Psoriasis is a common dermatological condition that is chronic and progressive. It affects almost all surface of the body. It presents with excessive growth of skin on areas like the head, elbows, nails, palms, trunk, soles, knees, abdomen and back.\(^1\) Psoriasis is a complex disease in which there are erythematous, sharply demarcating papules and rounded plaques covered by silvery scales. Sometimes these lesions are pruritic and furthermore, other exterior factors can worsen psoriasis which includes medications (lithium, beta blockers, and antimalarials) stress, and infections.\(^2\)

This disease has no cure available, but there are certain lifestyle modifications and medications that can help to improve the severe symptoms which impacts the quality of life of the patient. It is estimated that 2% of world population is having psoriasis.\(^3\) Psoriasis exerts a substantial clinical, psychological and economic burden making the patients depressed and anxious. The degree of burden experienced by patients with psoriasis is comparable to patients who may have many chronic conditions, such as heart disease, diabetes, arthritis, stroke and congestive heart failure.\(^4\)

The manifestation of psoriasis is clinically classified as psoriasis vulgaris, palmoplantar psoriasis, guttate psoriasis, pustular psoriasis, plaque psoriasis, erythrodermic psoriasis and inverse psoriasis. Psoriasis vulgaris appears as a rash with silvery scales, it may be associated with itching and pain. It can appear in any part of the skin including scalp, palms of hands and soles of feet. It is also called as plaque psoriasis as there is scaling of skin. There is a danger of opening of skin due to scratching the skin resulting in bleeding prone for skin infections. It is usually observed in patients with the age group of 18 and above.
Guttate psoriasis is a condition which is common in children. This type of psoriasis is characterised by small coin shaped papules and plaques. Lesions typically appear on the trunk and limbs occasionally on scalp, face and ears. Inverse psoriasis shows up as red lesions in body folds. It may appear smooth and shiny. The patients may also have plaque psoriasis, pustular psoriasis on the body along with inverse psoriasis. Pustular psoriasis in characterized by pustules surrounded by red skin. The pus consists of white blood cells. It is not an infection, nor is it contagious. Erythrodermic psoriasis is characterized by erythema and scaling involving more than 90% of the body surface area. It is usually mistaken as contagious which is not true as there are no microorganisms involved in causing this condition.

There are well identified comorbidities associated with psoriasis like diabetes mellitus, obesity, hyperlipidaemia, and metabolic syndrome. Apart from this the patient usually suffers from psychological stress, anxiety and depression. The chances of developing the cardiovascular diseases are very high in psoriasis patients. The evidence for comorbidities like metabolic syndrome, diabetes mellitus, hyperlipidaemia, and obesity, is available in literature. In a cross sectional study it was established that the patient who were not treated for psoriasis by systemic medications showed a higher prevalence of metabolic syndrome when compared to the patients on systemic medications. The occurrence of dyslipidaemia was prevalent among psoriasis patients irrespective of being treated with Ultraviolet-A phototherapy with psoralen PUVA.
The patients on oral retinoids showed an increase in triglycerides and cholesterol and a decrease in HDL with no alteration in LDL in psoriasis patients when compared to controls. \(^6,7\) Type 2 Diabetes mellitus was also prevalent among psoriatic patients. However to consider type 2 diabetes mellitus as a risk factor the evidence is still elusive. \(^7,8\) The cardiovascular disease like myocardial infarction is one of the serious conditions which appears in psoriasis patients due to association with atherosclerosis and thrombosis as co-morbidities of psoriasis. \(^9,10\)

The dramatic presentation of psoriasis due to disfigured skin usually creates the mental trauma among patients and their relatives. Further, as there are lot of myths and beliefs influenced by ignorance, which makes the patient depressed and his relatives to look down on patient. The patient condition becomes more severe if not treated leading to spread of the disfiguration and sometimes the joints gets affected leading to psoriatic arthritis. The available therapies are empirical and the effectiveness cannot be definitive which frustrates the patient. The patients should manage pruritus and the pain in the joints along with psychological trauma and face the stigma of isolation.\(^{11,12}\)
Psychological Comorbidities

The psychological trauma faced by the patient is a major cause for conditions like depression anxiety and stress. Significant higher levels of anxiety and depression are observed among patients who find it difficult to face society and family members who usually think the condition is infectious and isolate the patient from family and society. 13 The isolation and humiliation usually makes the patient more submissive and tries to keep away from the eye of the public as a result of fear of being criticized and mocked. As they are viewed as marginal special population they get a differential treatment, as far as the employment opportunities is concerned, it is worse for female patients and with younger patients as they face the society in a hostile manner as they go for differential treatment.13 The influence of psychiatric comorbidities, explicitly depression, on the humanistic aspect of patients with psoriasis has not been well recorded. The occurrence of a foremost psychiatric disorder was connected with a negative impact on the humanistic aspect of mental wellbeing, societal functioning, and general health observations but not on physical health, or pain. 14
Psoriasis Area Severity Index (PASI)

The therapeutic treatment of psoriasis is mainly guided by the severity of psoriasis which is based on psoriasis area severity index (PASI) score. The PASI score categorizes psoriasis into mild, moderate and severe. The locations of affected area are, the head (h), upper limb (u), trunk (t) and lower limbs (l), are independently recorded by using these parameters namely, erythema, induration and desquamation, each of which is classified on a severity scale of 0 to 4, where 0 = nil, 1 = mild, 2 = moderate, 3 = severe and 4 = very severe. The percentage association can be calculated as: 1 = less than 10% area; 2 = 10-29%; 3 = 30-49%; 4 = 50-69%; 5 = 70-89%; and 6 = more than 90%. The changes in the PASI score are reflective of effectiveness of a particular clinical intervention and an easy way to follow the prognosis of psoriasis. The humanistic outcomes are mainly mirrored by the PASI score hence the humanistic outcome in patients with psoriasis can be assessed using various instruments.
Quality of life (QOL)

The term Quality of life (QOL) if defined or standardized would not be a proper definition, as it is the perception of different individuals on that particular disease or condition. WHO defines QOL as —individuals’ perception of their position in life, in the context of the cultural and value system in which they live and in relation to their goals, expectations, standards and concerns. With the latest advances in therapy for those suffering from psoriasis, the endurance of these patients has been amplified and their humanistic outcome has grown into a significant focus for researchers and clinicians. Patients with psoriasis have to deal with various social problems like social stigma, poverty, depression and cultural beliefs especially in an Indian scenario. These aspects can have a major effect on their QOL in terms of physical, mental and social perspectives which in turn could cause a series of glitches in everyday activities and leisurely aspects of the patients. Evaluating health-related quality of life (HRQOL) will help in the documentation of the burden of chronic disease, subsequent to changes in health over a period of time, evaluating the effects of treatment and calculating the extent of expenditure falling on each individual. There is a need to remove myths regarding psoriasis from the community and the patient as well. Public attitude has to be changed from fear and hatred to sympathetic and sharing, this change in attitude can only happen through continuous education to the family, relatives and friends of these patients. The patients are supposed to be educated thoroughly regarding disease treatments and lifestyles which mend the humanistic aspect for the patients and it will also remove the apprehension and fear from the patient’s mind leading to improvement in QOL of the patients.
The different instruments developed on validity to evaluate QOL are available through various web sources for utilization. The QOL instruments are generally of two types like generic and disease specific. These questionnaires cover varied aspects of a patient’s life like the symptoms, emotional facets, day to day activities, and impact on work, effect on personal relationships and also on the adverse effects of the treatment. The generic questionnaires focus on overall QOL whereas disease specific are designed to evaluate the QOL of patients in a particular condition. The dramatic representation of an uncontrolled psoriasis really affects the social life and employment prospects of the patient, making the patient feel a downtrodden psyche affecting the lifestyle of a patient.

**Treatment in Psoriasis**

The treatment options available include topical steroids, coal tar application, oral methotrexate, retinoids, cyclosporine, UVB phototherapy and photochemotherapy (PUVA). The topical agents are commonly used for mild condition. While phototherapy and methotrexate can be used for moderate and severe disease and biological agents are used for severe disease but are considered as last resort in this hospital set up. Although the PASI scores give an idea regarding the status of disease, when it comes to treatment physicians face a daunting task of convincing patients regarding the cost of illness to the patients from time to time which may fluctuate, during the course of the disease.
Psoralen photochemotherapy (PUVA) is the combined use of psoralens (P) and long-wave UV radiation (UVA) and this combination produces a therapeutic response which is not attained when used as a solitary agent. A phototoxic reaction is induced which helps in the remission of the disease.\textsuperscript{19} Psoralens are a group of phototoxic compounds that can interact with various components of cells and then absorb photons to produce photochemical reaction that alter the function of the cellular constituents.\textsuperscript{20} Parrisch et al. (1974), developed a powerful source of UVA and utilized it after 8 MOP (Methoxsalen) administration in the treatment of psoriasis and coined the term PUVA. In 1982, the Food and Drug Administration (FDA) approved the use of PUVA treatment in the management of severe psoriasis.\textsuperscript{21} Further the phototherapy is supplemented with topical treatment. The bath PUVA therapy is given intermittently depending on the PASI score and the symptoms visible on the skin. Srinivas et al have recommended a starting dose of $4 - 6 \text{ J/cm}^2$ with increments of $0.5 \text{ J/cm}^2$ depending on response. The maximum dose suggested is $18 \text{ J/cm}^2$. The treatment is given 3 to 4 times per week.\textsuperscript{13} In systemic treatment immunosuppressant like methotrexate are administered per oral on a dosing schedule of weekly once. The patients on methotrexate are given folic acid after two days.
Pharmacoeconomics

Though psoriasis is commonly considered as a non-life threatening disease this disease has a significant social and financial burden from the point of view of the patient and also the health infrastructure. Due to the persistent features of this disease it has been observed that psoriasis will require a lifelong treatment and care which will impact the patient with a lifelong financial burden. Also due to the availability of many treatment options there is a necessity to identify the aspects and analyse the extent of morbidity and mortality that chronic disease like psoriasis can cause to an individual. To this end the help of pharmacoeconomics was taken which will help in the major decision making pertaining to the use of medicines.

Cost of illness

Cost of illness comprises of a series of aspects of a particular disease and its impact on health outcomes pertaining to that country, community and that hospital set up. This method of analysis is usually applied to analyze the incidence, prevalence, the longevity that can be obtained in a particular disease, the extent of morbidity, the impact of the disease on the quality of life of that particular disease and in turn its effect on the financial front like the direct and indirect cost from death, grievance or debility due to the disease in question and all the comorbidities associated with it.
It should be noted that cost of illness studies serves a different purpose than other health economic evaluations (e.g. CEA, CBA) which are focused on evaluating the costs of interventions rather than estimating the cost of a particular disease. Furthermore it can be a good basis for further CEA or CBA. The disease burden or cost of disease analysis is the most commonly used health policy analysis method. It always presumes the hypothesis that the emerging cost is the expenditure that resurfaces as profit in case of a positive result. With these data we can inform pharmaceutical reimbursement decisions.

Scarcity of resources forces us to choose; a situation arises where we must decide which interventions to finance. During cost calculation, we take into account all the identified changes in resources, their measurement and definition of value that will be used.

**Cost effectiveness Analysis**

It is one of the pharmacoeconomics analysis that is used to compare the relative costs to the outcomes of two or more course of action. This analysis helps to monetise the benefits that can be achieved. It helps in highlighting the interventions that are relatively cheaper when compared to the available options. It can also help in identifying ways that can redirect the available resources in a more cost effective manner. It is not the defining criterion but it will be one of the significant ones that will help in the proper allocation of the various resources that are available. It compares the interventions only in terms of their efficiency at improving health.
Cost-effectiveness analysis also requires comparable units for measuring costs. For domestic studies, the cost units in domestic currency will have a clear meaning. In majority of the analyses that are done, the researchers multiply regional unit prices by the estimated quantities of inputs required for each intervention and then divide them by the estimated health effect to derive the cost-effectiveness ratios. In cases where they could not find disaggregated information on inputs but some cost-effectiveness measures were reported, they usually make extrapolations and suggest the expected outcome.23 In some cases, input ratios were available for one region and the researchers can extrapolate these to other regions. It basically offers facts about the costs of improving health by means of a particular intervention. As with any investment decision, the price of something is an important, but not the only, consideration. However, without information about price, decision makers cannot see the trade-offs involved in addressing other concerns.
Decision Analytic Modelling

Decision analytic modelling synthesizes evidence on health consequences and costs, (usually of alternative and mutually exclusive healthcare strategies) and informs health care budget decision makers about resource allocations. However, the purpose of such models is not to make unconditional claims, but rather to serve as an aid to decision makers and reveal relationships between assumption and outcomes. Decision analysis is a mathematical model that incorporates a systematic and quantitative approach to decision making under conditions of uncertainty. The framework for decision analysis is based on research by von Neumann and Morgenstern, known as the theory of expected utility. The premise of this theory is that rational decision makers would choose an option that maximizes their expected utility. However, given the abundance or complexity of information, the ability of decision makers to process and arrive at a rational decision may be subject to bias. The structured approach afforded by decision analysis model enables the decision to be based on a more extensive range of data and a formal synthesis of the information; thereby supplementing reasoning abilities and reducing bias.
This study is set out to demonstrate how to achieve an objective with the least use of resources. To implement this into a chronic disease like psoriasis, pharmacoeconomic analyses like cost of illness and cost effectiveness analysis are being used to analyse the data obtained. The perspective of a pharmacoeconomic evaluation is paramount because the study results will be highly dependent on the perspective selected. The Healthcare costs can be categorized as direct medical, direct nonmedical, indirect nonmedical, intangible, opportunity, and incremental costs. In this study we consider economic, humanistic, and clinical outcomes using pharmacoeconomic methods, to inform local decision making whenever possible.