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## Clinical profile of steroid-induced glaucoma in Bali Mandara Eye Hospital year 2019



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### ABSTRACT

**Introduction:** Glaucoma is an optic neuropathy characterized by optic disc cupping and visual field loss usually associated with raised intraocular pressure. Glaucoma incidence is rapidly increasing, with global incidence is estimated to reach 76 million in 2020. There are many causes of glaucoma; one of them is corticosteroid use. Unmonitored steroid use can be resulting in undesirable side effects such as steroid-induced glaucoma. This study aims to evaluate the clinical profile of steroid-induced glaucoma in Bali Mandara Hospital year 2019.

**Method:** A descriptive-cross sectional study was conducted using secondary data involving 35 medical records of patients diagnosed with glaucoma in Bali Mandara Eye Hospital, Denpasar, from January to December 2019. Age, gender, steroid type, routes and duration of steroid administration were recorded from medical records. Obtained data were analyzed

descriptively using SPSS version 23 for Windows.

**Results:** Patient's characteristics mostly were male 57.14% and 42.86% female, 31.43% were elderly >55 years old. They mostly used eye drops steroid (85.71%), and 14.29% took oral steroids. The most used eye drops were Dexamethasone eye drops (77.14%). For oral steroids, they took Methylprednisolone (8.57%) and Dexamethasone (5.71%). Most of them have symptoms after one year of steroid use (34.39%).

**Conclusion:** Steroid-induced glaucoma can occur in both males or females in all age groups, which the elderly and children have a higher risk. Most cases occur from topical steroids. Steroid-induced glaucoma is avoidable irreversible blindness. Therefore, the use of steroids must be judicious; self-medication must be avoided. The doctor must provide education to patients who are given steroid therapy.

**Keywords:** intraocular pressure, glaucoma, steroid, steroid-induced glaucoma

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### INTRODUCTION

Glaucoma is an optic neuropathy characterized by optic disk cupping and visual field loss usually associated with raised intraocular pressure (IOP).<sup>1,2</sup> In the last decade, the prevalence of glaucoma has increased rapidly in line with population growth and aging. In 2010, the number of glaucomas reached 60.5 million. Glaucoma incidence globally is estimated to reach 76 million in 2020 and 111.8 million in 2040. Glaucoma is the second leading cause of blindness worldwide after cataract. According to Riskesdas 2007, the prevalence of glaucoma was 0.46% in Indonesia, meaning that as many as 4 to 5 people out of 1000 people suffer from glaucoma.<sup>3</sup>

There are many causes of glaucoma,

one of them is corticosteroid use. The discovery of steroids was a major breakthrough in the treatment of various autoimmune and inflammatory diseases.<sup>4</sup> Currently, corticosteroids are applied successfully in many medical fields, including ophthalmology and are some of the most frequently prescribed drugs.<sup>5</sup> But unmonitored use of steroids, especially in eye drop formulations, is common in situations when it is easily available over-the-counter, resulting in undesirable side effects.<sup>6</sup> One of those undesirable effects is the elevation of intraocular pressure resulting in steroid-induced glaucoma. Steroid-induced glaucoma can occur in people of all ages, although children are less frequently reported to have IOP elevation with steroids. No gender and racial predilection exist for steroid-

induced glaucoma. The incidence of steroid-induced glaucoma in patients with systemic corticosteroids is unknown because most of them do not have their IOP checked. These patients may be discovered during a routine eye exam while on medication, or glaucoma may have progressed to the point of causing visual symptoms.<sup>7</sup>

The most common routes of steroid-induced glaucoma are topical and intraocular or periocular administration. It can also occur through systemic steroids, application to the skin, intranasally, or by inhalation.<sup>4</sup> Commonly used, potent corticosteroids like Betamethasone, Dexamethasone and Prednisolone have a significant tendency to induce glaucoma. Less potent steroids such as Fluorometholone and Medrysone

are less likely to induce glaucoma. The concentration or dose of a steroid is also related to the likelihood of producing an intraocular pressure elevation.<sup>7</sup> Patients who receive corticosteroid therapy may develop IOP elevations in days, weeks, months or years after initiating treatment. Topical corticosteroids typically produce IOP elevation within 2 to 6 weeks. Systemically administered steroids, however, may take a longer duration to elicit an IOP rise.<sup>7</sup>

This study aims to find out the clinical profile of steroid-induced glaucoma at Bali Mandara Eye Hospital in 2019. We evaluate steroid-induced glaucoma profile based on age, gender, types, routes and duration of steroid administration.

## METHODS

The study was done using cross-sectional and descriptive retrospective methods. It was conducted in Bali Mandara Eye Hospital, Denpasar, Indonesia. Samples were obtained from secondary data of patients' medical records with steroid-induced glaucoma in one year from January to December 2019 through total sampling. The inclusion criteria were all patients who came to Bali Mandara Eye Hospital diagnosed with steroid-induced glaucoma from January to December 2019, while the exclusion criteria were all

glaucoma patients that were not caused due to steroid use.

The variables obtained were age, gender, steroid type, routes and duration of steroid administration. The age was classified according to the Indonesian Health Department classification of age groups into child (5-11 years old), teenager/adolescent (12-25 years old), adult (26-45 years old), early elderly (46-55 years old) and late elderly (>55 years old). The type of steroid was recorded based on the steroid used by the patient, which is written in the medical record. The steroid administration route is how the patient uses steroids, either topically, periocular, intravitreal, inhalation, or oral. The duration of steroid administration is the time from the initial use of steroids to cause glaucoma symptoms. The obtained data were analyzed descriptively using SPSS version 23 for Windows.

## RESULTS

From January 2019 to December 2019, 35 data were obtained from patients diagnosed with steroid-induced glaucoma. Most of the patients were male (57.14%) male and 42.86% female. The patient's age was ranging from children to the elderly. About 5.71% of patients were categorized as children 5-11 years old, teenager/adolescent (14.29%), adult (22.86%), early

elderly (25.71%), and most of them were in the late elderly age group (31.43%). The prevalence of steroid-induced glaucoma based on demographics can be seen in Table 1.

Based on the steroid administration route, as we can see in Table 2, most of the patients use local steroids or steroid eye drops (85.71%), and the other 14.29% used oral steroids. The most widely local or steroid eye drops used Dexamethasone (77.14%) and 8.57% using Prednisolone eye drops. In the oral route, the prevalence of Methylprednisolone and Dexamethasone usage were 8.57% and 5.71%, respectively.

The duration of steroid use counted from the first steroid usage until the patient came for treatment. Most of them have been using the steroid for one year (34.69%). The other using the steroid for one week (2.86%), 1-3 months (28.75%), 4-6 months (17.14%), 8-11 months (2.86%), two years (5.71%), three years (2.86%) and five years (5.72%) as we can see in Figure 1 below.

## DISCUSSION

Increased IOP due to steroid use can occur in all age groups, although children are reported less frequently. The previous study shows that older patients have a greater risk of being steroid induced glaucoma.<sup>7</sup> This is consistent with this study's result, which showed steroid induced glaucoma is most common in the elderly. No gender and racial predilection exist for steroid-responsive glaucoma.<sup>7</sup> The results of this study showed the number of male patients was slightly more than female, 57.14% male and 42.86% female.

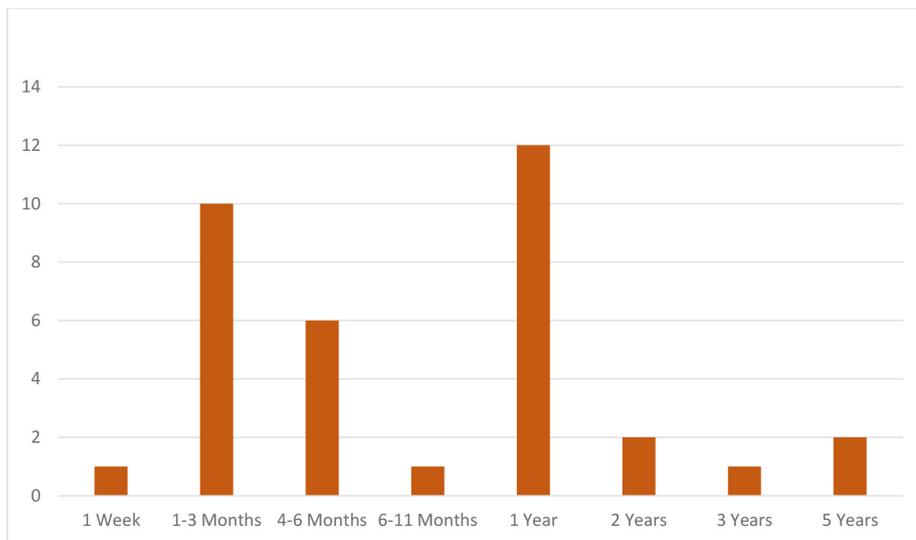
Patients with steroid-induced glaucoma have increased IOP due to response to steroids with various steroid administration routes. Most steroid-induced glaucoma cases occur from exogenous steroids, which may be given topically, periocular or systemically. However, endogenous steroids can also cause this condition.<sup>7</sup> In this study also showed that most patients (87.71%) with glaucoma due to steroids experienced an increase in IOP due to local steroids. In general, the pressure inducing effect of a topical steroid is proportional to its anti-inflammatory potency. Commonly used, potent corticosteroids like

**Table 1. The prevalence of steroid-induced glaucoma based on demographics**

	n (%)
<b>Age Group (years)</b>	
Child (5-11)	2 (5.71%)
Teenager/Adolescent (12-25)	5 (14.29%)
Adult (26-45)	8 (22.86%)
Early elderly (46-55)	9 (25.71%)
Late elderly (>55)	11 (31.43%)
<b>Gender</b>	
Male	20 (57.14%)
Female	15 (42.86%)
<b>Total</b>	35 (100%)

**Table 2. Route of administration and steroid type**

	n (%)
<b>Local</b>	<b>30 (85.71%)</b>
Dexamethasone	27 (77.14%)
Prednisolone	3 (8.57%)
<b>Oral</b>	<b>5 (14.29%)</b>
Methylprednisolone	3 (8.57%)
Dexamethasone	2 (5.71%)



**Figure 1.** Duration of steroid administration

Betamethasone, Dexamethasone, and Prednisolone have a significant tendency to induced glaucoma. Less potent steroids such as Fluorometholone and Medrysone are less likely to induced IOP elevations.<sup>7</sup> Kersey et al. have reported differences in the level of steroid response in known high responders to steroid for different preparations and found that the higher the steroid potency, the greater the ocular hypertensive effect; the study shows that Dexamethasone 0.1% has the highest IOP increase response.<sup>8</sup> This is consistent with the results of this study, where 77.14% of patients experience steroid induced glaucoma after the use of Dexamethasone eye drops.

Patients who receive corticosteroid therapy may develop IOP elevations in days, weeks, months, or years after initiating treatment. Topical corticosteroids typically produce IOP elevation within 2 to 6 weeks. Systemically administered steroids, however, may take a longer duration to elicit an IOP rise.<sup>7,9</sup> In this study, the increase in IOP varies from 1 week to 5 years. Most patients use steroids for one year. This can happen because, at first, it was asymptomatic, and most of these patients do not have their IOP checked. These patients may be discovered during a routine eye exam while on medication, or glaucoma may have progressed to the point of causing visual symptoms.<sup>7</sup> Steroid-induced glaucoma is a disease that can be prevented. Many ocular or extraocular diseases that require

steroid therapy are one cause of excessive use of steroids.

Another thing that causes steroids to be overused is that steroids can reduce symptoms quickly to feel better, and patients continue steroid therapy without the doctor's supervision. In addition, steroids are very easy to get over-the-counter and relatively cheap, so patients can easily get steroids. This study's limitation is the small sample size due to the short research period (1 year). Thus further research with a bigger scale is needed to validate these study findings. This study can provide basic data for future studies, especially analytic studies that evaluate the relationship between steroid use and the incidence of glaucoma-induced steroids.

## CONCLUSION

In conclusion, data obtained in January-December 2019, there were 35 patients diagnosed with steroid-induced glaucoma. Most of the patients were male, elderly (>55 years) and using local steroids (Dexamethasone eye drops). The duration of administration of steroids to cause symptoms varies from 1 week to 5 years. Steroid-induced glaucoma is avoidable irreversible blindness. Therefore, the use of steroids must be judicious. Self-medication must be avoided. The doctor must provide education to patients who are given steroid therapy. If possible, steroids are replaced with nonsteroidal

anti-inflammatory drugs, and patients who receive steroid therapy should be monitored regularly.

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## ETHICAL CLEARANCE

This study has obtained ethics approval.

## CONFLICT OF INTEREST

We declare that there was no conflict of interest in this study.

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## AUTHOR CONTRIBUTION

All authors contributed equally to this study.

## REFERENCES

1. Riordan-Eva P, Augsburger JJ. Vaughan & Asbury's General Ophthalmology. New York: McGraw-Hill Education. 2018.
2. American Academy of Ophthalmology. Glaucoma. San Francisco: European Board of Ophthalmology. 2018.
3. Kemenkes RI. Situasi Glaukoma di Indonesia. Infodatin. 2019.
4. Razeghinejad M, Katz L. Steroid-Induced Iatrogenic Glaucoma. *Ophthalmic Res.* 2012; 66-80.
5. Marcus MW et al. Corticosteroid and Open-Angle Glaucoma in the Elderly: A Population-Based Cohort Study. *Drugs & Aging.* 2012
6. Phalke S, Kaushik S, Kaur S, Pandav S. Steroid-induced Glaucoma: An Avoidable Irreversible Blindness. *J. Curr. Glaucoma Pract.* 2017;67-72.
7. Dada T, Nair S, Dhawan M. Steroid-induced Glaucoma. *J. Curr. Glaucoma Pract.* 2009;33-38.
8. Kersey J, Broadway D. corticosteroid-induced glaucoma: a review of the literature. *Eye.* 2006;407-416.
9. Sebastian M, Kusumadaja MA, Sutyanan IWE. Perubahan tekanan intraokuler pasca ekstraksi lensa pada pasien glaukoma sekunder akibat katarak senilis di Rumah Sakit Umum Pusat Sanglah Denpasar. *Intisari Sains Medis.* 2020;11(2):745-749.



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