

ORIGINAL ARTICLE

Knowledge, attitudes, and practices regarding corticosteroid side effects for treating pediatric inflammatory diseases among the general population in the Makkah region, Saudi Arabia: a cross-sectional study.

Duaa Salah Fatani¹, Ali Alwan Almuntashri¹, Khalid Fawzi Amjad¹, Rimas Awad Alfahmi¹, Reem Khalid Alnemari¹, Mohammed Hassan Alzahrani¹, Abeer Shaker El Moursy Ali² 

ABSTRACT

Background: Corticosteroids (CSs) are widely prescribed medications because of their potent anti-inflammatory and immunosuppressive properties and are commonly used to treat a broad range of pediatric inflammatory conditions. Despite their therapeutic benefits, misuse, misconceptions, and reliance on non-medical information sources have contributed to poor public awareness, corticophobia, and reduced adherence to prescribed treatment. Previous studies in Saudi Arabia have reported inadequate awareness regarding CS use and its adverse effects. Therefore, this study aimed to assess public awareness regarding the side effects of CSs used in the treatment of pediatric inflammatory diseases.

Methods: A cross-sectional study was conducted in Makkah, Saudi Arabia, between January 15 and December 25, 2025. In this study, 401 adults aged ≥ 18 years who met the inclusion criteria and consented to participate were included. Data were collected from the participants using a structured online questionnaire distributed from March 13 to June 9, 2025. The questionnaire assessed sociodemographic characteristics, knowledge, awareness, and practices related to CS use.

Results: Most participants (297; 74.1%) demonstrated poor knowledge regarding the use, indications, and side effects of CSs in treating pediatric inflammatory diseases, whereas 104 (25.9%) demonstrated good knowledge.

Conclusions: The general population in the Makkah region has limited awareness of pediatric CS use and its potential side effects, highlighting the need for targeted health education and counseling to promote safe use and reduce complications. The findings should be interpreted in light of potential selection bias related to online convenience sampling and the predominance of younger participants.

Keywords: Awareness, corticosteroids, Makkah, pediatrics, side effects.

Introduction

Corticosteroids (CSs) are among the most widely prescribed medications because of their powerful anti-inflammatory and immunosuppressive properties. These properties make them a cornerstone in managing a broad spectrum of conditions characterized by immune system overactivity or widespread inflammation [1].

Correspondence to: Abeer Shaker El Moursy Ali

*Lecturer of Pathology, Makkah College, Makkah, Saudi Arabia.

Email: abeershaker72@gmail.com

Full list of author information is available at the end of the article.

Received: 29 July 2026 | **Revised:** 29 August 2026 |

Accepted: 13 September 2026



Clinically, they are commonly used in various conditions, including acute and chronic allergic reactions, bronchial asthma, chronic obstructive pulmonary disease (COPD), autoimmune disorders such as systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA), gastrointestinal disorders such as inflammatory bowel disease (IBD), and joint and muscle inflammation [2]. Additionally, they are used for the treatment of dermatological cases such as atopic dermatitis (eczema) [3].

Despite their significant therapeutic value, CSs may be used inappropriately by patients. In Saudi Arabia, nearly one-third (31.75%) of topical CS users reportedly self-medicated without physician supervision, following advice from pharmacists, family members, or friends [4]. A comparable study indicated that friends and family (45.5%) were the primary sources of information about CS use, followed by healthcare providers (38.8%) and social media (28.8%). Reliance on non-medical sources strongly shapes the public understanding of CSs, although the reliability of such information remains questionable. Furthermore, social media can contribute to the dissemination of misleading information [2].

Consequently, the inappropriate use of CSs has increased both local and systemic adverse effects, particularly among pediatric patients, who are more vulnerable to growth impairment and other long-term complications [5]. Findings from a study conducted in Makkah revealed that a considerable proportion of parents demonstrated suboptimal awareness and misconceptions regarding the adverse effects of long-term CS therapy [6]. This lack of awareness has been associated with a higher likelihood of adverse outcomes and early discontinuation of therapy among pediatric patients [5–6].

Moreover, recent evidence from the western region of Saudi Arabia revealed that the majority of participants (80.7%) exhibited corticophobia [7], which was primarily attributable to inadequate public awareness regarding CSs, with social media (32.3%) identified as the principal source of information, often responsible for exaggerating potential risks. Consequently, this fear negatively influences clinical management by reducing patient adherence to prescribed treatments [7].

Based on existing evidence and the wide spectrum of pediatric cases requiring CS therapy to manage inflammatory conditions [8], this study aimed to assess public awareness of CS-related side effects in pediatric patients with inflammatory diseases. The findings are expected to help identify prevalent misconceptions, knowledge gaps, and key areas for targeted educational interventions.

Methods

This descriptive cross-sectional study aimed to assess the awareness among the general population about the side effects of CS treatments for pediatric inflammatory conditions in Makkah, Saudi Arabia. Participants were recruited through a structured online questionnaire distributed electronically to adults aged 18 years or older

who were willing to participate between March 13, 2025, and June 9, 2025.

The research team developed the questionnaire based on established literature and previously validated instruments [1,8,9], with targeted modifications to align the items with the objectives and target population of the present study. The modified questionnaire was reviewed by the study supervisor prior to distribution to assess the clarity and relevance of the items. No additional formal psychometric validation or pilot testing was conducted for the modified questionnaire. It consisted of five main sections. The first section collected sociodemographic data, including age, gender, educational level, occupation, marital status, relationship to a pediatric patient with an inflammatory disease, and place of residence. The second section evaluated knowledge, focusing on participants' understanding of CSs, including familiarity with the term, their therapeutic roles, common uses (particularly in pediatric inflammatory diseases), and potential side effects. The third section assessed attitudes and explored participants' beliefs and concerns about CS use, as well as their preferences for alternative treatments for pediatric patients. The fourth section examined practices, including patterns of CS prescription and approaches to managing side effects in pediatric cases. Finally, the fifth section addressed participants' sources of information about CSs.

Using OpenEpi software, version 3.01 [10], the sample size was calculated based on a population of 32,175,224 individuals, as reported in the 2022 Saudi census [11]. With a 95% confidence interval (CI) and an anticipated response rate of 50%, the minimum required sample size was determined to be 385 participants.

This study was approved by a local Biomedical Research Ethics Committee (approval number: HAPO-02-K-012-2025-04-2668; approval date: 1 April 2025).

The questionnaire began with a concise explanation of the study's objectives, emphasizing that participation was entirely voluntary. No personal identifiers, including participants' names, were obtained, and all the responses were handled with strict confidentiality. Additionally, no data were obtained without the participants' informed electronic consent.

Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) (version 28.0; IBM Corp., Armonk, NY, USA). Incomplete questionnaires and responses with missing data were excluded from the final analysis. Descriptive statistics were used to summarize the participants' characteristics, knowledge, attitudes, and practices. Categorical variables were expressed as frequencies and percentages. Knowledge scores were computed by assigning one point for each correct answer, and the total score was converted into a percentage. Consistent with the scoring approach used in a previous Saudi Arabian CS-related knowledge study, a cutoff of 60% was used to categorize participants as having poor knowledge (<60%) or good knowledge (≥60%) [12].

To examine the associations between overall knowledge level and various sociodemographic and behavioral variables, the Pearson chi-square test (χ^2) was performed. For variables with small expected cell counts, the exact probability test was applied. A *p* value of less than 0.05 was considered to indicate statistical significance.

Results

Responses from participants residing outside the Makkah Region were excluded from the analysis. A total of 401 participants from the Makkah Region, Saudi Arabia, were included in the study. The majority of the participants were aged 18–25 years (294; 73.3%), followed by those aged 36–45 years (41; 10.2%), 26–35 years (31; 7.7%), and 46–55 years (26; 6.5%), while only a small proportion were aged >55 years (9; 2.2%). Female participants slightly outnumbered male participants, accounting for 217 (54.1%) and 184 (45.9%), respectively. Most participants had a university degree or higher (284; 70.8%), whereas 110 (27.4%) had secondary education and 7 (1.7%) had less than secondary education.

With respect to occupation, the largest group comprised students (272; 67.8%), followed by participants employed in non-healthcare jobs (75; 18.7%), unemployed individuals (36; 9%), healthcare professionals (12; 3%), and retirees (6; 1.5%). Most participants were single (299; 74.6%), whereas 92 individuals were married (22.9%), and 10 participants were divorced or widowed (2.5%). The majority reported no relation to a child with an inflammatory disease (330; 82.3%), whereas 54 (13.5%) had a first-degree relation and 17 (4.2%) had a second- or third-degree relation.

With respect to the child's age, "I don't know" was the most common response (322; 80.3%). Among those who were aware, the children's age ranged from 1 to 18 years, with slight variation across age categories. When asked about CS use by the child, 66 participants (16.5%) reported "yes," 47 (11.7%) reported "no," and the majority (288; 71.8%) were unsure. With respect to the route of CS administration, 34 participants (8.9%) reported oral use, 22 (5.7%) inhaled use, 14 (3.7%) local use, and 7 (1.8%) intravenous use, whereas a large proportion (306; 79.9%) were unsure (Table 1).

A majority of participants (226; 56.4%) correctly identified the primary use of CSs as anti-inflammatory agents. The most commonly recognized indications were allergies (47.9%), RA (47.4%), and asthma (46.4%), whereas IBD (33.2%) and SLE (33.7%) were less frequently recognized. Awareness of CS-related side effects was generally limited; central obesity (44.6%), mood swings (41.1%), immunosuppression and increased risk of infection (40.4%), and osteoporosis (40.1%) were among the most frequently recognized adverse effects, whereas skin thinning (30.7%) was among the least frequently recognized (Supplementary Table 1).

The overall knowledge level regarding CS use, indications, and side effects in the management of pediatric inflammatory diseases was assessed using a 60% cutoff point. The findings revealed that the majority of

participants (297; 74.1%) had poor knowledge, whereas only 104 participants (25.9%) had good knowledge.

With respect to sources of information about CSs, physicians or healthcare providers were the most frequently reported sources (288; 71.8%), followed by the internet or social media (190; 47.4%) and pharmacists (129; 32.2%). Other sources included family or friends (71; 17.7%), television or radio (36; 9%), study materials (11; 2.7%), and miscellaneous sources (7; 1.7%).

Table 2 presents the participants' attitudes and practices regarding CS use and the management of its side effects in cases of pediatric inflammatory diseases. The majority of the respondents expressed some level of concern, with 154 participants (38.4%) being moderately worried and 93 (23.2%) very worried about CS side effects. Only a minority (14.7%) were not worried at all. In terms of treatment preferences, more than half of the participants (207; 51.6%) were open to using alternative therapies only if they were equally effective, whereas 13.2% preferred alternatives regardless of efficacy. However, a small group (6.2%) reported full trust in CSs. When asked whether CSs should be avoided due to their side effects, more than half (227; 56.6%) were unsure, whereas 23.2% agreed that they should be avoided and 20.2% disagreed.

With respect to adherence behavior, 46.6% of the participants reported that they would follow the physician's prescription exactly, whereas 31.4% preferred to seek a second opinion. A smaller proportion indicated that they would stop treatment or seek alternatives if side effects occurred (8%), and 6% reported that they would reduce the dose independently. Most participants (337; 84%) reported no previous experience with discontinuing CS treatment without medical consultation. Among those who had experience managing side effects, the most common response was to follow up with a physician (292; 72.8%), whereas others reported stopping the medication (9.5%), seeking alternatives (12.2%), or adjusting the dose themselves (5.5%).

Table 3 highlights participants' experiences with receiving information about CSs from healthcare providers and their expressed need for further education. The majority of participants (337; 84%) reported no previous experience with CS prescriptions. Only a small proportion (28; 7%) reported receiving information about potential side effects from their physician at the time of prescription, whereas 36 participants (9%) reported that CSs were prescribed without any information about side effects.

When asked about additional information needs, most participants expressed a strong desire for further knowledge. The most frequently requested topic was correct use and dosage (278; 69.3%), followed by ways to reduce side effects (244; 60.8%) and information on long-term adverse effects in children (243; 60.6%). A considerable proportion (225; 56.1%) were also interested in learning about alternative therapies. Only a very small number of participants (2; 0.5%) indicated that they did not require any additional information.

Table 1. *Biodemographic characteristics of the study participants in the Makkah region, Saudi Arabia (N = 401).*

Bio-demographic data	No	%
Age in years		
18–25	294	73.3
26–35	31	7.7
36–45	41	10.2
46–55	26	6.5
>55	9	2.2
Gender		
Male	184	45.9
Female	217	54.1
Educational level		
Below secondary	7	1.7
Secondary education	110	27.4
University/above	284	70.8
Work		
Not working	36	9.0
Student	272	67.8
Non-health care field	75	18.7
Health care field	12	3.0
Retired	6	1.5
Marital status		
Single	299	74.6
Married	92	22.9
Divorced/widow	10	2.5
Degree of relation with the child suffering from an inflammatory disease		
No relation	330	82.3
First degree	54	13.5
Second degree	8	2.0
Third degree	9	2.2
If related, how old is the child with the inflammatory disease?		
1–3 years	12	3.0
4–6 years	14	3.5
7–9 years	16	4.0
10–12 years	17	4.2
13–15 years	8	2.0
16–18 years	12	3.0
I don't know	322	80.3
Is the child using CSs as a treatment for the inflammatory disease?		
Yes	66	16.5
No	47	11.7
I don't know	288	71.8
If yes, what is the form of the CS used?		
Oral	34	8.9
Inhaled	22	5.7
Local	14	3.7
Intravenous	7	1.8
I don't know	306	79.9

CS = corticosteroids; No = number; % = percentage; N = total number of participants.
 Percentages were calculated from the total sample.

Table 4 presents the association between participants' overall knowledge level about CSs and various sociodemographic characteristics, experiences, and attitudes. Age was a significant factor ($p = 0.002$). Younger

participants aged 18–25 years had the highest proportion of good knowledge (31.3%), whereas knowledge decreased with age; only 7.7% of those aged 46–55 years and 9.8% of those aged 36–45 years demonstrated good

Table 2. Participants' attitudes and practices regarding corticosteroid use and side effect management in pediatric inflammatory diseases (*N* = 401).

Items	No	%
How concerned are you about the side effects of CSs in children?		
Not worried at all	59	14.7
A little worried	95	23.7
Moderately worried	154	38.4
Very worried	93	23.2
Do you prefer alternative therapies to CSs for the treatment of inflammatory diseases in children?		
Yes, always	53	13.2
Yes, but only if the alternatives are equally effective.	207	51.6
Not sure	116	28.9
No, I trust corticosteroids as a treatment.	25	6.2
Do you think CSs should be avoided because of their side effects?		
Yes	93	23.2
Not sure	227	56.6
No	81	20.2
If the doctor prescribes CSs for your child, will you:		
Follow the prescription exactly	187	46.6
Consult another doctor before starting treatment	126	31.4
Stop the medication if side effects appear	32	8.0
Reduce the dose to reduce side effects	24	6.0
Seek alternative treatments before using CSs	32	8.0
Have you ever stopped your child's CS treatment without consulting a doctor due to concerns about side effects?		
No previous experience	337	84.0
No	64	16.0
How do you deal with the side effects of CSs in your child?		
Follow up with the doctor	292	72.8
Stop the medication immediately	38	9.5
Searching for alternative treatments	49	12.2
Adjust the dose myself	22	5.5

CS = corticosteroids; No = number; % = percentage; *N* = total number of participants.
Percentages were calculated from the total sample.

Table 3. Participants' experience with corticosteroid counseling and information needs regarding use and side effects (*N* = 401).

Items	No	%
Did you receive information about the side effects of CSs when they were first prescribed by your doctor?		
No previous experience	337	84.0
Yes	28	7.0
No	36	9.0
What additional information would you like about CSs?		
Correct use and dosage	278	69.3
Side effects of long-term CS use in children	243	60.6
Ways to reduce side effects	244	60.8
Alternative treatments	225	56.1
Nothing	2	0.5

CS = corticosteroids; No = number; % = percentage; *N* = total number of participants.
Percentages were calculated from the total sample.

knowledge. Work status was also significantly associated with knowledge ($p=0.001$). Participants working in the healthcare field had the highest level of good knowledge (41.7%), followed by students (33.5%). By contrast, very low knowledge levels were observed among unemployed

participants (5.6%) and those in non-healthcare fields (6.7%).

Marital status was significantly associated with knowledge level ($p = 0.001$), with single individuals demonstrating a higher proportion of good knowledge

Table 4. Association between participants' overall knowledge level of corticosteroids and their sociodemographic characteristics, experiences, and attitudes (N = 401).

Factors	Overall knowledge level				p-value
	No	%	No	%	
Age in years					0.002*
18–25	202	68.7	92	31.3	
26–35	26	83.9	5	16.1	
36–45	37	90.2	4	9.8	
46–55	24	92.3	2	7.7	
> 55	8	88.9	1	11.1	
Gender					0.453
Male	133	72.3	51	27.7	
Female	164	75.6	53	24.4	
Educational level					0.279
Below secondary	7	100.0	0	0.0	
Secondary education	80	72.7	30	27.3	
University/above	210	73.9	74	26.1	
Work					0.001*^
Not working	34	94.4	2	5.6	
Student	181	66.5	91	33.5	
Non-health care field	70	93.3	5	6.7	
Health care field	7	58.3	5	41.7	
Retired	5	83.3	1	16.7	
Marital status					0.001*
Single	204	68.2	95	31.8	
Married	84	91.3	8	8.7	
Divorced/widow	9	90.0	1	10.0	
Is the child using CSs as a treatment for the inflammatory disease?					0.164
Yes	43	65.2	23	34.8	
No	34	72.3	13	27.7	
I don't know	220	76.4	68	23.6	
If the doctor prescribes CSs for your child, will you:					0.003*
Follow the prescription exactly	126	67.4	61	32.6	
Consult another doctor before starting treatment	104	82.5	22	17.5	
Stop the medication if side effects appear	23	71.9	9	28.1	
Reduce the dose to minimize side effects	23	95.8	1	4.2	
Seek alternative treatments before using CSs	21	65.6	11	34.4	
Did you receive information about the side effects of CSs when they were first prescribed by your doctor?					0.001*
No previous experience	256	76.0	81	24.0	
Yes	11	39.3	17	60.7	
No	30	83.3	6	16.7	

CS = corticosteroids; P = Pearson chi-square test; % = percentage; ^ = exact probability test; * = statistically significant.

$p < 0.05$ was considered statistically significant.

Percentages were calculated within each row according to the overall knowledge category (poor vs. good).

(31.8%) compared with married (8.7%) and divorced or widowed participants (10%). Participants' intended response to CS prescriptions was also significantly associated with knowledge level ($p = 0.003$). Those who reported that they would follow the prescription exactly had the highest percentage of good knowledge (32.6%), whereas those who indicated that they would reduce the dose to minimize side effects had a markedly low percentage of good knowledge (4.2%). Finally, receiving

information about side effects at the time CSs were first prescribed was significantly associated with knowledge level ($p = 0.001$). Among participants who received such information, 60.7% demonstrated good knowledge, compared with 24% of those with no previous experience and 16.7% of participants who had been prescribed CSs but did not receive information.

Table 5 presents the association between participants' CS use practices and their overall knowledge level. A

Table 5. Association between participants' corticosteroid-related practices and their overall knowledge level (N = 401).

Practice	Overall knowledge level				p-value
	Poor		Good		
	No	%	No	%	
Have you ever stopped your child's CS treatment without consulting a doctor due to concerns about side effects?					0.046*
No previous experience	256	86.2	81	77.9	
No	41	13.8	23	22.1	
How do you deal with the side effects of CSs in your child?					0.001**^
Follow up with the doctor	200	67.3	92	88.5	
Stop the medication immediately	33	11.1	5	4.8	
Searching for alternative treatments	45	15.2	4	3.8	
Adjust the dose myself	19	6.4	3	2.9	

CS = corticosteroids; P = Pearson chi-square test; % = percentage; ^ = exact probability test; * = statistically significant.

* $p < 0.05$ was considered statistically significant.

Percentages were calculated within each row according to the overall knowledge category (poor vs. good), not from the total sample.

significant association was observed between knowledge level and whether participants had ever discontinued their child's CS treatment without consulting a physician ($p = 0.046$). Among those classified as having good knowledge, 77.9% reported no prior experience of discontinuing CS treatment without medical consultation. Furthermore, participants' approaches to managing CS side effects were strongly and significantly associated with knowledge level ($p = 0.001$). The majority of participants with good knowledge (88.5%) reported consulting their physician when side effects occurred, compared with 67.3% among those with poor knowledge. Conversely, participants with poorer knowledge were more likely to stop the medication immediately (11.1% vs. 4.8%), seek alternative treatments (15.2% vs. 3.8%), or adjust the dose themselves (6.4% vs. 2.9%).

Discussion

The present study revealed notable variability in participants' knowledge of the use, indications, and side effects of CSs for managing pediatric inflammatory diseases. More than half of the respondents (56.4%) correctly identified the primary role of CSs as anti-inflammatory agents, a finding that aligned with previously reported literature [8].

Participants exhibited greater awareness of certain CS indications, with nearly half identifying allergies (47.9%), RA (47.4%), and asthma (46.4%) as common indications. Conversely, recognition of conditions such as SLE (33.7%) and IBD (33.2%) was relatively low; these findings were consistent with those of earlier studies [1,13]. Regarding CS-associated adverse effects, participants most commonly recognized central obesity (44.6%), mood swings (41.1%), immunosuppression with increased susceptibility to infections (40.4%), and osteoporosis (40.1%). These results aligned with patterns reported in the literature [14–15].

By contrast, participants demonstrated markedly lower awareness of less commonly recognized adverse effects of CS, particularly those involving cardiovascular, gastrointestinal, and dermatological systems. Fewer than

40% of the participants recognized side effects, such as increased risk of heart disease, hypertension, fluid retention (edema), gastric ulcers, stretch marks, easy bruising, or skin thinning, accounting for 35.9%, 35.2%, 34.2%, 35.9%, 32.2%, 31.9%, and 30.7%, respectively; these findings were consistent with previously published evidence [9,14].

The findings revealed that the majority of participants (74.1%) reported a poor level of knowledge regarding CS use, indications, and potential side effects. Similar patterns have been reported in studies from other regions of Saudi Arabia, which also documented unsatisfactory levels of awareness [7,16]. This highlights a significant overall knowledge gap within the community and underscores the urgent need for targeted educational interventions to improve the public understanding of CS therapy. In contrast to our results, earlier evidence revealed relatively high levels of knowledge regarding CS use and safety, suggesting that awareness may vary across populations and settings [1].

Moreover, the current study revealed that several sociodemographic and experiential factors were significantly associated with participants' overall knowledge of CSs. Younger participants aged 18–25 years reported the highest levels of good knowledge (31.3%) compared with older cohorts whose awareness declined progressively with age. These findings aligned with those of prior research conducted in Jeddah, which similarly reported that participants aged 21–39 years exhibited greater levels of awareness than those aged 40 years and above [3]. However, contrasting evidence from another study indicated that individuals aged 36–45 years achieved the highest median awareness scores, suggesting that the relationship between age and awareness may vary across populations and study contexts [1].

In the present study, knowledge levels were substantially higher among healthcare workers (41.7%) and students (33.5%). By contrast, individuals working in non-healthcare fields (6.7%) and unemployed participants (5.6%) exhibited markedly limited understanding; these findings reinforce those reported in an earlier study [1]. This pattern underscores the critical influence of

educational background and professional context in shaping overall health literacy.

In contrast to earlier studies that identified family, friends, or social media as the dominant information sources [2,14], our participants primarily relied on physicians (71.8%) for CS-related information. However, this reliance was not associated with higher levels of knowledge, as most participants still demonstrated poor awareness. These findings suggest that, within this study population, receiving information from physicians alone may not necessarily correspond to adequate understanding. Factors such as recall bias, variability in communication practices, or differences in individual comprehension may have influenced this observation.

Of note, only 7% of the participants reported receiving information from their physicians regarding CS side effects during the prescribing process. By comparison, 9% reported that no information was provided despite their children being prescribed CSs. Importantly, receiving information about CS side effects at the time of prescription was significantly associated with higher knowledge levels ($p = 0.001$). Good knowledge was observed in 60.7% of participants who reported receiving such information, compared with 24.0% of those with no previous experience of CS prescription. This finding underscores the potential importance of counseling at the time of prescribing in improving patients' and caregivers' understanding of CS therapy. These findings are consistent with earlier evidence and highlight persistent gaps and missed opportunities in patient-physician communication [2,14]. Physicians are generally regarded as trusted sources of information, yet their role in providing comprehensive counseling remains underutilized [2,14]. However, due to the cross-sectional design, this association should not be interpreted as causal.

Furthermore, 69.3% of the participants expressed a greater interest in acquiring knowledge about the appropriate use and dosing of CSs administered to their children. Additionally, 60.6% demonstrated motivation to obtain more comprehensive information regarding the long-term adverse effects of CS use in pediatric populations, and 60.8% reported interest in learning ways to minimize these risks. Consistent with previous literature, parental awareness of the risks associated with prolonged CS therapy remains limited, underscoring the need for enhanced education and broader dissemination of information [6].

A further point to consider is that 56.1% of the participants stated that they were willing to receive information about alternative therapies. The current study found that a considerable proportion of participants expressed moderate (38.4%) or strong (23.2%) concern regarding CS side effects. These results align with recent evidence from Western Saudi Arabia, where the majority of participants (80.7%) demonstrated corticophobia [7]. This pattern suggests an inverse relationship between awareness and corticophobia, where insufficient knowledge and limited physician counseling may contribute to heightened fear and reluctance toward

CS use. If such concerns persist without appropriate counseling, they may result in poor adherence or delays in initiating necessary treatment, ultimately posing risks to pediatric health outcomes [7].

Several limitations should be acknowledged. First, the cross-sectional design of the study and its reliance on self-reported responses may have introduced potential biases, including social desirability bias. Additionally, the use of convenience sampling through online and social media distribution may have introduced selection bias and limited the representativeness of the sample. The predominance of younger participants may further limit the generalizability of the findings to the broader population. In addition, although the questionnaire was based on previously validated instruments, the modified version did not undergo additional formal psychometric validation or pilot testing, which may affect the reliability and validity of the measurements. Furthermore, the statistical analysis was limited to bivariate associations, and multivariable regression analysis was not performed to adjust for potential confounding factors. Therefore, the observed associations should be interpreted with caution. Future studies should incorporate multivariable analyses to identify independent predictors of knowledge while accounting for potential confounders. A final point to consider is that the study was conducted exclusively in Makkah, Saudi Arabia, which may inherently constrain the generalizability of the findings to other regions. Despite these issues, a key strength of this study is its status as one of the first studies to assess public awareness of CS side effects in the context of pediatric inflammatory diseases in the Makkah Region.

In conclusion, this study revealed that the general population in the Makkah Region has limited knowledge and awareness regarding the use of CSs and their potential side effects among pediatric patients. Despite the widespread therapeutic use of CSs, misconceptions and limited understanding remain prevalent, particularly regarding their metabolic, immunological, and growth-related effects. Urgent efforts are needed to enhance health education and strengthen communication between healthcare providers and the public. Implementing evidence-based educational initiatives and ensuring thorough counseling at the time of prescription are essential to promote safe use, improve adherence, and reduce CS-related complications in pediatric care. As observed in this study, higher knowledge levels were associated with more appropriate attitudes toward CS use and follow-up behaviors.

Targeted public health education programs may help improve awareness regarding the safe use of CSs, particularly in pediatric populations. Additionally, healthcare providers may consider providing counseling at the time of prescription to ensure that parents understand the appropriate dosage, duration of treatment, and possible adverse effects. Further research is also needed to evaluate the effectiveness of educational interventions in improving public knowledge and adherence to CS therapy among pediatric patients.

Acknowledgement

The authors would like to thank American Journal Experts (AJE) for professional English language editing and proofreading services.

List of Abbreviations

CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Disease
CSs	Corticosteroids
IBD	Inflammatory Bowel Disease
RA	Rheumatoid Arthritis
SLE	Systemic Lupus Erythematosus
SPSS	Statistical Package for the Social Sciences

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Consent for participation

Written informed consent was obtained electronically from all participants before participation.

Consent for publication

Not applicable.

Ethical Approval

This study was approved by the Biomedical Research Ethics Committee of Umm Al-Qura University (approval number: HAPO-02-K-012-2025-04-2668; approval date: 1 April 2025).

Author details

Duaa Salah Fatani¹, Ali Alwan Almuntashri¹, Khalid Fawzi Amjad¹, Rimas Awad Alfahmi¹, Reem Khalid Alnemari¹, Mohammed Hassan Alzahrani¹, Abeer Shaker El Moursy Ali²

1. College of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia.
2. Lecturer of Pathology, Makkah College, Makkah, Saudi Arabia.

Supplementary content (If any) is available online.

References

1. Al-Jabr KH, Alhumaidan LS, Alghamdi AA, Almutairi MS, Alsubaihi AA, Alrasheedi SM, et al. Awareness of side effects of corticosteroids among users and nonusers in Saudi Arabia. *J Pharm Bioallied Sci.* 2024;16 Suppl 2:S1612–8. https://doi.org/10.4103/jpbs.jpbs_925_23
2. Qutob RA, Alhusaini BA, Aljarba NK, Alzaid ON, Aljahili NA, Alzahrani KS, et al. Public awareness regarding corticosteroid use and side effects: a cross-sectional study in Riyadh, Saudi Arabia. *Healthcare (Basel).* 2023;11(20):2747. <https://doi.org/10.3390/healthcare11202747>
3. Roblah TM, Baabdullah AM. Awareness and knowledge of adverse effects of topical corticosteroids among the general population in Jeddah, Saudi Arabia. *Clin Cosmet Investig Dermatol.* 2023;16:3065–75. <https://doi.org/10.2147/CCID.S421282>
4. Elmorsy E, Alanazi YM, Alenazy AE. Awareness and knowledge about topical steroid among population in Arar, Saudi Arabia. *J Med Health Sci.* 2019;13:1048.
5. Aljebab F, Choonara I, Conroy S. Systematic review of the toxicity of long-course oral corticosteroids in children. *PLoS One.* 2017;12(1):e0170259. <https://doi.org/10.1371/journal.pone.0170259>
6. Hon KL, Kam WY, Leung TF, Ng PC. Parental beliefs and attitudes toward topical corticosteroid use in children with eczema. *Int J Dermatol.* 2016;55(5):e249–56.
7. Magboul MA, Fadel HA, Al-Johani AG, Asali FW, Al-Zahrani AS, Al-Sahari MR, et al. Topical corticosteroid phobia among the general population in the western region of Saudi Arabia. *J Family Med Prim Care.* 2025 Mar;14(3):1085–90. https://doi.org/10.4103/jfmpc.jfmpc_1355_24
8. Alhammadi NA, Mohammed Al Oudhah SM, Mofareh Asiri MA, Alshehri MA, Almutairi BA, Mohammed Abdullah Thalibah A, et al. Public awareness of side effects of systemic steroids in Asir region, Saudi Arabia. *J Family Med Prim Care.* 2023 Sep;12(9):1854–8. https://doi.org/10.4103/jfmpc.jfmpc_2202_22
9. Al-Hayli AA, Alsohabi DI, Mahfouz HA, Alrizqi RA, Alfaqih MA, Alrashdi AK, et al. Parent concern and awareness of topical corticosteroid use in pediatric patients with atopic dermatitis in the Makkah region. *Int J Med Dev Ctries.* 2024;8(11):3014–24. <https://doi.org/10.24911/IJMD.51-1729945949>
10. Dean AG, Sullivan KM, Soe MM. OpenEpi: open source epidemiologic statistics for public health, version 3.01 [Internet]. 2013 [cited 2026 Mar 31]. Available from: <https://www.openepi.com>
11. General Authority for Statistics. Population census 2022: total population of Saudi Arabia [Internet]. 2022 [cited 2026 Mar 31]. Available from: <https://www.stats.gov.sa/en>
12. Algorinees RM, Alshammari BJ, Albalawi MA, Almozaini KH, Alharbi TF, Alshammari TA, et al. Assessment and knowledge of long-term steroid use and its related cataract & glaucoma development among Hail residents. *Clin Ophthalmol.* 2025;19:585–97. <https://doi.org/10.2147/OPHT.S510432>
13. Hussein IA. Awareness regarding corticosteroids use and side effects among patients and irrational users in Gadarif, Sudan: a cross-sectional study. *Sch Acad J Pharm.* 2024;13(7):337–52. <https://doi.org/10.36347/sajp.2024.v13i07.007>
14. Rifaei SM, Etoom S, Hanandeh SA, Ali SH, Alzboon AM, Al-Jaraideh MD, et al. Public awareness of corticosteroid use and side effects: a cross-sectional study from Jordan. *Mater Sociomed.* 2025;37(1):24–31. <https://doi.org/10.5455/msm.2025.37.24-31>
15. Alamri RA, Al Satti HS. Knowledge and attitudes towards topical corticosteroids among previous users in the general population of Saudi Arabia. *Cureus.* 2024;16(3):e55373. <https://doi.org/10.7759/cureus.55373>
16. Ferrara G, Petrillo MG, Giani T, Marrani E, Filippeschi C, Oranges T, et al. Clinical use and molecular action of corticosteroids in the pediatric age. *Int J Mol Sci.* 2019;20(2):444. <https://doi.org/10.3390/ijms20020444>