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AN APPROACH FOR THE TREATMENT OF PSORIASIS: PHARMACOLOGICAL & NON-PHARMACOLOGICAL THERAPY

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***Abstract*— Psoriasis is non-pandemic contamination and having a repulsive skin issue, which can likewise incorporate an entire arrangement of the individual. It is long-lasting running auto-immune sicknesses that were described by white to red shading patches of unusual skin with the patches of flaky and irritated. They were shed pre-maturely in as little as 7 days to 10 days. Commonly involved sites for the psoriasis are the sacral region, upper back, scalp, gluteus, umbilicus, underneath the privates and bosoms, shins and sacrum, and the extensor surfaces of furthest points, particularly on the knees and elbows, palms, fingers and toes, soles. The common symptoms of psoriasis are dry skin, painful swollen joints, depression, signs of pustular psoriasis, itching, and burning sensation, and genital lesions, etc. The lesion can be seen as a pink to salmon– color plaque which is covered by loose adheres of silver-white scale. There is also an epidermal thickening (which is also called as acanthosis), and it is in the regular downward elongation of rete ridges. These kinds of changes predominantly happen at the time development progress of keratinocytes which are instigated by inflammatory messengers which influence three subtypes of WBC. These inflammatory messengers help in the incitement of the keratinocytes and hence it causes transformations of qualities that are associated with the skin capacities for development or the advancement of psoriasis. Major of treatment for psoriasis are set to the standardization of skin just as decrease or freeing from the plaques, papules, and erythema, and furthermore scales.**

Keywords— **Psoriasis, Keratinocytes PASI, Pharmacological Therapy, Non-Pharmacological Therapy**

I. INTRODUCTION

The term psoriasis was gotten from the Greek word "psora" which signifies "tingle" [1]. It's a long-lasting running auto-immune ailment that was described by white to red shading patches of anomalous skin with the patches of flaky and irritated [2]. Psoriasis is a non-pandemic disease and having a terrible skin issue, which can likewise incorporate an entire arrangement of the individual [3]. On account of psoriasis, the keratinocytes were separated and it moved more quickly than the typical from layer basale to layer corneum. They were shed pre-maturely in 7 days to 10 days. At that point, the youthful keratinocytes were work to make unusual keratin, which structures flaky, shimmering scales at the outside of the skin, for the most part, happened on the elbows, scalp (dandruff), and knees [4].

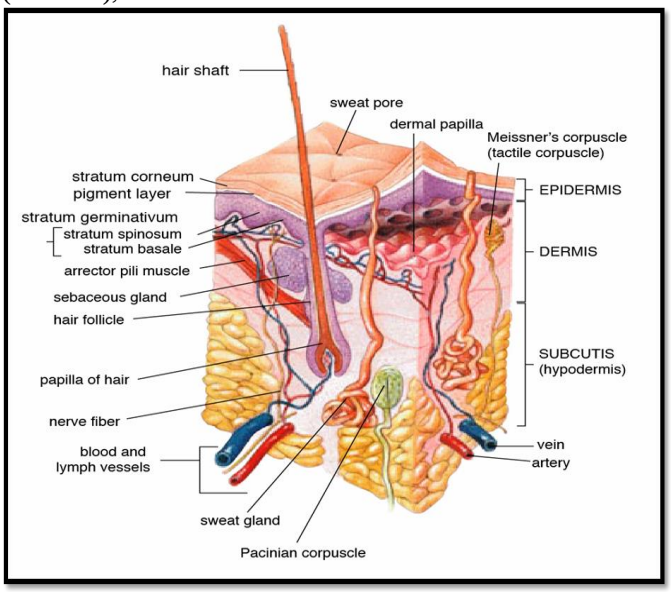

Fig 1. The Layers of Skin [5]

It was described by intermittent intensifications and the abatements of thickened, erythematous, and furthermore with the scaling plaques. The typical introduction is with all around outlined red-shaded plaques with an overlying scale [6]. Psoriasis is a particularly basic condition, particularly to the age gathering of 15 to 40 years. Ordinarily included sites for the psoriasis are the sacral region, upper back, scalp, gluteus, umbilicus, underneath the private parts and bosoms, shins and sacrum and the extensor surfaces of furthest points, particularly on the knees and elbows, palms, fingers, and toes, soles [7].

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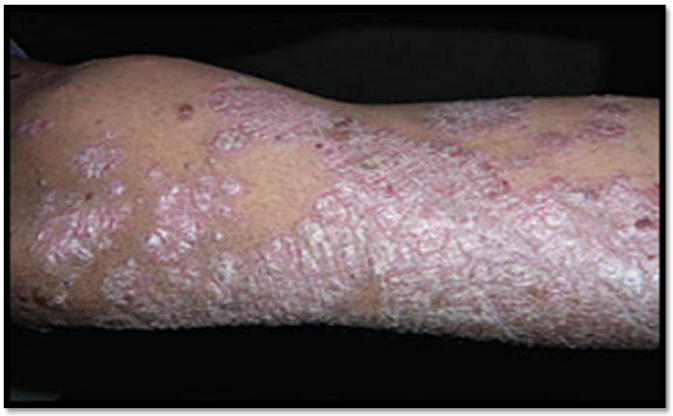

Fig 2. Chronic Plaque Psoriasis [8]

Triggering elements that are to prompt the condition is to incorporate injury, disease, and furthermore burn from the sun. In about 25% of cases, peculiar pitting of nails was seen. Psoriatic arthritis resembling rheumatoid arthritis was produced in about 5% of cases but their rheumatoid factor is absent [9].

II. ETIOLOGY

Psoriasis is a multi-factorial and complex sickness having collaboration between ecological variables (like exogenous or endogenous antigens) with the particular hereditary foundation (like human leukocyte antigen [HLA] types). In a number of cases, it was observed that there is a genetic predisposition and almost 70 percent of patients report that they are having psoriasis cases in their family [10]. The irritation and enhanced spread of skin cells which prompts the particular clinical sort of scaling and redness. It might likewise deliver contaminations, for example, strep throat of skin diseases and so forth [11]. Psoriasis can likewise be because of insects bite, smoking, heavy alcohol consumption, severe sunburns, stress, cold weather, and diet [12].

III. SYMPTOMS OF PSORIASIS

The common symptoms of psoriasis are:-

- Dry skin
- Painful swollen joints
- Depression
- Signs of pustular psoriasis
- Itching and burning sensation
- Genital lesions etc [13].

Due to the psoriasis disease, the standards of life were impaired significantly. Due to this disease the patients are also facing a mental illness like depression, outrage, stress and they face a few issues in everyday exercises. The one, who is suffering from psoriasis, they have to face a lot of things like social discrimination and the psychologically devastation. [14].

IV. MORPHOLOGY

The lesion can be seen as a pink to salmon– color plaque which is covered by loose adheres of silver-white scale. There is also an epidermal thickening (which is also called as acanthosis), and it is in the regular downward elongation of rete ridges [15].

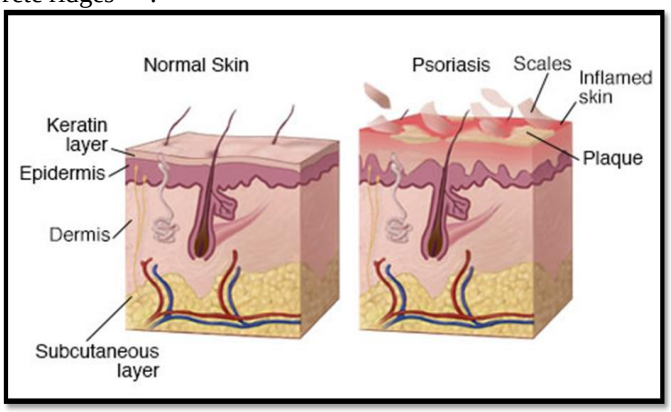

Fig 3. T.S of Skin (Normal vs Psoriasis) [16]

V. MECHANISM

IMMUNOPATHOGENIC PATHWAY

The Psoriasis sicknesses were portrayed as a strange, insignificant, and exceptional advancement of the epidermal layer [17]. The skin cells which were harmed at the time of wound fix and furthermore an overabundance of skin cells coming about because of the neurotic occasions in psoriasis [18]. These sorts of changes for the most part happen at the time advancement progress of keratinocytes which are incited by inflammatory messengers which influence three subtypes of WBC [19]. These inflammatory messengers help in the incitement of the keratinocytes [20] and consequently, it causes changes of qualities which are associated with the skin capacities for development or the advancement of psoriasis [21]. The cells which are dying will discharge the DNA which fills in as an inflammatory messenger in psoriasis infection and it elevates the receptors to help in the arrivals of the interferon [22]. Keratinocytes other than radiate cytokines like interleukin 1, interleukin 6, and furthermore the tumor rot factor (TNF) α, which helps in the creation of the irritation [23].

IMMUNOLOGIC PATHWAY

Recently, much consideration has been coordinated to a cell-mediated immune pathway in psoriasis. Te main role behind the initiated T cell has been exhibited by the reaction to drugs that block T-cell activation, migration, or cytokine emission in psoriasis. There are two T-cell signals which are mediated by antigen-presenting cells (APC) and *via* cell-cell interactions by surface proteins are required for the activation of cutaneous inflammatory T-cell–mediated immune such as dendritic cells or macrophages. The "principal signal" is the communication of the T-cell receptor with antigen introduced by the APC. The

"second signal," additionally called costimulation, is intervened through different surface collaborations. The two signs are fundamental for the underlying actuation of T cells in psoriasis. When T cell is actuated, they relocate from lymph hubs and the flow into the skin. The explicit cell surface of proteins on T cells and vascular endothelium include selectins, integrins, and other attachment molecules in this development. The best-comprehended cell connection is the connection between LFA-1 on T cells and intercellular attachment molecule-1 on endothelial cells. Once in the skin, actuated T cells discharge different cytokines that incite the pathologic changes of psoriasis. Cytokines are proteins emitted by resistant cells that quandary to quite certain receptors on the cell surface, impacting keratinocytes, and different cells to create pathologic changes normal for psoriasis [10].

VI. Clinical Types of Psoriasis

PSORIASIS VULGARIS

It is the most regular variation for psoriasis. It can occur at any phase yet for the most part happened toward the start of youthful adulthood. The ordinary psoriatic injury is in red and forcefully differentiated plaque having an overlying silvery scale. Its dissemination is typically balanced and incorporate extensor locales, for example, the knees and elbows [12].

GUTTATE PSORIASIS

It is all the more effectively being found in kids and youthful grown-ups. Guttate psoriasis is appearing to be a broad textured emission of a little 'tear like' flaky plaque. It can seem 10–14 days after the streptococcal upper respiratory tract disease. For the medicines we by and large go for the topical or UVB phototherapies which are generally compelling [24].

SCALP PSORIASIS

It is all the more effectively being found in youthful grown-ups just as in the mature age individuals. Scalp psoriasis shows up as flaky outlined plaques that stretching out to the hairline and furthermore around the ears. Male pattern baldness is very uncommon [12].

PSORIATIC NAIL DISEASE

In psoriasis, the nails were much of the time getting influenced. A few patients were accounted for as their nails are the main territory that was influenced. Changes incorporate nail ridging, nail pitting, onycholysis (which means segment from the nail bed of nail), and complete nail decimation just as hyperkeratosis under the nail. Topical medicines are less compelling for psoriatic nail sickness [25].

PALMOPLANTAR PSORIASIS

At the palms and soles sites, you will see a sharp outline on the included areas. Palmoplantar psoriasis is of two structures: the principal structure is excited hyperkeratotic fissured skin in which it tends to be difficult or sterile pustules on the erythematous base which can dry to leave the little earthy colored macules (palmoplantar pustulosis). The pustular structure is a very normal person in smokers [26].

FLEXURAL PSORIASIS

It can occur at flexural destinations like submammary areas, groin, axillae, and genitalia. As a result of the grating and furthermore, because of dampness inside the skin folds, sores vary will show up from traditional psoriasis and it will in general be red and coated rather than the textured. Influenced regions of psoriasis will in general be clearly demarcated [25].

PSORIATIC ARTHROPATHY

Roughly 25percent of patients were experiencing a related arthropathy. There are five examples of the psoriatic arthropathy and they are rheumatoid joint pain like, osteoarthritis-like, monoarthopathy, sacroiliitis-like, and joint inflammation mutilans. The rheumatoid consider will be negative these kinds of patients. A few medicines were compelling for skin psoriasis is methotrexate and some natural specialists with activity against TNFα [12].

VII. Diagnosis

The analysis of psoriasis is genuinely founded on the idea of the skin. Judgments were trailed by clinical assessment [27]. Still, there is no precise tests are accessible to analyze psoriasis, now and again biopsy was done to separate it from the contagious contamination [28]. Psoriasis finding incorporates the investigations of the dermatological conditions like discoid skin inflammation, seborrhoeic dermatitis, pityriasis rosea nail growth, or cutaneous T cell lymphoma additionally dermatologic indications of foundational diseases with psoriasis [29].

VIII. Treatment

Basic treatment for psoriasis is set to the standardization of skin just as decrease or freeing from the erythema, papules, and plaques, and furthermore scales. Decrease or the freeing from the skin appears as the treatment target which prompts standardized cosmesis [25].

“PASI - Psoriasis Area and Severity Index”:- Determine the amount of body surface which are area affected, along with the degree of erythema, induration, and scaling. PASI combines the assessment of the severity of lesions and the area affected into a single score in the range 0 (no disease) to 72 (maximal disease).

The National Psoriasis Foundation advocates that if the PASI 50 (50% decrease from baseline) that's means it showing the clinically relevant endpoint when it's been assessing the efficacy of treatment [30].

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Plaque characteristic	Lesion score	Head	Upper Limbs	Trunk	Lower Limbs
Erythema	0 = None 1 = Slight 2 = Moderate 3 = Severe 4 = Very severe				
Induration/Thickness					
Scaling					
Add together each of the 3 scores for each body region to give 4 separate sums (A).					
Lesion Score Sum (A)					

Percentage area affected	Area score	Head	Upper Limbs	Trunk	Lower Limbs
Area Score (B) *Degree of involvement as a percentage for each body region affected (score each region with score between 0-6)*	0 = 0% 1 = 1% - 9% 2 = 10% - 29% 3 = 30% - 49% 4 = 50% - 69% 5 = 70% - 89% 6 = 90% - 100%				
Multiply Lesion Score Sum (A) by Area Score (B), for each body region, to give 4 individual subtotals (C).					
Subtotals (C)					
Multiply each of the Subtotals (C) by amount of body surface area represented by that region, i.e. x 0.1 for head, x 0.2 for upper body, x 0.3 for trunk, and x 0.4 for lower limbs.					
Body Surface Area		**x 0.1**	**x 0.2**	**x 0.3**	**x 0.4**
Totals (D)					
Add together each of the scores for each body region to give the final PASI Score.					

Fig 4. Method to calculate PASI - Psoriasis Area and Severity Index [31]

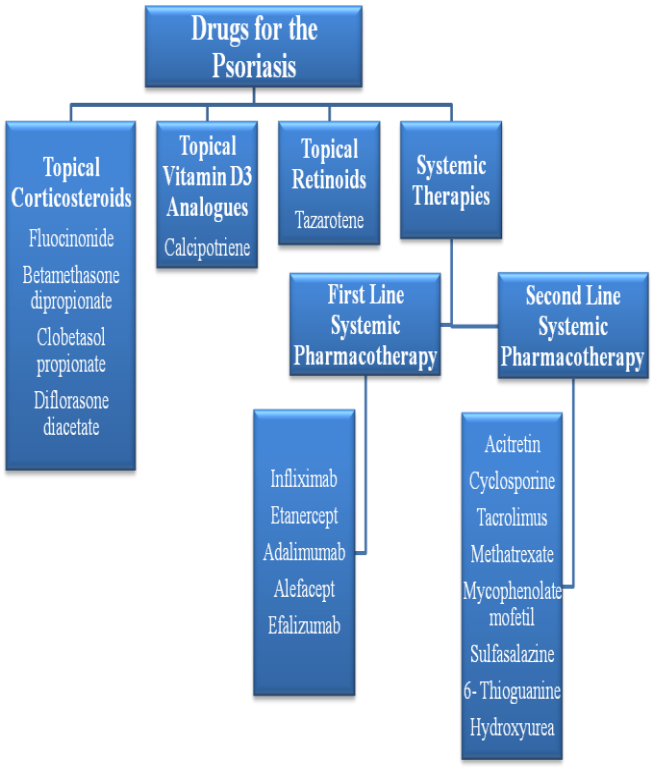

Fig 5. Classification of Anti-Psoriatic Agents [32]

PHARMACOLOGIC THERAPY

1. **Topical therapy:** Keratolytics, Coal tar, Corticosteroids, Anthralin, Vitamin D analogues (calcipotriene and calcitriol), Tazarotene, Immunomodulators (tacrolimus and pimecrolimus)

2. **Systemic therapy:** Methotrexate, Mycophenolate mofetil, Tacrolimus, Sulfasalazine, 6-Thioguanine, Hydroxyurea, Cyclosporine, Acitretin.

3. **Biologic therapy:** Infliximab, Etanercept, Alefacept, Efalizumab, Photochemotherapy, PUVA [10]

MECHANISM OF ACTION OF DRUGS

1. **Topical Treatment**

1.1. **Topical Corticosteroids**

Mitosis and halt synthesis of DNA in epidermal cells and seem to restrain phospholipase A, bringing down the measures of arachidonic corrosive, prostaglandins, and leukotrienes in the skin.

1.2. **Topical Vitamin D3 Analogues**

- Inhibit keratinocyte separation and expansion and have a mitigating impact by diminishing IL-8, IL-2.
- Topical retinoids hydrolyzed to its dynamic metabolites, tazarotenic corrosive, which tweaks keratinocyte expansion and furthermore the separation.

2. **Systemic Therapy**

2.1. **First – Line Systemic Pharmacotherapy**

- Infliximab- Chimeric monoclonal antibody directed against TNF – α
- Etanercept- Combination protein that ties TNF – α, seriously meddling with its communication with cell-bound receptors.

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- Adalimumab- Human immunoglobulin G1 monoclonal TNF-α immunizer. The initiation of the proinflammatory cytokine TNF-α brings the authoritative of Adalimumab.
- Alefacept- Combination protein which is going to ties CD2 on Lymphocytes actuation and expansion.
- Efalizumab- Acculturated monoclonal immune response that restrains CD11-α integrin, which is engaged with Lymphocytes actuation, the relocation into the skin, and cytotoxic capacity.

2.2. **Second – Line Systemic Pharmacotherapy**

- Acitretin- It a retinoic corrosive subordinate and the dynamic metabolite of etretinate.
- Cyclosporine- It shows the immune-suppressive action as through by the inhabitation of the 1 period of the T cell actuation. It additionally restrains the arrival of fiery arbiters from mast cells, basophils, and polymorphonuclear cells.
- Tacrolimus- Immunosuppressants that inhibits T-cell activation.
- Methotrexate- An anti-metabolite, is a folic acid analog which is responsible for the competitive inhibition of the dihydrofolate reductase
- Mycophenolate- Inhibits DNA and RNA synthesis. [32]

NONPHARMACOLOGIC THERAPY

Emollients: Emollients are commonly utilized during the treatment of free periods to limit the skin dryness that may prompt early repeat [25]. These are hydrated layer corneum and to limit cutaneous transepidermal water loss. Hydration makes the layer corneum swell and levels the surface form. Emollients are viable as lotions decline restricting powers inside the layer, improve desquamation, and dispose of scaling.

Balneotherapy: Balneotherapy (and climatotherapy) is additionally a restorative methodology including washing in water and containing a few salts, regularly joined with a common introduction to the sun. The Kangal Natural aquifer in Turkey and the Blue Tidal pond in Iceland are likewise outstanding salt waters. The salts in these waters are a blend of salts that diminish the dynamic T cells in the skin and are a transmission for psoriasis. A diminishing in serum manganese and lithium levels is huge in the wake of washing with dead ocean salts, and impact accepted to be identified with the viability of the salts [10].

Ultraviolet B Phototherapy: Ultraviolet B (UVB) light (290 to 320 nm) is significant phototherapeutic mediation for the sickness of psoriasis. Presentation to UV light by common daylight has been utilized to reward psoriasis for a considerable length of time. The best frequency of UVB for the treatment of psoriasis is 310 to 315 nm, and it additionally prompted the improvement of an Ultraviolet B "narrow-band" (NB) light source, in which 83% of the UVB discharge is at 310 to 313 nm [10, 23].

Excimer Laser Phototherapy: Most laser treatment has been incapable, while excimer lasers, which create a 308-nm UVB frequency, have some viability at clearing psoriasis and initiating tolerably delayed reductions. Shockingly, this way to deal with treatment is constrained to the treatment of the individual, segregated plaques. The excimer laser has a few favorable circumstances over customary NB-UVB phototherapy, including the ability to effectively treat psoriatic plaques with fewer medicines and with a littler UV radiation portion. In addition, it might have a lower danger of cancer-causing nature and photoaging [23, 33].

Combinational Therapy: This treatment of fundamental operators alongside the other alteration may improve a helpful advantage. Also, the portion of every specialist may frequently be decreased when utilized in a mix that may bring about lower harmfulness [34].

Mixes may include:

- Acitretin + photochemotherapy using ultraviolet A
- Acitretin + UVB
- Methotrexate + UVB
- Methotrexate + cyclosporine
- PUVA + UVB [10, 33]

Now in mixed treatment, biologic specialists are presently ordinarily being utilized in rotational treatment. Patients may get a biologic routine for a shorter period and then they were exchanged for the nonbiologic routine, proceeding on a rotational premise. One target of rotational treatment is to limit aggregate medication poisonousness [10].

IX. CONCLUSION

The term psoriasis was gotten from the Greek word "psora" which signifies "tingle". On account of psoriasis, the keratinocytes were partitioned and it moved more quickly than the ordinary from layer basale to layer corneum. They were shed pre-maturely to mature in 7 days to 10 days. At that point, the immature keratinocytes were work to make strange keratin, which structures flaky, gleaming scales at the outside of the skin, for the most part, happened on the elbows, scalp (dandruff), and knees. In about 25% of cases, particular pitting of nails was seen. Psoriatic joint inflammation looking like rheumatoid joint pain was created in about 5% of cases yet their rheumatoid factor is missing. In this illness, the

biochemical substances which are ordinarily answerable for the composed blast and furthermore in the progressing of epidermal cells get impeded. In this way, it causes the aggravation and enhanced proliferation of skin cells which prompts the particular clinical sort of scaling and red patches of skin. Monozygotic twins will have a higher concordance for psoriasis as opposed to dizygotic twins. Psoriasis finding incorporates the investigations of the dermatological conditions like discoid dermatitis, seborrhoeic skin inflammation, pityriasis rosea nail organism, or cutaneous T cell lymphoma additionally dermatologic indications of foundational ailments with psoriasis. Psoriasis can be treated as with two methods i.e; Pharmacologic therapy which includes the different drugs and the other one is Non-Pharmacologic therapy which includes emollients, Balneotherapy, and laser technique. Whereas, when we go in a combination of it, the affinity increased towards psoriasis.

X. REFERENCE

[1] Christophers E. (2001). Psoriasis- epidmology and clinical spectrum. Clinical and Experimental Dermatology, Vol. 26, (pp. 314-20).
[2] Menter A, Gottlieb A, Feldman SR, Van Voorhees AS, Leonardi CL, Gordon KB. (2008). Guidelines of Care for the Management of Psoriasis and Psoriatic Arthritis: Section 1. Overview of Psoriasis and Guidelines of Care for the Treatment of Psoriasis with Biologics. Journal of the American Academy of Dermatology, Vol. 58, (pp. 826-50).
[3] Shrivastav S, Sindhu R, Kumar S, Kumar P. (2009). Anti-Psoriatic and Phytochemical Evaluation of Thespesia Populnea Bark Extracts. International Journal of Pharmacy and Pharmaceutical Science, Vol. 1, (pp. 176-85).
[4] Tortora GJ, Derrickson B. (2012). Principles of Anatomy & Physiology. 13th ed. USA: John Wiley & Sons, Inc, (pp. 158).
[5] https://en.wikipedia.org/wiki/Human_skin on 25/05/20.
[6] Griffiths CE, Barker JN. (2007). Pathogenesis and Clinical Features of Psoriasis. The Lancet, Vol. 370, (pp. 263-71).
[7] Mohan H, Mohan P, Mohan T, Mohan S. (2010). Textbook of Pathology. 6th ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd, (pp. 778).
[8] https://www.aafp.org/afp/2007/0415/p1235.html on 25/05/2020.
[9] Waugh A, Grant A. (2001). Ross and Wilson: Anatomy and Physiology in Health and Illness. 9th ed. Edinburgh: Churchill Livingstone, (pp. 369).
[10] DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. (2005). Pharmacotherapy: A Pathophysiologic Approach. 6th ed. London: The McGraw-Hill Companies; (pp. 1769-81).
[11] Cherukuri S, Vuppalapati L, Narayanan V, Paramanayakam A, Balaraman S. (2018). Current Trends in Treatment and Management of Psoriasis: An Updated Review. International Research Journal Of Pharmacy. Vol. 9, No. 3, (pp. 6-16).
[12] Walker R, Whittlesea C. (2012). Clinical Pharmacy and Therapeutics. 5th ed. Edinburgh: Churchill Living Stone Elsevier, (pp. 898-904).
[13] Fujii R, Mould J, Tang B, Brandt H, Pomerantz D, Chapnick J. (2012). PSY46 Burden of Disease in Patients With Diagnosed Psoriasis in Brazil: Results From 2011 National Health and Wellness Survey (NHWS). Value in Health. Vol. 15, (pp. A107).
[14] Sampogna F, Tabolli S, Abeni D. (2012). Living with psoriasis: prevalence of shame, anger, worry, and problems in daily activities and social life. Acta Derm Venereol, Vol. 92, No. 3, (pp. 299-303).
[15] Kumar V, Abbas AK, Aster JC, (2013). Robbins SL. Robbins's Basic Pathology. 9th ed. Canada: Elsevier Saunders, (pp. 854).
[16] https://beckyb.com.au/2018/10/psoriasis-i-think-ive-got-it-but-im-not-sure on 25/05/2019.
[17] Sachappert S. (1998). Ambulatory Care Visits to Physician Offices, Hospital Outpatient Departments and Emergency Departments: United States 1996. National Center for Health Statistics. Vital Health Statistics, Vol. 13, (pp. 1-37).
[18] Ouyang W. (2010). Distinct Roles of IL-22 in Human Psoriasis and Inflammatory Bowel Disease. Cytokine & Growth Factor Reviews, Vol. 21, (pp. 435-41).
[19] Palfreeman AC, McNamee KE, McCann FE. (2013). New Developments in the Management of Psoriasis and Psoriatic Arthritis: A Focus on Apremilast. Drug Design, Development and Therapy, Vol. 7, (pp. 201).
[20] Baliwag J, Barnes DH, Johnston A. (2015). Cytokines in Psoriasis. Cytokine, Vol. 73, No. 2, (pp. 342-50).
[21] Roberson ED, Bowcock AM. (2010). Psoriasis Genetics: Breaking the Barrier. Trends in Genetics, Vol. 26, (pp. 415-23).
[22] Dombrowski Y, Schauber J. (2012). Cathelicidin LL-37: A Defense Molecule with a Potential Role in Psoriasis Pathogenesis. Experimental Dermatology, Vol. 21, (pp. 327-30).
[23] Duarte I, Cunha JAJd, Bedrikow RB, Lazzarini R. (2009). What is the most Common Phototherapy Prescription for Psoriasis: NBUVB or PUVA. Prescription behavior. Anais Brasileiros De Dermatologia, Vol. 84, (pp. 244-8).
[24] O'Doherty CJ, Macintyre C. (1985). Palmoplantar Pustulosis and Smoking. British Medical Journal (Clinical Research Ed), Vol. 291, (pp. 861-4).

[25] Cherukuri S, Vuppalapati L, Narayanan V, Paramanayakam A, Balaraman S. (2018). Current Trends in Treatment and Management of Psoriasis: An Updated Review. International Research Journal Of Pharmacy, Vol. 9, No. 3, (pp. 6-16).
[26] Asumalahti K, Ameen M, Suomela S, Hagforsen E, Michaelsson G, Evans J, et al., (2003). Genetic Analysis of PSORS1 Distinguishes Guttate Psoriasis and Palmoplantar Pustulosis. Journal of Investigative Dermatology, Vol. 120, (pp. 627-32).
[27] Weigle, N, Duke, M. (2013). Psoriasis. American Family Physician, Vol. 87, (pp. 626-33).
[28] Johnson MAN, Armstrong AW. (2013). Clinical and Histologic Diagnostic Guidelines for Psoriasis: A Critical Review. Clinical Reviews in Allergy & Immunology, Vol. 44, (pp. 166-72).
[29] Mease PJ, Armstrong AW. (2014). Managing Patients with Psoriatic Disease: The Diagnosis and Pharmacologic Treatment of Psoriatic Arthritis in Patients with Psoriasis. Drugs, Vol. 74, (pp. 423-41).
[30] Dutta S, Chawla S, Kumar S. (2018). Psoriasis: A Review of Existing Therapies and Recent Advances in Treatment. J Rational Pharmacother Res, Vol. 4, No. 1, (pp. 12-23).
[31] http://www.bad.org.uk/shared/get-file.ashx?id=1654&itemtype=document on 25/05/2020.
[32] Shankar KR, Kiranmayi GVN. (2016). Pharmacology: A Companion Handbook with Illustrations. 1st ed. Hyderabad: PharmaMed Press, (pp. 406-09).
[33] Lapolla W, Yentzer BA, Bagel J, Halvorson CR, Feldman SR. (2011). A Review of Phototherapy Protocols for Psoriasis Treatment. Journal of the American Academy of Dermatology, Vol. 64, (pp. 936-49.
[34] Koo JY. (1999). Current Consensus and Update on Psoriasis Therapy: A Perspective from the US. The Journal of Dermatology, Vol. 26, (pp. 723-33).