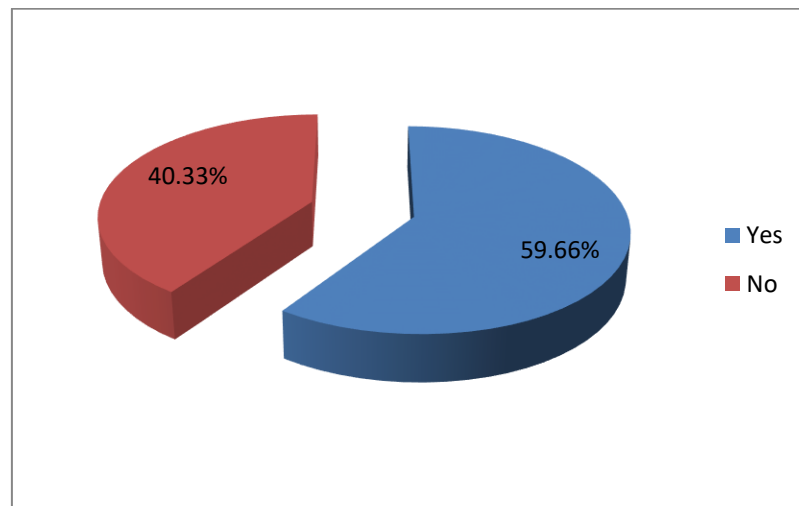
#### 4.6.1 Effect of external environment



**Fig 4.13: Effect of external environment**

It was observed that among 181 patients, 66.85% answered that they have increased skin infection when they are outside their home.

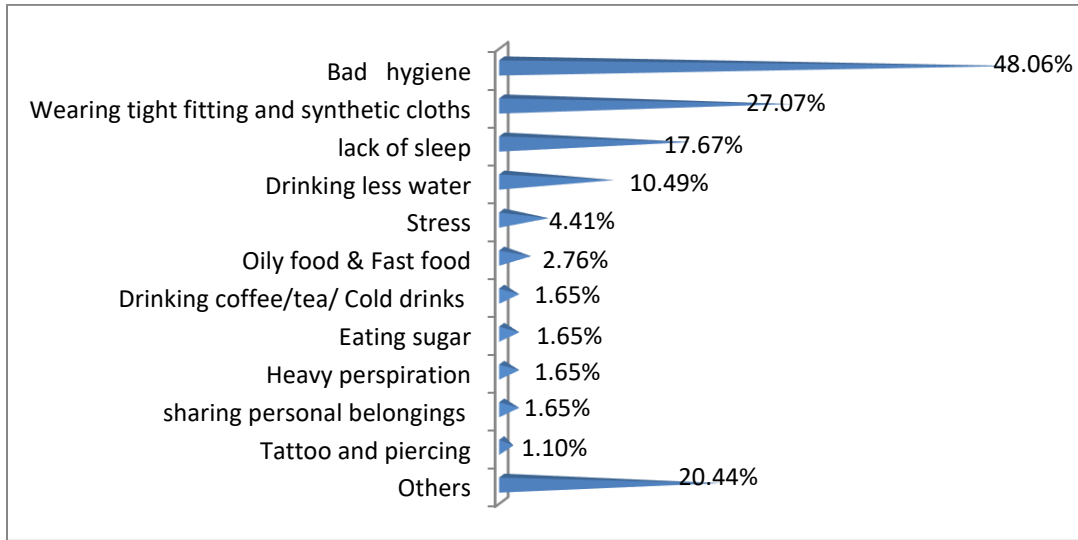
#### 4.6.2 Knowledge about risk factors



**Fig 4.14: Knowledge about risk factors**

During this research it was seen that, almost (59.66%) (n=108) patients knew the risk factor of skin infections. The remaining 40.33% (n=73) answered that they don't have any idea about the risk factors.

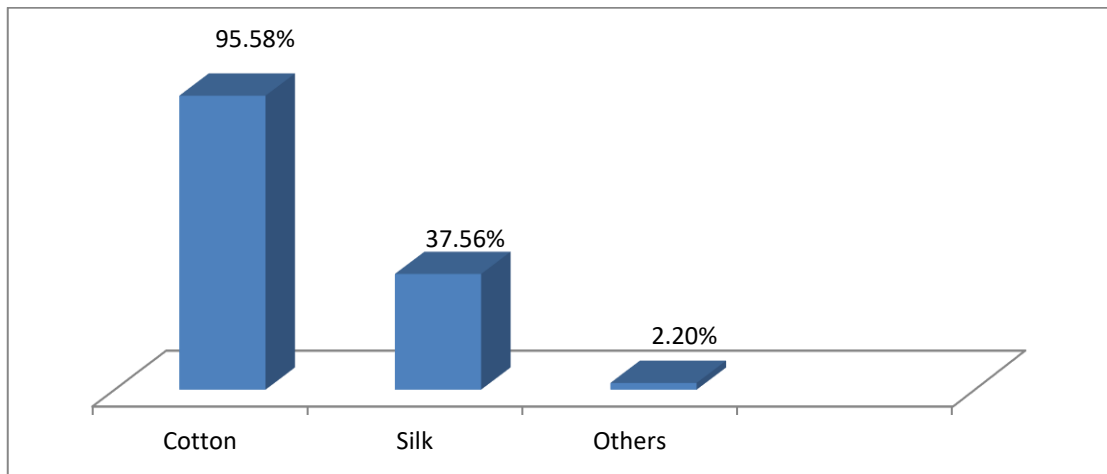
#### 4.6.3 Risk factors for skin disease (N=108)



**Fig 4.15: Risk factors for skin disease**

Majority (48.07%) patients identified bad hygiene as the risk factors of skin infection followed by wearing tight cloth (27.07%), lack of sleep (17.67%), Drinking less water (10.49%) etc.

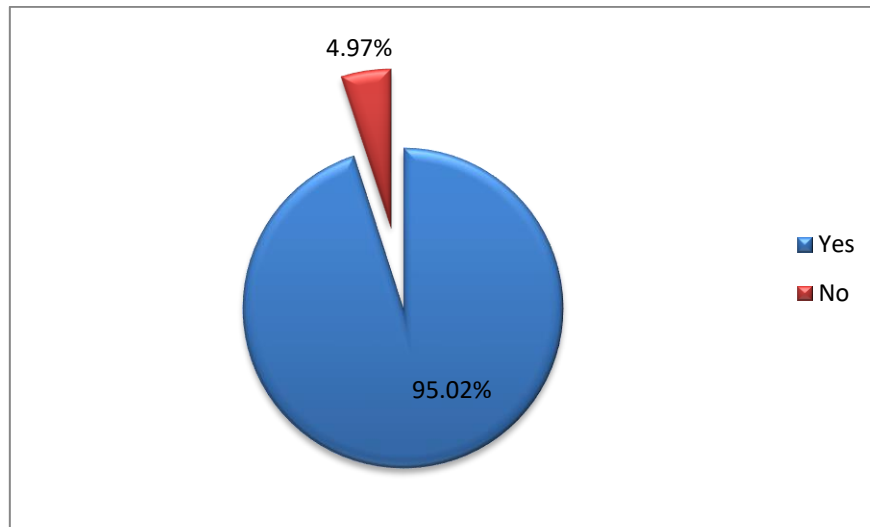
#### 4.6.4 Patient prefer to wear cloth



**Fig 4.16: Patient prefer to wear cloth**

When asking about the preference of cloth, almost all (95.58%) patients said cotton cloth is the most preferable cloth for them. On the other hand, 37.56% answered that silk cloth are also preferable cloth for them.

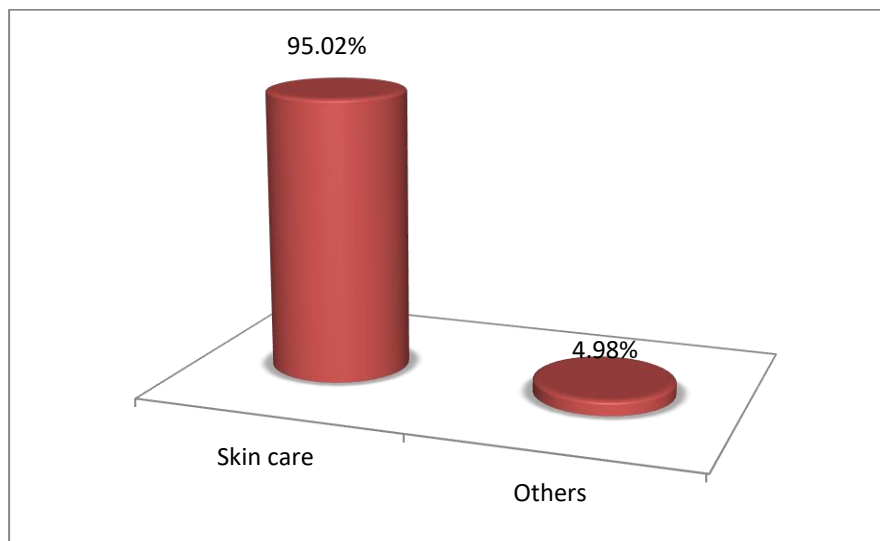
#### 4.6.5 Use of cosmetics products



**Fig 4.17: Use of cosmetics products**

The highest proportions (95.02%) (n=172) of respondents used cosmetics and 4.97% (n=9) of patient didn't use cosmetics.

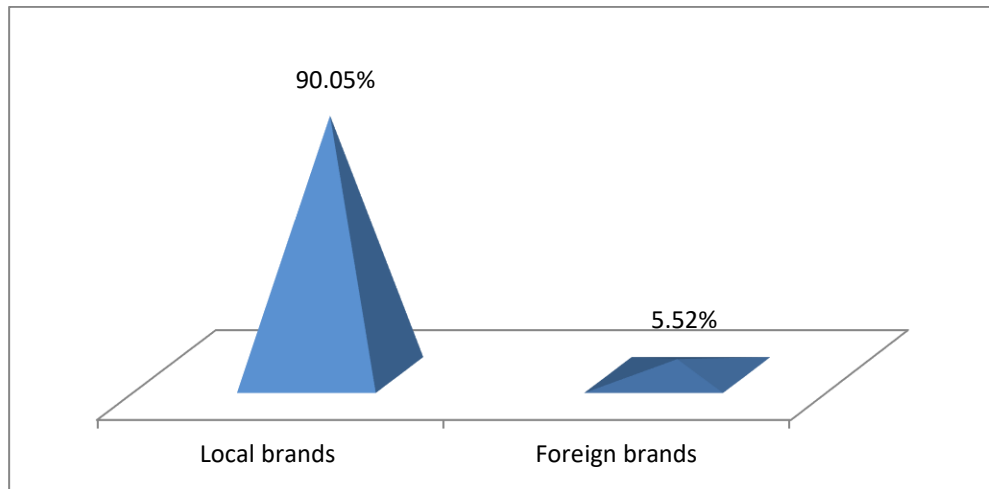
#### 4.6.6 Types of cosmetics used (N=172)



**Fig 4.18: Types of cosmetics used**

All of the patients (95.02%) said that they use cosmetics for skin care and 4.98% of patient use cosmetics in other purpose.

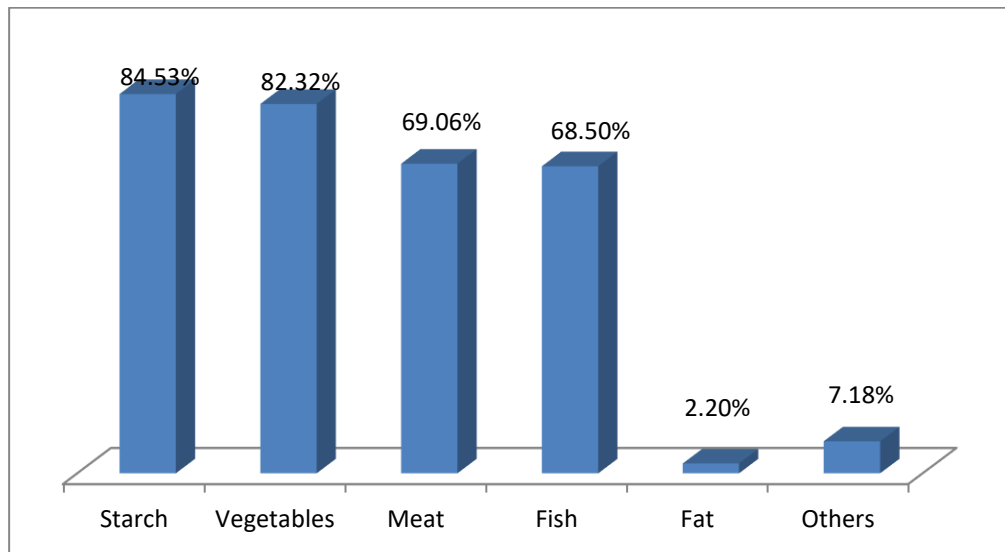
#### 4.7.1 Preference over the brand of cosmetics



**Fig 4.19: Preference over the brand of cosmetics**

An estimated 90.05% of the Govt Hospital patients used mostly local brand which is highest rather than foreign brand user.

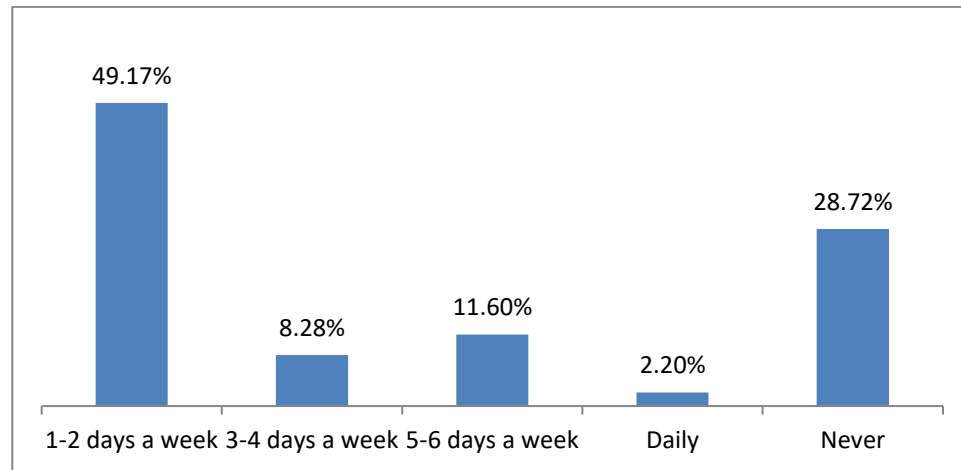
#### 4.7.2 Foods which consumed on a daily basis



**Fig 4.20: Foods which consumed on a daily basis**

Most patients (84.53%) consumed starch as a daily basis. Second most (82.32%) common type of food is vegetable which is consumed by patient. Meat and fish are also consumed by the patient on a daily basis and their percentage were 69.06% and 68.50% respectively.

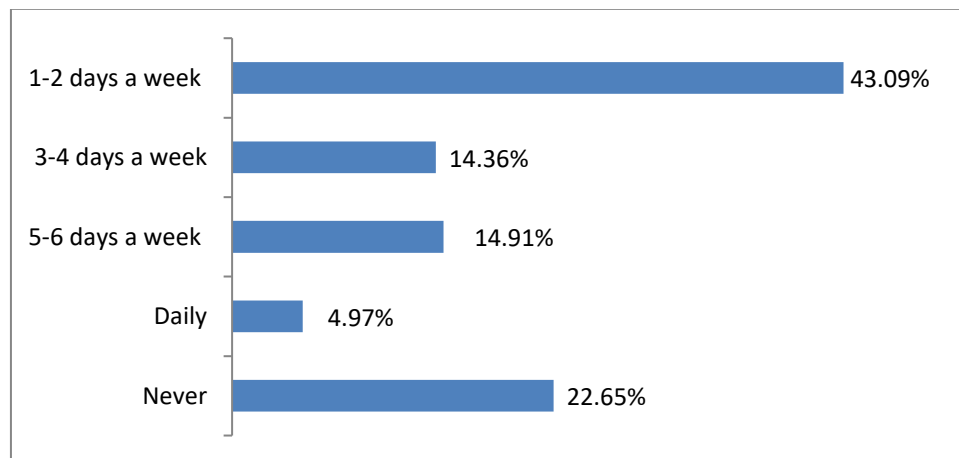
### 4.7.3 Weekly fast food consumption



**Fig 4.21: Weekly fast food consumption**

In the present study, fast food was consumed by an approximately 49.17% between 1-2 days a week. It was also observed that 28.65% of the patients never consumed fast food, and the other 11.60% took fast food 5-6 days a week.

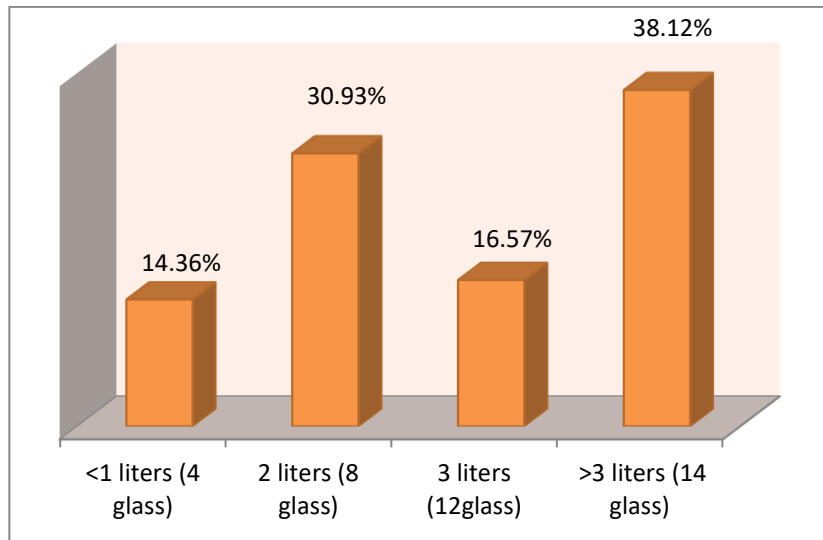
### 4.7.4 Patient weekly oily food consumption



**Fig 4.22: Patient weekly oily food consumption**

In this study, oily food was consumed by an approximately 43.09% between 1-2 days a week. It was also observed that 22.65% of the patients never consumed oily food, and the other 14.91% took oily food 5-6 days a week.

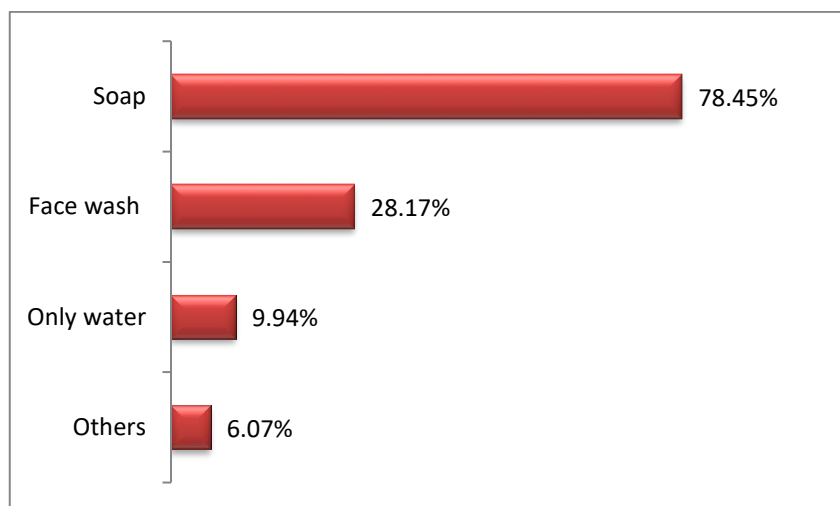
#### 4.7.5 Daily consumption of water



**Fig 4.23: Daily consumption of water**

In the research, it is estimated that about 38.12% of patient drank >3 liters of water on daily basis and it was the highest compared with others. About 14.36% patients consumed <1 liters of water per day.

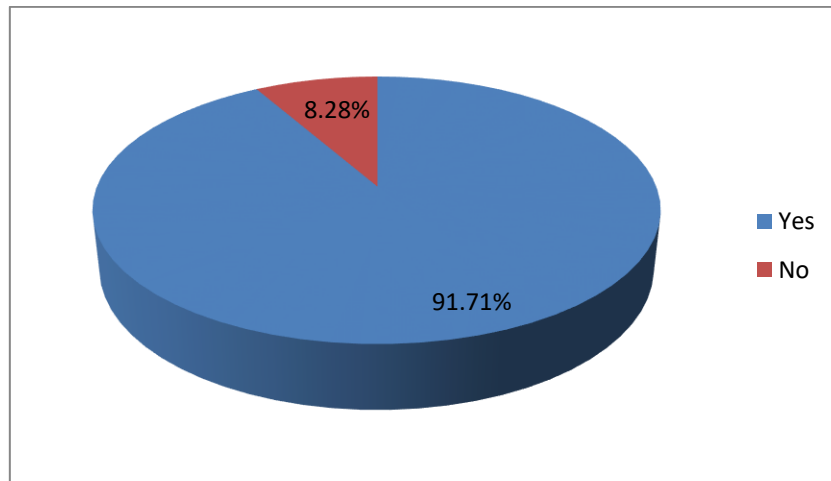
#### 4.7.6 Method used to clean skin



**Fig 4.24: Patient used to clean skin**

Approximately 78.45% patient used soap to clean their skin and 28.17% patient used face wash to clean their skin.

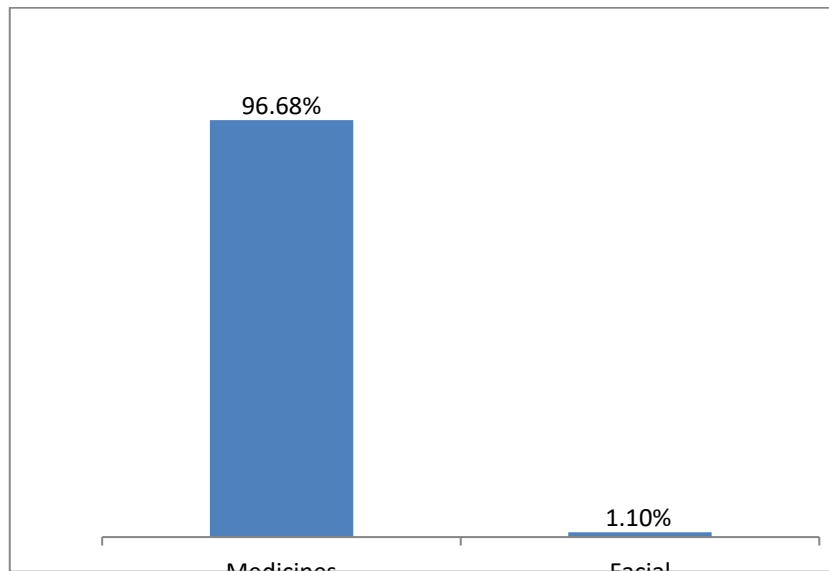
#### 4.8.1 Patient who are doing skin treatment



**Fig 4.25: Patient who are doing skin treatment**

Almost all (91.71%) (n=166) Patients confirmed that they are undergoing skin treatment. Only 8.28% (n=15) patients answered negative.

#### 4.8.2 Skin treatment option (N=166)

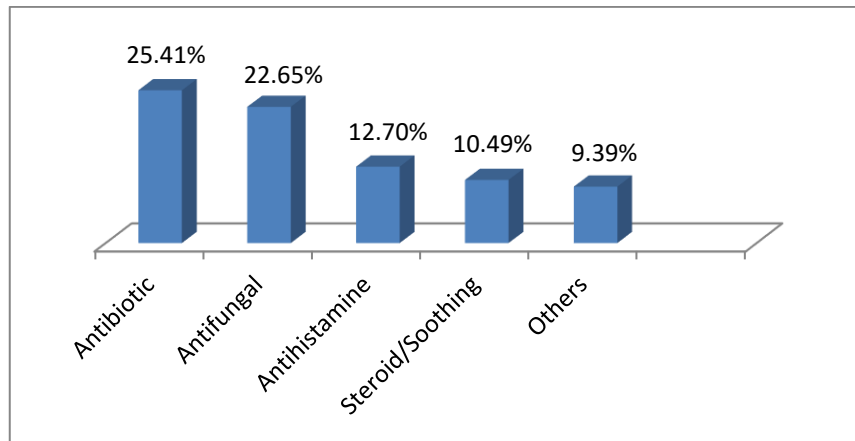


**Fig 4.26: Skin treatment option**

Majority of the patient (96.68%) in hospital treated their skin by medicine and topical agent. Very low (1.10%) of patients used facial treatment to solve their skin problem.



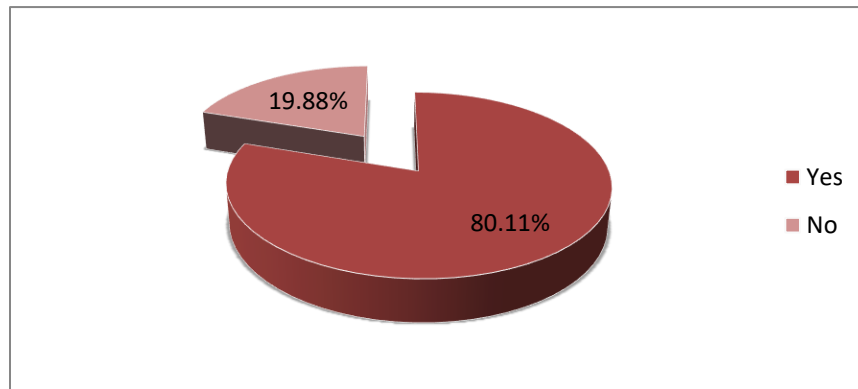
### 4.8.3 Medicine used to treat skin disease



**Fig 4.27: Medicine used to treat skin disease**

As shown in Fig 4.27, antibiotic (25.41%) was the most common drugs prescribed. Antibiotic were used in both oral as well as topical route. Antifungal drug (22.65%) was second most common drugs, Antihistamine (12.70%) and steroidal/soothing agent (10.49%) and others (9.39%) were used less commonly.

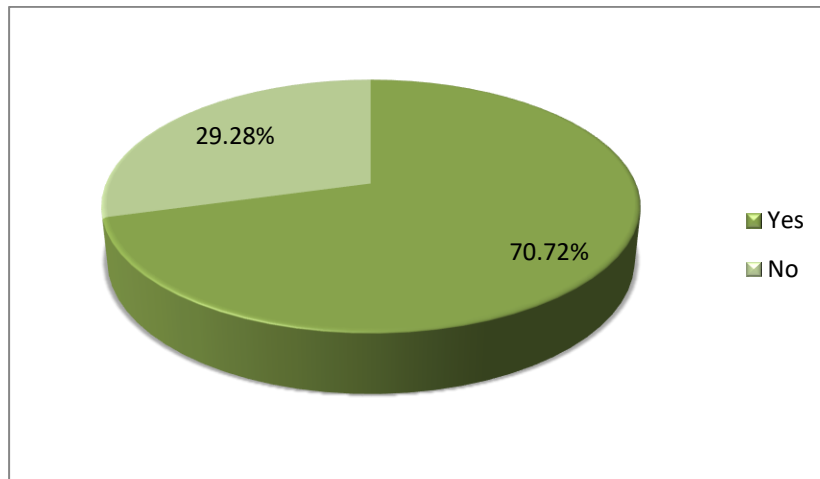
### 4.8.4 Impact of skin disease on quality of life



**Fig 4.28: Impact of skin disease on quality of life**

Patients with skin disease may experience severe symptoms, such as itching, pain, and discomfort that can have a profound psychological impact. Although mortality rates are generally low, skin diseases have significant effects on quality of life. Here we have seen that 80.11% of the patient said that their quality of life is affected by skin disease and other 19.88% answered negative.

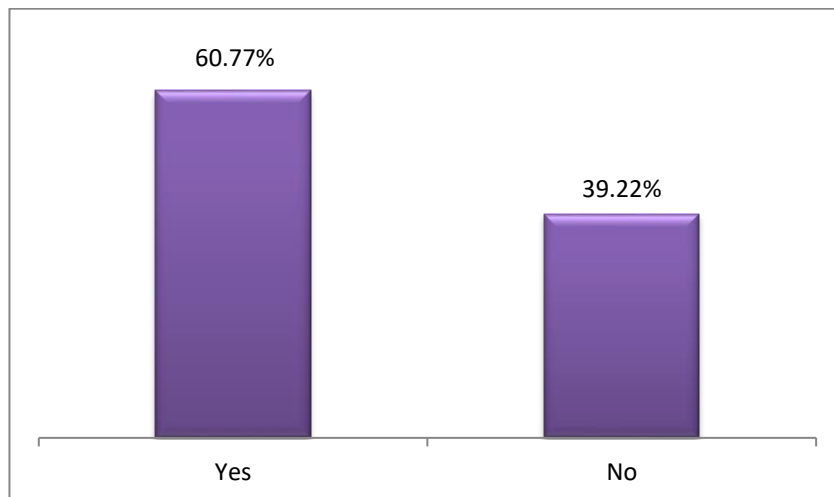
#### 4.8.5 Embarrassment due to skin disease



**Fig 4.29: Embarrassment due to skin disease**

During the study it was seen that majority of the patient (70.72%) feel embarrass due to skin disease. Remaining 29.28% didn't feel embarrassed.

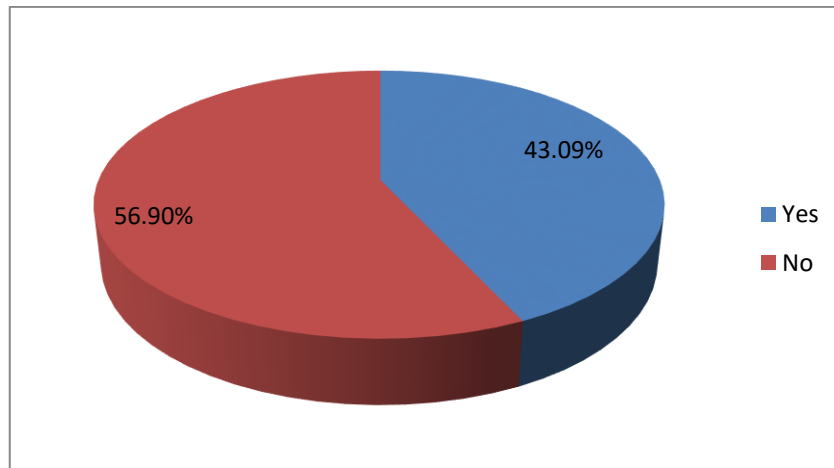
#### 4.8.6 Effect on social and personal activity



**Fig 4.30: Effect on social and personal activity**

Patient's social and physical activities, including sports and work, may be adversely affected because of reluctance to allow others to see their skin disease. It can be summarized that around 60.77% of the patients think that skin disease hampers social and personal activity in their life and 39.22% patients thought otherwise.

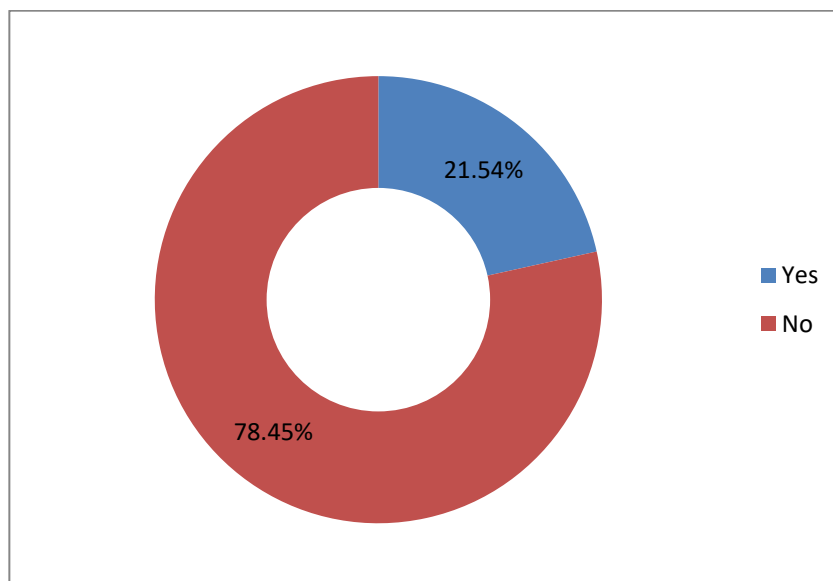
#### 4.9.1 Effect skin disease on work



**Fig 4.31: Effect skin disease on work**

In the study most (56.90%) of the patient said that they feel disturb in working period due to the skin infection. Others 43.09% answered negatively.

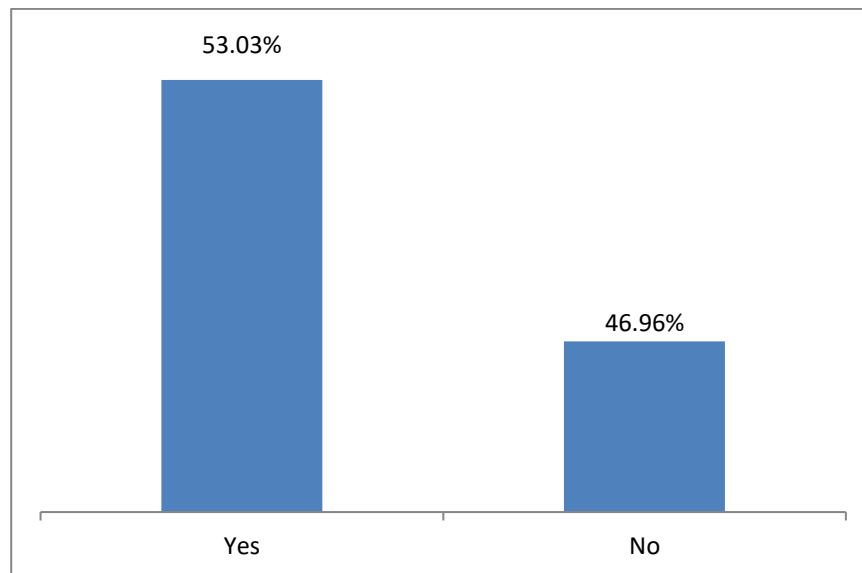
#### 4.9.2 Effect of skin disease on relationship



**Fig 4.32: Effect of skin disease on relationship**

In the study 78.45% of the patient said that they have no effect on relationship status due to skin disease and 21.54% patient said they feel problem about this matter.

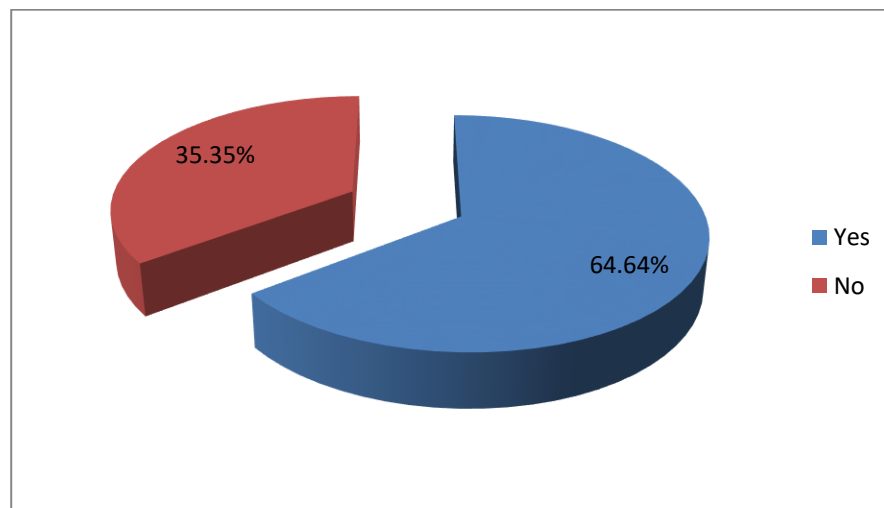
#### 4.9.3 Preference over the choice of clothing because of skin infection



**Fig 4.33: Preference over the choice of clothing because of skin infection**

It was observed that 53.03% have preference over the choice of cloth and 49.96% did not have any preference due to skin disease.

#### 4.9.4 Preference with choice of food



**Fig 4.34: Preference with choice of food**

In the study 64.64% Patients answered that they have preference over choice of food and 35.35% thought otherwise.

# Chapter 5

## Discussion & Conclusion

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## Discussion

Skin disease is one of the most common human illnesses. The Global Burden of Disease (GBD) study estimated the GBD attributable to 15 categories of skin disease from 187 countries. Three skin conditions, fungal skin diseases, other skin and subcutaneous diseases, and acne were in the top 10 most prevalent diseases worldwide, and eight fell in to the top 50; these additional five skin problems were pruritus, eczema, impetigo, and scabies. At the global level, skin conditions were the fourth leading cause of nonfatal disease burden. Using more data than has been used previously, the burden due to these diseases is enormous in both high- and low-income countries (Hay et al, 2014).

Skin diseases are the major contributors of disease burden in society. It affects individuals of all ages, neonates to elderly. Owing to its chronic nature, it causes serious impact on quality of life and financial status of the sufferer and his family. The present study was conducted on 181 patients from different Govt hospitals of Bangladesh. Among them 63.54% patients were male and rest of them was female. The population was aged between 6 month to 95 years old and most of them (67.95%) belonged to higher middle class family.

The general living and hygienic standards of these patients were average to high and majority of them belonged to middle socioeconomic class with monthly income within Tk.10,000-40000 BDT. Only 11.04% of the patients were illiterate and majority (29.83%) was students followed by housewife (30.4%).

It was observed that 71.27% of the patients answered that they were mostly suffered by skin disease during the summer season. The study of Manjula, Sreekiran & Sreekanth, (2011) and study of Durai and Nair (2015) also found similar observation but in higher age group.

The prevalence of skin infection among adults was found to be 72.92% with allergy, psoriasis & fungal infection being the most common. These findings correlate with studies performed in tropical countries such as India, tropical Africa and the region of timor leste, which has a similar climate to Bangladesh. A change in climate with greater heat and humidity was reported as a cause of an increase in bacterial and fungal proliferation (Ramamuthie et al, 2015).

More than 50% of participants were aware of the risk factors associated with skin infection. A huge number of participants (48.07 %) knew that bad hygiene could contribute to chances of contracting skin infection, whereas 27.07 % of them were aware of wearing tight fitting and synthetic cloths as a risk factor of skin infection. Only 17.67 % showed awareness of the risk of lack of sleep as a trigger to skin infection. The findings are in line with those of Ramamuthie et al, (2015), who reported that 71% of their respondents were aware of skin infection as a result of their tertiary education and middle socioeconomic status. These statements were dissimilar with statistics from Bangladesh, which indicate that Dhaka is one of the highly urbanized cities with adequate provision of health, education and sanitary facilities within each socio-economic class. Furthermore, the participants from the Dhaka city have good health-seeking behaviors. Nevertheless, we were concerned about a lack of awareness among the majority group, which had to be explored.

Skin infection has great negative effects on QoL. The QoL of 181 participants with skin infection was mostly (80.11%) affected by uncomfortable physical symptoms such as itchiness, soreness, pain and stinging. Embarrassment and self-consciousness about the appearance of the skin condition were found to be a second major factor affecting QoL (70.72 %). The effect on QoL of embarrassment and self-consciousness resulting from skin infection was also in line with other studies performed in central Saudi Arabia by Abolfotouh et al, (2012), in which the location of lesions caused by skin infection created a major psychological impairment in individual identity development. Furthermore, the messiness and time-constraints imposed by the topical application of treatments for skin infection caused discomfort and annoyance.

## **Conclusion**

Skin infection is widely prevalent among the population of the Bangladesh. Despite an average awareness of risk factors contributing to skin infection, this study revealed that Bangladeshi people still lack some basic knowledge and understanding of skin infections that indirectly affect their QoL. Awareness of skin infections is under-researched in Bangladesh, and a deep understanding remains to be achieved. Thus, there is a need for further studies on community health education and treatment individualization for skin infections in Bangladesh.



# Chapter 6

## Reference

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Amirlak B. (2017) *Skin Anatomy*, [Online] Available from: <https://emedicine.medscape.com/article/1294744-overview#a3> [Accessed 8 January 2018].

Arbuckle R., Atkinson M. J., Clark M., Abetz L., Lohs J., Kuhagen I., Harness J., Draelos Z., Thiboutot D., Blume-Peytavi U., and Copley-Merriman K. (2008) Patient experiences with oily skin: The qualitative development of content for two new patient reported outcome questionnaires. *BMC Medical Education*, [Online] Available from: <https://doi.org/10.1186/1477-7525-6-80> [Accessed 8 January 2018].

Allam M and Riad H (2013) Concise review of recent studies in vitiligo. *Qatar Medical Journal*, [Online] (2), 1–19. Available from: doi: 10.5339/qmj.2013.10 [Accessed 8 January 2018].

Abolfotouh M.A., Al-Khowailed M.S., Suliman W.E., Al-Turaif D.A., Al-Bluwi E., Al-Kahtani H.S. (2012) Quality of life in patients with skin diseases in central Saudi Arabia. *International Journal of Genetic Medicine*, [Online] 5,633-42 Available from: doi: 10.2147/IJGM.S33276. [Accessed 4 January 2018].

Ahmed N., Islam M.Z., Farjana S. (2012) Pattern of Skin Diseases: Experience from a Rural Community of Bangladesh. *Bangladesh Medical Journal*, [Online] 41(1), 50-52 Available from: DOI: <http://dx.doi.org/10.3329/bmj.v41i1.18784> [Accessed 6 January 2018].

Bhosle M.J., Kulkarni A., Feldman SR., and Balkrishnan R. (2006) Quality of life in patients with psoriasis. *Biomed central The open access Publisher*, [Online] 2006; 4, 35. Available from: doi: 10.1186/1477-7525-4-35 [Accessed 6 January].

Basra M.KA., Shahrukh M. (2009) Burden of Skin Diseases. *Medscape*, [Online] 9(3), 271-283. Available from: [https://www.medscape.com/viewarticle/706091\\_1](https://www.medscape.com/viewarticle/706091_1) [Accessed 9 January 2018].

Boer M., Duchnik E., Maleszka R., and Marchlewicz M. (2016) Structural and biophysical characteristics of human skin in maintaining proper epidermal barrier function. *Advances in Dermatology and allergology*, [Online] 33(1), 1–5.

Barankin B. and DeKoven J. (2002) Psychosocial effect of common skin diseases. *Official publication of the college of family Physician of Canada*, [Online] 48, 712–716.

Badiee P. and Hashemizadeh Z. (2014) Opportunistic invasive fungal infections: diagnosis & clinical management. *Indian journal of Medical research*, [Online] 139(2), 195–204.

Byrne DD., Reboli AC. (2017) Rare Yeast Infections: Risk Factors, Clinical Manifestations, Treatment, and Special Considerations. *New England journal of Medicine*, [Online] 4( 4), 218–231.

Basavaraj KH., Seemanthini C., Rashmi R. (2010) Diet in dermatology: Present perspectives. *Indian Journal of Dermatology*, [Online] 55(3), 205-210 Available from: doi: 10.4103/0019-5154.70662 [Accessed 7 January 2018].

Capitanio B., Sinagra JL., Ottaviani M., Bordignon V., Amantea A., and Picardo M. (2009) Acne and smoking. *Dermato endocrinology*, [Online] 1(3), 129–135.

Chamlin SL. and Chren MM. (2010) Quality-of-life Outcomes and Measurement in Childhood Atopic Dermatitis. *HHS Public Access*, [Online] 30(3), 281–288 Available from: doi: 10.1016/j.iac.2010.05.004 [Accessed 4 January 2018].

Chren MM., Lasek RJ., Quinn LM., Mostow EN., Zyzanski SJ. (1996) Skindex, a quality-of-life measure for patients with skin disease: reliability, validity, and responsiveness. *Journal of Investigational Dermatology*, [Online] 107(5), 707-13.

Durai PC.T., Nair D.G. (2015) Acne vulgaris and quality of life among young adults in South India. *Indian Journal of Dermatology*, [Online] 60(1), 33-40 Available from: doi: 10.4103/0019-5154.147784 [Accessed 6 January 2018].

Darjani A., Heidarzadeh A., Golchai J., Sadr-Eshkevari S., Alizadeh N., Arami M., Nichhah N. (2014) Quality of life in psoriatic patients: a study using the short form-36. *International Journal of Preventive Medicine*, [Online] 5(9), 1146-52.

Duarte I., Silveira JEPS., Hafner MFS., Toyota R., Pedroso DMM. (2017) Sensitive skin: review of an ascending concept. *Brazilian society of Dermatology*, [Online] 92(4), 521-525 Available from: doi: 10.1590/abd1806-4841.201756111 [Accessed 9 January 2018].

Douglass Jo A. and O’Hehir ER. (2006) Diagnosis, treatment and prevention of allergic disease: the basics. *The Medical Journal of Australia 2006*, [Online] 185 (4), 228-233.

Dave ND., Xiang L., MD, Rehm KE., and Marshall GD. (2011) Stress and Allergic Diseases. *HHS Public Access*, [Online] 31(1), 55–68. Available from: doi: 10.1016/j.iac.2010.09.009 [Accessed 5 January 2018].

English J., Dawe R., Ferguson J. (2003) Environmental effects and skin disease. *British Medical Bulletin*, [Online] 68(1), 129–142 Available from: <https://doi.org/10.1093/bmb/ldg026> [Accessed 6 January 2018].

FDA (2013) *Guidance for Industry: Acute Bacterial Skin and Skin, Structure Infections: Developing Drugs for Treatment*, Available from: <http://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/default.htm> [Accessed 10 January 2018].

Feldman R. (2017) Epidemiology, clinical manifestations, and diagnosis of psoriasis. *Uptodate*, [Online] (<http://www.uptodate.com/home>). Available from: <https://www.uptodate.com/contents/epidemiology-clinical-manifestations-and-diagnosis-of-psoriasis> [Accessed 13 January 2018].

Goodman DM. (2013) Food Allergies. *National Institute of Allergy and Infectious Diseases, US Food and Drug Administration*, [Online] 310(4), 444.

Globe D., Bayliss Ms., and Harrison DJ. (2009) The impact of itch symptoms in psoriasis: results from physician interviews and patient focus groups. *Health and Quality of life Outcomes*, [Online] 7(1), 1-62. Available from: <https://doi.org/10.1186/1477-7525-7-62> [Accessed 4 January 2018].

Gold, M. (2009) Prescription Medications for Treating Acne. *Journal of Clinical and Aesthetic Dermatology*, [Online] 2, 40-44.

Gardner S.S., (2017) *Picture of the Skin*, [Online] Available from: <https://www.webmd.com/skin-problems-and-treatments/picture-of-the-skin#2> [Accessed 9 January 2018].

Greaves M.W. and Weinstein GD., (1995) Treatment of Psoriasis. *The new England journal of Medicine*, [Online] 332(9), 581-589.

Hicks Dr. R. (2017) *Healthy skin & hair guide*, [Online] Available from: <https://www.webmd.boots.com/healthy-skin/guide/whats-your-skin-type> [Accessed 8 January 2018].

Hay RJ., Johns NE., Williams HC., Bolliger IW., Dellavalle RP., Margolis DJ., Marks R., Naldi L., Weinstock MA., Wulf S.K., Michaud C., Murray C. JL. and Naghavi M. (2014) The Global Burden of Skin Disease in 2010: An Analysis of the Prevalence and Impact of Skin Conditions. *Journal of Investigative Dermatology*, [Online] 134, 1527–1534 Available from: doi:10.1038/jid.2013.446 [Accessed 10 January 2018].

Hasan M. MD, Hosain S, Asaduzzaman AM, Haque MA, Roy UK (2016) Prevalence of Health Diseases among Bangladeshi Tannery Workers and associated Risk factors with Workplace Investigation, *Journal of Pollution Effects & Control* [Online] 4,175 Available from: doi: 10.4175/2375-4397.1000175 [Accessed 7 January 2018]

Igarashi T., Nishino K., and Nayar S. K. (2005) The Appearance of Human Skin. *A Survey*", *Foundations and Trends® in Computer Graphics and Vision*, [Online] 3(1), 1-95. Available from: <http://dx.doi.org/10.1561/06000000013> [Accessed 7 January 2018].

Islam A.K.M.S., Wadud M.A. (1999) Skin diseases in a rural area of Bangladesh. *Bangladesh Journal of Dermatology, Venereology and Leprology*, [Online] 16(1) Available from: <https://www.researchgate.net/publication/289171107> [Accessed 9 January 2018].

Jain A., Jain S., and Rawat S. (2010) Emerging fungal infections among children: A review on its clinical manifestations, diagnosis, and prevention. *Journal of Pharmacy & Bioallied Sciences*, [Online] 2(4), 314–320. Available from: doi: 10.4103/0975-7406.72131 [Accessed 5 January 2018].

Johnson J., Medical News Today (17-06 2017) *What you need to know about fungal infections*, Available from: <https://www.medicalnewstoday.com/articles/317970.php> [Accessed 8 January 2018].

Jones and Bartlett Publishers (2011) *Basic Biology of the Skin*, [Online] 29-32, Available from: [http://samples.jbpub.com/9780763761578/03ch\\_pg029-032\\_Wiles.indd.pdf](http://samples.jbpub.com/9780763761578/03ch_pg029-032_Wiles.indd.pdf) [Accessed 9 January 2018],

Kaffenberger BH., Shetlar D., Norton SA., Rosenbach M. (2017) The effect of climate change on skin disease in North America. *Journal of American Academic Dermatology*, [Online] 76(1), 140-147. Available from: doi: 10.1016/j.jaad.2016.08.014. [Accessed 5 January 2018].

Kanitakis, J. (2002). Anatomy, histology and immunohistochemistry of normal human skin. *European Journal of Dermatology*, [Online] 12(4), 390–401.

Lev-Tov H and Maibach HI (2012) The Sensitive Skin Syndrome. *Indian journal of Dermatology*, [Online] 57(6), 419–423. Available from: doi: 10.4103/0019-5154.103059 [accessed 8 January 2018].

Luo EK., MD, Medical News Today (26-09 -2017) *Vitiligo: Symptoms, causes, and treatments*, Available from: <https://www.medicalnewstoday.com/articles/245081.php> [Accessed 9 January 2018].

Lopes C., Soares J., Tavoria F., Duarte A., Correia O., Sokhatska O. (2015) Chitosan Coated Textiles May Improve Atopic Dermatitis Severity by Modulating Skin Staphylococcal Profile: A Randomized Controlled Trial. *PLoS ONE*, [Online] 10(11), e0142844 Available from: <https://doi.org/10.1371/journal.pone.0142844> [Accessed 6 January 2018].

Meglio Di. P., Villanova F., and Nestle FO. (2014) Psoriasis. *Cold spring Harbor Perspective in Medicine*, [Online] 4(8), a015354. Available from: doi: 10.1101/cshperspect.a015354 [Accessed 5 January].

Mann ER., Smith KM., Bernardo D., Al-Hassi HO., Knight SC. and Hart AL. (2012) Review: Skin and the Immune System. *Journal of Clinical and Experimental Dermatology Research*, [Online] S2:003. doi: 10.4172/2155-9554.S2-003 [Accessed 7 January 2018].

Morganti P. (1997). Chapter 1, Mitsui, Ph.D (ed) *New Cosmetic Science*, Cosmetics and skin Third edition, 16 (1), 499 Available from: <https://trove.nla.gov.au/version/27801687> [Accessed 8 January 2018].

Moncrieff G., Cork M., Lawton S., Kokiet S., Daly C., Clark C. (2013) Use of emollients in dry-skin conditions: consensus statement. *Clinical and experimental Dermatology*, [Online] 38(3), 231-8.

Manjula VD., Sreekiran S., Saril PS., and Sreekanth MP. (2011) A Study of psoriasis and quality of life in a tertiary care teaching hospital of kottayam, kerala. *Indian Journal of Dermatology*, [Online] 56(4), 403–406 Available from: doi: 10.4103/0019-5154.84767 [Accessed 5 January 2018].

Nordlund JJ. (2011) Vitiligo: a review of some facts lesser known about depigmentation. *Indian journal of Dematology*, [Online] 56(2), 180–189. Available from: doi: 10.4103/0019-5154.80413 [Accessed 8 January 2018].

Ogedegbe EE. and Henshaw EB. (2014) Severity and impact of acne vulgaris on the quality of life of adolescents in Nigeria. *Clin Cosmet Investig Dermatol*, [Online] 7, 329–334.

Ograczyk A., Miniszewska J., Kępska A., and Zalewska-Janowska A. (2014) Itch, disease coping strategies and quality of life in psoriasis patients. *Advances in Dermatology and Allergology*, [Online] 31(5), 299–304. Available from: doi: 10.5114/pdia.2014.40927 [Accessed 6 January 2018].

Pappas A. (2009) The relationship of diet and acne. *Dermato endocrinology*, [Online] 1(5), 262–267.

Rosińczuk J., Taradaj J., Dymarek R., and Sopel M. (2016) Review Article Mechanoregulation of Wound Healing and Skin Homeostasis. *BioMed Research International*, (2016), 1-13.

Reed J.T., Ghadially R., Elias P.M., (1995) Skin Type, but Neither Race nor Gender, Influence Epidermal Permeability Barrier Function. *AMA Journal of Ethics*, [Online] 131(10), 1134-1138. Available from: doi:10.1001/archderm.1995.01690220040008 [Accessed 7 January 2018].

Rathi SK. (2011) Acne vulgaris treatment : the current scenario. *Indian Journal of Dermatology*, [Online] 56(1), 7–13 Available from: doi: 10.4103/0019-5154.77543 [Accessed 5 January 2018].

Romanowska M., Reilly L., Palmer CN., Gustafsson MC., and Foerster J. (2010) Activation of PPAR $\beta/\delta$  Causes a Psoriasis-Like Skin Disease In Vivo. *A peer review open access Journal*, 5(3), e9701. Available from: doi: 10.1371/journal.pone.0009701 [Accessed 3 January 2018].

Ramamuthie G., Verma RK., Appalasamy J. and Barua A. (2015) Awareness of Risk Factors for Skin Infections and its Impact on Quality of Life among Adults in a Malaysian City: A Cross-Sectional Study. *Tropical Journal of Pharmaceutical Research*, [Online] 14(10), 1913-1917 Available from: <http://www.tjpr.org> [Accessed 8 January 2018].

Silpa S.R., Chidvila V. (2013) A review on skin cancer. *International research journal of pharmacy* 4, [Online] (8) 83-88. Available from: <http://dx.doi.org/10.7897/2230-8407.0481> [Accessed 9 January 2018].

Sitcharungsi R. and Sirivichayakul C. (2013) Allergic diseases and helminth infections. *Pathogens and Global Health*, [Online] 107(3), 110–115. Available from: doi: 10.1179/2047773213Y.0000000080 [Accessed 6 January 2018].

Walker SL., Eglantine Lebas., Sario V.D., Deyasso Z., Shimelis N. D., Marks M., Chrissy H.R., Lambert SM. (2017) The prevalence and association with health-related quality of life of tungiasis and scabies in schoolchildren in southern Ethiopia. *PLOS Neglected Tropical Disease*, [Online] Available from: <https://doi.org/10.1371/journal.pntd.0005808> [Accessed 6 January 2018].

Wickett R.R., and Visscher O.M. (2006) Structure and function of the epidermal barrier, *American Journal of infection control*, [Online] 34(10), S98–S110.

World Health Organization (2005) Epidemiology and Management of Common Skin Diseases in Children in Developing Countries. *Epidemiology and management of skin diseases*, [Online] Available from: <http://www.who.int/iris/handle/10665/69229> [Accessed 10 January 2018].

Xu F., Lu T. and Jian T. (2011) *Skin Structure and Skin Blood Flow In: Introduction to Skin Biothermomechanics and Thermal Pain*, [Online] Available from: <http://www.springer.com/gp/book/9783642132018> [Accessed 9 January 2018].

Yaghoobi R., Omidian M., Bagherani N. (2011) Vitiligo: a review of the published work. *Us National library of Medicine National Institute of Health*, [Online] 38(5), 419-31.

Zugerman C. (1990) Clinical manifestations and etiology. *Us National library of medicine National Institute of health*, [Online] 8(1), 209-13.