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Clinical Spectrum and Treatment Patterns in Patients with Adenoviral Conjunctivitis: A Single-Center Experience

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ABSTRACT

Background: Conjunctivitis is characterized by inflammation of the conjunctiva, encompassing a variety of diseases, and most commonly imparts ocular disorders. This study was done to compare the effectiveness of topical corticosteroids versus topical antihistamines in the treatment of adenoviral conjunctivitis.

Methods: This observational study was conducted at the outpatient department of ophthalmology, Combined Military Hospital, Jhelum, Pakistan, during an adenoviral outbreak from August to September 2023. A total of 196 patients presenting with clinically suspected viral conjunctivitis, and prescribed either topical steroids or antihistamines, were analyzed. Non-probability, consecutive sampling technique was adopted. The demographic and clinical data collected included gender, age, duration of symptoms, and specific symptoms such as redness, discharge, and photophobia. Symptom severity was assessed at baseline and after 7 days of treatment. Data analysis was performed using IBM-SPSS Statistics, version 26.0. Categorical data between both treatment options were compared using the chi-square test, taking a p-value of <0.05 as statistically significant.

Results: In a total of 196 patients, 123 (62.8%) were male. The median age and duration of symptoms were 31.00 years (15.00-45.75 years) and 1 day (1-2 days), respectively. Bilateral eye involvement was found in 105 (53.6%) patients. There were 136 (69.4%) patients who were prescribed topical steroids, whereas 60 (30.6%) were advised topical antihistamines. The steroid group was more effective in treating adenoviral conjunctivitis, with 68.4% of patients showing significant improvement in key symptoms, compared to 46.7% in the antihistamine group. Overall, steroids led to better symptom resolution and fewer ineffective cases than antihistamines (p=0.029).

Conclusion: Topical corticosteroids are significantly more effective than antihistamines in treating adenoviral conjunctivitis, particularly in reducing key symptoms such as redness, discharge, and conjunctival hyperaemia.

Keywords: Adenovirus, Antihistamine, Conjunctivitis, Pain, Redness, Steroid.

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INTRODUCTION

Conjunctivitis is characterized by inflammation of the conjunctiva, encompassing a variety of diseases, and most imparting ocular disorders[1]. Conjunctivitis can manifest in the form of infection due to numerous microorganisms like viruses, bacteria, parasites[2]. Non-infectious forms of conjunctivitis include allergies, mechanical, irritative, or toxic stimuli, immune-mediated response, or neoplastic manifestations[3]. Viral infections are most commonly involved in conjunctivitis, and these account for around 80% of these cases. Adenovirus is estimated to be responsible for 65-90% cases of viral conjunctivitis[4].

Adenovirus, beyond causing severe systemic infections in humans, has also become a focal point for ophthalmologists due to its role in global conjunctivitis outbreaks[5]. Viral conjunctivitis, the most common form, sees a significant increase during the summer months of July to August, whereas bacterial conjunctivitis is more prevalent in the winter, from December to April[6]. Differentiating symptoms include matted eyelids with purulent discharge and the absence of itching in bacterial conjunctivitis, compared to viral conjunctivitis[7]. Symptoms of viral conjunctivitis encompass red or pink eyes, watery discharge, irritation, swollen lids, and punctate keratopathy, potentially leading to corneal scarring and vision loss[8]. Clinicians usually recommend supportive care with artificial tears, topical steroids, and frequent cold compresses for symptomatic relief. Antiviral medications such as acyclovir and ganciclovir, either oral or topical, may be prescribed to shorten the duration of the infection[9].

Despite being one of the most common causes of viral conjunctivitis globally, detailed clinical data and treatment approaches are not uniformly documented. By documenting clinical characteristics and treatment patterns, this research can identify prevalent symptoms and trends in the treatment strategies. This information is crucial for improving diagnostic accuracy, tailoring patient care, and reducing the spread of infection. The findings of this study may also help standardize treatment protocols, leading to better patient outcomes and more efficient use of healthcare resources. This study aimed to contribute valuable insights that can inform clinical practice and improve the overall management of adenoviral conjunctivitis. The objective of this research was to evaluate the effectiveness of topical corticosteroids versus topical antihistamines in the treatment of adenoviral conjunctivitis.

METHODS

This was an observational study conducted at the outpatient department of ophthalmology, Combined Military Hospital, Jhelum, Pakistan, during an adenoviral outbreak from August to September 2023. Ethical approval was obtained (letter number: 104587, dated 1st June, 2023). The study included patients of either gender, any age, presenting with clinically suspected viral conjunctivitis, and those who were prescribed either topical steroids or antihistamines. Exclusion criteria included patients with non-viral causes of conjunctivitis, patients unwilling to provide consent, and those with other ocular pathologies. Informed and written consents were obtained from all study participants. Non-probability, consecutive sampling technique was adopted. As this study was planned during a suspected adenoviral outbreak so no formal sample size was calculated, and this study included all eligible patients fulfilling the eligibility criteria during the study period.

The demographic and clinical data collected included gender, age, duration of symptoms, and specific symptoms such as redness, discharge, and photophobia. Symptom severity was assessed at baseline and after 7 days of treatment. Clinical evaluations were done through slit-lamp examination. Outcome was labeled in the form of effectiveness. Effective treatment was described if the patient showed significant improvement (either complete resolution or marked reduction) in all three key symptoms (redness, discharge, and hyperaemia). Partially effective treatment was described if the patient showed improvement in one or two of the key symptoms. Ineffective treatment was defined as if the patient showed no improvement or worsening of symptoms in the key areas (redness, discharge, hyperaemia).

Data analysis was done using IBM-SPSS version 26.0. Qualitative variables were shown as frequency and percentages. Quantitative variables were represented as mean and standard deviation or median and interquartile range (if data were abnormally distributed). Categorical data between both treatment options were compared using the chi-square test, taking a p-value of <0.05 as statistically significant.

RESULTS

Table 1: Demographic and Clinical Characteristics of Patients (N=196)

Characteristics		Total (%) (N=196)	Steroid group (n=136)	Antihistamine group (n=60)	p-value
Gender	Male	123 (62.8%)	85 (62.5%)	38 (63.3%)	0.911
	Female	73 (37.2%)	51 (37.5%)	22 (36.7%)	
Age (years)	≤5	7 (3.6%)	4 (2.9%)	3 (5.0%)	0.797
	6-18	57 (29.1%)	39 (28.7%)	18 (30.0%)	
	19-45	83 (42.3%)	60 (44.1%)	23 (38.3%)	
	46-60	40 (20.4%)	28 (20.6%)	12 (20.0%)	
	>60	9 (4.6%)	5 (3.7%)	4 (6.7%)	
Eye involvement	Right	57 (29.1%)	39 (28.7%)	18 (30.0%)	0.748
	Left	34 (17.3%)	22 (16.2%)	12 (20.0%)	
	Both	105 (53.6%)	75 (55.1%)	30 (50.0%)	
Family history of conjunctivitis		95 (48.5%)	70 (51.5%)	25 (41.7%)	0.206
Contact with others affected by conjunctivitis		56 (28.6%)	39 (28.7%)	17 (28.3%)	0.361
Duration of symptoms (days)	<3	164 (83.7%)	114 (83.8%)	50 (83.3%)	0.932
	≥3	32 (16.3%)	22 (16.2%)	10 (16.7%)	

In a total of 196 patients, 123 (62.8%) were male. The median age was 31.00 years (15.00-45.75 years), ranging between 6 months to 84 years. The median duration of symptoms was 1 day (1-2 days), ranging between 1 to 30 days. Bilateral eye involvement was found in 105 (53.6%) patients. The family history of conjunctivitis was noted in 95 (48.5%) patients. Contact with others affected by conjunctivitis was reported in 56 patients (28.6%). There were 136 (69.4%) patients who were prescribed topical steroids, whereas 60 (30.6%) were advised topical antihistamines. **Table 1** shows a comparison of demographic and clinical characteristics between patients of both study groups, and no statistically significant differences were observed (p>0.05).

Table 2: Comparison of Symptoms and Clinical Findings in Both Study Groups (N=196)

Clinical findings	Total (%) (N=196)	Steroid group (n=136)	Antihistamine group (n=60)	p-value
Pain	176 (89.8%)	122 (89.7%)	54 (90.0%)	0.950
Discharge	154 (78.6%)	104 (76.5%)	50 (83.3%)	0.281
Conjunctival hyperaemia	149 (77.0%)	106 (77.9%)	43 (71.7%)	0.343
Redness	140 (71.4%)	97 (71.7%)	43 (71.7%)	0.961
Chemosis	120 (61.2%)	88 (64.7%)	32 (53.3%)	0.132
Photophobia	54 (27.6%)	39 (28.7%)	15 (25.0%)	0.595
Follicles	25 (12.8%)	14 (10.3%)	11 (18.3%)	0.120
Lymph nodes	4 (2.0%)	2 (2.2%)	1 (1.7%)	0.806
Corneal infiltrates	2 (1.0%)	2 (1.5%)	-	0.345

Evaluation of baseline symptoms and clinical findings reported pain as the most prevalent symptom, affecting 176 (89.8%) patients, discharge 154 (78.6%), conjunctival hyperaemia 149 (77.0%), and redness 140 (71.4%) patients. There were no statistically significant differences concerning baseline symptoms and clinical findings between the two study groups (p>0.05), and the details are shown in **Table 2**.

Table 3: Comparison of Improvement in The Frequency of Symptoms After 7 Days of Treatment in Both Study Groups

Symptoms	Steroid group (n=136)	Antihistamine group (n=60)	p-value
Redness minimized	98 (72.1%)	34 (56.7%)	0.034
Discharge reduced	102 (75.0%)	31 (51.7%)	0.001
Conjunctival Hyperaemia reduced	96 (70.5%)	32 (53.3%)	0.019

Table 3 shows that after 7 days of treatment, redness was minimized in 98 (72.1%) patients in the steroid group compared to 34 (56.7%) in the antihistamine group (p=0.034). Discharge was reduced in 102 (75.0%) patients in the steroid group versus 31 (51.7%) in the antihistamine group (p=0.001). Conjunctival hyperaemia was reduced in 96 (70.5%) patients in the steroid group compared to 32 (53.3%) in the antihistamine group (p=0.019), demonstrating the superior efficacy of steroids in symptom resolution.

The steroid group was more effective in treating adenoviral conjunctivitis, with 68.4% of patients showing significant improvement in key symptoms, compared to 46.7% in the antihistamine group. Partially effective treatment was more common in the antihistamine group (41.7% vs. 25.4%). The antihistamine group had a higher rate of ineffective treatment (11.7% vs. 6.6%). Overall, steroids led to better symptom resolution and fewer ineffective cases than antihistamines (p=0.029), and the details are depicted in **Figure 1.**

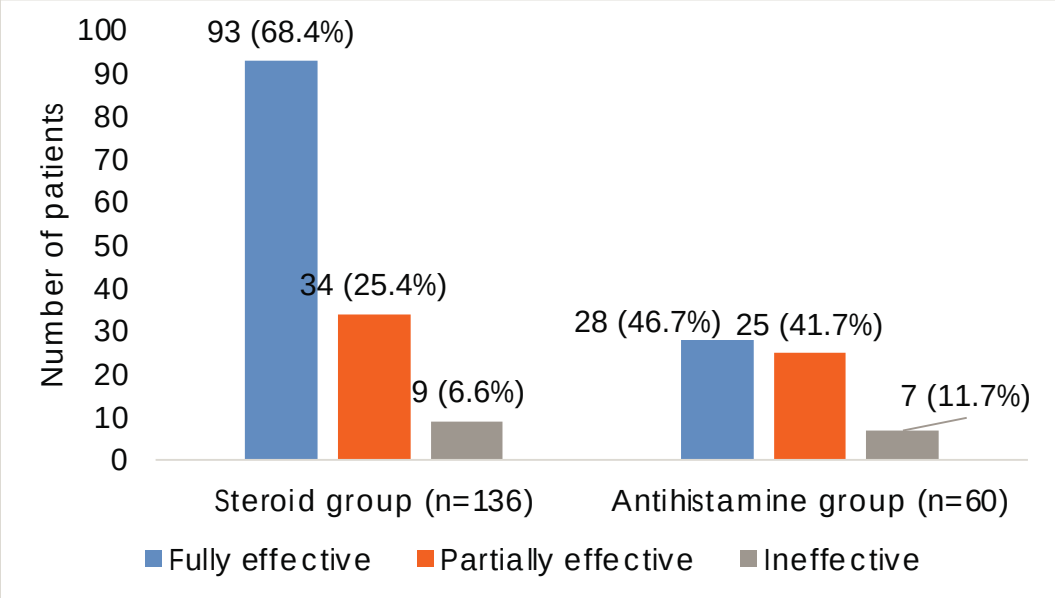

Figure 1: Comparison of Efficacy in Both Study Groups

DISCUSSION

In this study, a male predominance with 62.8% being male was reported in patients with adenoviral conjunctivitis. This gender disparity is consistent with the findings from a local study (52.7% male)[10] and regional data (61.8% male)[11], suggesting a higher susceptibility or perhaps a higher healthcare-seeking behavior among males for this condition. Higher levels of outside world exposure during the disease outbreak and environmental, hormonal, or behavioral factors could be behind this clear male predominance[12]. The median age of our patients was 31.00 years. This is comparable to the mean age reported by other regional studies, showing mean age as 29.68 years[13], and 39.3 years[14]. Adenoviral conjunctivitis affects a broad age spectrum, with a slight inclination towards young adults[15].

Symptomatically, pain and discharge, were the most common presenting symptoms in this study, noted in 89.8% and 78.6%, patients, respectively. Another study found redness and foreign body sensation as the most common symptoms in 94.4% and 92.1% of cases, respectively[13]. The present study found redness to be present in 71.4% patients. The consistency across studies highlights the typical clinical presentation of adenoviral conjunctivitis, emphasizing the need for clinicians to consider these symptoms highly indicative of the disease. Conjunctival hyperaemia and chemosis were the most frequent clinical findings in this study, documented in 77.0% and 61.2% of patients, respectively. This prevalence of conjunctival hyperaemia is slightly lower, but still comparable to another study that reported a prevalence of 92.1%[13]. The slight variation could be attributed to differences in patient populations or clinical assessment criteria. Some researchers have reported a higher incidence of subepithelial corneal infiltrates (13.9%) in PCR-positive patients, a finding not as prevalent (1.0%) in this study[16]. This discrepancy could be attributed to differences in diagnostic methods and population demographics. The literature provides insights into the unilateral nature of adenoviral conjunctivitis, which has been found in more than half of the patients, similar to the present finding where both eyes were involved in 53.6% of patients[10]. The bilateral eye involvement suggests a potential for high transmissibility and

warrants public health measures to prevent spread[17].

The use of steroids in adenoviral conjunctivitis is supported by the contemporary data that showed topical prednisolone to be effective in treating subepithelial corneal infiltrates in patients with adenoviral conjunctivitis[16]. Another study demonstrated the efficacy of topical corticosteroids in reducing "ocular surface disease index" scores and clinical symptomatology, underscoring the importance of steroids in the therapeutic regimen[18]. Treatment is generally tailored to symptom relief and inflammation control, regardless of the time elapsed since symptom onset. The contemporary literature has described the therapeutic efficacy of cyclosporin A and corticosteroids, highlighting the importance of tailored treatment approaches in managing persistent or severe cases of adenoviral conjunctivitis[18].

In this study, topical steroids proved to be significantly more effective in adenoviral conjunctivitis when compared to topical antihistamine (p=0.029). A study from Turkey revealed that topical corticosteroids resulted in less severe and shorter duration of adenoviral keratoconjunctivitis[18]. Corticosteroids are generally recommended to be used only when patients develop more severe manifestations of adenoviral conjunctivitis, such as the formation of pseudomembranes or the presence of symptomatic subepithelial infiltrates (SEI)[19]. However, there is still uncertainty regarding their potential role in preventing the onset of corneal SEI if administered during the early, acute phase of the infection. While corticosteroids are known to reduce inflammation, their use in the early stages raises questions about whether they might help mitigate long-term complications or, conversely, delay viral clearance and prolong the infectious period. Further research is needed to determine if early intervention with corticosteroids can influence the development of SEI or other complications in adenoviral conjunctivitis. The literature describes antihistamines and mast cell stabilizers resulting in alleviation of symptoms related to conjunctivitis, but the present study showed that topical steroids resulted in much better outcomes[20-22]. Some researchers have found topical steroids to be similar in efficacy to NSAIDs or artificial tears, but more studies are required comparing various contemporary treatment options in acute adenoviral conjunctivitis[23]. Although this research was conducted during an adenoviral conjunctivitis outbreak but this study did not specifically analyze seasonal trends. Some studies have observed a higher incidence in winter and summer, which highlights the potential influence of environmental factors on the epidemiology of adenoviral conjunctivitis[24,25]. This could inform future studies to explore the role of climatic conditions in the disease's prevalence.

The present study's limitations include the lack of PCR confirmation for adenoviral infection, limiting the specificity of our findings to adenoviral conjunctivitis alone. Future research could benefit from incorporating molecular diagnostic techniques to enhance the accuracy of diagnosis and correlation with clinical outcomes.

CONCLUSION

Topical corticosteroids are significantly more effective than antihistamines in treating adenoviral conjunctivitis, particularly in reducing key symptoms such as redness, discharge, and conjunctival hyperaemia.

ETHICAL APPROVAL

The ethical approval was obtained from the Institutional Ethical Committee through letter number:104587, dated: 1st June, 2023.

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None

CONFLICT OF INTEREST

The authors have no conflict of interest.

AUTHORS' CONTRIBUTIONS

MS contributed to the conception and design of the study, data collection, proofreading, critical revisions, and approved the final manuscript. **BS** was involved in drafting, data analysis, proofreading, critical revisions, and final approval. **SF** conceived the idea, participated in drafting, data analysis, proofreading, critical revisions, and gave final approval. **HA** contributed to data collection, synthesis, ensured data integrity, and participated in proofreading, critical revisions, and final approval. **NF, BA, and NM** were responsible for drafting, data analysis, proofreading, critical revisions, and approving the final version for publication.

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