

Psoriasis: Latest Trends in Treatment, Diagnosis and Management in Medical Science

Dutta Amit Kumar^{1,*}, Kumari Ritu²

Abstract

Psoriasis is a common chronic inflammatory and autoimmune skin disease that primarily affects the skin. It affects about 2–4% of the world populations. It is clinically characterized by skin rashes, highly inflamed red scale itchy plaque. Abundant therapeutic agents are accessible for the treatment of psoriasis. Wide range of therapeutic mediators such as coal tar, topical corticosteroids, anthralin, retinoid, calcineurin inhibitors, methotrexate, cyclosporine are proven to be effective in treating mild to severe psoriasis. Psoriasis is a lifelong disease and the management, diagnosis and treatment of psoriasis depends on the severity of the disease. Topical therapy is first line treatment of psoriasis management as it has many advantages. For severe conditions, systemic treatment and phototherapy is indicated.

Keywords: Psoriasis, common types, epidemiology, causes, factors, latest treatment

INTRODUCTION

The word “psora” comes from Greek word which means “to itch”. Psoriasis is a chronic inflammatory and autoimmune skin disease affecting 2–4% of total population worldwide. It is clinically characterized by highly inflamed red erythematous plaques supported by silvery scales [1]. The main chemical features of psoriasis are an erythematous and scaly skin lesion which is generally located in the joints (elbows, knees), lower back, scalp, and also spread to the forehead, back of neck, or behind ears, chest and arms. Psoriasis cannot be passed from one person to another. It does sometimes happen in the members of same family [2]. It affects males and females equally and also affects the children, adult, elderly and may occur at any age of life. Psoriasis is a life-long disease. The management and treatment of psoriasis are different depending on the severity of the disease. The first line of active treatments for the management of mild-to-moderate psoriasis is the use of topical agents. For a severe condition, systemic treatment or phototherapy is indicated [3].

*Author for Correspondence

Dutta Amit Kumar

¹Associate Professor, Department of Cancer Cytogenetics, Amity Institute of Biotechnology, Amity University, Ranchi, Jharkhand, India

²Lab Assistant, Department of Cancer Cytogenetics, Amity Institute of Biotechnology, Amity University, Ranchi, Jharkhand, India

Received Date: July 10, 2021

Accepted Date: August 09, 2021

Published Date: August 30, 2021

Citation: Dutta Amit Kumar, Kumari Ritu. Psoriasis: Latest Trends in Treatment, Diagnosis and Management in Medical Science. Research & Reviews: A Journal of Biotechnology. 2021; 11(2): 24–32p.

TYPES OF PSORIASIS

Plaque Psoriasis (Common Type)

Plaque psoriasis is the most common form of psoriasis; about 80–90% cases belong to those who have psoriasis (Figure 1). The main symptoms of plaque psoriasis are raised, inflamed red skin cover with silvery, white scales; these patches may itch and burn, and it can appear anywhere on the body. Basically elbows, knees, scalp and lower back areas are affected [4].

Guttate Psoriasis

Guttate is derived from the Greek word ‘gutta’ meaning a droplet. It is defined by sensitive inception of countless, tiny 2–10 mm diameter lesions of psoriasis. It is usually triggered by a



Figure 1. Affected Areas of Plaque Psoriasis.



Figure 2. Affected Areas of Guttate Psoriasis.

bacterial infection such as Streptococcal, throat infections. It affects childhood, young and adulthood, and affect about 18% of those who have guttate psoriasis as mentioned in Figure 2. The main symptoms of guttate psoriasis are patchy skin that are bright red, smooth, and shiny, but do not have scales; most of the cases get worse with sweating and rubbing. The affected areas include chest, arms and legs [5].

Inverse Psoriasis

It is also known as flexural psoriasis. The lesion in flexural psoriasis is visibly demarcated by pink lesions that lack scales. Flexural psoriasis is expressed by sweat and roughness and there is a risk of minor infections. The main symptoms included irritation from rubbing and sweating, yeast, fungal, and bacterial infections which can be seen in Figure 3. Affected areas include armpits, the skin folds around genitals and between buttocks and in few cases under breasts and groin [6].

Pustular Psoriasis

This type of psoriasis is uncommon and mostly appears in adults. It causes pus-filled bumps (pustules) surrounded by red skin. These may look like infections but are not and less than 5% of people have this type of psoriasis. The symptoms include fever, chills, nausea, fast heart rate and muscle weakness. Affected areas are basically hands, feet and sometimes it covers most of the body which is mentioned in Figure 4 [7].

Erythrodermic Psoriasis

This type of psoriasis is the least common type of psoriasis, but it is very serious and affects most of the body surface. It causes widespread, fiery skin that appears to be burned. One common example is mentioned in Figure 5. The main symptoms include severe itching, burning, or peeling, a faster heart rate and changes in body temperature [8].

Nail Psoriasis

Up to half of those with psoriasis have nail changes. Nail psoriasis is even more common among people who have psoriasis; about 50–80% of them have this type of psoriasis. The main symptoms include pitting of nails, tender painful nails, color changes (yellow-brown) and separation of nail from the bed as mentioned in Figure 6. Toe, nails and fingernails are the mostly affected parts in nail psoriasis [9].

Psoriatic Arthritis

Psoriatic arthritis is a form of arthritis that affects some people who have psoriasis—a condition that features red patches of skin topped with silvery scales. Most people develop psoriasis first and are later diagnosed with psoriatic arthritis, but the joint problems can sometimes begin before skin patches appear. Main symptoms include painful, stiff joints that are worse in the morning and after rest, sausage-like swelling on the fingers and toes. Warm joints may be discoloured as shown in Figure 7.



Figure 3. Affected Areas of Inverse Psoriasis.



Figure 4. Affected Areas of Pustular Psoriasis.



Figure 5. Affected Areas of Erythrodermic Psoriasis.



Figure 6. Affected Areas of Nail Psoriasis.



Figure 7. Affected Areas of Psoriatic Arthritis.

EPIDEMIOLOGY

According to the World Health Organization (WHO), psoriasis is almost the dominant autoimmune disease in the United States. According to the present studies [10], as many as 7.5 million Americans (approximately 2.2% of the population) have psoriasis. According to the World Psoriasis Day Consortium, about 125 million people worldwide (2–3% of total population) have psoriasis. Studies showed that between 10% and 30% of people with psoriasis also developed psoriatic arthritis. The prevalence of psoriasis in African Americans is 1.3% as compared to Caucasians. It is estimated that the prevalence of psoriasis has varied across studies. The prevalence of psoriasis in adults ranged from 0.91% to 8.5% and in children it ranged between 0 and 2.1% [11]. The study stated that 25% of people with psoriasis could be classified as having sensible to severe psoriasis as shown in Figure 8. About one third of people affected with psoriasis around the world report a family history of the disease.

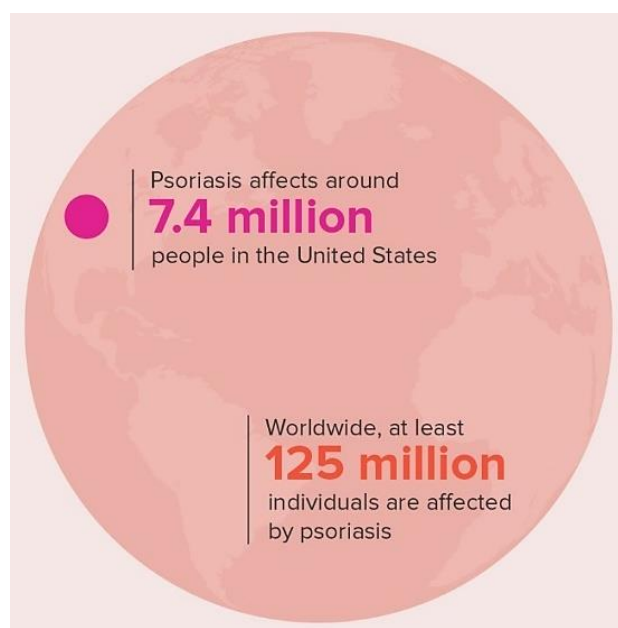


Figure 8. Latest Reports of Prevalence of Psoriasis.

CAUSES OF PSORIASIS

The cause of psoriasis is not fully understood, but there are several factors responsible which include genetic, environmental factors and the immune system.

Environmental Factors

There are certain environmental factor that trigger the psoriasis gene to become active. Some of the factors are stress, smoking, cold weather, obesity, heavy alcohol consumption, folate and Vitamin B12 deficiency, injury to the skin such as a cut scrape and a severe sunburn [12].

Genetic Factors

It plays a major role in the development of this disease. Approximately 10% of the general population have genes which are predisposed to psoriasis. But only 1–3% of the population develops the disease. Families with history of psoriasis has higher chance of developing this disease. Psoriasis is a complex disease with a significant genetic component. Twin studies and familial aggregation studies have confirmed the high heritability of psoriasis, with a concordance rate of 35–72% among monozygotic twins. These studies suggested that both genetic and environmental factors are responsible for developing psoriasis [13].

Immune System

In normal healthy individual, T cells which is a part of white blood cells (WBCs), protect the body against infection by identifying and destroying foreign material. But in psoriasis, T cells are over activated. This over activation of T cell triggers other immune responses such as dilation of blood vessels in the skin around the plaques and stimulation of inflammatory chemical signal [14]. Cytokines such as tumor necrosis factor- α , interleukin-1 β , interleukin-6, interleukin-36 and interleukin-22 are secreted. These secreted inflammatory signals stimulate T cells proliferation which causes an ongoing cycle in which new skin cells move to the outermost layer of the skin too quickly (in days rather than weeks), leading to formation of dead skin which is built up in thick, scaly patches on the skin surface [15].

DIAGNOSIS

Diagnosis is done by clinical examination but as such no precise tests are available to diagnose psoriasis. Sometimes biopsy may be carried out to differentiate it from fungal infection. Diagnosing the joints by pain and using X-ray and bone scanning methods are the ways to diagnose this condition.

Psoriasis diagnosis includes the study of dermatological conditions such as discoid eczema, seborrheic eczema, nail fungus or cutaneous T-cell lymphoma is also dermatologic manifestations of systemic illnesses with psoriasis [16].

TREATMENT

Agent Used in Psoriasis

Topical Corticosteroids

Topical corticosteroids are used as a first line agent and in combination with other topical agents. They showed down cell turnover by suppressing the immune system, which reduces inflammation and relieves associated itching [17]. They also have vasoconstrictions properties. Corticosteroids are classified based on potency according to their vasoconstrictive properties. The lower potency corticosteroids are particularly recommended for application on the face, groin, axillary areas, and in infants and children. Whereas, mid- and higher-potency corticosteroids are commonly used for other areas in adults [18]. The latest treatment of psoriasis is described in Figure 9.

Coal Tar

The benefits of coal tar have been known for many years. The use of coal tar has declined due to the availability of another topical agent. It is used in the treatment of mild-to-moderate and severe psoriasis. It relieves itching and swelling. It also inhibits enzymes that contribute in the pathogenesis of psoriasis [19].

Topical Vitamin D3 Analogs

Topical vitamin D3 analogues are a mainstay of treatment in mild-to-moderate plaque psoriasis. Vitamin D3 analogues exert their effect in psoriasis via binding nuclear vitamin D3 receptors on genes involved in cellular proliferation, differentiation and inflammation. Currently available synthetic vitamin D3 analogues include calcipotriol, maxacalcitol, tacalcitol and calcitriol. These agents are only minimally systemically absorbed and therefore have few systemic side effects. Side-effects include skin irritation. About 20% of patients reported skin irritation particularly on the face and in skin fold [20].

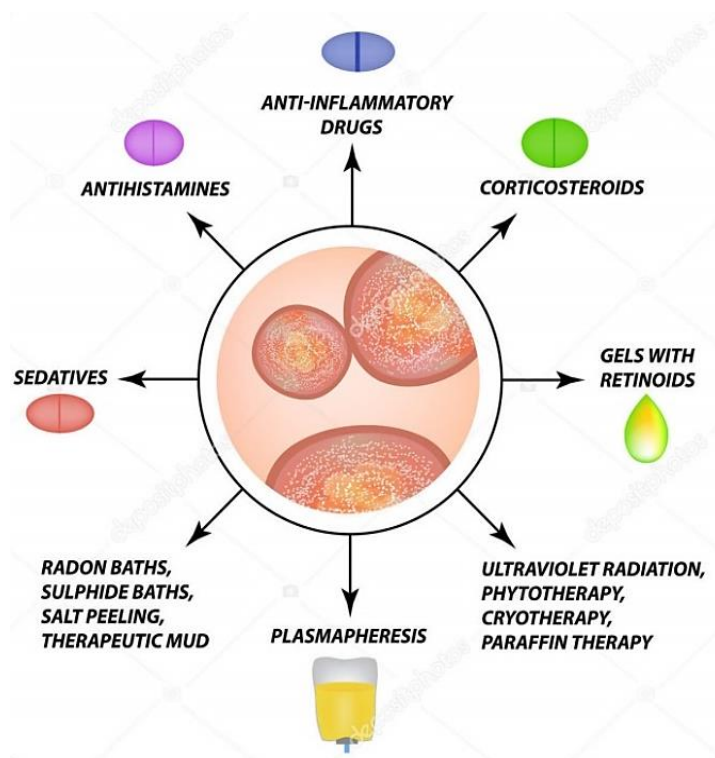


Figure 9. The Latest Treatment of Psoriasis.

Dithranol

It is also called as Anthralin. This is used for treating thick plaques of psoriasis. This is a traditional medicine—Chrysarobin—that has been in use for a century. It is used in the concentration of 0.1–1% [21].

Tazarotene

Tazarotene is a synthetic retinoid with properties similar to that of Vitamin-A. It may be used as a single agent or in combination with a corticosteroid, calcipotriol or phototherapy [22].

Tacrolimus

Topical tacrolimus is particularly effective for inverse psoriasis, which is likely to be due to the reduced level of induration seen in these psoriatic lesions, which allows greater skin penetrance, as compared to hyperkeratotic plaques of psoriasis on the body [23].

Salicylic Acid

It is a keratolytic agent. It is used to remove scales that appear on the skin. It is used in a concentration of 2–10%; it is usually combined with coal tar, steroids and dithranol. Side-effects include moderate or severe skin irritation, flushing, unusually warm skin and reddening of skin [24].

Systemic Therapy**Phototherapy**

Phototherapy is a type of psoriasis treatment that may relieve the pain and itchiness of the condition. It often uses ultraviolet (UV) light, which reduces inflammation and slows down the creation of skin cells. Phototherapy is also used for other skin conditions, such as eczema. However, it is not as simple as just going out in the sun or patient who cannot receive systemic drugs for their moderate-to-severe psoriasis [25]. There are three main alternatives—broadband (BB) ultraviolet B (BB-UVB, 280–320 nm), narrowband (NB)-UVB (311–313 nm) and UVA (280–400 nm). They inhibit DNA synthesis and keratinocytes proliferation and induce apoptosis of T lymphocytes and production of anti-inflammatory mediators [26]. BB-UVB comprises of the most active portion of sunlight radiation and produce excellent responses in case of guttate psoriasis. NB-UVB has been shown to be effective especially for guttate or thin plaque disease and is now considered as the first lines phototherapy, because of its association with milder effects [27–29].

Traditional Systemic Drugs

Psoriasis is an inflammatory skin disease with a chronic relapsing course. In about 20–30% of psoriatic patients, disease severity requires systemic treatment, which carries a huge economic and management burden for the healthcare system. The decision to employ systemic treatment, reserved for severe or extensive forms, needs to be weighed carefully and is influenced by factors from the host. Each form of treatment, that is, photochemotherapy, cyclosporin A, methotrexate, acitretin—considered the traditional psoriatic treatments—should be evaluated for each specific clinical condition (Table 1) [30].

Acitretin

Acitretin is an oral retinoid (vitamin-A derivative) used to treat severe psoriasis, usually at a dose of 0.25–1 mg per kg body weight per day. It is best taken after a meal because it needs fat to be absorbed through the gut wall. Acitretin is available as 10 mg and 25 mg capsules [31]. Oral retinoids are safe in children, as verified by long-term follow up of patients with keratinization disease, but always require monitoring [32].

Methotrexate

Methotrexate (MTX) is an example of antimetabolic that modulates the immune system and the inflammatory processes. MTX can effectively treat severe psoriasis, psoriatic arthritis, and nail psoriasis. Most patients observed less psoriasis in four to six weeks. It may take six months to get complete clearing. While it can be very effective, no treatment works for everyone [33, 34]. Folic acid is routinely administered to further reduce these side effects [35, 36].

Table 1. Different Medications and their Possible Transporters along with the Adverse Effects and Other Consideration.

Medication	Mechanism of action	Available vehicle(s)	Adverse effect	Other consideration
Topical steroids	• Anti-inflammatory, Anti-proliferative	• Lotion, cream, gel, ointment, solution, oil, foam	• Skin atrophy, acneiform eruption, adrenal axis suppression.	• Mild potency for face, flexures groin. • Moderate potency for trunk extremities. • High potency for palms, soles, scalp.
Vitamin D analogues: calcipotriene, calcitrol	• Inhibition of keratinocyte proliferation	• Cream, ointment, solution	• Local skin irritation. In excessive doses, cause hypercalcemia.	• Often used in conjugation with topical steroids for synergistic effects.
Tars: Crude coal tar, LDC	• Anti-proliferative, antipruritic	• Cream, lotion	• Irritation, folliculitis, photosensitivity.	• Best for areas of thick plaque, often adjunctive.
Anthralin (dithranol)	• Anti-inflammatory, antiproliferative	• Cream, lotion	• Irritation, staining of skin and clothing.	• Best for areas of thick skin or thick plaque, can be used in short contact, often adjunctive.
Topical Calcineurin Inhibitors: Tacrolimus	• Inhibition of T cell activation and proliferation, immunomodulatory.	• Ointment, cream	• Stinging, burning, pruritus.	• Most useful in treatment of face, flexures, groin.
Tazarotene	• Reduces inflammation, restores normal epidermal proliferation.	• Cream, gel	• Irritation	• Best as adjunctive, treatment of thick plaques not in sensitive areas, useful in nail psoriasis category.

Cyclosporine

Cyclosporine was first approved to prevent the body from rejecting a transplanted organ. When given to organ-transplant recipients who had psoriasis, patients discovered that the medicine also effectively treated their psoriasis. Since that discovery, the US Food and Drug Administration (FDA) has approved cyclosporine to treat psoriasis in adults who have extensive or disabling psoriasis. Cyclosporine works quickly to treat extensive or disabling psoriasis. A dermatologist may prescribe it to help a patient gain control of severe psoriasis and then switch the patient to another psoriasis treatment. Also, in children it is the risk factor of malignancies, in particular skin cancer and lymphoproliferative disease [37].

CONCLUSION

Psoriasis is a very troublesome disease and is considered as a chronic immune modulated inflammatory autoimmune skin disease. No single diet or food will treat or prevent psoriasis. The interplay between different genetic factors and environmental risk factors that have been proposed include smoking, alcohol consumption, diet, overweight, physical inactivity, infection, drugs and stressful life events. Psoriasis is quite common among children. A clinical suspicion prevails for the diagnosis and treatment of psoriasis at all ages.

REFERENCES

1. Sala M, Elaissari A, Fessi H. Advances in Psoriasis Physiopathology and Treatments: Up to date of mechanistic insights and perspectives of novel therapies based on innovative skin drug delivery systems (ISDDS). *J Controlled Release*. 2016; 239: 182–202p.
2. Liu Y, Krueger JG, Bowcock AM. Psoriasis: genetic associations and immune system changes. *Genes and Immunity*. 2007; 8(1): 1–2p.

3. Bailey EE, Ference EH, A. Alikhan A, et al. Combination treatments for Psoriasis: A systematic review and meta-analysis. *Arch Dermatol.* 2012; 148: 511–522p.
4. Lee S, Coleman CI, Limone B, et al. Biologic and non-biologic systemic agents and phototherapy for treatment of chronic plaque psoriasis. *Med J Aust.* 2006; 185(10): 562– 564p.
5. Henley ND. Rapid-onset skin rash- Guttate psoriasis. *American Family Physician.* 2012; 86: 361–362p.
6. Syed ZU, Khachemoune A. Inverse psoriasis: Case presentation and review. *American Journal of Clinical Dermatology.* 2011; 12: 143–146p.
7. Viguiet M, Aubin F, Delaporte E, et al. Efficacy and safety of tumor necrosis factor inhibitors in acute generalized pustular psoriasis. *Archives of Dermatology.* 2012; 148(12): 1423–1425p.
8. Hawilo A, Zaraa I, Benmously R, et al. Erythrodermic Psoriasis: Epidemiological clinical and therapeutic features about 60 cases. *La tunisie Medicale.* 2011; 89(11): 841–847p.
9. Aydin SZ, Castillo-Gallego C, Ash ZR, et al. Ultrasonographic assessment of nail in psoriatic disease shows a link between onychopathy and distal interphalangeal joint extensor tendon enthesopathy. *Dermatology.* 2012; 225(3): 231–235p.
10. Parisi R, Symmons DP, Griffiths CE, et al. Global Epidemiology of Psoriasis: A Systematic Review of Incidence and Prevalence. *Journal of Investigative Dermatology.* 2013; 133: 377–385p.
11. Nickoloff BJ. Skin Innate Immune System in Psoriasis: Friend or Foe. *Journal of Clinical Investigation.* 1999; 104: 1161–1171p.
12. Robert C, Kupper TS. Inflammatory skin diseases, T cells, and immune surveillance. *New England Journal of Medicine.* 1999; 341(24): 1817–1828p.
13. Krueger G, Ellis CN. Psoriasis—recent advances in understanding its pathogenesis and treatment. *Journal of the American Academy of Dermatology.* 2005; 53(1): 94–100p.
14. Mudigonda P, Mudigonda T, Feneran AN, et al. Interleukin-23 and Interleukin-17: Importance in Pathogenesis and Therapy of Psoriasis. *Dermatology Online Journal.* 2012; 18(10): 1p.
15. Mease PJ, Armstrong AW. Managing patients with Psoriatic Disease: The Diagnosis and Pharmacologic Treatment of psoriatic Arthritis in patients with psoriasis. *Drugs.* 2014; 74: 423–441p.
16. Bhutani T, Koo J, Maibach HI. Efficacy of clobetasol spray: factors beyond patient compliance. *Journal of Dermatological Treatment.* 2012; 23(1): 11– 15p.
17. Nast A, Kopp IB, Augustin M, et al. Evidence based (s3) guidelines for the treatment of psoriasis vulgaris. *Journal der deutschen dermatologischen Gesellschaft.* 2007; 5(s3): 1–19p.
18. Greaves MW, Weinstein GD. Treatment of Psoriasis. *New England Journal of Medicine.* 1995; 332(9): 581–589p.
19. Grant WB, Holick MF. Benefits and requirements of vitamin D for optimal health: A Review. *Altern Med Rev.* 2005; 10(2): 94–111p.
20. Oostveen AM, Beulens CA, Kerkhof PC, et al. The effectiveness and safety of short-contact dithranol therapy in Paediatric Psoriasis: A prospective comparison of regular day care and day care with telemedicine. *British Journal of Dermatology.* 2014; 170(2): 454–730p.
21. Weinstein GD, Krueger GG, Lowe NJ, et al. Tazarotene gel, a new retinoid, for topical therapy of psoriasis: Vehicle-controlled study of safety, efficacy, and duration of therapeutic effect. *Journal of the American Academy of Dermatology.* 1997; 37(1): 85–92p.
22. Martin EG, Sanchez RM, Herrera AE, et al. Topical tacrolimus for the treatment of Psoriasis on the Face, Genitalia, Intertriginous Areas and Corporal Plaques. *Journal of Drugs in Dermatology: JDD.* 2006; 5(4): 334–336p.
23. Huber C, Christophers E. Kerolytic effect of salicylic acid. *Archives of Dermatological Research.* 1977; 257(3): 293–297p.
24. Cordoro KM. Systemic and light therapies for the management of Childhood Psoriasis: part II. *Skin Therapy Lett.* 2008; 13(4): 1–3p.
25. Holme SA, Anstey AV. Phototherapy and PUVA Photochemotherapy in Children. *Photodermatol Photoimmunol Photomed.* 2004; 20(2): 69–75p.

26. Lara CI, Ramnarine S, Lansang P. Treatment of childhood psoriasis with Phototherapy and Photochemotherapy. *Clin Med Insights Pediatr.* 2013; 7: 25–33p.
27. Pasic A, Ceovi R, Lipogenic J, et al. Phototherapy in Pediatric Patients. *Pediatr Dermatol.* 2003; 20(1): 71–77p.
28. Kopp T, Karlhofer F, Szépfalusi Z, Schneeberger A, Stingl G, Tanew A. Successful use of acitretin in conjunction with narrowband ultraviolet B phototherapy in a child with severe pustular psoriasis, von Zumbusch type. *Br J Dermatol.* 2004; 151(4): 912–916p.
29. Cordoro KM. Systemic and light therapies for the management of Childhood Psoriasis: part II. *Skin Therapy Lett.* 2008; 13(4): 1–3p.
30. Brecher AR, Orlow SJ. Oral retinoid therapy for dermatologic conditions in children and adolescents. *J Am Acad Dermatol.* 2003; 49(2): 171–182p.
31. Geel van MJ, Mul K, Jager de ME, et al. Systemic treatments in Paediatric Psoriasis: A Systematic Evidence- based Update. *J Eur Acad Dermatol Venereol: JEADV.* 2015; 29(3): 425–437p.
32. Kalb RE, Strober B, Weinstein G, et al. Methotrexate and Psoriasis: 2009. *J Am Acad Dermatol.* 2009; 60(5): 824–837p.
33. Wright NA, Piggott CD, Eichenfield LF. The role of biologics and other systemic agents in the treatment of pediatric psoriasis. *Semin Cutan Med Surg.* 2010; 29(1): 20–27p.
34. Hashkes PJ, Becker ML, Cabral DA, et al. Methotrexate: New uses for an old drug. *J Paediatric.* 2014; 164(2): 231–236p.
35. Kilic SS, Hacimustafaoglu M, Celebi S, et al. Low dose cyclosporin A treatment in generalized pustular psoriasis. *Pediatr Dermatol.* 2001; 18(3): 246–248p.
36. Mahe E, Bodemer C, Pruszkowski A, et al. Cyclosporine in Childhood Psoriasis. *Arch Dermatol.* 2001; 137(11): 1532–1533p.
37. Ellis CN. Safety issues with cyclosporine. *Int J Dermatology.* 1997; 36(Suppl 1): 7–10p.