

Manifestations of ocular rosacea in females with dark skin types



Amal O. Al-Balbeesi^a; Eman A. Almukhadeb^{a,*}; Mona R. Halawani^a; Ghada A. Bin Saif^a; Samir M. Al Mansouri^b

Abstract

Background: Current knowledge about ocular rosacea in dark skin individuals is lacking. The prevalence of ocular rosacea varies considerably among studies and is probably higher than previously presumed.

Objective: To estimate the prevalence and pattern of ocular rosacea among dark skinned female patients, compare it with fair skinned, and to correlate the severity of cutaneous disease with ocular findings.

Method: Female patients diagnosed with rosacea between 2011 and 2013 were studied prospectively. They were referred to ophthalmology for clinical observations and slit lamp examination. In all patients Schirmer and Tear break up time tests to diagnose dry eye were performed.

Result: Fifty six consecutive female patients, joined the study with different skin types ranging from skin type 4 to 6. A total of 43 patients (76.8%) were positive for ophthalmologic findings. The most frequent symptoms were itching, burning sensation and redness, while the most frequent signs were meibomian gland dysfunction, dry eyes, eyelid telangiectasia and irregular margin. Significant correlation was noted between meibomian gland dysfunction and irregular lid margin ($P = 0.003$). Dry eye and Schirmer test significantly correlated with eye lid telangiectasia ($p = 0.004$; 0.015) respectively. No significant correlation was found between the severity of cutaneous disease and ocular findings.

Conclusion: Ocular rosacea in dark skinned females is a common presentation and is comparable to that reported for fair skin, with eyelid telangiectasia and meibomian gland dysfunction being early phenomena. Earlier onset and more benign course were seen compared to other studies. Ocular and cutaneous rosacea are independent of each other.

Keywords: Dark skin, Ocular rosacea, Dry eye

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Introduction

Rosacea is a common chronic skin disease with characteristic persistent erythema, telangiectasia, papules and pustules in the flush areas of the face and V-neck. The National Rosacea society committee identified four subtypes of rosacea: Erythematotelangiectatic, Papulopustular, Phymatous and Ocular.¹ In patients with rosacea, ocular disease is estimated by dermatologists to be 3% and by an ophthalmolo-

gist to be 58%.^{2–4} The cutaneous eruption appears first in 53% of cases, coincident occurrence of cutaneous and ocular disease in 27%, and ocular lesions appear first in 20% of cases.⁵

Rosacea effects on the eyes may easily be missed since the complaints are often non-specific. The ocular manifestations range from minor, such as blepharoconjunctivitis to major such as corneal neovascularization, thinning and on rare occasions perforation that can result in blindness.^{6–8} Other ocular

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^a Department of Dermatology (82), College of Medicine, King Saud University, Riyadh, Saudi Arabia

^b Department of Ophthalmology, College of Medicine, King Saud University, Riyadh, Saudi Arabia

* Corresponding author at: Department of Dermatology, College of Medicine, King Saud University, P.O. Box 90831, Riyadh 11623, Saudi Arabia. e-mail address: eman-derma@hotmail.com (E.A. Almukhadeb).

findings including meibomian gland dysfunction, chalazia, superficial punctate keratitis, iritis, scleritis and episcleritis may occur.

McCully et al. reported generalized sebaceous gland dysfunction that also involves the meibomian glands in patients with rosacea. Meibomian glands are row of sebaceous glands along the lid margin posterior to eyelashes. Their lipid secretion retard tears evaporation and maintain the structural integrity of the ocular surface.⁹ Meibomian gland dysfunction MGD is a chronic diffuse abnormality of the meibomian gland characterized by a terminal duct obstruction and qualitative and quantitative abnormality in the glandular secretion.

Meibomian gland dysfunction predisposes rosacea patients to blepharitis, keratoconjunctivitis sicca (dry eyes) and chalazia.⁹⁻¹¹

The etiopathogenesis of ocular rosacea is unknown; however recently there has been much focus on matrix metalloproteinase, bacterial lipases and interleukin 1 alpha predisposing to rosacea induced blepharitis and corneal epitheliopathy.¹²

Purpose of the study: To estimate the prevalence and pattern of ocular rosacea among dark skinned females, compare it with fair skin, and to correlate the severity of cutaneous disease with ocular findings.

Method

This prospective study included female patients diagnosed with rosacea at the Dermatology Clinic at King Khalid University Hospital, King Saud University, Riyadh, Saudi Arabia who were accrued between 2010 and 2013. The inclusion criteria were patients with the diagnosis of rosacea, based on the clinical criteria developed by the expert National Rosacea Society Committee (grouping of one or more of the following primary findings of flushing, persistent facial erythema and telangiectasia, papules and pustules with a central face distribution). Ocular manifestations may be identified by looking for tearing, blood shot appearance (interpallebral conjunctival hyperemia), lid margin telangiectasia, periocular or lid margin erythema, chalazia, and by the symptoms such as foreign-body sensation, burning, stinging, itching, dryness, photophobia, blurred vision, or decreased visual acuity. We adopted the SPT system for classifying the skin types: light brown as type 4, brown as type 5, and dark brown or black as type 6. Patients were initially seen for dermatologic history and examination, a detailed questionnaire and clinical evaluation that included age, gender, clinical type of rosacea, ocular symptoms (including dryness, itching, redness, tearing, blurry vision, foreign body sensation), was obtained from each patient, the duration of rosacea, cutaneous symptoms (including scaling, pruritus and burning). All patients were referred to the Department of Ophthalmology and examined by a single physician (Author AL-Mansouri S). Schirmer test followed by clinical and Slit lamp examination including tear break up time (TBUT) and fluorescein staining of both eyes were performed for all patients. To diagnose dry eye that is known as keratoconjunctivitis sicca; a combination of abnormal test results of Schirmer, tear break up time TBUT and fluorescein staining along with the complaint of dry eye are required.

The Schirmer 1 test without anesthesia was performed. The test was considered within normal limit if it was

≥ 10 mm. The tear film break-up time test was considered normal if it was ≥ 10 s.

Statistics

Data were collected and analyzed using PASW (Predictive Analytics Software, IBM-SPSS Inc, Chicago, Illinois, USA) version 18.0. Descriptive data were expressed in percentages. The group statistics were assessed using Student's t test for paired samples and the Pearson's correlation test to determine the correlation between variables. Statistical significance was considered significant if p values were less than 0.05.

Ocular signs were compared with cutaneous manifestations severity by analysis of variance, chi squared and student t test to evaluate the correlation of findings.

Results

A total of 56 female patients with rosacea were included in the study. Mean age was 42.6 ± 10.5 years. Mean duration of rosacea was 8.0 years. Forty-three patients (76.8%) had ophthalmological findings. The mean age of patients who had ocular rosacea was 44.7 years.

The most frequent symptoms were itching (76.7%) and burning sensation (58.1%), and the most frequent signs were meibomian gland dysfunction (46.5%) (Fig. 1a), dry eyes (39.5%) telangiectasia (26.8%) (Fig. 1b) and irregular eyelid margin (17.9%), (Fig. 1c), (Table 1).

There were 14 patients (25.0%) with skin type IV, 25 (44.6%) with skin type V and 17 (30.4%) with skin type VI. Family history of rosacea was positive in 13 (23.2%) patients. The range of visual acuity in both right and left eyes was 20/20 to 20/200 and 20/20 to 20/400 respectively. 44.6% of patients had decreased visual acuity for ocular conditions other than rosacea such as trachomatous scars, cataract and refractive errors.

There were 43 patients (76.8%) who had cutaneous erythema; 15 (26.8%) were mild, 19 (33.9%) were moderate and 9 (16.1%) were severe. Telangiectasia was documented in 40 (71.4%) patients; 18 (32.1%) were mild, 17 (30.4%) were moderate and 5 (8.9%) were severe. There were 23 patients (41.1%) who had papulo-pustular rosacea; 13 (23.2%) were mild, 6 (10.7%) were moderate and 4 (5.4%) were severe. Fourteen patients (25.0%) had facial scaling and 28 (50.0%) had pruritus.

Dry eye tests

The mean Schirmer test was 1.8 mm in the right eye and 2.7 mm in the left eye. A decrease in TBUT was noted in 9 (20.9%) for the right eye and 9 (20.9%) for the left eye. The mean TBUT was 6.4 ± 0.4 s for the right eye and 6.5 ± 0.4 s for the left eye (Table 2).

Dry eye (keratoconjunctivitis sicca) and Schirmer test significantly correlated with eye lid telangiectasia ($p = 0.004$; 0.015) respectively. A significant correlation was noted between meibomian gland dysfunction and irregular lid margin ($P = 0.003$).



Fig. 1. (a-f) Ocular signs of rosacea.

Correlation between cutaneous manifestation of rosacea with ocular symptoms and signs

There was no substantial correlation between the severity of erythema and telangiectasia with any of the ocular symptoms including, foreign body sensation $p = 0.884, 0.773$; burning $p = 0.278, 0.702$; itching $p = 0.878, 0.603$; blurry vision $p = 0.647, 0.737$; redness $p = 0.647, 0.833$ and tearing $p = 0.442, 0.364$ respectively.

Papulopustular rosacea similarly had no correlation with any ocular symptoms, including foreign body sensation

$p = 0.427$, burning $p = 0.760$, itching $p = 0.576$, blurry vision $p = 0.374$, redness $p = 0.383$ and tearing $p = 0.605$.

Erythema and telangiectasia severity had no correlation to chalazia $p = 0.246, 0.331$; eyelid telangiectasia $p = 0.762, 0.351$; irregular lid margin $p = 0.562, 0.562$; meibomian gland dysfunction $p = 0.969, 0.686$ and conjunctival hyperemia $p = 0.258, 0.686$, respectively.

Severity of papulopustular rosacea had significant correlation to chalazia $p = <0.001$, but none to eyelid telangiectasia $p = 0.394$, irregular lid margin $p = 0.394$, meibomian gland dysfunction $p = 0.833$ and conjunctival hyperemia $p = 0.261$.

Table 1. Ocular signs and symptoms:

Ocular symptoms	No. of patients, %	Ocular signs	No. of patients, %
Itching	33 (76.7%)	Eye lid findings	
Burning	25 (58.1%)	Meibomian gland dysfunction	20 (46.5%)
Redness	18 (41.9 %)	Keratoconjunctivitis sicca	17 (39.5%)
Tearing	14 (32.6%)	Lid telangiectasia	15 (26.8%)
Foreign body sensation	13 (30.2%)	Irregular lid margin	10 (17.9%)
Blurry vision	8 (15.7%)	Blepharitis	14 (32.6%)
		Chalazia	2 (4.7%)
		Conjunctival and corneal findings	
		Conjunctival hyperemia	4 (9.3%)
		Pannus	6 (14.0%)
		Cicatrizing conjunctivitis	1 (2.3%)
		Corneal scarring	3 (7.0%)
		Corneal vascularization	0 (0.0%)
		Corneal thinning/perforation	0 (0.0%)

Table 2. Results of mean values of Tear break up time and Schirmer test.

Current study	Mean value RE; %	Mean value LE;%
TBUT	6.4 s; (20.8%)	6.5 s; (20.8%)
Schirmer	1.8 mm; (20.8%)	2.7 mm; (15.1%)
<i>Lazaridou</i>		
TBUT	9.4 s; (0.0%)	9.3 s; (0.0%)
Schirmer	14.9 mm; (87.5%)	15.1 mm

RE: Right eye; LE: Left eye; TBUT: Tear break up time.

Discussion

The incidence and characteristics of ocular rosacea among dark skinned individuals is unknown. The current study addresses the findings of ocular rosacea among female patients with skin of color. We report a prevalence of 76.8% among our population that is comprised of skin types 4–6 and an early onset of ocular manifestations than that reported in the literature. Bakar et al.¹³ reported 72% prevalence of ophthalmic involvement in rosacea patients that is consistent with our findings. Yet, in a study reported by Lazaridou from Northern Greece, ocular manifestations in their population were 33%.¹⁴ This variance in prevalence among different reports might be assigned to the heterogeneity of ocular rosacea manifestations among different ethnic groups and the variable diagnostic means of the disease since the symptoms and signs are non-specific.

It is interesting to report that the mean age of the patients with ocular manifestations in our study was 44.7 years, that is a decade younger than the two study series reported by Jenkins and Akpek of 51–60 and 56 years respectively.^{15,16}

Ghanem reported that the most common ocular signs were meibomian gland dysfunction 85.2%, eyelid telangiectasia 53.4%, blepharitis 44.3%, and conjunctival hyperemia 40.9%.¹⁷ In the report of Akpek, eye lid telangiectasia was reported in 81%, meibomian gland dysfunction 78% and blepharitis 65%.¹⁸

These patterns are similar to our study, with meibomian gland dysfunction 46.5% eyelid telangiectasia 26.8% and

blepharitis 32.6% of patients (Fig. 1d). Conjunctival hyperemia and chalazia were reported in 9.3% and 4.7%, respectively (Fig. 1e). It is apparent that our patients have similar ocular pattern to fair skin with common involvement of the eyelid and conjunctiva.

Severe corneal complications of rosacea such as corneal erosions, ulcers and perforation were not seen in any of our patients, which are consistent with the report of Ghanam¹⁹ (Tables 3, 4), (Fig. 2). On the other hand Akpek reported serious corneal erosions and ulcers in 4.6% and 5.3% of patients respectively. Although serious ocular complications are rare, sight threatening complications have been reported.⁸ The most common minor corneal finding in Akpek study was punctate epithelial keratopathy (PEK); confined to the inferior half of the cornea; reported in 15.3%, while Ghanem reported an incidence of 13.6% and 0.0% in our study group. Other ocular findings, including conjunctival granuloma, phlyctenular conjunctivitis, iritis, scleritis and episcleritis were not reported in our population (Fig. 3). A more recent study done in King Khaled Eye Specialist Hospital, Saudi Arabia with almost similar median age group to our current study reported the most common ocular manifestation to be blepharitis 13 (56.5%) with higher incidence of major ocular manifestation in comparison to our study.²⁰ In their study they reported 13 patients (56.5%) with stromal keratitis with peripheral neovascularization and 6 patients (26%) with recurrent epithelial erosions.²⁰

It seems that ocular presentations in our study fall in the category of minor rather than major complications of rosacea. The lack of serious corneal complications in our study group might be ascribable to the younger age of our patients or due to genetic constitution of the Saudi population. Longer follow up of patients is required to confirm this observation.

The incidence of dry eyes in the general population is not accurately known, but has been estimated to be 4.1–7.5% of normal control patients.¹⁰ There is no single test that is specific enough to diagnose dry eyes absolutely, however the combination of abnormal Schirmer test which measures the aqueous tear secretion and TBUT to measure the tear stability in symptomatic patients are usually sufficient to diagnose dry eyes. Many studies had confirmed that dryness of the eyes is one of the common problems of rosacea which is coherent with our study.^{21,22} Lazaridou and Quartman reported a normal Schirmer test in all patients and an abnormal TBUT in 87.5% and 95% of patients respectively.

We found decrease TBUT in 20.8% of patients for right and left eye respectively. The mean TBUT was 6.4 s in the right eye and 6.5 s in the left eye (Table 2).

Schirmer test was low in 20.8% of patients for the right eye and in 15.1% of patients in the remaining eye. The mean Schirmer test was 1.8 mm, 2.7 mm in right and left eye respectively (Table 2). The discrepancy between the outcomes of the different studies regarding dry eye tests could be secondary to the variance in the net effect of the different ocular pathological process that disrupts the balance between the different tear film components.

The integrity of the tear film depends on the outer lipid layer produced by the meibomian glands which are obstructed in rosacea patients, the middle aqueous layer produced by lacrimal glands and an inner mucous layer produced by the goblet cells of the conjunctiva.^{21–25} The tear film in rosacea may become unstable and evaporates easily

Table 3. Comparison between minor ocular manifestation in our study and other studies.

	Current study	Ghanem 2003	AKPIK 1997	Al-Amry 2018
Total no of patients	56	88	131	23
Mean age	44.7	54	56	40.61
Blepharitis	14(32.6%)	39(44.3%)	86(65.0%)	13(56.5%)
Conjunctival hyperemia	4(9.3%)	8(9.1%)	59(45.0%)	12(52%)
Telangiectasia	15(26.8%)	47(53.4%)	106(81.0%)	0(0.0%)
Irregular margin	10(17.9%)	0(0.0%)		4(16%)
MGD	20(46.5%)	75(85.2%)	103(78.0%)	9(39%)
Chalazia	2(4.7%)	13(14.8%)	14(10.0%)	3(13%)
KJ Sicca	17(39.5%)	0(0.0%)	34(26.0%)	0(0.0%)
Iritis	0(0.0%)	0(0.0%)	3(2.0%)	1(4.3%)
Superficial punctate keratitis	0(0.0%)	0(0.0%)	20(15.0%)	0(0.0%)
Scleritis	0(0.0%)	1(1.2%)	1(0.7%)	1(4.3%)
Episcleritis	0(0.0%)	4(4.5%)	11(8.0%)	2(8.70%)
Conjunctival granuloma	0(0.0%)	0(0.0%)	1(0.7%)	0(0.0%)
Phycentular conjunctivitis	0(0.0%)	0(0.0%)	1(0.7%)	0(0.0%)
Cicatrizing conjunctivitis	1(2.3%)	2(2.3%)	12(9.0%)	0(0.0%)

Table 4. Comparison between the major ocular manifestation in our study and other studies.

	Current study	Ghanem 2003	AKPIK 1997	Al-Amry 2018
Stromal Keratitis with peripheral neovascularization	0(0.0%)	0(0.0%)	21(16.0%)	13(56.5%)
Recurrent epithelial erosions	0(0.0%)	0(0.0%)	7(5.0%)	6(26%)
Corneal ulcer	0(0.0%)	2(2.3%)	7(5.0%)	1(4.3%)
Corneal perforation	0(0.0%)	1(1.2%)	1(0.7%)	2(8.7%)

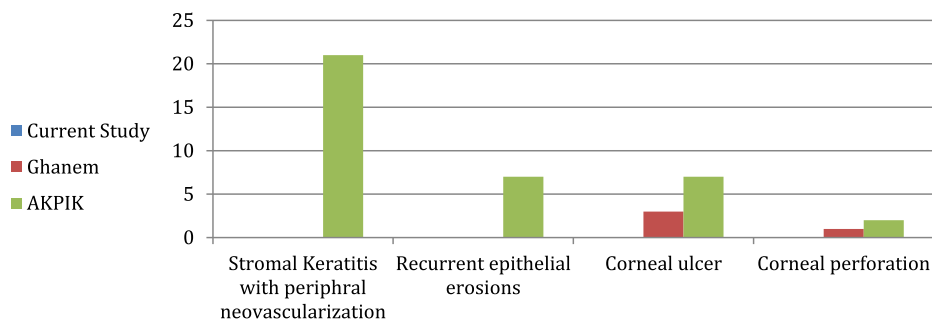


Fig. 2. Major ocular manifestation comparison with other studies.

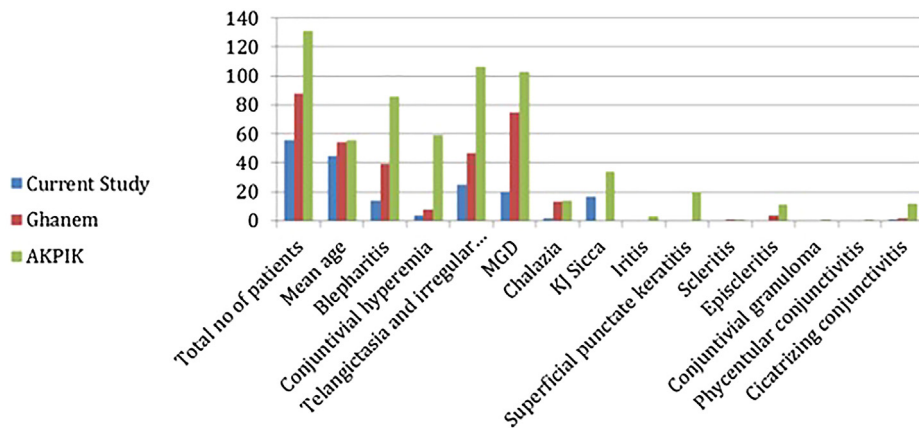


Fig. 3. Minor ocular manifestation comparison with other studies.

secondary to meibomian gland obstruction and inspissated secretions resulting in dryness of the eye (Fig. 1f).

Significant correlation was found between meibomian gland dysfunction and irregular lid margin ($p = 0.003$), such a correlation might be due to mechanical perturbation of

the gland ducts, that hampers the flow of secretions and results in an unstable tear film and dry eyes. Unlike the study of Gudmundsen, where dry eye did not correlate with any specific clinical expression of rosacea²⁰, we found that dry eye correlated with eye lid telangiectasia ($p = 0.004$). The

cause for such a correlation is not entirely clear, but we speculate that tear evaporation increases as a result of the heat delivered from the telangiectatic blood vessels, along with an abnormal meibomian gland lipid secretion resulting in dry eye. Such a speculation needs to be evaluated further.

Commonly dry eye is with no long term effects, however if the condition is severe and left untreated, it can produce corneal damaging complications which may contribute to impairment or loss of vision. Twenty four patients (47.1%) of our population had abnormal visual acuity due to causes other than rosacea like, cataract, trachoma and refractive errors.

There had been a report that correlates facial telangiectasia with ocular signs of rosacea.²⁵ Such an association could not be found in our study, that is consistent with the report by Quarterman.²⁵ There was statistically significant correlation between papulopustular rosacea and chalazia which did not make a clinical significance due to the small number of patients with chalazia i.e. 2; 4.7% (Fig. 1e).

It is evident from the information shown in this study that dark skinned individuals with rosacea have similar ocular manifestations like fair skin. However, in dark skin the presentation occurs at a younger age than the reported for fair skin. The younger age group of our population might explain the predominance of minor ocular disease.

In summery ocular manifestations of rosacea is more common than previously expected. Although, minor manifestations like meibomian gland dysfunction, lid telangiectasia, irregular margins, blepharitis, and dry eyes are more prevalent, ocular rosacea is a potentially sight compromising disease if left untreated. Furthermore, the problem is more complicated by non-specific ocular findings and the lack of appropriate diagnostic tests. Therefore dermatologists should inquire about ocular symptoms if patients fail to report them.

Limitations of the study: One of the limitations of our study is that it only studied female patients and the lack of a control group. The reason behind the inclusion of only female patients is due to the lack of control over the composition of the study population since we consecutively recruited dermatology consultation seekers. Female patients express higher concerns about skin problems than males that compel them to seek medical advice more often. The disproportionate representation of male patients in our study is due to the scarce number of male patients attending the dermatology clinics for rosacea during the study period. Rosacea is seen as a cosmetic problem since the general wellness of the patients is un-compromised, and the erythema that is the hallmark of the disease, is often veiled by the dark skin complexion of our population. Combined, these factors add more causes for the under-presentation of male patients in our study.

Since patients with rosacea show a considerable magnitude of manifesting ocular symptoms and usually fail to report them, the dermatologist should inquire about such symptoms and refer patients to formal ophthalmology evaluation and follow up when required.

Conclusion

Darker skinned patients with cutaneous rosacea are likely to have some ocular manifestations of the disease similar to

fair skin individuals. Relatively mild ocular changes with no sight threatening findings were observed in our population, most likely caused by, our younger age of the patients as compared to that of the literature. The most common ocular finding is eyelid telangiectasia that is easily accessible for examination, when looking for possible ocular involvement. Thus, dermatologists and primary care physicians are recommended to inquire about ocular symptoms that are commonly unreported by the majority of patients, due to the lack of knowledge about such an association.

We recommend that, patients with rosacea should be referred to ophthalmology to rule out ocular changes. Although sight threatening findings are rare early diagnosis, close follow up and education of the patients of such serious complications is mandatory.

Conflict of interest

The authors declared that there is no conflict of interest.

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