

Ocular Manifestations in Psoriasis

Aditya Maitray¹, Ananth S. Bhandary^{2,*}, Sathyendranath B. Shetty³, Gairik Kundu⁴

^{1,4}PG Student, ²Associate Professor, ³Professor & HOD, Dept. of Ophthalmology, M.S. Ramaiah Medical College, Bangalore

***Corresponding Author:**

Email: ananthbhandary@gmail.com

Abstract

Aims and Objectives:

1. To assess the frequency of ocular manifestations in patients with psoriasis.
2. To study the various clinical manifestations of psoriasis in the eye.
3. To investigate possible relationships between the frequency of ocular involvement and patients age, sex, duration of illness since diagnosis, type of psoriasis and severity of the disease, and treatment received for psoriasis.

Methodology: Complete ophthalmic examination was performed in 75 patients >18 years of age, diagnosed with psoriasis, attending M.S. Ramaiah Hospital Bangalore, between November 2012 - May 2014.

Results: Among 75 cases of psoriasis 53 patients had ocular manifestations. 29(39%) patients had cataract/ pseudophakia. 28(39%) patients had dry eyes, 18(24%) patients had blepharitis. Chronic conjunctivitis was seen in 6(8%) patients and acute anterior uveitis in 2(2.6%) patients. Ocular manifestations were more common in patients with PASI score >10 when compared to patients with PASI score ≤10 (p value is 0.009). There is no statistical significance between duration of disease and ocular manifestations of psoriasis (p value is 0.19). The prevalence of dry eyes was higher among the patients with higher PASI score (p value is 0.001).

Conclusion: Ocular manifestations are a significant part of the psoriasis manifestations. Therefore routine eye examinations are recommended in psoriasis patients of all types, to screen for common associated ophthalmic conditions including dry eyes, blepharitis, conjunctivitis and uveitis during their regular follow-up visits with their dermatologist.

Keywords: Blepharitis; Cataracts; Dry eyes; PASI score; Psoriasis vulgaris; Uveitis.

Introduction

Psoriasis affects 1% to 3% of the adult population with various extra cutaneous manifestations. Around 10% of psoriasis patients have ocular manifestations.¹

Ophthalmic complications are numerous and generally tend to occur much later after the skin involvement. Consequences of ocular manifestations are often neglected and surveys into the quality of life implications of psoriasis mostly do not give importance to ocular symptoms.²

Ocular manifestations are subtle and are often overlooked. If ocular examinations could be carried out at regular intervals, patients with psoriasis would be benefited. Commonest ocular manifestations being dry eyes, and blepharitis. Others include pinguecula, punctate keratitis, cataract, uveitis, glaucoma and retinal micro-vascular abnormalities.²

The occurrence of uveitis in psoriasis and psoriatic arthritis has been quoted in multiple studies, in which one study quotes uveitis in three of seven patients with psoriasis.³⁻⁵

Studies and surveys relating to the dermatological quality of life implications of psoriasis generally do not directly address ocular symptoms. Since there are not many studies relating psoriasis with ocular manifestations, we plan to undertake this study to address these issues.⁶

Psoriasis vulgaris is "a chronic systemic inflammatory disorder with recurrent relapses, the

course of which can be altered by environmental factors.

Various morphological types of psoriasis are chronic plaque type, guttate, pustular, erythrodermic⁷. The classical lesions are well demarcated plaques, on an erythematous base with silvery scales on the surface.

On removal of the psoriatic plaques, there appears an underlying red membrane with multiple bleeding points due to tearing away of thin supra papillary epithelium, phenomenon known as Auspitz's sign. In case the scaling is concealed, it can be induced by light tangential scratching with the edge of a glass slide. This is known as "the Grattage sign"⁸.

Types of Psoriasis

1. Plaque Psoriasis
2. Pustular Psoriasis
3. Erythrodermic Psoriasis
4. Guttate psoriasis
5. Inverse Psoriasis
6. Others including scalp psoriasis and nail psoriasis.

Ocular manifestations - Psoriasis may affect the lid, conjunctiva or cornea resulting in the development of ocular manifestations, including conjunctival hyperemia and conjunctivitis, ectropion and trichiasis and corneal dryness with punctate keratitis and corneal melting.

Chandran et al² in a study conducted at Singapore, found that 67% of their patients with psoriasis in

Singapore had one ophthalmic abnormality whereas 20% had more than one aberrancy.

In a Study done by Erbagci et al⁹ in Turkey on ocular manifestations in psoriasis, total of 67.74% of psoriasis had ocular manifestations.

Blepharitis - it is the most prevalent ocular finding in psoriasis as found by Cram et al¹⁰. Edema, Erythema and plaques may develop leading to cicatricial ectropion, trichiasis, madarosis and even loss of lid tissue.

Erbagci et al⁹ demonstrated that early ocular involvement mainly chronic blepharitis occurs in 65% of patients with psoriasis vulgaris.

Dry eyes – It is said to be second only to blepharitis in incidence. Her et al¹¹ who evaluated dry eye symptoms, ocular surface changes and tear film function in patients with psoriasis, stated that the dry eye symptom was more common in patients with Psoriasis.

A Study conducted on 100 Patients by Kilic et al¹² noted incidences of ocular findings in both eyes in the patient group to be statistically higher than that in the control group. Schirmer and Tear Break up time values were statistically lower in the patient group than those in the control group.

A Chronic nonspecific conjunctivitis is fairly common. Lambert et al³ in a study of patients with psoriatic arthritis, noted ocular inflammation in 30%. Most common lesion was conjunctivitis, being found in 19.6%.

Corneal manifestations – occurs secondary to lid or conjunctival complications, such as dryness and trichiasis. The most common finding is punctate keratitis. Peripheral corneal melting syndrome is uncommon and consists of marginal corneal thinning, sometimes to the extent of perforation.¹³

Uveitis – seen mostly in patients with psoriatic arthritis.

Zeboulon et al¹⁴ in a systematic review of 29,877 patients for prevalence and characteristics of uveitis in spondyloarthropathies (SpA), identified that mean prevalence of uveitis in SpA was 32.7%. This prevalence increased with mean disease duration and was higher in HLA B-27 positive patients with an odds ratio of 4.2. Uveitis was acute in 88.7%, anterior in 90.5%, unilateral in 87.3%. Recurrence occurred in 50.6%.

Lens – Wanscher and Vesterdal¹⁵ studied 266 consecutive “in patients” of psoriasis, >10 years of age. 188(70%) had clear lenses, 66(26%) presented with minute punctate opacities considered as physiological variations. Four had blue-dot cataract and 6 had congenital or evolutionary small opacities at various sites in the lenses but without blurring of vision. Only one patient aged 72, had crystalline cataract with slightly impaired vision.

Effect of treatment

Corticosteroids may cause posterior subcapsular cataract. Screening of cataracts is recommended at a frequency of 3-4 times a year in patients on long term steroid therapy and twice a year on intermittent topical ocular or systemic steroids.¹⁶

Psoralen Ultraviolet A Therapy(PUVA)

Cox et al¹⁷ studied the effects of PUVA therapy on 59 patients. They found three patients developed new lens opacities after 3 months of commencing PUVA therapy. However, none of these patients was considered to have cataract, as none had impairment of visual acuity.

Retinoids– Ocular side effects of retinoids include blepharitis, conjunctivitis, keratitis, photophobia, dry eye syndrome, corneal opacities, color vision disorders, cataract and optic neuritis.¹⁸⁻²⁰

Acetazolamide- Kuroda et al²¹ in their case report of a 28 year male with history of 20 years of generalized pustular psoriasis developed psoriatic arthritis and glaucoma. He had precipitation of psoriasis after starting oral acetazolamide for glaucoma and the symptoms improved after withholding acetazolamide.

Aims and Objectives

1. To assess the frequency of ocular manifestations in patients with psoriasis.
2. To Study the various clinical manifestations of Psoriasis in the eye.
3. To investigate possible relationships between the frequency of ocular involvement and patient age, sex, duration of illness since diagnosis, type of psoriasis and severity of the disease, and treatment received for psoriasis.

Materials and Methods

This was a hospital based descriptive study. The Study group consisted of 75 Patients of Psoriasis who presented to the outpatient department of Dermatology and Ophthalmology in M.S. Ramaiah Medical College from Nov 2012 to May 2014. The sample size was estimated using the standard formula for estimating the proportion with absolute precision. The minimal sample size estimated for this study (seventy five) was based on the estimated percentage prevalence of ocular manifestations in psoriasis. The minimal sample was estimated for 5% precision and 5% level of significance. Prior ethics committee clearance was obtained.

Inclusion Criteria

Patients more than 18 years of age with diagnosis of Psoriasis.

Exclusion Criteria

1. Patients with diabetes mellitus and renal disease.
2. Patients using contact lenses.

Procedure

Informed consent was taken from all patients.

Patient characteristics, age, gender, address, occupation, duration of disease, type of psoriasis, area of skin involvement, past and current treatment, ocular symptoms were noted. Schirmer's-1, Tear break up time and intraocular pressure were measured. PASI score was calculated for every patient.

PASI Score – Psoriasis Area and Severity Index²² is a scale for quantifying the severity of psoriasis based on the area involved and appearance of plaque.

The body is divided into 4 sections:

1. Head
2. Arms
3. Trunk
4. Legs

For every section, the percentage area of skin involved is estimated and converted into a grade 0 to 6. Three clinical signs estimate the severity within each area: erythema, induration and desquamation. They are scored on a scale of 0 to 4. The above 3 severity parameters are summed up for each section of skin, multiplied by area score and by weight of section of the body (0.1 for head, 0.2 for arms, 0.3 for body and 0.4 for legs). Every section is scored by itself, and four scores are summed up to calculate the final PASI, which can be a number ranging from 0-72.

Ophthalmic Examination was done in a sequential order:

It included

- Head Posture

- Ocular position
- Extra ocular movements
- BCVA (Best corrected Visual Acuity) using Snellen's Chart
- Slit Lamp Examination to evaluate the anterior segment of the eye to rule out blepharitis, lid abnormalities, conjunctival xerosis, corneal pathologies including superficial punctate keratitis, corneal melting and opacities, acute anterior uveitis, cataract and vitritis at a magnification of 10X to 25X. The cataract evaluation was done according to the Lens Opacities Classification system III²³.
- Tear Film Break up time (TBUT), Schirmer I tests were done to detect dry eyes.
- Goldmann Applanation Tonometry for measuring IOP.
- Posterior segment examination by 90D.

Observations

75 Psoriasis patients attending the Dept. of Dermatology, M.S. Ramaiah Hospital between Nov 2012 to May 2014 conforming to the inclusion and exclusion criteria were included in the study.

Out of the 75 psoriasis patients included in the study, 53 had ocular manifestations.

Patient characteristics

Age distribution: The mean age of the patients was 46.8 ± 11.65 years, ranging from 18-68 years. Majority of the patients in the study were in the age group of 41-60 years. The age distribution of patients with psoriasis with ocular manifestations is provided in the table below.

Table 1: Age distribution of studied patients with and without ocular manifestations

Age Group (in years)	No. of Patients with ocular manifestations	No. of Patients without ocular manifestations	Total No. of Patients
0-20	1	1	2
21-40	10	9	19
41-60	30	10	40
61-80	12	2	14
>80	0	0	0

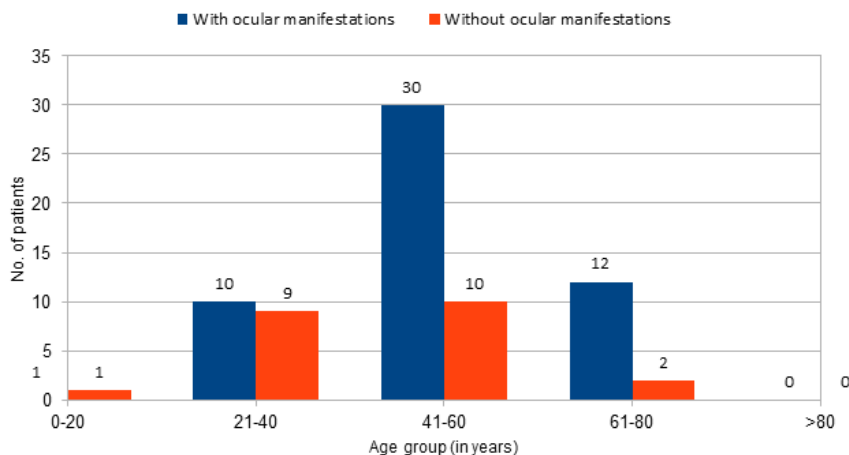
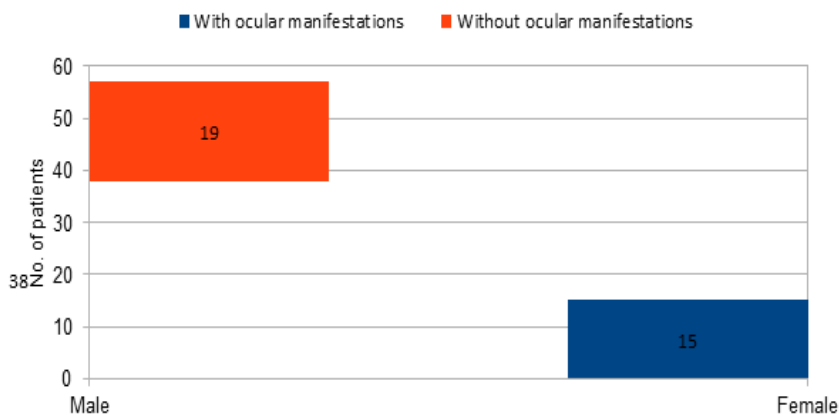


Fig. 1: Age distribution in patients with Psoriasis with and without ocular manifestations

Gender distribution

Out of 75 patients psoriasis patients, 57 were males and 18 were females. 15 out of 18 females(83%) had ocular manifestations and 38 out 57 males (67%) had ocular manifestations.



Disease Characteristics

Duration of psoriasis in our study population was 5.2±4.4 years. Majority of patients had disease duration of less than 5 years.

Table 2: Frequency distribution of psoriasis patients with or without ocular manifestations based on disease duration

Duration of disease (in years)	Total no. of patients with Psoriasis	No. of Psoriasis patients with ocular manifestations
<5 years	50	36(72%)
6-10 years	17	11(65%)
>10 years	8	6(75%)

There is no statistical significance between duration of disease and ocular manifestations of psoriasis(p value- 0.19 by Chi square).

Type of Psoriasis

The Distribution of ocular manifestations in different types of psoriasis is given in table 3.

Table 3: Ocular Manifestations in different types of psoriasis

Type of Psoriasis	No. of Psoriasis patients	No. of Psoriasis patients with ocular manifestations
Plaque	65	47
Guttate	2	1
Erythrodermic	2	2
Pustular	2	1
Psoriatic Arthritis	4	2

Severity of Psoriasis**Table 4: Distribution of Psoriasis with ocular manifestations based on PASI score**

PASI score	Ocular Manifestations present	Ocular manifestations absent	Total
<5	4	4	8
5-10	26	10	36
>10	23	8	31
Total	53	22	75

About 50% with less than 5 PASI score, 72% with 5-10 PASI score and 74% patients with more than 10 PASI score developed ocular manifestations. Ocular manifestations was more common in patients with PASI score >10 when compared to patients with PASI ≤ 10 and this difference was statistically significant (p value is 0.009) by Fischer exact test).

Treatment received by the psoriasis patients:

Total 55 were on systemic treatment with methotrexate as primary therapy along with emollients, 7 were receiving topical tar and 8 were receiving topical steroids, 5 receiving PUVA therapy, and 2 patients on acetretin.

Table 5: Comparison between treatment received and prevalence of ocular manifestations

Type of Treatment	No. of Psoriasis patients	No. of Psoriasis patients with ocular manifestations
Methotrexate	55	43
Topical Steroids	8	2
PUVA	5	3
Topical Tar	7	4
Acetretin	2	1

Ocular Manifestations:

Out of, 75 patients with Psoriasis, 53 patients had ocular manifestations. Ocular manifestations such as cataract/pseudophakia (n=29), Dryness (n=28), blepharitis (n=18), conjunctivitis (n=6) and uveitis (n=2) were observed in the study group, with the overlap of manifestations.

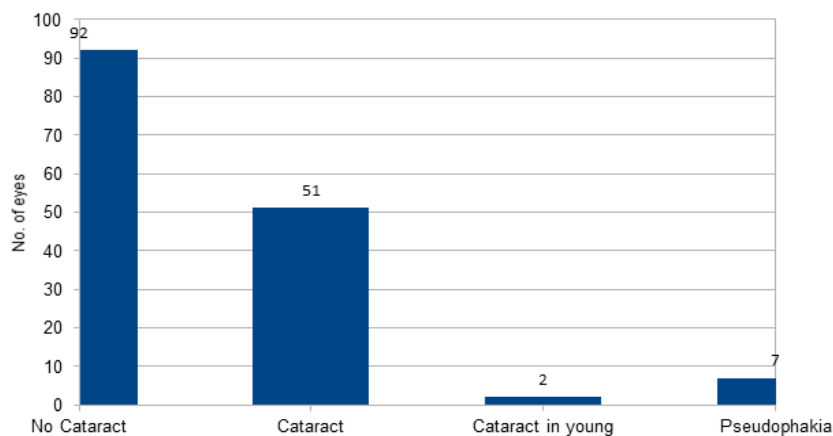
Table 6: Distribution of patients with ocular manifestations

Ocular manifestations	No. of Psoriasis patients with ocular manifestations
Cataract/Pseudophakia	29(39%)
Dry eyes	28(37%)
Blepharitis	18(24%)
Chronic conjunctivitis	6(8%)
Uveitis	2(2.6%)

Cataract:**Table 7: Age distribution of cataract in psoriatic patients**

Age group (in years)	No. of psoriasis patients with cataract	No. of Psoriasis patients with pseudophakia
0-20	-	-
21-40	1(2 eyes)	-
41-60	14(28 eyes)	-
61-80	10(19 eyes)	-

One patient (2 eyes) diagnosed with presenile cataract(21-40 years) had early posterior subcapsular cataract in both eyes. Between the age groups 41-60 years, 17 patients(34 eyes) had cataract either of nuclear sclerosis(30 eyes) or posterior subcapsular type(4 eyes).

**Fig. 3: Distribution of cataract in psoriasis patients****Dry eyes:**

Twenty Eight of 75 psoriasis patients had dryness of eye(Schirmer's-1 <10mm or TBUT <10s), with the prevalence being higher among the patients with higher PASI score (>10) which was statistically significant(p value - 0.001 by Fischer Exact test).

Table 8: Distribution of patients with dry eyes based on PASI score

PASI Score	No. of Psoriasis patients	No. of Psoriasis patients with dry eyes
<5	8	1
5-10	36	11
>10	31	16

Blepharitis:

Eighteen psoriasis patients (36 eyes) had blepharitis. Anterior seborrhoeic blepharitis was most commonly seen. It was most common in patients with plaque psoriasis(30 eyes) followed by erythrodermic psoriasis(2 eyes). Meibomitis was seen in 2 patients (4 eyes) with plaque psoriasis.

Conjunctival manifestations – 6(12 eyes) out of 75 patients had diffuse conjunctival injection.

Corneal manifestations – none of the patients had corneal opacity or corneal melting.

Uveitis- 2 patients(3 eyes) were diagnosed with acute anterior uveitis. PASI score was more than 10 in both cases. The case with bilateral uveitis had psoriatic arthritis.

Schirmer's I and TBUT**Table 9: Mean Schirmer and TBUT Values based on severity of psoriasis**

PASI Score	Schirmer I(mm)		TBUT (Seconds)
	Right eye	Left eye	
<5	18±6.82	16.5±7.83	10.75±1.24
5-10	12.24±3.68	11.64±4.42	9.70±1.24
>10	10.2±3.90	11.42±2.48	7.65±2.48

Schirmer test values were low in 21 Psoriasis patients and 12 psoriasis patients had low tear break up times.

In some patients with PASI score >10 it was recorded as low as 4mm and 5mm in the right and left eye respectively. However, there was no statistically significant difference in Schirmer values between the psoriasis patients with PASI<10 and PASI>10 by unpaired t test(p value – 0.176) nor for tear break up time (p value – 0.191).

Fundus examination- Two patients(4 eyes) had grade I hypertensive retinopathy. One patient(2 eyes) had grade 2 hypertensive retinopathy. None of the other patients had any abnormality in the fundus.

Intraocular pressure(IOP)– None of the patients had increased IOP nor increased cup to disc ratio. Mean IOP was 15 mm of Hg. Highest IOP in a patient was 19 and 18mm Hg in the right and left respectively. Cup to disc ratio was 0.3 to 0.6. No patient was diagnosed to have glaucoma.



Picture showing a patient with facial involvement undergoing Schirmer's test

Discussion

We carried out the screening of the psoriasis patients in the out-patient department of dermatology. Out of 75 patients studied, 53 patients(70.67%) had ocular manifestations. Studies done by Chandran et al² and Erbagci et al⁹ had found the prevalence of ocular manifestations in psoriasis to be 67% and 65% respectively, which were in congruence with the present study.

Cataract has been reported to be the most important cause of visual impairment in psoriasis patients¹. Wanscher et al¹⁵, in their study of 266 study psoriasis patients with mean age of 24.7 years, found that incidence of cataract among psoriasis patients does not exceed the normal population, hence concluded routine eye examinations for cataract are not necessary for such patients. In our study, in the age group less than 40 years, 5.26% of patients with psoriasis had cataract and hence examination for cataract does become essential.

Dry eyes- Lima et al¹ in their study have found abnormal Schirmer test in 50% of Psoriasis patients along with 67% abnormality in tear break up time. Kilic et al¹² noted Schirmer test and tear break up time values to be statistically lower in the patient group than those in the control group.

In our study the prevalence rate was 37.3% and this may be under estimation, because of rigid diagnostic criteria to classify dry eye(Schirmer I<10 or TBUT >10). In addition there is a poor relationship between signs and symptoms of dry eye²⁴. Therefore, there could be more number of cases of dry eyes, which have been unnoticed.



Slit Lamp picture showing meibomitis in a patient with psoriasis



The patient had severe dry eyes with high blink rate. Slit Lamp Picture showing anterior Blepharitis in a patient with scalp psoriasis

Blepharitis

Erbagci et al⁹ showed 65% prevalence of blepharitis in psoriasis patients, whereas in our study it was found only to be 24% of cases.

Campanati et al²⁵ observed that the ocular symptoms, Schirmer's test and tear break up time improved after 12 weeks of immuno-suppressant drugs. Hence lower prevalence in our study can be due to the fact that 59 out of 75 patients were receiving methotrexate as primary treatment for psoriasis.

Conjunctivitis- Kaldeck et al²⁶ reported 11 cases of conjunctivitis out of 90 psoriasis patients whereas Ingram et al stated that the occurrence of conjunctivitis and psoriasis was coincidental. In our study we found the prevalence of conjunctivitis(8%) to be more than the prevalence in general population.

Cornea- None of the patients in the present study had corneal manifestations except for arcus senilis, which is an age related change.

Uveitis- Wollina et al²⁷ in their study that anterior uveitis in temporarily seen in about one quarter of psoriatic arthritis patient. Villani et al²⁸ described that 7% Patients with psoriatic arthritis have anterior uveitis. In addition they also inferred that uveitis has been frequently under diagnosed.

In our study, 2 Patients with Psoriasis had anterior uveitis out of which one had psoriatic arthritis.



Picture showing blepharitis in a patient with Plaque psoriasis

Intraocular pressure(IOP)

IOP was in the normal range(15 ± 3 mm Hg) in our study. The use of topical corticosteroids had not resulted in increase in intraocular pressure nor development of glaucoma. The mean intraocular pressures in psoriasis patients were normal in the study done by Lima et al¹ also.

Conclusion

- Ocular manifestations are a significant part of the psoriasis process.
- Dry eye and blepharitis are the most common ocular manifestations seen in our study.
- There was a significant association between PASI score and ocular manifestations. The greater the score, more common and severe are the ocular manifestations.
- Higher Incidence of pre-senile cataract was noted among the psoriasis patients as compared to general population.
- Uveitis in psoriasis patients can occur even in the absence of psoriatic arthritis.

Therefore routine eye examinations are recommended in psoriasis patients of all types, to screen for common associated ophthalmic conditions including dry eyes, blepharitis, conjunctivitis and uveitis during their regular follow up visits with their dermatologist.

References

1. Lima FBF de, Abalem MF, Ruiz DG, Gomes B de AF, Azevedo MNL de Moraes HV, et al. Prevalence of eye disease in Brazilian patients with psoriatic arthritis. Clin Sao Paulo Braz.2012;67(3):249-53.
2. Chandran NS, Graves M, Gao F, Lim L, Cheng BCL. Psoriasis and the eye; prevalence of eye disease in Singaporean Asian Patients with psoriasis; J Dermatol; 2007 Dec;34(12):805-10.
3. Lambert JR, Wright V. Eye Inflammation in psoriatic arthritis. Ann Rheum Dis.1976 Aug;35(4):354-6.

4. Kammer GM, Soter NA, Gibson DJ, Schur PH. Psoriatic arthritis: a clinical, immunologic and HLA Study of 100 patients, *Semin Arthritis Rheum.*1979 Nov;9(2):75-97.
5. Catsarou-Catsari A, Katsambas A, Theodoropoulos P, Stratigos J. Ophthalmological manifestations in patients with psoriasis. *Acta Derm Venereol.*1984;64(6):557-9.
6. Menter A, Gottlieb A, Feldman SR, Van Voorhees AS, Leonardi CL, Gordon KB, et al. Guidelines of care for the management of psoriasis and psoriatic Arthritis. Section 1. Overview of psoriasis is and guidelines of care for the treatment of psoriasis with biologics. *J Am Acad Dermatol.*2008 May;58(5):826-50.
7. Nestle FO, Kaplan DH, Barker J. Psoriasis. *N. Engl J Med.*2009 Jul 30;361(5):496-509.
8. Van de Kerkhof PC, de Hoop D, de Korte J, Kuipers MV. Scalp Psoriasis, clinical presentations and therapeutic management. *Dermatol Basel Switz.*1998;197(4):326-34.
9. Erbagci I, Erbagci Z, Gungor K, Bekir N. Ocular anterior segment pathologies and tear film changes in patients with psoriasis vulgaris. *Acta Med Okayama.* 2003 Dec;57(6):299-303.
10. Cram DL. Corneal melting in psoriasis. *J Am Acad Dermatol.*1981 Nov;5(5):617.
11. Her Y, Lim JW, Han SH. Dry eye and tear film functions in patients with psoriasis. *Jpn J Ophthalmol.*2013 Jul;57(4):341-6.
12. Kilic B, Dogan U, Parlak AH, Goksugur N, Polat M, Serin D, et al. Ocular findings in patients with Psoriasis. *Int J Dermatol.*2013 May;52(5):554-9.
13. Varma S, Woboso AF, Lane C, Holt PJ. The peripheral corneal melting syndrome and psoriasis: coincidence or association? *Br J Dermatol.*1999 Aug;141(2):344-6.
14. Zeboulon N, Dougados M, Gossec L. Prevalence and characteristics of uveitis in the spondyloarthropathies: a systematic literature review. *Ann Rheum Dis.*2008 Jul;67(7):955-9.
15. Wanscher B, Vesterdal E. Syndermatotic cataract in patients with psoriasis. *Acta Derm Venerol.*1976;56(5):397-9.
16. Renfro L, Snow JS. Ocular effects of topical and systemic steroids. *Dermatol Clin.*1992 Jul;10(3):505-12.
17. Cox NH, Jones SK, Downey DJ, Tuyp EJ, Jay JL, Moseley H, et al. Cutaneous and ocular side effects of oral pharmacotherapy: results of an 8 year old follow-up study. *Br J Dermatol.*1987 Feb;116(2):145-52.
18. Denis P, Nordmann JP, Saiag P, Liotet S, Laroche L, Saraux H. Chronic blepharoconjunctivitis during a treatment with acitretin. *J FrOphthalmol.*1993;16(3):191-4.
19. Fraunfelder FW. Corneal toxicity from topical ocular and systemic medications. *Cornea.*2006 Dec;25(10):1133-8.
20. McClure SL, Valentine J, Gordon KB. Comparative tolerability of systemic treatments for plaque-type psoriasis. *Drug Saf.*2002;25(13):913-27.
21. Kuroda K, Kojima T, Tanabe E, Fujita M, Shinkai H. Pustular psoriasis precipitated by acetazolamide. *J Dermatol.*1995 Oct;22(10):784-7.
22. Meier M, Sheth PB. Clinical spectrum and severity of psoriasis. *Curr Probl Dermatol.*2009;38:1-20.
23. Lafond G, Roy PE, Grenier R. Lens opacities appearing during therapy with methoxsalen and long-wavelength ultraviolet radiation. *Can J Ophthalmol.*1984 Jun;19(4):173-5.
24. Nichols KK, Nichols JJ, Mitchell GL. The lack of association between signs and symptoms in patients with dry eye disease. *Cornea.*2004 Nov;23(8):762-70.
25. Campanati A, Neri P, Giuliadori K, Arapi I, Carbonari G, Borioni E, et al. Psoriasis beyond the skin surface: a pilot study on the ocular involvement. *Int Ophthalmol.*2014 May;35-40.
26. Kaldeck, R. Ocular psoriasis; clinical review of eleven cases and some comments on treatment. *AMA Arch Derm Syphilol.* 1953;68:44-49.
27. Wollina U, Unger L, Heinig B, Kittner T. Psoriatic arthritis. *Dermatol Ther.*2010 Apr;23(2):123-36.
28. Villani AP, Rouzaud M, Sevrain M, Barnetteche T, Paul C, Richard MA. et al. Symptoms dermatologists should look for in daily practice to improve detection of psoriatic arthritis in psoriasis patients: an expert group consensus. *J Eur Acad Dermatol Venereol JEADV.*2014 Aug;28 Suppl 5:27-32.