

# Prevalence and Pharmacotherapeutic Management of Pediatric Psoriasis—A Descriptive Review

Ahmed A. Albarraq, Saad S. Alqahtani, Sarfaraz Ahmad, David Banji

Pharmacy Practice Research Unit, Department of Clinical Pharmacy, College of Pharmacy, Jazan University, Jizan, KSA.

## ABSTRACT

Psoriasis is an auto-immune chronic inflammatory skin disease, which affects about 3.5% of the world's population. Prevalence of psoriasis among children aged 0 to 18 years is 1% in the United State of America, 5.3% in eastern Saudi Arabia and is on constant rise in other parts of the world. An effective treatment of psoriasis in children may often be challenging mainly because of the lack of established therapeutic guidelines. The objective of this review, therefore, is to provide an update on the prevalence and the pharmacotherapeutic management of pediatric psoriasis, which could be beneficial to clinical pharmacists and other healthcare workers. This multifactorial papulosquamous disorder is linked with the genetic makeup of an individual although the various risk factors like obesity, stress, emotional imbalance, psychological disturbances, cold weather, skin irritation, infection in the respiratory tract and the presence of hemolytic *streptococcus* could trigger psoriasis. Plaque psoriasis is the most common; but, guttate, pustular disease, erythrodermic (red skin) and rheumatoid psoriasis diseases are also noticed in children. The successful approach for treating psoriasis in children depends on the precise selection of line of therapy on case-by-case basis to enhance benefit-risk ratio, with careful attention of its impact on the patient and family. Therefore, treatment of pediatric psoriasis must be rationalized based on the type and intensity of the disease to reduce probable side effects of drugs in children.

**Key words:** Psoriasis, Pediatric, Rational, Autoimmune disease, Dermatological, Prevalence.

## INTRODUCTION

Psoriasis is an autoimmune dermatological disorder characterized by hyper-proliferation of skin cell.<sup>1</sup> It is a prolonged, painful, disabling, non-communicable and physiologically disturbing disease.<sup>2</sup> It can occur throughout the body, but usually affects the nails, toes, scalp, knees and elbow.<sup>3</sup> General occurrence of psoriasis in the United State of America is about 2.5%.<sup>4,5</sup> prevalence among children aged 0 to 18 years is 1%; and, the incidence is 40.8 per one hundred thousand (100,000).<sup>6</sup> Whereas, the percentage of occurrence in eastern Saudi Arabia is about 5.3% and the family history of psoriasis is 8.4% in Saudi Arabia.<sup>7</sup> The 10% incidence of childhood psoriasis is reported in Saudi Arabia,<sup>8</sup> which occurred before the age of 10 years and 2% at less than 2 years of age.<sup>9-11</sup>

Psoriasis shows a bimodal age group distribution;<sup>12</sup> the first modal being pediatric psoriasis that arises under 18 years of age and the second is adult psoriasis that occurs over 18 years.<sup>13</sup> Pediatric psoriasis is further classified as (i) Infantile psoriasis, which occurs in the first year and is a self-limiting condition; (ii) Proleptical psoriasis; and (iii) arthritic-psoriasis.<sup>14,15</sup>

Inborn psoriasis has scanty incidence with appropriate family history.<sup>16</sup> It involves a dissimilar outline of anatomic development, a large portion of erythrodermic, linear or pustular subtypes with a low prognosis.<sup>17</sup> Hence, inborn psoriasis is characterized by scaling, erythematous or pustular occurrence in the neonates.<sup>18</sup> It may appear at any stage of life and is much more common in

Submission Date: 02-04-2019;

Revision Date: 12-06-2019;

Accepted Date: 26-07-2019

DOI: 10.5530/ijper.53.4.118

Correspondence:

Dr. David Banji,

Pharmacy Practice Research Unit, Department of Clinical Pharmacy, College of Pharmacy, Jazan University, Jizan, KSA.

Phone: +966-557942809

E-mail: davidbanji@gmail.com



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the age group of 50–69 years.<sup>19</sup> Incidence of this form of psoriasis may vary from 0.09% to 11.4% worldwide, thereby, making it a serious global issue.<sup>20</sup> Psoriatic pediatric patients may have high risk of developing other serious clinical co-morbid conditions.<sup>21</sup> They could concomitantly suffer from psoriatic arthritis, anxiety, depression, obesity, hypertension, dyslipidemia, non-alcoholic fatty liver disorder, diabetes mellitus (DM) type-2 and decrease quality of life.<sup>22</sup> Among the afflicted patients, about thirty-three percent of patients develop symptoms at an early age of life, while others remain symptomless until they approach adulthood.<sup>23</sup>

Social stigma and rejection are main issues with psoriasis.<sup>24</sup> Loneliness, segregation and unattractiveness are manifested in the affected.<sup>24</sup> There are greater possibilities of depression, disability and loss of playful life among pediatric patients.<sup>25</sup> In addition, high therapeutic expenses can add to the socioeconomic burden on parents.<sup>26</sup> Psoriasis in these patients is not just difficult for the victim; but, it could be serious for others also.<sup>27</sup> Children may feel self-conscious, emotional, exhibit low self-esteem and finally, leading to the development of several co-morbid conditions in children.<sup>28</sup> It, therefore, is suggested that an early detection of diseases may be a significant approach to delay or prevent considerable co-morbidities and to reduce the burden of disease.<sup>29</sup> Another noticeable feature of this disease is that it might get better or worse as it could disappear or reappear suddenly.<sup>30</sup>

The objective of this review article, therefore, is to provide an update on the rational approach for the treatment of childhood psoriasis with careful consideration of symptoms of the disease, which can benefit clinical pharmacists and other healthcare workers.

### Incidence and prevalence of the disease

Psoriasis could occur from four days to fourteen years of age.<sup>31</sup> The average age of appearance of the disease in boys it peaks at the age of 6-10 years.<sup>31</sup> however, for girls, it appears at 10-14 years.<sup>32</sup> Lifetime occurrence of psoriasis at the age group 0-17 years was 1.37 % in Taiwan and China.<sup>33</sup> Study on 277 pediatric psoriatic patients in China revealed an average age of onset of disease and occurrence ratio between male and female were found to be 11 years and 1:1 respectively.<sup>34</sup> In another cohort study in the USA, the annual prevalence of pediatric psoriasis was 40.8 per 100,000 in patients less than 18 years of age.<sup>35</sup> Further, it was observed that the magnitude of suffering was equal in both males and females and prevalence of childhood psoriasis increased as age advanced with no particular peaks in disease condition.<sup>36</sup> Similarly, there was no difference found

in occurrence of pediatric psoriasis between male 23 (37.7%) and female patients 38 (62.3%) under 18 years of age in Turkey.<sup>37</sup>

### Etiology

The genetic characteristics and involvement of the immune system of an individual might be the reasons for its auto-immune disease status; however,<sup>38</sup> psoriasis can easily be aggravated by many triggering agents like stress, trauma, excess exposure to sun, chronic infections and usage of a certain category of systemic drugs.<sup>39</sup> The defensive action of T lymphocytes against microorganisms and mistaken action of immune cells against healthy cells of skin are the other possibilities for sudden eruption of psoriasis.<sup>40,41</sup>

### Precipitating factors

Obesity in children is considered as one of the precipitating factors for onset of psoriasis at an early age.<sup>42</sup> Emotional stress, psychiatric morbidity are the other factors can precipitate psoriasis to the extent of 14.8% and 9.8%, respectively.<sup>1,43</sup> Upper respiratory infection is another risk factor for psoriasis in children.<sup>44</sup> Triggering factors for generalized pustular psoriasis is depicted in Figure 1

### Clinical presentation

Plaque-type of psoriasis in young patients has matching pattern (68%) with adults, which is usually seen on the scalp, elbows, knees and the post-auricular region.<sup>45</sup> The other types of pediatric psoriasis are: 1. Guttate disease (28.9%); 2. Erythroderma (1.4%); 3. Pustular disease including palmoplantar pustular psoriasis (1.1%) and 4. Mucosal glossitis (1.1%)<sup>46</sup> Generalized pustular psoriasis is rare in children; but, if present, it may pose as a

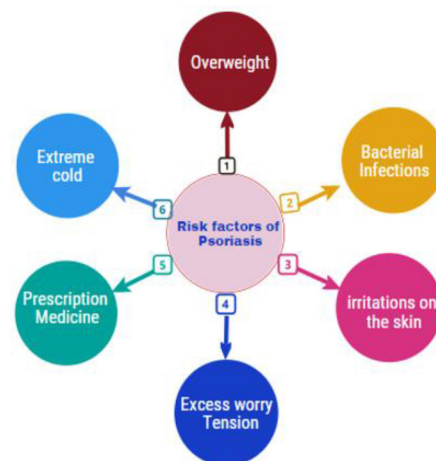


Figure 1: Risk factors of Psoriasis.

serious life-threatening threat.<sup>47</sup> Psoriasis can be characterized by distinct symptoms as indicated in Figure 2.<sup>48</sup> Based on the Psoriasis Area and Severity Index (PASI), calculated by considering the affected body area and co-existence of psoriatic arthritis, psoriasis is graded as (1) Mild - if it is under 3% body surface area; (2) Medium or moderate – between 3% -10 % and (3) Severe - above 10% is used to assess the severity of the disease.<sup>49</sup>

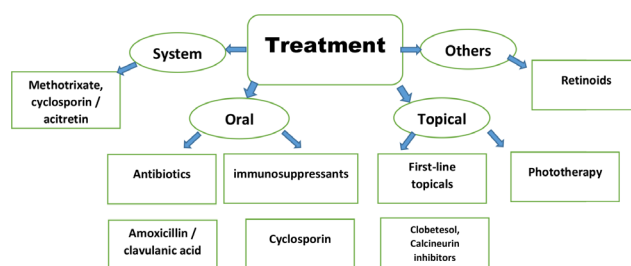
The most common symptoms such as skin scaling, itching, erythema, fatigue, swelling, burning sensation, bleeding can occur among 92%, 72%, 69%, 27%, 23%, 20% and 20% of the affected individuals respectively and scaling of skin in the non-scalp area and scalp areas to the extent of 89% and 62% respectively.<sup>50,51</sup> Nail psoriasis prevailed among 4.2% - 69% of the affected individuals.<sup>52,53</sup>

**Treatment**

Many therapeutic choices are available for the treatment of psoriasis (Figure 2 and 3; Table 1) and different things work for different patients.<sup>53</sup> Topical treatment will be the first preferred option in pediatric psoriasis and other treatments include systemic administration, based on the severity of disease.

**Topical treatment**

Dermal applications are used to treat mild to moderate types of psoriasis.<sup>56</sup> There are different types of agents available that can be regularly used as topical therapies



**Figure 3: Treatment options.**

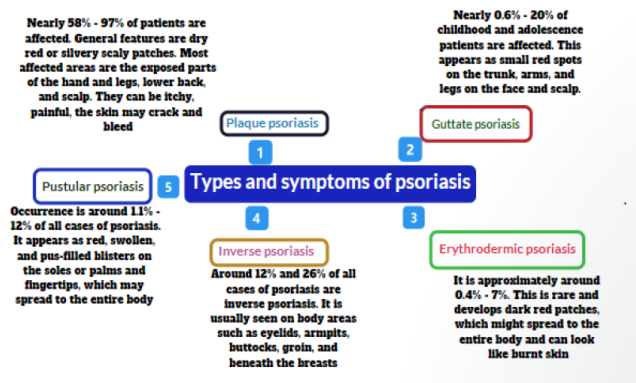
for treating pediatric psoriasis.<sup>57</sup> The different topical anti-psoriatic applications are moisturizers, corticosteroids, vitamin D and salicylic acid or coal tar in the form of ointments, creams, shampoos and lotions.<sup>58</sup> Topical steroids are generally recommended for atopic dermatitis.<sup>59</sup> Long term application of potent steroids can lead to atrophy if a large area of the body surface is involved. Topical clobetasol is prescribed in children aged 12 and over.<sup>60</sup> Calcipotriene or calcitriol topical preparations can be used in the treatment of pediatric psoriasis,<sup>61</sup> however, other formulations like anthralin or dithranol should preferably be avoided in pediatric patients due to its side effects.<sup>62</sup> The other topical anti-psoriatic preparations like calcineurin inhibitors, tacrolimus and pimecrolimus can be considered in treating pediatric psoriasis<sup>63,64</sup> Table 2.

**Desquamation agents**

Desquamation agents such as salicylic acid, lactic acid and urea are indicated to remove the scales formed during psoriasis.<sup>65</sup> They are more effective if they are used concurrently with anti-inflammatory agents like topical corticosteroids (TCS) and the analogs of vitamin D as topical preparation.<sup>66</sup> Salicylic acid has distinctive beneficial effects in removing thick plaques formed on the scalp, soles and palms.<sup>64</sup> However, it should be avoided in infants as it can cause percutaneous salicylism.<sup>67</sup>

**Light (Photo) therapy**

An exposure to ultraviolet (UV) light is another powerful treatment option available to treat psoriasis.<sup>68</sup> Brief



**Figure 2: Types and symptoms of psoriasis.**

Sr.No	Line of treatment	Category	Drug	Dose	Formulation
1	Core list – for a basic health care system	Anti-inflammatory Antipruritic	Betamethasone	0.1% (as Valerate)	Cream
			Hydrocortisone	1% (acetate)	Cream
2	Complimentary list - Medicines required for Systemic therapies, diagnostic, monitoring, training or care.	Anti-arthritic	methotrexate	2.5 mg	Tablet
		Immunosuppressants	cyclosporin	25 mg	capsule

**Table 2: Drugs recommended in pediatric psoriasis.**

Sr. No.	Category and its potency	Active Agent(s)	Concentration	Formulation	Indications
1	Dermal Corticosteroids (low potency)	Desonide	0.05%	Ointment, Cream, Lotion, Gel, Foam	Sensitive area - groin, face, axillae
2	Dermal Corticosteroids (Medium potency)	Triamcinolone acetonide	0.025% 0.1% 0.5%	Ointment, Solution, Cream, Lotion,	High-risk areas (axillae, groin then decrease the potency)
3	Dermal Corticosteroids (High potency)	Clobetasole propionate	0.05%	Ointment, Cream, Solution, Gel, Foam Spray, Shampoo	Indicated in high risk and sensitive areas (axillae, groin then decrease the potency)
4	Analogues of Vitamin D	Calcipotriene	0.05%	Cream, Solution (scalP)	Combined with dermal corticosteroid for steroid-separating effects
5	Retinoid - topical	Tazarotene	0.05% 0.1%	Gel	Preferred in psoriasis in adults.
6	Liquor Carbons Detergents (LCD) / Coal tar	corticosteroid, emollients, lactic and salicylic acid (e.g. 5% LCD in 0.1% triamcinolone ointment)	20% LCD 2% crude coal tar (CCT) 5% CCT 10% CCT	Petrolatum Aquaphor Nutra Derm lotion - Cetaphil cream 2%	Anti-inflammatory and keratolytic action

exposure to UV light on a daily basis is beneficial; however, excess exposure can worsen the situation.<sup>69</sup> Usage of laser therapy, concurrent therapies with UV light and dermal anti-psoriatic preparations on the affected skin are also beneficial.<sup>70</sup> This therapy is advantageous and preferred line of treatment in children because of its safety, provided the protocol of phototherapy is followed.<sup>71</sup>

### Systemic treatment

In uncontrolled and severe psoriasis, systemic treatment is considered as the last treatment option.<sup>72</sup> The most preferred drugs in this line of treatment are immunosuppressive drugs like methotrexate, acitretin or cyclosporin along with oral antibiotics.<sup>73</sup>

### Oral antibiotics

Oral antibiotics for short period of time is helpful in psoriasis if oral pharyngeal culture is positive. Erythromycin (50mg/kg/d) for fifteen days and, amoxicillin/clavulanic acid (50 mg/kg/d) for twenty days is beneficial in the treatment of guttate psoriasis.<sup>74</sup>

### Cyclosporin

Cyclosporin is useful in treating pediatric psoriasis in a dose ranging from 3-5 mg/kg body weight.<sup>75</sup> However, its use is limited as it has a low therapeutic window and serious side effects; and if used, requires regular moni-

toring of patients. Monitoring of high blood pressure and renal function tests is frequently required.<sup>76</sup>

### Retinoids

Retinoids are useful in treating psoriasis; but, because of its severe side effects, they cannot be the first-line treatment in childhood psoriasis.<sup>77</sup> Cheilitis, pruritus, hair loss, fragile skin and arthritis were other adverse effects often observed during the use of retinoids.<sup>78</sup>

### Methotrexate

Methotrexate is extensively used to treat pediatric psoriasis ranging from moderate to severe types and found to be an outstanding therapeutic outcome at a dose of 0.2-0.7 mg/kg/per week.<sup>79</sup> It is an effective option in severe conditions (PASI $\geq$ 10). It is preferred over cyclosporin because of its advantage in managing psoriatic arthritis.<sup>80</sup>

### Biologics

If conventional systemic drugs are ineffective, the biological agents are recommended to treat medium to serious type of psoriasis.<sup>81</sup> The biological agents TNF- $\alpha$  inhibitors, etanercept and infliximab are currently in therapy to treat pediatric rheumatoid arthritis.<sup>82</sup> These agents have satisfactory safety profile than classical systemic treatment and the option of this treatment depends on various other factors such as patient preferences, the speed of onset of action, side effects and the

treatment cost.<sup>83</sup> A recent expert opinion by Kaushik *et al.*, suggested that Etanercept and Ustekinumab should be the preferred biologic agents to treat moderate to severe psoriasis and the traditional systemic agents (methotrexate, cyclosporine and acitretin) should be used only for a short term.<sup>84</sup>

### Natural supplements

Antioxidants present in the food and food supplements may improve disease severity, though it cannot treat psoriasis on its own.<sup>85</sup> It helps in keeping skin clear and can reduce pain at the joints.<sup>86</sup> The other food supplements such as alpha-linolenic acid, Eicosapentaenoic acid (EPA), Docosahexaenoic acid (DHA) and Omega-3 fatty acids have desired and useful actions on body's immunity and are found effective in psoriatic patients.<sup>87</sup>

### CONCLUSION

Psoriasis is a prolonged autoimmune dermatological disorder with great discomfort, but rarely a life-threatening disorder. The common precipitating factor includes stress, genetic predisposition and environmental factors. The treatment approach for pediatric psoriasis remains the same as adults but practitioner need to take care about unwanted effects of drugs. As the management of psoriasis is a long-term therapy, drugs with a narrow therapeutic index should be avoided to minimize vital organ complications. There is limited application of oral antibiotics; however, corticosteroids and vitamin D analogs can be effective in case of mild plaque psoriasis. Apart from this therapeutic approach, some dietary supplement like fish oil, EPA, DHA and phototherapy can be included in the plan of therapy to get an additive effect.

### ACKNOWLEDGEMENT

The authors would like to express thanks to Prof. Otilia J F Banji for reviewing this manuscript, Dr. Nawazish Alam, Dr. Md. Sajid Ali and Dr. Sarfaraz Alam, College of Pharmacy, Jazan University, Jazan, KSA, for helping in reviewing literature sources for this manuscript.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### ABBREVIATIONS

**EPA:** Eicosapentaenoic acid; **CCT:** Crude Coal Tar; **DHA:** Docosahexaenoic acid; **DM:** Diabetes Mellitus; **LCD:** Liquor Carbons Detergents; **PASI:** Psoriasis

Area and Severity Index; **TCS:** Corticosteroid; **TNF $\alpha$ :** Tumor Necrosis Factor-alpha; **UV:** Ultra Violet.

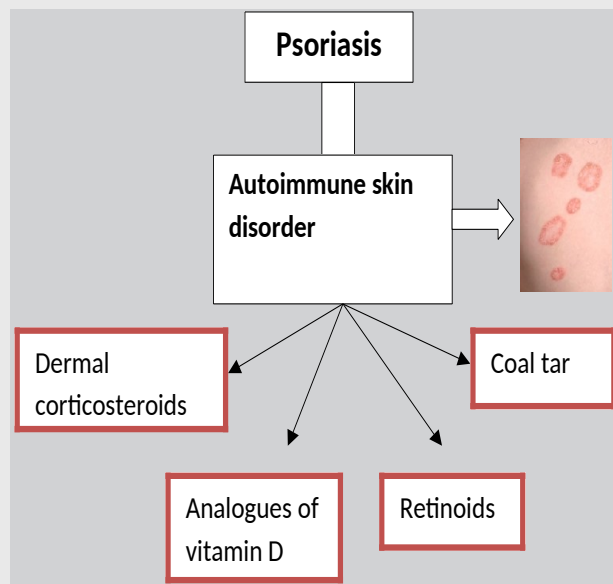
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### PICTORIAL ABSTRACT



### SUMMARY

Psoriasis is a typical, inflammatory, autoimmune skin disorder escalating among children. Manifestation in children is identical to the pattern in adult patients, with the scalp, areas behind the auricle of ears, hands and knees being most affected. There are different types of psoriasis and its severity grading is usually based on surface area. Approaches to delay or prevent co-morbidities and to reduce the burden of disease is of immediate concern in treating them. Various pharmacotherapeutic agents are available to improve the quality of life of psoriatic victims, but lack of effective guidelines makes the treatment challenging in children. As psoriasis requires long-term therapy, drugs with marginal safety index should be avoided to reduce various complications. Information provided on classification, indication, dosages and the risks of each of the major therapeutic agents may help the health care providers in selecting the appropriate drug or combination of drugs in treating pediatric psoriasis.

## About Authors



**Dr. Sarfaraz Ahmad**, Assistant Professor, Pharmacy Practice Research Unit, Department of Clinical Pharmacy, Jazan University, Jizan, KSA.

**Dr. Ahmed A. Albarraq**, Associate Professor and Vice-Dean for PG Studies and Research is a senior faculty in the College of Pharmacy, Jazan University, Jizan, KSA.



**Dr. David Banji**, Professor, Pharmacy Practice Research Unit, Department of Clinical Pharmacy, Jazan University, Jizan, KSA.

**Dr. Saad S. Alqahtani**, Assistant Professor and Head of the Department of Clinical Pharmacy. He is also the Chairman of Pharmacy Practice Research Unit, College of Pharmacy, Jazan University, Jizan, KSA.

**Cite this article:** Albarraq AA, Alqahtani SS, Ahmad S, Banji D. Prevalence and Pharmacotherapeutic Management of Pediatric Psoriasis–A Descriptive Review. *Indian J of Pharmaceutical Education and Research*. 2019;53(4):569-76.