









What factors shape public knowledge, attitudes, and practices of corticosteroid use in the UAE during the COVID-19 pandemic?

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ABSTRACT

Background: Corticosteroid therapy has been associated with detrimental consequences such as cardiovascular problems and immunosuppression.

Aims & objectives: This study aimed to assess the public knowledge, attitudes, and practice surrounding the use of corticosteroids in the United Arab Emirates (UAE) during the COVID-19 pandemic.

Methods: This was a cross-sectional study carried out among the general population of the UAE from March to July 2022. A self-administered online survey was used, which included questions about participants' socio-demographics, health status, and knowledge regarding corticosteroids. Eligibility criteria included participants aged >18 years or older and could read and respond to the questionnaire.

Results: The study involved 583 participants, where the majority were mostly males living in urban areas. Nearly half had a bachelor's degree, and 36.9% worked in the health sector. Around 55.0% of the participants had a high level of knowledge about corticosteroids, while more than half had a negative attitude towards them. The most frequently reported reason for using corticosteroids was dermatological diseases. Males with lower education levels, and who had not been infected with COVID-19 had lower odds of having a high level of knowledge about corticosteroids. Furthermore, older participants and those with a lower education level had a more negative attitude towards corticosteroids.

Conclusions: This study showed gaps in knowledge and unfavorable attitude toward use of corticosteroids. Age, gender, working field, education level, residential area, having a chronic disease, being infected with COVID-19, and knowledge level were significantly associated with knowledge, attitude, and/or practice of corticosteroid use.

Keywords: public knowledge, attitude, practice, corticosteroids, COVID-19

INTRODUCTION

Corticosteroids are a versatile class of medications widely utilized in the treatment of various inflammatory and immunologic disorders [1]. These pharmaceutical agents have a rich history of addressing a multitude of medical issues, including but not limited to rheumatologic, dermatological, pulmonary, hematological, ophthalmologic, and gastrointestinal ailments. However, the mechanisms underlying the favorable effects of corticosteroids remain intricate and somewhat enigmatic [2].

Background on Corticosteroid Use & Misuse During the COVID-19 Pandemic

The global landscape witnessed a significant shift in the use of corticosteroids with the advent of the COVID-19 pandemic [3]. Beyond their conventional applications, corticosteroids emerged as a crucial intervention in the management of severe COVID-19 cases. A growing body of research has demonstrated their efficacy in reducing mortality rates and accelerating recovery among hospitalized COVID-19 patients [4]. Particularly, the administration of dexamethasone, a type of corticosteroid, has proven instrumental in enhancing survival rates for severely ill COVID-19 patients requiring supplemental oxygen or mechanical ventilation [5]. Notably, corticosteroid treatment gained widespread attention as emerging data

linked it to improved clinical outcomes in COVID-19 vaccination complications as well [6].

It is imperative to acknowledge that the use of corticosteroids in the context of COVID-19 treatment is not without its potential risks and side effects. Prolonged usage can lead to immunosuppression, heightening susceptibility to infections, and trigger adverse effects such as hyperglycemia, hypertension, wound healing, excitability and mood disturbances [1, 7-10]. These side effects pose a considerable challenge, fostering concerns and misconceptions about steroid use among both healthcare providers and patients [11]. Previous research has underscored the significance of patients' perceptions in determining treatment compliance and success, particularly in cases of allergic rhinitis and asthma [12-14]. It is noteworthy to mention that patients' preferences for specific medications are not solely rooted in their efficacy and safety; but also in their individual inclinations [15]. In various studies inadequate compliance has been identified as a primary cause of suboptimal treatment outcomes, particularly in the management of pediatric atopic dermatitis [16-18]. Patients grappling with severe atopic dermatitis often encounter low adherence to topical treatments, accompanied by treatment-related anxiety [18-21].

It was revealed that participants harbored concerns and misconceptions about corticosteroids, often stemming from their experiences with side effects or from information they had gathered from peers or media [22]. These apprehensions frequently influenced their decision to opt for oral treatments rather than corticosteroid inhalation. Some of the participants seemed pre-disposed with the possibility of experiencing side effects. This was due to speaking to others or perceiving the personal risks from the negative thoughts from the media, i.e., athletes or bodybuilders. These fears directed participants towards oral treatment rather than corticosteroid inhalation. Side effects reported by participants encompassed weight gain, increased appetite, bruising, and osteoporosis. However, the most significant concern revolved around psychological disturbances, including irritability, anxiety, and depression, with some participants experiencing steroid-induced psychosis. In light of these misconceptions and the difficulties in decision-making, participants frequently found themselves struggling to convince themselves of the necessity of initiating or continuing corticosteroid treatment, despite being aware of the potential consequences.

Unfortunately, there remains a dearth population-based research investigating perceptions and understanding of corticosteroids. Prior studies have been restricted by small sample sizes and the focus on a single dosage forms [23]. Additionally, these studies often targeted select populations, such as healthcare professionals [24], caregivers [25-27], and/or special patient groups [28-30]. These studies collectively revealed limited knowledge about corticosteroids and their optimal use and their optimal usage.

Scope of Corticosteroid Use & Regulation in the UAE

The United Arab Emirates (UAE) has witnessed a surge in corticosteroid use over the past several years. A significant aspect of this upsurge is the widespread availability of corticosteroids through community pharmacists or telemedicine services [31, 32]. This accessibility has not only facilitated the treatment of traditional indications but has also become vital in managing severe cases of COVID-19, where corticosteroids are often administered to reduce inflammation

and improve patient outcomes. This expanded use reflects the adaptability and versatility of corticosteroids within the UAE's healthcare system.

Regulating the use of corticosteroids is essential to ensure their safe and effective administration. In the UAE, corticosteroids are classified as prescription-only medications, and healthcare providers must adhere to strict guidelines when prescribing them. This regulatory framework is crucial in preventing misuse and abuse of these potent drugs. Physicians are required to evaluate patients thoroughly, considering the risk-benefit ratio, before prescribing corticosteroids. These regulations serve as safeguards to ensure that corticosteroids are used appropriately, especially considering their potential side effects and risks associated with prolonged usage, such as immunosuppression and increased susceptibility to infections [10].

The COVID-19 pandemic brought to light the significance of corticosteroid use, and the UAE was no exception [33]. With the guidance of the COVID-19 treatment guidelines [5], healthcare providers in the UAE have effectively incorporated corticosteroids into the treatment protocols for severe COVID-19 cases. Studies conducted both globally and within the UAE have consistently demonstrated the efficacy of corticosteroids in reducing mortality rates and accelerating patient recovery in hospitalized COVID-19 cases [5].

As the world continues to grapple with the ongoing pandemic, understanding the nuanced dynamics of corticosteroid use and misuse on a global scale remains an imperative area of study to guide clinical practice, policy development, and patient education, ensuring the effective and safe use of these medications. Despite an extensive review of the existing literature, there is a notable absence of studies assessing public knowledge, perception, attitude, and experience concerning corticosteroids use among the public in the UAE, particularly in the context of the COVID-19 era. This study thus carries significant importance as it aimed to comprehensively assess the knowledge, attitudes, and practices related to corticosteroid use among the general public in the UAE during the COVID-19 pandemic.

METHODS

Study Design & Subjects

This was a cross-sectional study carried out among the general population of the UAE from March through July 2022. Participants aged 18 years or older and can read and respond to the questionnaire were enrolled in the study.

Sample Size & Sampling Method

Using Raosoft software-sample size calculator, the minimal required sample size was 385 responses, at 95% confidence interval (CI), 0.5 standard deviation, and a 5.0% margin of error. Convenience-snowball sampling was used in the participant recruitment process. Through Facebook and WhatsApp groups, Instagram, social media portals were used to reach all of the participants.

Study Instrument

This research used a self-administered online survey distributed to participants in both English and Arabic using the Google Forms platform. The study instrument was adapted from a published validated questionnaire, which was used for

similar purposes [34]. The tool was initially translated to Arabic and back translated to English by different translator and both versions were compared and found similar. Experts in the field including five pharmacy academics reviewed the instrument for face and content validity and changes were made, where appropriate. The survey was then piloted on 20-individuals to ensure the relevance and clarity of the study questionnaire. The study survey included two sections.

The first part collected socio-demographics such as age, sex, educational level, residential area, working field and assessment of the health status information of the participants as being infected with COVID-19, number of COVID-19 infections, and past medical history.

The second part included the following questionnaires:

- **Knowledge:** It is a 14-item questionnaire that assessed participants knowledge using “yes” or “no” options, with one point given for each correct answer to yield a total possible score of 14. The knowledge level of the participants was interpreted as high knowledge level if the knowledge score was higher than the median and low level if the knowledge score was equal to or below the median.
- **Attitude:** It is a 12-item questionnaire that evaluated participants’ attitudes towards the use of corticosteroids on a five-point Likert scale ranging from strongly disagree (one point) to strongly agree (five points), with higher scores indicating negative attitude, and with a maximum possible score of 60. The participants were classified into having positive or negative attitudes based on the median (those who scored an attitude score above the median were in the positive attitude group, while those with a score equal to or below the median were in the negative attitude group).
- **Practice:** It is four domains, including sources of information about corticosteroids, reported side effects from using corticosteroids, the main indication for using corticosteroids, and dosage forms of corticosteroids used by the participants.

Statistical Analysis

Data were analyzed using SPSS (version 24). Descriptive statistics were presented as median and interquartile range for continuous variables and frequency and percentage for categorical variables. Multivariate analysis was conducted using a binary logistic regression test to find the factors significantly and independently associated with knowledge, attitude, and practice of corticosteroid use. The assumption of binary regression was confirmed as the outcome is dichotomous and no multicollinearity was found between the model predictors. Significance level was considered at $p < 0.05$.

RESULTS

A total of 583 individuals were enrolled in the study with a median age of 32 years; the majority were males (60.9%) and living in the urban area (75.0%). Almost half of the participants were bachelor’s degree holders (47.9%), and 36.9% were working in the health sector. The majority of the participants have never been infected with COVID-19 (81.6%), and do not have any chronic disease (90.6%). The most commonly

Table 1. Socio-demographic & medical characteristics of study participants

Sample characteristics	F (%) / M (Q) (n=583)
Age	32 (22-32)
Sex	
Male	355 (60.9%)
Female	228 (39.1%)
Educational level	
School level	27 (4.6%)
Diploma	230 (39.5%)
Bachelor	279 (47.9%)
Postgraduates	47 (8.1%)
Residential area	
Urban	437 (75.0%)
Rural	146 (25.0%)
Working field	
Health sector	215 (36.9%)
Students	122 (20.9%)
Non-health sector	213 (36.5%)
Unemployed/retired	33 (5.7%)
Have you been infected with COVID-19?	
Yes	107 (18.4%)
No	476 (81.6%)
How many times have you been infected with COVID-19?	
One time	82 (76.63%)
Two times	18 (16.82%)
Three or more times	5 (4.67%)
Do you have any chronic diseases?	
Yes	55 (9.4%)
No	528 (90.6%)
If yes, which of the following could apply?	
Hypertension	17 (2.9%)
Diabetes mellitus	19 (3.3%)
Obesity/overweight	29 (5.0%)
Cardiovascular diseases (stroke)	13 (2.2%)
Kidney disease	10 (1.7%)
Osteoporosis	15 (2.6%)
Depression	20 (3.4%)
Rheumatoid arthritis	10 (1.7%)
Immune disorder	15 (2.6%)
Respiratory disease (asthma)	13 (2.2%)
Dermatological disorder (acne/psoriasis)	31 (5.3%)
Others	13 (2.2%)

Note. F: Frequency; M: Median; & Q: 25th-75th quartiles

reported chronic disease among the respondents were dermatological disorders (5.3%), followed by obesity/overweight (5.0%) and depression (3.4%). **Table 1** represents the socio-demographic and medical characteristics of the study participants.

The current study found that 55.1% showed a high knowledge level about corticosteroids, with a total median knowledge score of eight (seven-nine). The most commonly recorded correct answers by respondents regarding corticosteroids were for the item “corticosteroids are anti-inflammatory medicine” (75.5%), followed by “corticosteroids are mainly used to reduce inflammation and suppress the immune system” (60.4%), while the least correct answer was for the item “corticosteroids do the adrenal glands normally produce man-made hormones” (29.2%).

Furthermore, the most commonly recognized side effects of corticosteroids in the long term were weight gain (79.9%) and thinned skin that bruises easily (60.7%), while the least were skin acne (29.8%) and hyperglycemia (47.5%). The participants’ knowledge regarding corticosteroids is presented in **Table 2**.

Table 2. Participants' knowledge regarding corticosteroids

Items	F (%) / M (Q)	
	Y (C)	NS or N (I)
Corticosteroids, often known as steroids, are anti-inflammatory medicine.	440 (75.5%)	143 (24.5%)
Corticosteroids are man-made hormones normally produced by the adrenal glands.	170 (29.2%)	413 (70.8%)
Corticosteroids are mainly used to reduce inflammation and suppress the immune system.	352 (60.4%)	231 (39.6%)
Corticosteroids are used to treat various health conditions (e.g., asthma, eczema, COVID-19, etc.).	290 (49.7%)	293 (50.3%)
Prolonged steroid treatment at high doses—particularly with steroid tablets—can cause problems in some people.	332 (56.9%)	251 (43.1%)
Used dose needs to be reduced slowly over a few weeks or months before stopping corticosteroids if you have been taking them for a long time.	284 (48.7%)	299 (51.3%)
Corticosteroids potential long-term side effects:		
Skin acne	174 (29.8%)	409 (70.2%)
Weight gain	466 (79.9%)	117 (20.1%)
Thinned skin that bruises easily	354 (60.7%)	229 (39.3%)
Increased risk of infections	278 (47.7%)	305 (52.3%)
Mood changes	334 (57.3%)	249 (42.7%)
High blood glucose	277 (47.5%)	306 (52.5%)
High blood pressure	324 (55.6%)	259 (44.4%)
Osteoporosis	290 (49.7%)	293 (50.3%)
Knowledge score	8 (7-9)	
Knowledge level	Low	262 (44.9%)
	High	321 (55.1%)

Note. F: Frequency; M: Median; Q: 25th-75th quartiles; Y: Yes; C: Correct; NS: Not sure; N: No; & I: Incorrect

Table 3. Participants' attitudes towards use of corticosteroids

Items	F (%) or M (25 th -75 th quartiles)				
	SD	D	N	A	SA
Afraid from weight gains due to corticosteroids use.	0 (0.0)	56 (9.6)	84 (14.4)	80 (13.7)	363 (62.3)
Afraid from the possible increase in blood sugar due to corticosteroids use.	1 (0.2)	14 (2.4)	114 (19.6)	303 (52.0)	151 (25.9)
Afraid from the possible increase in blood pressure due to corticosteroids use.	0 (0.0)	29 (5.0)	230 (39.5)	120 (20.6)	204 (35.0)
Afraid from the possible osteoporosis due to corticosteroids use.	0 (0.0)	37 (6.3)	159 (27.3)	145 (24.9)	242 (41.5)
Afraid from my body will depend on/get addicted to corticosteroids use & can't live without it.	9 (1.5)	49 (8.4)	209 (35.8)	110 (18.9)	206 (35.3)
Afraid from oral and injectable corticosteroids more than the topical products.	6 (1.0)	28 (4.8)	175 (30.0)	164 (28.1)	210 (36.0)
Afraid from social refusal if they know about my corticosteroids use.	37 (6.3)	46 (7.9)	218 (37.4)	94 (16.1)	188 (32.2)
Afraid from the possible depression of mood swings due to corticosteroids use.	6 (1.0)	27 (4.6)	192 (32.9)	163 (28.0)	195 (33.4)
Afraid from the possible unknown/untreatable side effects.	6 (1.0)	30 (5.1)	200 (34.3)	124 (21.3)	223 (38.3)
Prefer to use traditional therapy rather than corticosteroids.	9 (1.5)	30 (5.1)	191 (32.8)	142 (24.4)	211 (36.2)
Prefer to use herbal therapy rather than corticosteroids.	10 (1.7)	30 (5.1)	224 (38.4)	124 (21.3)	195 (33.4)
Prefer to use any other medicine, even if expensive, rather than corticosteroids.	9 (1.5)	30 (5.1)	196 (33.6)	161 (27.6)	187 (32.1)
Attitude score	48 (44-50)				
Attitude classification	Positive				282 (48.4%)
	Negative				301 (51.6%)

Note. F: Frequency; M: Median; SD: Strongly disagree; D: Disagree; N: Neutral; A: Agree; & SA: Strongly agree

Results showed that more participants demonstrated high knowledge (55.1%), with a median total knowledge score of eight (seven-nine). The majority of the participants were not aware that corticosteroids are man-made hormones normally produced by the adrenal glands (70.8%) and the least recognized side effect was skin acne (29.8%).

More participants reported negative attitude toward corticosteroid therapy (51.6%) with a median score of 48 (44-50). The most commonly reported attitude was related to the fear of the impact of corticosteroid on blood sugar (77.9%) and weight gain (76.0%).

As shown in **Table 3**, the current study demonstrated a negative perception towards corticosteroids' use among the participants. Most participants showed a negative attitude towards corticosteroids (51.6%), with a total median attitude score of 48 (44-50).

Most of the participants strongly agreed/agreed that they were afraid of the possible increase in blood sugar due to corticosteroids use (77.9%), afraid of weight gain due to corticosteroids use (76.0%), and afraid of the possible osteoporosis due to corticosteroids use (66.4%).

The most used sources for information about corticosteroids were university lectures (80.5%), followed by the Internet (68.6) and social media (59.5%). **Figure 1** shows different sources of information regarding corticosteroids.

As shown in **Figure 2**, the most reported side effect from using corticosteroids was thinned skin that bruises easily (26.9%), while the least were diabetes (1.0%) and acne (4.5%).

The most reported indication for using corticosteroids was dermatological disease (36.2%), while the least were systemic immunological disorders (1.4%) and joint or rheumatologic diseases (1.9%). **Figure 3** illustrates the main indication and reasons behind using corticosteroids among the study participants.

The most used dosage form of corticosteroids was topical (cream or ointment) (36.4%), followed by tablets (12.2%), while the least was drops such as eye drops (2.6%). The dosage forms of corticosteroids used by the participants are presented in **Figure 4**.

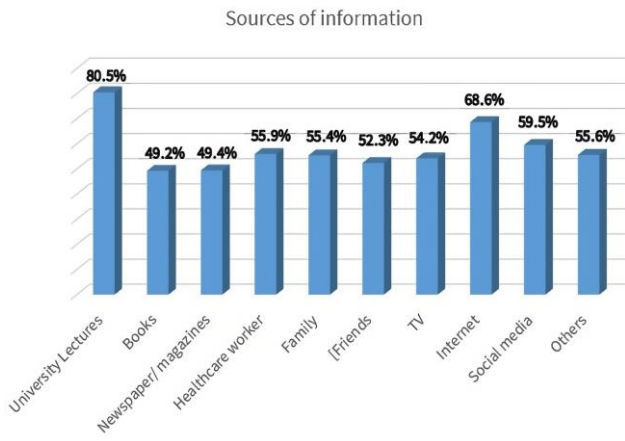


Figure 1. Sources of information about corticosteroids (Source: Authors' own elaboration)

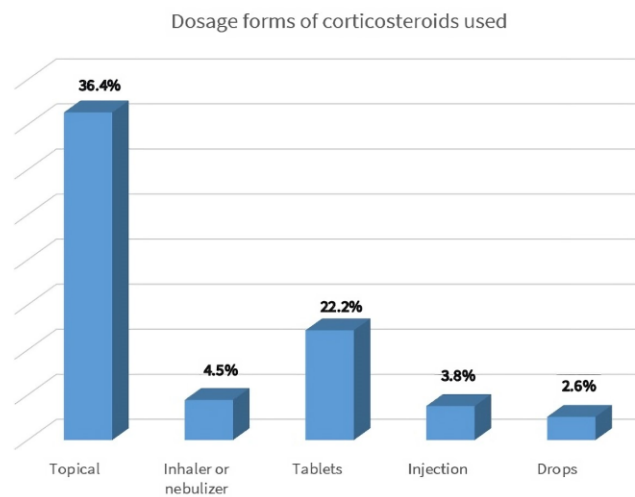


Figure 4. Dosage forms of corticosteroids used (Source: Authors' own elaboration)

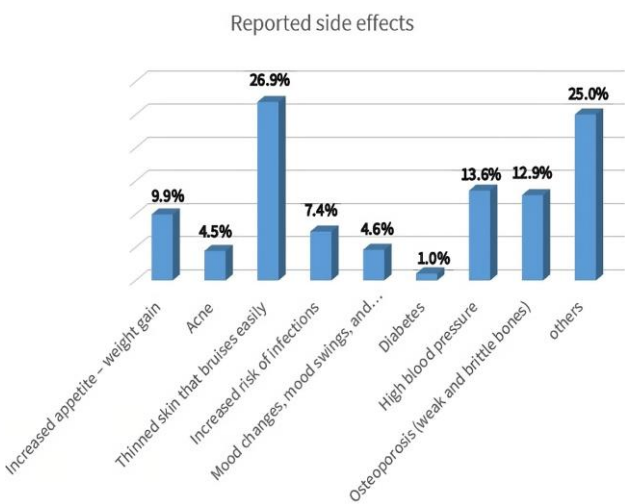


Figure 2. Reported side effects from using corticosteroids (Source: Authors' own elaboration)

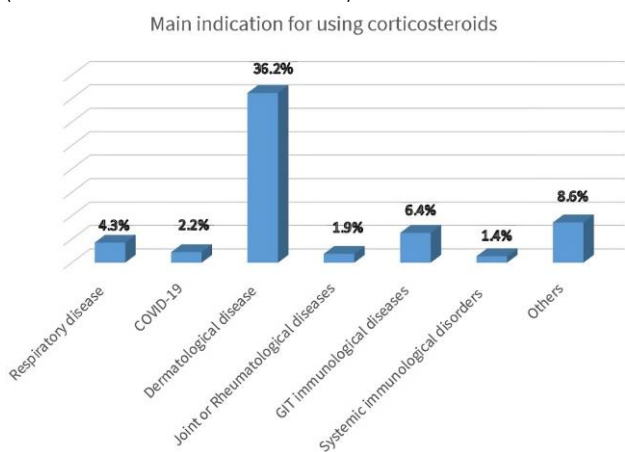


Figure 3. Main indication for corticosteroids' use (Source: Authors' own elaboration)

Regarding participants' knowledge of corticosteroids, the binary logistic regression results showed that males had significantly lower odds of being in the high knowledge group when compared to females (odds ratio [OR]=0.576, 95% CI=0.359-0.923, p<0.05) (Table 4).

Males student participants had significantly lower odds of being in the high knowledge group when compared with those working in the health sector (OR=0.505, 95% CI=0.275-0.925, p<0.05). Moreover, respondents with lower education level (diploma degree holders [OR=0.248, 95% CI=0.116-0.530, p<0.01] and bachelor's degree holders [OR=0.479, 95% CI=0.239-0.960, p<0.05]) had significantly lower odds to be in the high knowledge group when compared to those with higher education level (postgraduates).

Furthermore, participants who had not been infected with COVID-19 had significantly lower odds of being in the high knowledge group than their counterparts (OR=0.541, 95% CI=0.325-0.900, p<0.05). The results also showed that for every one-year increase in age, the odds of having a negative attitude increased (OR=1.029, 95% CI=1.004-1.054, p<0.05). Participants working in the non-health sector had significantly lower odds of having negative attitudes when compared with those working in the health sector (OR=0.648, 95% CI=0.431-0.975, p<0.05). Moreover, participants with diploma degrees had significantly higher odds of having a negative attitude when compared to those who were postgraduates (OR=2.367, 95% CI=1.106-5.062, p<0.05). Furthermore, respondents living in urban areas had significantly lower odds of having a negative attitude when compared with those who were living in a rural area (OR=0.659, 95% CI=0.437-0.993, p<0.05). Finally, participants with low knowledge levels about corticosteroids had significantly lower odds of negative attitudes than those with high knowledge (OR=0.486, 95% CI=0.318-0.744, p<0.01). Concerning participants' practice of corticosteroid use, the regression results found that male participants (OR=0.333, 95%

Table 4. Multivariate analysis of factors associated with general public knowledge, attitude, & practice of corticosteroids use

Variable	Knowledge			Attitude			Practice			
	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	
Age	0.560	0.992	0.964-1.020	0.021*	1.029	1.004-1.054	0.521	0.987	0.950-1.027	
Gender	Male	0.022*	0.576	0.359-0.923	0.090	1.453	0.944-2.236	<0.001**	0.333	0.187-0.593
	Female					Reference				

Note: *p<0.05 & **p<0.001

Table 4 (continued). Multivariate analysis of factors associated with general public knowledge, attitude, & practice of corticosteroids use

Variable	Knowledge			Attitude			Practice			
	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	
Working field	Student	0.027*	0.505	0.275-0.925	0.115	0.620	0.342-1.124	<0.001**	6.926	3.146-15.251
	Non-health sector	0.073	0.638	0.391-1.042	0.037*	0.648	0.431-0.975	0.622	0.831	0.397-1.738
	Unemployed/retired	0.136	0.487	0.189-1.254	0.391	1.420	0.637- 3.167	0.121	2.290	0.804-6.518
	Health sector					Reference				
Education	School level	0.050	0.308	0.095-0.998	0.386	1.678	0.521-5.407	0.427	0.591	0.162-2.160
	Diploma	<0.001**	0.248	0.116-0.530	0.026	2.367	1.106- 5.062	0.225	0.521	0.181-1.495
	Bachelor	0.038*	0.479	0.239-0.960	0.079	1.916	0.927- 3.961	0.252	1.681	0.691-4.091
	Postgraduate					Reference				
Residential area	Urban	0.837	1.055	0.630-1.767	0.046*	0.659	0.437-0.993	<0.001**	6.386	2.320-17.574
	Rural					Reference				
Having a chronic disease	No	0.096	0.569	0.293-1.105	0.300	1.416	0.734- 2.732	<0.001**	0.252	0.108-0.588
	Yes					Reference				
Being infected with COVID-19	No	0.018*	0.541	0.325-0.900	0.439	1.234	0.724- 2.104	<0.001**	0.091	0.046-0.181
	Yes					Reference				
Source of information	Non-scientific	0.192	0.627	0.311-1.265	0.888	1.055	0.501-2.221	0.314	1.553	0.659-3.662
	Scientific					Reference				
Knowledge level	Low				0.001**	0.486	0.318- 0.744	0.009*	0.446	0.243-0.819
	High					Reference				
Attitude	Positive						0.608	1.167	0.647-2.103	
	Negative					Reference				

Note.*p<0.05 & **p<0.001

CI=0.187-0.593, p<0.01), participants who had not been infected with COVID-19 (OR=0.091, 95% CI=0.046-0.181, p<0.01), participants who did not have any chronic disease (OR=0.252, 95% CI=0.108-0.588, p<0.01), and those who had a low level of knowledge (OR=0.446, 95% CI=0.243-0.819, p<0.01) had significantly lower odds of having a high practice of using corticosteroids when compared with their counterparts. On the other hand, participants who were students (OR=6.926, 95% CI=3.146-15.251, p<0.01), and those who were living in an urban area (OR=6.386, 95% CI=2.320-17.574, p<0.01) had significantly higher odds to report using corticosteroids than their peers.

DISCUSSION

Corticosteroid use during the COVID-19 pandemic has emerged as a pivotal topic in global healthcare literature, warranting rigorous investigation and scrutiny. These versatile medications, traditionally employed in treating various inflammatory and immunologic disorders [1], garnered widespread attention as they became integral in managing severe COVID-19 cases. Studies have demonstrated their potential to reduce mortality rates and expedite patient recovery, particularly in those requiring supplemental oxygen or mechanical ventilation [5]. Additionally, corticosteroids have been associated with favorable outcomes in the management of COVID-19 vaccination complications [6]. However, it is equally crucial to examine the potential risks and challenges associated with corticosteroid use, including immunosuppression, increased susceptibility to infections, and a range of adverse effects [10]. Although the majority of this study participants knew that corticosteroids are anti-inflammatory medications and are mainly used to reduce inflammation and suppress the immune system, which was similar to the results reported in earlier studies [35, 36], several knowledge gaps were demonstrated in the present study. Consistent with earlier research findings [37, 38], the present study demonstrated suboptimal knowledge of corticosteroids

use among the participants. Higher knowledge scores were reported by pharmacy students who participated in an Indonesian study [35].

Another study conducted in India reported negligent knowledge and awareness about corticosteroids among the study participants. In particular, most of this study participants failed to recognize that corticosteroids are man-made hormones normally produced by the adrenal glands. This might be attributed to low public awareness of the fact that corticosteroids are a class of naturally occurring steroid hormones in the human body [39], as well as their impaired perception that it is simply a synthetic drug. Furthermore, many participants in our study were unaware of the correct manner to cease corticosteroids gradually after a lengthy course of treatment, which is consistent with the results of a study conducted in India, which showed that resident doctors lacked awareness regarding dose-tapering technique after chronic corticosteroid treatment [40]. In contrast, a study conducted in Indonesia reported that 86.4% of the participants were knowledgeable about the discontinuation of corticosteroids [35].

A more thorough analysis of the participant's knowledge regarding corticosteroids could only be produced by looking at their awareness of the side effects associated with these medications on long-term use. Most of the study participants were unable to recognize skin acne and hyperglycemia as potential side effects of corticosteroids. In comparison, a study conducted in Egypt found that only 44.0% of the participants were aware that hyperglycemia is a side effect of corticosteroids [41]. Another study in Saudi Arabia showed that around 80.0% of the participants failed to identify 23 side effects of corticosteroids, including central obesity, bruising, acne, and hyperglycemia [42]. A Sudanese study found that less than one-quarter of the participants were able to recognize that weight gain, hyperglycemia, hypertension, osteoporosis, gastritis, poor healing and reduced immunity were side effects of corticosteroids [37].

One of the most practical and accessible sources of health information nowadays is reportedly the internet, including social media [43, 44], which could explain why it was found as one of the most popular sources for information about corticosteroids in this study and earlier research findings [23, 34, 40].

Unlike the findings reported in a previous survey [45], the current investigation discovered gender differences with regard to corticosteroids' knowledge level, with females demonstrating noticeably superior knowledge than males.

In comparison, an Indian study reported that males were more aware of corticosteroids than females [38]. Females are typically more concerned about anything that could affect their beauty, which in our study were the harmful effects of corticosteroids on the human body such as weight gain, skin atrophy, and other significant side effects, so it makes sense why they were found more knowledgeable about corticosteroids than males. Furthermore, the knowledge level of corticosteroids differed significantly between current students and those working in the health sector in the present study. This is understandable because individuals working in the health field have expanded expertise with many types of medications, including corticosteroids, which makes them more aware and knowledgeable about them.

Even though no significant association [28] or weak correlation [38] between education level and knowledge and awareness regarding steroids was established in previous literature, the current study results demonstrating that this relationship does exist, with participants with lower education levels showing significantly lower knowledge scores when compared with those holding postgraduate degrees. Moreover, our study found that individuals who had not been infected with COVID-19 were significantly less knowledgeable about corticosteroids than those who had, which is similar to the findings in [34].

Similar to a previous Emirati study [41], the present study participants demonstrated negative attitude toward corticosteroid use. The majority of this study participants claimed that they were afraid of using corticosteroids due to hyperglycemia, weight gain, and osteoporosis associated with corticosteroids' use, which might justify the reported negative attitudes. A high prevalence of fearful feelings towards corticosteroids was also observed in previous research [34, 46, 47].

On the other hand, a positive attitude towards corticosteroid use was found among most of the participants surveyed in Indonesia [35] and British [36] studies. These findings could be linked to differences in study population characteristics. The latter two studies were conducted among pharmacy students and community pharmacists, who would undoubtedly display different perceptions and beliefs toward the use of medications with which they are familiar compared to the public.

The current study revealed that older age, medical working field, living in a rural area, low education level, and high knowledge of corticosteroids were significantly associated with negative attitudes towards corticosteroid use. A multinational survey conducted among several Arabic countries demonstrated consistent findings regarding the association of age with a developing fear of corticosteroids' use [34]. Furthermore, although healthcare professionals are well-knowledgeable about the safety profile of corticosteroids,

many of them experience anxiety, fears, and misplaced beliefs of the potential side effects that could emerge from corticosteroids' use, which would negatively affect their attitude towards its' use [48-50].

On the other hand, people living in rural areas and those with a low education level may have insufficient understanding and awareness of corticosteroids, making them more susceptible to unfavorable ideas about them. The results reported in earlier research in contrast to earlier research finding [35], the current study participants with high knowledge of corticosteroids were much more likely to have a negative attitude regarding their use, which could be attributed to misguided beliefs or misconceptions about the side effects profile of corticosteroids.

Consistent with the results reported in a recent study [34], skin thinning was the most frequently reported side effect of corticosteroids in the present study. Another Indian study found that approximately 11.0% of dermatology outpatients who used corticosteroids have encountered skin thinning during their use [51]. This is understandable because skin atrophy is a well-known side effect of corticosteroids, especially when using potent steroids too frequently or for long periods [52].

The most reported indication for using corticosteroids in the current study was dermatologic disease. More than half of the participants surveyed in an earlier study reported dermatologic disorders as the main indication for the use of corticosteroids [34]. Other studies found that acne was the most common indication for which corticosteroids were prescribed [53-55].

On the other hand, only 2.2% of this study participants indicated that COVID-19 infection was one of the main indications for corticosteroids use, which was much lower than that reported in a previous study [34]. Compared to other studies [41, 42], more participants reported the use of topical preparation as the most common dosage form of corticosteroids in the present study. However, a higher percentage of topical steroid users was reported in another study [34].

The current study showed that the male gender, working in the health sector, and having insufficient knowledge about corticosteroids were significantly associated with lower corticosteroids practice. The higher incidence of dermatologic conditions in women, such as acne and eczematous dermatitis that could necessitate corticosteroids may be one explanation for the relationship between male gender and lower corticosteroid use [56]. The reduced corticosteroid practice in individuals working in the medical sector may be attributed to more serious concerns and misplaced beliefs among healthcare professionals about corticosteroid use, eventually reducing its practice.

Furthermore, people with low knowledge of corticosteroids may be more hesitant to use drugs with such a safety profile if they are not fully aware of the risks involved. Participants in this study who lived in urban areas had a chronic illness and tested positive for COVID-19; conversely, they used corticosteroids more frequently than those who did not. In our study, participants living in urban areas were more likely to express a positive attitude towards using corticosteroids, which may justify why they demonstrated higher corticosteroid practice than those living in rural areas. People with chronic diseases and COVID-19-infected

individuals may have received corticosteroid treatment throughout their lifetimes, which may explain why they demonstrated higher corticosteroid use than those without such disorders.

Limitation of the Study

The cross sectional design of this study does not help establishing the cause effect relationship. The use of self-report method might lead to social desirability and recall bias. In addition, the use of convenience sampling technique might limit the generalizability of the study findings.

CONCLUSIONS

The current study results underscore the pressing need for implementing educational interventions and awareness campaigns to improve public knowledge gaps about corticosteroid therapy including their identity, the importance of gradual discontinuation and raise public awareness about the nature and severity of possible side effects of corticosteroids. In addition to enhance good practice in terms of corticosteroid use, the interventions should also foster a positive attitude towards corticosteroid use and alleviate concerns about its side effects, with a strong focus on raising awareness about corticosteroids, dispelling misconceptions about their safety, and emphasizing their importance in certain therapeutic regimens.

Future Research

In the context of future research, it is recommended to conduct controlled clinical trials to evaluate the impact of such educational interventions on individuals' perceptions and willingness to utilize corticosteroid therapies appropriately.

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