





# Assessment and Knowledge of Long-Term Steroid Use and Its Related Cataract & Glaucoma Development Among Hail Residents

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**Purpose:** This study evaluated the prevalence of steroid use and public awareness of its ocular complications, including cataracts and glaucoma, in Hail, Saudi Arabia.

**Methods:** A descriptive cross-sectional study was conducted in Saudi Arabia's Hail region from September 2024 to November 2024, targeting eligible and accessible residents aged 18 years or older. Data was collected using a pre-structured online questionnaire developed by the researchers. The final version was independently reviewed and distributed online to eligible applicants. The collected data included socio-demographic information, medical history, personal habits, and knowledge of potential associations between steroid use and eye diseases. Data analysis was done using SPSS version 26 based on descriptive statistics and relations using the Pearson  $\chi^2$  test and exact probability test.

**Results:** The study surveyed young adults aged 18 years or more, with 51.8% being male. Most participants (74.5%) had never used steroids. Eye drops were the most common, followed by topical creams. 30.8% of participants had good knowledge about long-term steroid use with cataract development, while 21% had a good knowledge level for steroid use and glaucoma development. In total, 24.7% had good knowledge about eye diseases.

**Conclusion:** A study in Hail, Saudi Arabia reveals a significant lack of public knowledge about the long-term use of steroids and associated ocular risks, particularly cataracts and glaucoma. Despite never using steroids, those who have used them often prefer short-term treatments. The study recommends improved patient education, health interventions, and regulation of over-the-counter steroids usage, especially for younger populations and those without healthcare backgrounds.

**Keywords:** long-term steroid use, cataract, glaucoma, knowledge, Saudi Arabia

## Introduction

Because of their strong anti-inflammatory and immunosuppressive qualities, steroids, especially corticosteroids (CS) are widely used in topical and systemic forms to treat autoimmune and chronic inflammatory diseases.<sup>1</sup> Steroids have therapeutic benefits, but long-term or high-dose use may cause several side effects, the most serious of which are ocular complications like cataracts and glaucoma.<sup>2,3</sup> CS-induced cataracts, which frequently appear as posterior subcapsular cataracts, are caused by structural alterations in the lens and, if left untreated, can lead to severe visual impairment.<sup>4</sup> Furthermore, it is well known that CS raises intraocular pressure, which can result in glaucoma, a progressive optic neuropathy that is still one of the main causes of irreversible blindness globally.<sup>5</sup>

CS use in Saudi Arabia, similar to many other countries, is widespread for treating various conditions, including inflammatory diseases, autoimmune disorders, and allergic reactions.<sup>6</sup> Research conducted in Saudi Arabia has raised concerns about the misuse and long-term use of CS, especially among patients with chronic conditions and those using

topical steroids for skin issues.<sup>7</sup> Studies indicate that CS -induced cataracts and glaucoma pose significant public health challenges, yet there is a lack of comprehensive public education regarding these risks.<sup>8</sup> Additionally, improper use of CS without medical supervision is common, further increasing the risk of severe adverse effects.<sup>9</sup>

Apart from cataracts and glaucoma, steroids can cause several other ocular complications. Central serous chorioretinopathy (CSC) is one such complication, where fluid builds up under the retina, potentially leading to vision loss. Steroid-induced ocular hypertension can also occur, characterized by elevated intraocular pressure without the presence of glaucomatous optic neuropathy. Additionally, delayed wound healing and increased susceptibility to infections are notable side effects of steroid use in the eye.<sup>10,11</sup>

Evidence suggests that CS can accelerate cataract formation and raise intraocular pressure, potentially leading to glaucoma, particularly among individuals predisposed to ocular hypertension.<sup>10</sup> Understanding these risks is crucial, as both conditions are progressive and may lead to irreversible vision loss if undetected and untreated. Studies have shown that patient awareness and knowledge about these complications are often limited, indicating a need for improved patient education on the risks associated with long-term steroid therapy.<sup>12,13</sup> This study aims to assess participants' knowledge regarding the risks of prolonged steroid use and their understanding of associated ocular complications, specifically cataracts, and glaucoma, to inform future educational interventions and clinical guidance.

## Materials and Methods

A Descriptive cross-sectional study was conducted in the Hail region, Saudi Arabia during the period from September 2024 to November 2024. The cross-sectional approach is the most suitable for survey studies assessing public issues with the flexibility to assess magnitude and frequency of the main study outcome. The study targeted all eligible (older than 18 years with internet access and who agree to participate in the study) and accessible residents in the Hail region during the study period. Residents at Hail for at least 6 months, aged 18 years or more, who agreed to participate in the study, and who filled out the survey completely were included. Others who refused to participate, ages less than 18 years were excluded. A total sample of 500 eligible residents was required to estimate an average good awareness level of 49%,<sup>14</sup> among adults with a precision of 5% at 95% confidence level and the design effect is 2. The sample size was calculated using Epi-Info 7 software for sample size calculation based on reported parameters. Eligible and accessible residents were included consecutively till achieving the required sample size or no more new answers were achieved. After obtaining ethical committee approval, data were collected using a pre-structured online questionnaire developed by the study researchers. The questionnaire based on a thorough literature review of similar studies and consultations with experts in the field. A pilot study involving 20 residents was conducted to evaluate the validity, reliability, and clarity of the questionnaire. The pilot showed high validity of the questionnaire items with an estimated  $\alpha$ -Cronbach's of 0.86. The final version of the questionnaire was independently reviewed by two individuals to ensure consistency and accuracy. Once finalized, the questionnaire was distributed online via Google Forms through social media platforms to eligible applicants. The collected data included participants' socio-demographic information (such as age, gender, college, residence, marital status, and monthly income), personal and family medical history related to glaucoma and cataracts, personal habits (including smoking history and steroid use, along with reasons for steroid use), knowledge of the potential association between steroid use and cataract or glaucoma development, and the sources of information participants have regarding the effects of steroid use on eye diseases. All participants provided informed consent, in accordance with the Declaration of Helsinki.

## Data Analysis

The data were collected, reviewed, and then fed to Statistical Package for Social Sciences version 26 (Released 2019. Armonk, NY: IBM Corp). All statistical methods used were two-tailed with an alpha level of 0.05 considering significance if P value less than or equal to 0.05. An overall knowledge score was computed by summing the correct answers where the correct answer was given a 1-point score and 0 was given otherwise. Participants with knowledge scores less than 60% of the total correct answers were considered with poor knowledge levels while others with knowledge scores of 60–100% were considered to have good knowledge levels. Descriptive analysis for categorical data was done using frequencies and percentages, whereas numerical data were presented as mean with standard

deviation. Also, participants' knowledge and awareness about long-term steroid use and its relation with eye diseases (cataract and glaucoma development) were tabulated while the overall knowledge level and their source of information were graphed. Cross tabulation for showing factors associated with participants overall knowledge level using Pearson Chi-Square test and exact probability test for small frequency distributions.

## Results

Table 1 presents the socio-demographic characteristics of 510 study participants of Hail region, Saudi Arabia. The majority were young adults, with 44.7% aged 18–24 years and 27.3% aged 25–30 years. The age ranged from 18 to 55 years old. Males comprised 51.8% of the sample, while females represented 48.2%. A large proportion resided in the city

**Table 1** Socio-Demographic Characteristics of Study Participants, Hail, Saudi Arabia (n=510)

Socio-Demographics	No	%
<b>Age in years</b>		
18–24	228	44.7%
25–30	139	27.3%
31–35	18	3.5%
> 35	125	24.5%
<b>Gender</b>		
Male	264	51.8%
Female	246	48.2%
<b>Residence</b>		
City	476	93.3%
Village	34	6.7%
<b>Marital status</b>		
Single	357	70.0%
Married	147	28.8%
Divorced / widow	6	1.2%
<b>Nationality</b>		
Saudi	489	95.9%
Non-Saudi	21	4.1
<b>Educational level</b>		
Below secondary	7	1.4%
Secondary	67	13.1%
University	403	79.0%
Post-graduate	33	6.5%
<b>Occupation</b>		
Not working	80	15.7%
Student	198	38.8%
Non-health care staff	137	26.9%
Health care staff	72	14.1%
Retired	23	4.5%
<b>Monthly income</b>		
< 5000 SR	240	47.1%
5000–10000 SR	96	18.8%
> 10000 SR	174	34.1%

(Continued)

**Table 1** (Continued).

<b>Socio-Demographics</b>	<b>No</b>	<b>%</b>
<b>Have you received education regarding long steroid use?</b>		
Yes	90	17.6%
No	420	82.4%
<b>Did you receive lectures or information about eye diseases?</b>		
Yes	169	33.1%
No	341	66.9%
<b>Chronic health problems</b>		
No	297	58.2%
Hypo or hypermetropia	129	25.3%
DM	84	16.5%
<b>Family history of eye diseases</b>		
No	226	44.3%
Hypo or hypermetropia	183	35.9%
Cataract	100	19.6%
Glaucoma	36	7.1%
DM	7	1.4%

(93.3%), and most participants were single (70.0%). Regarding nationality, 95.9% were Saudi, and 79.0% had university-level education. Occupation-wise, 38.8% were students, 26.9% were non-healthcare staff, and 15.7% were not working. Regarding income, 47.1% had a monthly income of less than 5000 SR per month, while 34.1% reported for 10000 SR. As for education on long-term steroid use and eye diseases, most participants (82.4% and 66.9%, respectively) reported not receiving any information. Exact of 25.3% of participants had hypo- or hypermetropia, 16.5% had diabetes, and 58.2% reported no chronic health problems. About family history, 44.3% had no eye diseases in the family, but hypo- or hypermetropia (35.9%) and cataracts (19.6%) were the most commonly reported conditions.

In the history of steroid use (see Table 2), a significant majority of participants (74.5%, n=380) reported that they had never used steroids. A smaller group, 8.0% (n=41), indicated that they used steroids infrequently. Additionally,

**Table 2** History of Steroid Use Among Study Participants, Hail Saudi Arabia (n=510)

<b>Steroid Use</b>	<b>No</b>	<b>%</b>
<b>Have you ever used steroids?</b>		
Never	380	74.5%
Infrequently	41	8.0%
< 2 weeks	38	7.5%
2 weeks –1 month	13	2.5%
1 month-2 months	13	2.5%
> 2 months'	25	4.9%
<b>The route of steroids used</b>		
Local creams	1	0.8%
Eye drops	73	56.2%
Topical creams near the eyes	23	17.7%
Oral steroids	20	15.4%
Nasal spray	13	10.0%

(Continued)

**Table 2** (Continued).

<b>Steroid Use</b>	<b>No</b>	<b>%</b>
<b>Reasons of using steroids</b>		
Redness	42	32.3%
Itching	58	44.6%
Immune disease	3	2.3%
Swelling	21	16.2%
All of them	6	4.6%
<b>Name of used eye drops</b>		
Tobradex	14	19.2%
Loxtra	3	4.1%
Maxitrol	42	57.5%
I dont know	14	19.2%
<b>Was the steroid sue prescribed by a physician</b>		
Yes	79	60.8%
No	51	39.2%

7.5% (n=38) had used steroids for less than two weeks, while 2.5% (n=13) used them for durations ranging from two weeks to two months. Only a minority of participants (4.9%, n=25) reported using steroids for more than two months. When it comes to the method of steroid administration, eye drops were the most commonly used (56.2%, n=73), followed by topical creams applied near the eyes (17.7%, n=23) and oral steroids (15.4%, n=20). Very few participants used local creams (0.8%) or nasal sprays (10.0%). The main reasons for steroid use included itching (44.6%, n=58) and redness (32.3%, n=42). Smaller proportions of participants used steroids for swelling (16.2%, n=21) or immune-related diseases (2.3%, n=3). A few participants (4.6%, n=6) reported using steroids for multiple reasons. Among the specific types of eye drops used, Maxitrol (combination of neomycin, polymyxin B, and dexamethasone) was the most common (57.5%, n=42), followed by Tobradex [tobramycin and dexamethasone] (19.2%, n=14) and Loxtra [ofloxacin, prednisolone acetate] (4.1%, n=3). Additionally, 19.2% (n=14) of users were unsure of the name of the eye drop. Finally, the majority of steroid users (60.8%, n=79) received their prescriptions from a physician; however, a significant proportion (39.2%, n=51) used steroids without a prescription. When assessing participants' understanding of cataracts and the effects of steroids on their development (Table 3), it was evident that many participants had limited knowledge. Only 31.0% (n=158) correctly identified cataracts as opacity

**Table 3** Knowledge of Long-Term Steroid Use and Its Related Cataract Development Among Study Participants in Hail, Saudi Arabia

<b>Items</b>	<b>Yes</b>		<b>No</b>		<b>I do not know</b>	
	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>
A cataract is an opacity of the inside lens of the eye	158	31.0%	14	2.7%	338	66.3%
A cataract is described as looking like waxed paper	145	28.4%	12	2.4%	353	69.2%
Aging and family history are the most common risk factors for cataracts	222	43.5%	18	3.5%	270	52.9%
A cataract is associated with deterioration of the vision	324	63.5%	7	1.4%	179	35.1%
Cataracts could result in complete blindness if left untreated	302	59.2%	10	2.0%	198	38.8%
Chronic usage of steroids is associated with ocular effects including glaucoma and cataract	136	26.7%	24	4.7%	350	68.6%
Topical steroid is the most common type associated with cataract	107	21.0%	21	4.1%	382	74.9%
Oral and intravenous steroids could increase the incidence of cataracts but with lower association than topical steroids	110	21.6%	28	5.5%	372	72.9%
Steroid-induced cataracts can be distinguished from other types of cataracts	83	16.3%	34	6.7%	393	77.1%
Steroid-induced cataracts could be treated with surgery	174	34.1%	24	4.7%	312	61.2%

in the lens of the eye, with a significant majority (66.3%, n=338) expressing uncertainty or lack of awareness. Similarly, only 28.4% (n=145) accurately described cataracts as resembling waxed paper, while 69.2% (n=353) were unsure or incorrect in their response. On a more positive note, 43.5% (n=222) recognized aging and family history as common risk factors for cataracts, although 52.9% (n=270) remained uncertain. A larger proportion, 63.5% (n=324), understood that cataracts are associated with vision impairment, indicating a relatively better grasp of the condition's impact. However, awareness of the link between steroid use and cataracts was much lower. Only 26.7% (n=136) of participants identified correctly that chronic steroid use can lead to ocular effects, including glaucoma and cataracts, while 68.6% (n=350) were unaware of this connection. Furthermore, only 21.0% (n=107) correctly identified topical steroids as the most common type associated with cataracts, whereas a larger portion (74.9%, n=382) did not know or answered incorrectly. Additionally, only 21.6% (n=110) understood that oral and intravenous steroids could increase the incidence of cataracts, while 72.9% (n=372) were unsure or incorrect. The distinction between steroid-induced cataracts and other types of cataracts was poorly understood, with only 16.3% (n=83) responding correctly and the majority (77.1%, n=393) unable to answer. Finally, 34.1% (n=174) correctly stated that steroid-induced cataracts could be treated with surgery, yet 61.2% (n=312) were either incorrect or did not know. Table 4 shows the level of knowledge among study participants in Hail, Saudi Arabia, about glaucoma

**Table 4** Knowledge of Long-Term Steroid Use and Its Related Glaucoma Development Among Study Participants in Hail, Saudi Arabia

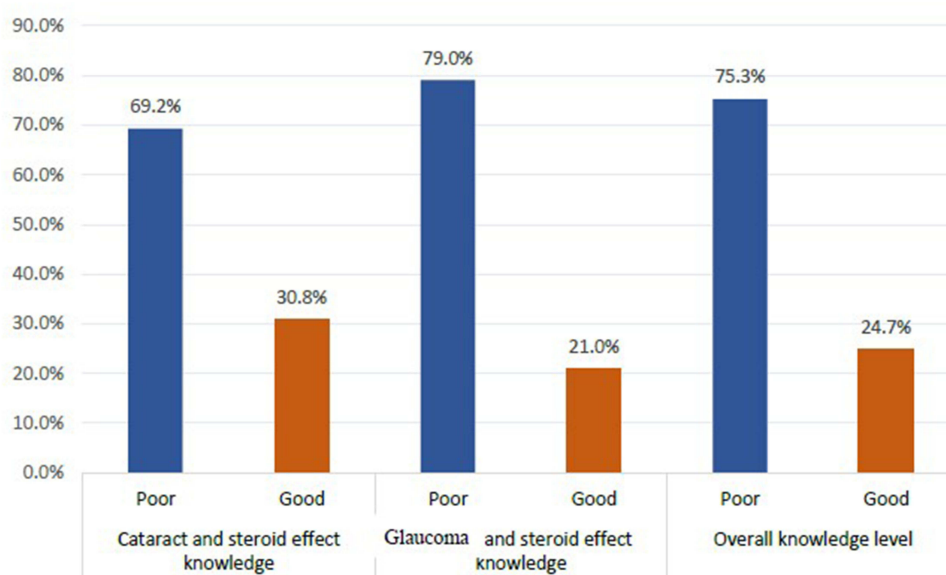
Items		No	%
<b>What is the normal value of eye pressure</b>	Between 11 and 21	116	22.7%
	Between 8 and 12	48	9.4%
	> 21	16	3.1%
	I do not know	330	64.7%
<b>Definition of glaucoma</b>	Damage to the optic nerve and high pressure in the eye	1	0.2%
	Damage to the optic nerve with or without high intraocular pressure	94	18.4%
	Condition having eye pain	45	8.8%
	Condition with raised IOP	135	26.5%
	I do not know	235	46.1%
<b>Is it possible to restore the lost sight with glaucoma treatment</b>	Yes	115	22.5%
	No	87	17.1%
	I do not know	308	60.4%
<b>Glaucoma is a treatable condition</b>	Yes	256	50.2%
	No	11	2.2%
	I do not know	243	47.6%
<b>Glaucoma is associated with deterioration of the vision</b>	Yes	301	59.0%
	No	17	3.3%
	I do not know	192	37.6%
<b>Chronic usage of steroids is associated with ocular effects including glaucoma and cataract</b>	Yes	198	38.8%
	No	17	3.3%
	I do not know	295	57.8%
<b>Topical steroid is the most common type associated with Glaucoma</b>	Yes	77	15.1%
	No	46	9.0%
	I do not know	387	75.9%
<b>Oral and intravenous steroids could increase the incidence of Glaucoma but with lower association than topical steroids</b>	Yes	63	12.4%
	No	45	8.8%
	I do not know	402	78.8%

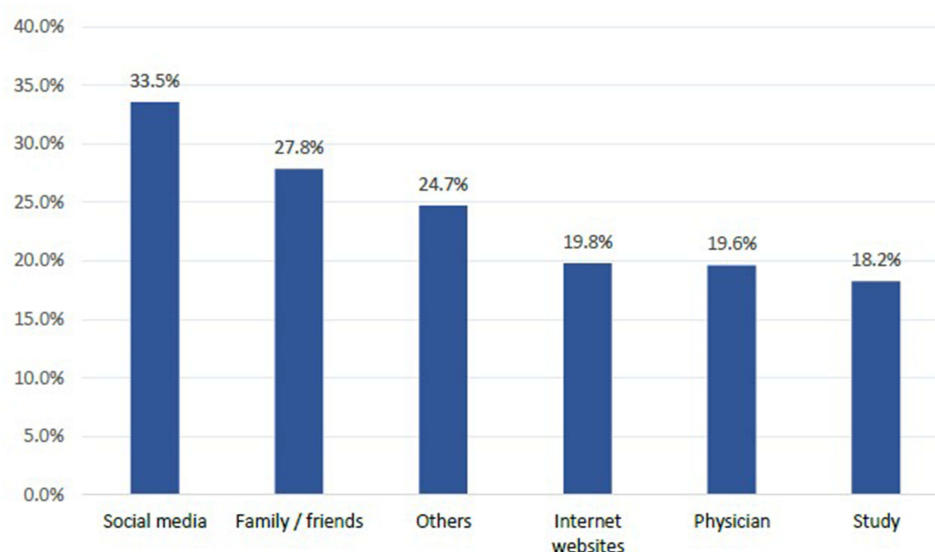
(Continued)

**Table 4** (Continued).

Items		No	%
<b>Chronic steroids could result in increased intraocular pressure</b>	Yes	136	26.7%
	No	31	6.1%
	I do not know	343	67.3%
<b>Steroid-induced Glaucoma can be distinguished from other types of Glaucoma</b>	Yes	75	14.7%
	No	48	9.4%
	I do not know	387	75.9%
<b>Steroid-induced Glaucoma could be treated with surgery</b>	Yes	145	28.4%
	No	25	4.9%
	I do not know	340	66.7%

and its link to long-term steroid use. Only 22.7% correctly identified the normal range for eye pressure (between 11 and 21 mmHg), while most participants (64.7%) did not know the correct range. Similarly, just 18.4% correctly defined glaucoma as “damage to the optic nerve with or without high intraocular pressure”, while many others (46.1%) did not know. When asked whether vision loss due to glaucoma can be restored, only 22.5% reported “No”, while 60.4% did not know. Regarding treatment, half of the participants (50.2%) knew that glaucoma is treatable, but almost half (47.6%) did not know. A majority (59.0%) understood that glaucoma leads to vision deterioration, while 37.6% were unsure. Concerning the relationship between chronic steroid use and eye conditions like glaucoma, 38.8% correctly reported that steroids could cause such problems, though 57.8% did not know. Only 15.1% correctly identified that topical steroids are most commonly linked to glaucoma, and just 12.4% knew that oral and intravenous steroids also contribute to increased risk, though most participants were unsure. Regarding steroid-induced intraocular pressure, 26.7% were aware that chronic steroid use can cause it, while many (67.3%) were unsure. Regarding distinguishing steroid-induced glaucoma from other types, only 14.7% (n=75) correctly answered that it can be distinguished, while a significant majority (75.9%, n=387) were uncertain. Finally, only 4.9% (n=25) stated that surgery could not be a treatment option, while 66.7% (n=340) did not know. **Figure 1.** The overall knowledge of Long-Term Steroid Use and its Related Cataract & Glaucoma Development. Exact of 157

**Figure 1** The overall knowledge of Long-Term Steroid Use and its Related Cataract & Glaucoma Development Among Hail Residents.



**Figure 2** The source of information about steroid use and its effect on eye diseases.

(30.8%) participants had an overall good knowledge about long-term CS use and development of cataract, 107 (21%) had an overall good knowledge about long-term CS use and development of glaucoma. In total, 126 (24.7%) participants had an overall good knowledge of the long-term use of CS and the development of eye diseases. Concerning the sources of information (Figure 2), the most reported were social media (33.5%), family/friends (27.8%), internet websites (19.8%), physicians (19.6%), and their study (18.2%). Table 5 outlines the factors associated with participants' knowledge regarding long-term steroid use and its effects on eye diseases. Younger participants (aged 18–24 years) showed a higher percentage of good knowledge (25.9%), whereas older age groups,

**Table 5** Factors Associated With Participants' Knowledge About Long Steroid Use and Its Effect on Eye Disease

Factors		Overall Knowledge Level				p-value
		Poor		Good		
		No	%	No	%	
Age in years	18–24	169	74.1%	59	25.9%	0.001*
	25–30	83	59.7%	56	40.3%	
	31–35	17	94.4%	1	5.6%	
	> 35	115	92.0%	10	8.0%	
Gender	Male	189	71.6%	75	28.4%	0.045*
	Female	195	79.3%	51	20.7%	
Residence	City	358	75.2%	118	24.8%	0.869
	Village	26	76.5%	8	23.5%	
Marital status	Single	263	73.7%	94	26.3%	0.206^
	Married	115	78.2%	32	21.8%	
	Divorced / widow	6	100.0%	0	0.0%	
Educational level	Below secondary	6	85.7%	1	14.3%	0.001*
	Secondary	50	74.6%	17	25.4%	
	University	327	81.1%	76	18.9%	
	Post-graduate	1	3.0%	32	97.0%	

(Continued)

Table 5 (Continued).

Factors		Overall Knowledge Level				p-value
		Poor		Good		
		No	%	No	%	
Occupation	Not working	57	71.3%	23	28.8%	0.001*
	Student	159	80.3%	39	19.7%	
	Non-health care staff	115	83.9%	22	16.1%	
	Health care staff	30	41.7%	42	58.3%	
	Retired	23	100.0%	0	0.0%	
Have you received education regarding long steroid use?	Yes	34	37.8%	56	62.2%	0.001*
	No	350	83.3%	70	16.7%	
Did you receive lectures or information about eye diseases?	Yes	101	59.8%	68	40.2%	0.001*
	No	283	83.0%	58	17.0%	
Chronic health problems	Yes	158	74.2%	55	25.8%	0.621
	No	226	76.1%	71	23.9%	
Family history of eye diseases	Yes	214	75.4%	70	24.6%	0.973
	No	170	75.2%	56	24.8%	
Have you ever used steroids	Yes	91	70.0%	39	30.0%	0.048*
	No	293	77.1%	87	22.9%	
The route of steroids used	Local creams	0	0.0%	1	100.0%	0.001*^
	Eye drops	48	65.8%	25	34.2%	
	Topical creams near the eyes	23	100.0%	0	0.0%	
	Oral steroids	20	100.0%	0	0.0%	
	Nasal spray	0	0.0%	13	100.0%	
Was the steroid use prescribed by a physician	Yes	47	59.5%	32	40.5%	0.001*
	No	44	86.3%	7	13.7%	
Source of information about steroid effect	Physician	53	53.0%	47	47.0%	0.001*
	Social media	129	75.4%	42	24.6%	
	Internet websites	71	70.3%	30	29.7%	
	Study	55	59.1%	38	40.9%	
	Family/friends	107	75.4%	35	24.6%	
	Others	126	100.0%	0	0.0%	

**Notes:** P: Pearson  $\chi^2$  test, <sup>^</sup>Exact probability test, \*P < 0.05 (significant).

particularly those aged 31–35 years (5.6%) and those over 35 years (8%), exhibited notably lower knowledge levels ( $p = 0.001$ ). In terms of gender, males demonstrated a higher level of good knowledge (28.4%) compared to females (20.7%), with a significant difference noted ( $p = 0.045$ ). Educational attainment also played a crucial role; a remarkable 97.0% of post-graduate participants displayed good knowledge, contrasted with only 18.9% of university graduates and 14.3% of individuals with less than secondary education ( $p = 0.001$ ). Furthermore, healthcare workers showed significantly higher knowledge (58.3%) compared to those in non-healthcare occupations (16.1%) and students (19.7%) ( $p = 0.001$ ). Participants who had received education about long-term steroid use exhibited a much higher percentage of good knowledge (62.2%) than those who had not received any education (16.7%) ( $p = 0.001$ ). Additionally, participants who attended lectures or received information about eye diseases had a significantly higher level of knowledge (40.2%) compared to those who did not (17.0%) ( $p = 0.001$ ). Regarding steroid use, individuals who had ever used steroids reported higher knowledge levels (30.0%) compared to non-users (22.9%), with a statistically significant difference ( $p = 0.048$ ). The route of steroid administration also affected

knowledge; users of topical creams near their eyes (100%) and oral steroids (100%) had the least knowledge, while those using nasal sprays (100%) or local creams (100%) demonstrated better knowledge ( $p = 0.001$ ). Finally, participants who received information from a physician had a higher knowledge level (40.5%) than those who obtained information from other sources, such as social media (24.6%), family or friends (24.6%), or internet websites (29.7%) ( $p = 0.001$ ).

## Discussion

The current study showed that a significant majority of participants (74.5%) have never used steroids. This finding aligns with previous studies that indicate non-use is common, particularly among populations without specific medical indications for steroid therapy. Gluck et al<sup>15</sup> observed similar trends, suggesting that most individuals avoid using steroids unless they are medically necessary. Among those who do use steroids, only a small proportion reported infrequent use, with very few persons indicating use that lasted longer than two months. This corresponds with the work of Hoppé et al<sup>16</sup> who found that short-term use is generally preferred to limit potential side effects. Concerns about the risks associated with prolonged steroid use have been well-documented since Cushing's pioneering research on long-term exposure.<sup>17</sup> Eye drops were the most commonly used method of administration, followed by topical creams and oral steroids. These preferences reflect findings by Foster and de la Maza,<sup>6</sup> who reported that ocular and topical steroids are frequently used due to their localized effects, which help reduce systemic exposure. Participants primarily used steroids to address itching (44.6%) and redness (32.3%), consistent with the findings of Al Dhafiri M et al<sup>18</sup> who noted the common use of topical steroids for inflammatory symptoms in Saudi Arabia. Notably, more than one-third of steroid users did not have a physician's prescription, raising safety concerns similar to those highlighted by many other researchers in Saudi Arabia.<sup>19</sup> Research has shown that the use of non-prescribed CS is an increasing concern in Saudi Arabia, particularly regarding self-medication for common issues such as skin conditions and allergies. Many people obtain over-the-counter CS creams, eye drops, or nasal sprays without medical guidance, often due to their easy availability and the mistaken belief that they are safe.<sup>7-9,19,20</sup>

Regarding the associated effect of steroid long-term use on cataract development, the results indicate substantial gaps in participants' knowledge of cataracts and steroid-associated risks, consistent with prior studies highlighting limited public understanding of ocular diseases.<sup>21,22</sup> About one-third of participants could accurately define cataracts, and a majority were unsure, aligning with findings from similar studies on public awareness of cataract etiology.<sup>23</sup> Less than half recognized aging and family history as risk factors, and over half remained uncertain, suggesting partial but insufficient awareness.<sup>24</sup> Knowledge of steroid use and its link to cataracts was notably low, with only one-fourth understanding that chronic steroid use can contribute to cataract formation, despite substantial evidence linking steroids with ocular risks.<sup>25,26</sup> Awareness of the risks associated with oral, intravenous, and topical steroids was similarly low highlighting an urgent need for patient education, as these forms of steroids are known to accelerate cataract development.<sup>27</sup>

In total, the current study showed a gap in knowledge regarding the long-term use of CS and its association with the development of cataracts and glaucoma among participants in Hail, Saudi Arabia. The results reveal that less than one-third of participants had good knowledge about CS-induced cataracts, and about one-fifth had good knowledge about CS-induced glaucoma, with one-fourth of them demonstrating overall good knowledge of CS-related eye diseases. These levels of awareness are relatively low, considering the widespread use of CS for various chronic conditions, and highlight the need for better patient education on the risks of prolonged CS use. Our results are consistent with a similar trend of inadequate understanding of CS -related complications when compared to earlier Saudi Arabian studies. For example, only 27.5% of patients receiving long-term CS therapy were aware of the possible ocular complications, such as cataracts and glaucoma, according to a study by Al-Riyami et al.<sup>28</sup> Similarly, only 22% of the sample showed awareness of the ocular risks associated with CS use, according to Al-Harbi et al.<sup>29</sup> These results are similar to those found in this study, which found that only a small portion of participants knew about the eye conditions linked to CS treatment.

A study by Al-Moallem et al<sup>30</sup> found that only 15% of participants showed awareness of the risks of cataracts and glaucoma associated with long-term CS use, whereas our study's knowledge levels seem to be somewhat higher.

Despite some variations, the overall trend is clear: a large portion of the population is still unaware of the risks linked to long-term CS use. This lack of awareness can likely be attributed to several factors, including inadequate counseling from healthcare providers and the absence of public health campaigns specifically aimed at educating patients about the potential eye-related side effects of CS use.<sup>31</sup> A study by Al-Jumah et al<sup>32</sup> found that healthcare providers often focus more on the immediate benefits of CS therapy, neglecting to adequately inform patients about the possible long-term side effects. This gap in patient education may help explain the low level of awareness observed in our study.

In the current study, the most reported sources of information about long-term steroid use and cataract and glaucoma development were social media, family/friends, internet websites, physicians, and their study. Most indicate the prevalence of informal sources of information which explains the assessed low knowledge levels. On a more positive note, physicians were also identified as a key source of information, although fewer participants mentioned this option compared to more informal sources. This highlights a potential gap in patient education during medical consultations, where healthcare providers might not be thoroughly discussing the long-term effects of CS use or maybe emphasizing other aspects of treatment instead.

Regarding factors associated with participants' knowledge level, the study findings reveal that younger participants, particularly those aged 18–24 years, demonstrated higher levels of good knowledge compared to older age groups. Males had better knowledge than females, and educational attainment played a significant role, with post-graduates showing the highest knowledge levels. Healthcare workers had notably more knowledge than non-healthcare workers and students. Participants who received education about steroid use and those who attended lectures on eye diseases exhibited higher knowledge compared to those who did not. Prior use of steroids also correlated with better knowledge. Finally, individuals who received information from physicians had higher knowledge levels compared to those who obtained information from other sources, such as social media, family, or websites. These findings highlight the importance of targeted health education, particularly for those with lower educational levels or who are not healthcare workers.

## Study Limitations

When interpreting the results of this study, several limitations should be noted. The cross-sectional design prevents establishing causal relations for predictors of knowledge. The reliance on self-reported data from an online questionnaire may introduce bias and limit generalizability due to convenience sampling. Furthermore, the online distribution may have excluded individuals without internet access, affecting sample representativeness.

## Conclusions and Recommendations

The study reveals a significant lack of public knowledge about the long-term use of CS and their associated ocular risks, particularly cataracts and glaucoma, among the Saudi population. Despite the majority of participants having never used steroids, those who have used them often prefer short-term treatments. The study also found low awareness of steroid-induced cataracts and glaucoma, with less than one-third of participants having adequate knowledge. Most participants rely on informal sources for information about steroid use and its effects. In Saudi Arabia, there is a need for improved patient education and health interventions on the long-term side effects of CS, particularly for chronic conditions. Healthcare providers should discuss these risks during consultations, while public health campaigns should emphasize the importance of seeking medical advice. Regulation of over-the-counter CS usage and integration of information about risks in medical curricula and public health initiatives are recommended. Special attention should be given to younger populations, those with lower education levels, and individuals without healthcare backgrounds.

## Ethical Approval

The study has been reviewed and approved by the Research Ethics Committee (REC) at University of Hail, with the research number H-2024-468.

## Disclosure

The authors report no conflicts of interest in this work.

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