



Evaluation of knowledge, experiences, and fear toward prescribing and dispensing corticosteroids among Egyptian healthcare professionals: A cross-sectional study

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Evaluation of knowledge, experiences, and fear toward prescribing and dispensing corticosteroids among Egyptian healthcare professionals: A cross-sectional study



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ABSTRACT

Background: Corticosteroids (CS) are essential drugs in the treatment of several medical conditions. Assuming different roles, physicians and pharmacists play a primary role in prescribing and dispensing these medications to optimize patients' clinical management. The data on assessing knowledge and experience of healthcare professionals toward CS is scarce. Therefore, this study aimed to assess and compare knowledge, experience, and fears towards CS among Egyptian physicians and pharmacists.

Methods: A cross-sectional, self-administrated, validated online questionnaire was used to collect the data from Egyptian healthcare professionals. The questionnaire consisted of four sections with multiple choice questions: sociodemographic (7 questions), knowledge about CS (13 questions), experience with CS prescription/dispensing (5 questions), and fears and preferences toward CS prescription/dispensing (13 questions). Descriptive and inferential statistics were used to analyze the data.

Results: A total of 600 responses were analyzed in this study. The study sample was almost two-half of healthcare providers: 303 (50.5%) pharmacists and 297 (49.5%) physicians. Pharmacists had marginally higher knowledge scores as compared to those recorded for physicians (11.29 versus 10.16, respectively; $P = 0.047$). Physicians had more experience choosing corticosteroids in treatment plans based on their experience (51.8% vs 38.5%) and guideline recommendations (72.8% vs 50.9%) than pharmacists. However, pharmacists had more experience dealing with corticosteroid use based on patients' preferences (19.5% vs 4.9%) and showed a broader scope of experiencing side effects of corticosteroids with their patients. The two professions demonstrated high levels of fear, with pharmacists acknowledging significantly lower concerns about CS than physicians (3.72 versus 4.0, respectively; $P = 0.003$).

Conclusion: Discrepancies exist among healthcare professionals in knowledge and experience, favoring better scientific knowledge of pharmacists related to corticosteroids. Based on these findings, the

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interprofessional collaborative efforts would provide comprehensive, patient-centered care that maximizes the benefits of CS while minimizing their risks.

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1. Introduction

Corticosteroids (CS) are drugs that play a pivotal role in the treatment of a vast majority of medical conditions, including inflammatory and immune-mediated disorders (Mahdy A 2017, Hodgins A 2023). Nevertheless, their clinical use does not come without risks. Prolonged usage of CS has been linked to serious and significant health adverse effects such as infections, osteoporosis, hyperglycemia, cardiovascular disorders, and immunosuppression (Liu et al., 2013). Therefore, the optimal use of CS requires a balance between therapeutic benefits and risks, which could be achieved through appropriate prescribing and monitoring of these medications.

Basic knowledge about CS usage guidelines and their potential risks appears to be imperative and should be a major source of concern for patients as well as healthcare professionals. Assuming different roles, physicians and pharmacists play a primary role in prescribing and dispensing these medications to optimize patients' clinical management (Sami et al., 2021, Waszyk-Nowaczyk et al., 2021). In addition to dispensing, pharmacists ensure the safe and effective use of the prescribed CS by providing drug information and medication counseling (McGivney et al., 2007). On the other hand, physicians are responsible for CS prescribing, monitoring, as well as managing their adverse effects (Yasir M 2023). Accordingly, the knowledge and experience towards CS among healthcare professionals are crucial to achieving the desired treatment outcomes, as incorrect information would negatively affect these outcomes (Jose and AlHajri 2018, Borges do Nascimento et al., 2022). For example, overstressing CS possible side effects could negatively impact perceptions of safety and contribute to treatment non-adherence (Smith et al., 2017). Assessing knowledge, experience and fear towards prescribing and dispensing CS among pharmacists and physicians might help identify areas where targeted education and training are needed.

The available evidence regarding the knowledge of healthcare professionals about CS is scarce, and conflicting data exist, creating a knowledge gap, with most previous studies focused on one dosage form. A cross-sectional study conducted in Saudi Arabia showed physicians had poor knowledge when asked about potency classification of selected CS agents (Alsukait et al., 2017). Similarly, in a population-based study, less than one-third of the patients had their routine clinical and biological monitoring before the initiation of CS, indicating a lack of prescribers' familiarity with the possible threats (Fardet et al., 2015). Contrary, a study concluded that dermatologists are generally knowledgeable about CS effectiveness (Sandoval et al., 2013). On the other hand, community pharmacists have the right attitudes about what patients should know regarding the use of topical CS (Lau and Donyai 2017). Kang et al. also observed that Korean community pharmacists have sufficient knowledge and awareness to guide patients on the appropriate use of CS. On the contrary, in an Egyptian study, pharmacists showed inadequate knowledge and practices regarding asthma management (Said et al., 2022, Kang et al., 2020).

Considering the relative lack of data providing a comprehensive assessment and comparison of knowledge, experience and fears towards CS of healthcare professionals in Egypt, this study aimed to assess and compare knowledge, experience, and fears towards CS among Egyptian physicians and pharmacists. This might inform

and improve patient care by identifying areas of knowledge gaps and misconceptions among healthcare professionals and contribute to the development of evidence-based guidelines for the use of corticosteroids.

2. Material and methods

This was a cross-sectional study that used a web-based questionnaire. The questionnaire was designed to be a self-administered tool, and data were collected via social media platforms (WhatsApp, Facebook and LinkedIn) between 12 December 2022 and 25 March 2023. Eligible participants include any licensed pharmacist or physician practicing in Egypt willing to respond to the questionnaire. Participation was voluntary and anonymous. At the start of the survey, each participant was provided with the study information and consent form to be filled out online if the respondents were willing to continue with the questionnaire. Ethical Approval has been acquired by two institutions, namely the Institutional Review Board (IRB) of the Faculty of Pharmacy, Applied Science Private University, Amman, Jordan (Approval number:2022-PHA-24) because the questionnaire developer is Jordanian and the ethical committee of the Faculty of Pharmacy, Future University in Egypt, New Cairo, Egypt (Approval Number: REC-FPFUE-28/2023) as the participants are Egyptians.

2.1. Sample size and selection of participants

The sample size has been determined using Open-Source Epidemiologic Statistics for Public Health (OpenEpi) Version 3.01 with a 95% confidence level and a 5% margin of error. Participants were recruited using a practical snowball sampling technique. The minimal sample size required for this study was 285 people from each group, which was adequate for the required statistical power (Dean AG 2013). Hence; the number of registered pharmacists in Egypt is 216,072 pharmacists (Salem et al., 2022) and the number of registered physicians is 213,000 practitioner (East 2020).

2.2. Study tool

Following an analysis of pertinent validated surveys in the literature, the study questionnaire was created (Ahmad et al., 2014, El Hachem et al., 2017, Choi et al., 2020, Barakat et al., 2023) using the fundamental guidelines for effective survey design (Boynton 2004). A pool of questions pertinent to the study's goals was created by combining information from several sources. The questionnaire comprised four sections with multiple choice questions: sociodemographic (7 questions), knowledge about CS (13 questions), experience with CS prescription/dispensing (5 questions), and fears and preferences toward CS prescription/dispensing (13 questions).

Five academics assessed the content validity of the study tool prepared in English. The questionnaire was piloted on 20 participants (pharmacists and physicians) to ensure the clarity of all items, and linguistic adjustments were made as necessary based on the participants' feedback. The final analyses did not take the pilot responses into account. Then, the final version of the questionnaire was distributed electronically.

Regarding knowledge assessment, the overall knowledge score was calculated based on the responses to 13 knowledge items.

The general knowledge score ranges from 0 to 13 based on the total of individual item scores (1 for a correct item), which had only two options, yes or no. A good degree of knowledge was defined in this study as having at least 50% of the total correct answers (Barakat et al., 2023). Furthermore, a 5-point Likert scale was used to record the responses related to the fear score (Strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5). With a Cronbach's alpha of 0.85, the scale's reliability and internal consistency were confirmed. The 5-point Likert-type scale results were examined for the respondents; the mean ± SD of the fear score was calculated for each item and sample category (pharmacists and physicians). The score results have been classified into three rankings (Abazid et al., 2021), with low scores falling between 1.00 and 1.66, moderate scores falling between 1.67 and 3.32, and high scores falling between 3.33 and 5.00.

2.3. Data analysis

The completed data from respondents were extracted, checked and then exported into Statistical Package for Social Sciences version 24.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were calculated and reported as appropriate, including mean, standard deviation (SD), frequency, and proportions. The chi-square test was used to compare pharmacists' and physicians' knowledge and experience. Mean (±SD) of knowledge and fear scores were calculated for the groups of pharmacists and physicians. Scores were compared statistically using an unpaired t-test. Multiple linear regression was conducted to test the predictors of the knowledge and fear scores. A P-value of < 0.05 represented a statistically significant difference.

3. Results

Fig. 1 depicts the flow chart of the study; of a total of 604 responses, four were excluded due to incompleteness, and 600 were included in the analysis. The study sample represented relatively same-sized groups of healthcare providers: 303(50.5%) pharmacists and 297(49.5%) physicians. Most participants were females (421, 70.2%), and the mean age was 33.8 ± 7.37 years old.

Most participants lived in greater Cairo (349, 58.2%), with a median experience (±IQR) of 6.0 ± 13.0 years. The highest percentage of respondents held bachelor's degrees (279, 46.5%). More than half of the respondents have worked in governmental hospitals (326, 54.3%). Regarding the specialty of the participating physicians, they were mainly general practitioners (n = 46, 7.7%), dermatologists (40, 6.7%) and other specialties (113, 18.8%), Table 1.

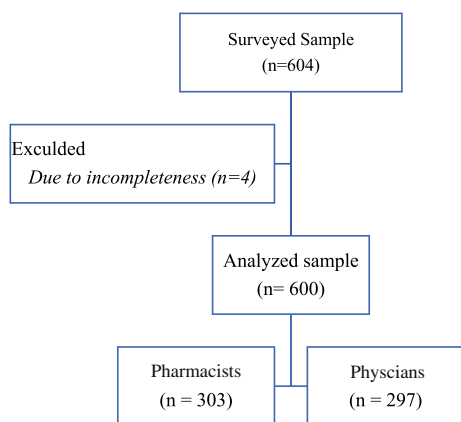


Fig. 1. Flow chart depicting the surveyed sample.

3.1. Knowledge of health care providers about corticosteroids

In general, both pharmacists and physicians demonstrated good knowledge of CS. Hence, out of a total score of 13, pharmacists scored 11.29 ± 2, which differs significantly from physicians' scores of 10.16 ± 2.8. Pharmacists were significantly more capable of recognizing that CS is mainly used to treat inflammation and suppress the immune system (279, 92.1%), to treat various health conditions (e.g., asthma, eczema, COVID-19) (256, 84.5%) and that the dose must be tapered down slowly upon stopping the treatment (281, 92.7%) as clear from Table 2. Almost the same trend was documented upon asking about the side effects of CS.

3.2. Healthcare providers' experience with prescribing/dispensing corticosteroids

Table 3 illustrates the experience of the participating healthcare providers with prescribing/dispensing CS. Almost two-thirds of the study sample had experience prescribing/dispensing (393, 65.5%), with topical or inhaler/nebulizer dosage forms being the most commonly prescribed or dispensed. Also, the main indications for that were dermatological or respiratory conditions. Physicians had more experience choosing corticosteroids in treatment plans based on their experience (51.8% vs 38.5%) and guideline recommendations (72.8% vs 50.9%) than pharmacists. However, pharmacists had more experience dealing with corticosteroid use based on

Table 1 Sociodemographic characteristics of the study participants (n = 600).

Variable	Pharmacists* (n = 303)	Physicians (n = 297)	Total (n = 600)
n (%)			
Gender			
• Female	233(76.9)	188(63.3)	421(70.2)
• Male	70(23.1)	109(36.7)	179(29.8)
Age in years (mean ± STD)	30.59 ± 7.06	37.1 ± 10.5	33.8 ± 7.37
Years of experience (median ± IQR)	5.0 ± 10.0	10.0 ± 18.0	6.0 ± 13.0
Location of work			
• Greater Cairo (Cairo, Giza)	142(46.9)	207(69.7)	349(58.2)
• Upper Egypt	107(35.3)	53(17.8)	160(26.7)
• Lower Egypt	54(17.8)	37(12.5)	91(15.2)
Qualifications			
• Bachelor's degree	175(57.8)	104(35.0)	279(46.5)
• Diploma	83(27.4)	18(6.1)	101(16.8)
• Fellowship/Board	26(8.6)	13(4.4)	39(6.5)
• Master's degree	12(4.0)	75(25.3)	87(14.5)
• PhD/MD/MD equivalent	7(2.3)	87(29.3)	94(15.7)
Place of Work			
• Academia	7(2.3)	–	7(1.2)
• Community Pharmacy - Independent	44(14.5)	–	44(7.3)
• Community Pharmacy-Chain	50(16.5)	–	50(8.3)
• Medical representatives	10(3.3)	–	10(1.7)
• Pharmaceutical company-Office based	2(0.7)	–	2(0.2)
• Pharmaceutical Industry	2(0.7)	–	2(0.2)
• Governmental Hospital	155(51.2)	171(57.6)	326(54.3)
• Private Hospital	–	12(4.0)	12(2.0)
• Governmental and Private Hospitals/clinics –	–	83	83(27.9)
• Private clinic	–	9(3.0)	9(1.5)
• Others	33(10.9)	22(7.4)	55(9.2)

STD: Standard deviation, IQR: interquartile range. * Percentages were calculated based on the total number of pharmacists (n = 303). \$ Percentages were calculated based on the total number of physicians (n = 297).

Table 2
Assessment of the healthcare providers' knowledge about corticosteroids (n = 600).

Knowledge statements	Pharmacists*	PhysicianS	Total	P-
	(n = 303)	(n = 297)	(n = 600)	value
	Correct answers n (%)			
o Corticosteroids, often known as steroids, are anti-inflammatory medicine.	291(96.0)	287(96.6)	578(96.3)	0.366
o Corticosteroids are man-made hormones normally produced by the adrenal glands.	232(76.6)	200(67.3)	432(72.0)	0.089
o Corticosteroids are mainly used to suppress the immune system and treat inflammation.	279(92.1)	150(50.5)	429(71.5)	<0.001
o Corticosteroids are used to treat various health conditions (e.g., asthma, eczema, COVID-19)	256(84.5)	189(63.6)	445(74.2)	<0.001
o Prolonged steroid treatment at high doses – particularly with steroid tablets – can cause health problems in some people.	300(99.0)	288(97.0)	588(98.0)	0.071
o The used dose of corticosteroids must be reduced slowly over a few weeks or months before stopping if they have been taken for a long time.	281(92.7)	192(64.6)	473(78.0)	0.002
According to your knowledge, corticosteroids have several potential side effects of long-term treatment, including				
o Weight gain	294(97.0)	288(97.0)	582(97.0)	0.259
o Thinned skin that bruises easily	278(91.7)	254(85.5)	532(88.7)	0.224
o Increased risk of infections	298(98.3)	230(77.4)	528(88.0)	0.049
o Mood changes	193(63.7)	150(50.5)	343(57.2)	0.038
o Hyperglycemia	280(92.4)	277(93.3)	557(92.8)	0.399
o Osteoporosis	238(78.5)	280(94.3)	518(86.3)	0.041
o Others	202(66.7)	233(78.5)	435(72.5)	0.049
Knowledge scores out of 13 (mean ± STD)	11.29 ± 2.3	10.16 ± 2.8	10.73 ± 2.8	0.047

* Percentages were calculated based on the total number of pharmacists (n = 303). \$ Percentages were calculated based on the total number of physicians (n = 297). The correct answer was scored 1 point, and 0 for the wrong answer. Significance measure at P < 0.05 and presented in bold: using chi-square test.

Table 3
Healthcare providers' experience with prescribing/dispensing corticosteroids.

Questions	Pharmacists	Physician	Total	P-
	(n = 303)	(n = 297)	(n = 600)	value
Did you ever prescribe/dispense Corticosteroids for any reason?*				
• No	72(23.8)	45(15.2)	117(19.5)	<0.001
• May be	62(20.5)	28(9.4)	90(15.0)	<0.001
• Yes	169(55.8)	224(75.4)	393(65.5)	<0.001
	Pharmacists	Physician	Total	P-
	(n = 169)	(n = 224)	(n = 393)	value
What was the most common dosage form you ever prescribed/dispensed?#				
• Topical (e.g., cream /ointment, eye/ear drops)	63(37.3)	72(32.1)	135(34.4)	0.562
• Inhaler or nebulizer	34(20.1)	79(35.3)	113(28.8)	<0.001
• Oral (Tablets, capsules, suspensions)	26(15.4)	41(18.3)	67(17.0)	0.044
• Injection	45(26.6)	30(13.4)	75(19.1)	0.333
What was the main indication for corticosteroid prescription/dispensing?#				
• Respiratory disease (e.g., Asthma, COPD)	96(56.8)	85(37.9)	181(46.1)	0.371
• COVID-19	31(18.3)	22(9.8)	53(13.5)	0.412
• Dermatological disease (e.g., eczema)	72(42.6)	82(36.6)	154(39.2)	0.726
• Joint or rheumatological diseases	20(11.8)	47(21.0)	67(17.0)	0.074
• GIT immunological diseases (e.g., Crohn's disease, ulcerative colitis)	11(6.5)	29(12.9)	40(10.2)	0.007
• Systemic immunological disorders (e.g., Multiple Sclerosis)	19(11.2)	38(17.0)	57(14.5)	0.021
• Others	23(13.6)	39(17.4)	62(15.8)	0.038
Why do you prefer to choose corticosteroids for the treatment? More than one option is/are allowed?#				
• Quicker relief for patients' symptoms	104(61.5)	126(56.3)	230(58.5)	0.184
• According to my experience, it is the most effective treatment for the most common cases	65(38.5)	116(51.8)	181(46.1)	0.03
• Treatment failure with other conventional therapy	71(42.0)	73(32.6)	144(36.6)	0.124
• According to guidelines and literature, it is the most effective treatment for the most common cases I have	86(50.9)	163(72.8)	249(63.4)	<0.001
• According to patient preference	33(19.5)	11(4.9)	44(11.2)	<0.001
• It is the safest option for treatment	16(9.5)	27(12.1)	43(10.9)	0.717
• Cost-effective	43(25.4)	54(24.1)	97(24.7)	0.729
• Others	33(19.5)	39(17.4)	72(18.3)	0.693
Did you ever experience any of the following side effects with your patients?#				
• Increased appetite – potentially leading to weight gain	118(69.8)	95(42.4)	213(54.2)	0.486
• Acne	101(59.8)	34(15.2)	135(34.4)	<0.001
• Thinned skin that bruises easily	105(62.1)	62(27.7)	167(42.5)	0.043
• Increased risk of infections	133(78.7)	110(49.1)	243(61.8)	0.248
• Mood changes, mood swings, and depression	85(50.3)	76(33.9)	161(41.0)	0.161
• Hyperglycemia	112(66.3)	73(32.6)	185(47.1)	0.181
• High blood pressure	126(74.6)	96(42.9)	222(56.5)	0.913
• Osteoporosis (weak and brittle bones)	110(65.1)	58(25.9)	168(42.7)	0.003
• Others	86(50.9)	47(21.0)	133(33.8)	0.028

* Percentages were calculated based on the total number of pharmacists (n = 303). \$ Percentages were calculated based on the total number of physicians (n = 297). #Only the participants who have an experience with prescribing/dispensing corticosteroids answered these questions (pharmacists n = 169, physician n = 224). Significance measure at P < 0.05 and presented in bold: using chi-square test.

patients' preferences (19.5% vs 4.9%) and showed a broader scope of experiencing side effects of corticosteroids with their patients.

3.3. Fears and preferences toward corticosteroids prescription/dispensing among health care providers

Both pharmacists and physicians showed high fears toward corticosteroid prescription/dispensing. However, on the Likert scale, physicians' fear score (4.00 ± 1.4) was significantly higher than pharmacists' 3.72 ± 1.8. Their fear was mainly attributed to systemic corticosteroid preparations, the risk of developing adrenal insufficiency after stopping the CS, the risk of patient's-social refusal if they know about the CS use, the risk of depression or mood swings, and the risk of any unknown/untreatable side effects affecting their patients, [Table 4](#).

The majority of the pharmacists (263, 86.8%) and physicians (265, 89.2%) significantly (p < 0.05) agreed/strongly agreed (compared to neutral and disagree answers) that the patient must be counseled well about the safety of corticosteroid use. While around half of the pharmacists and physicians were either neutral or disagreed/strongly disagreed with using herbal therapy instead of CS or any other medication regardless of price, [Fig. 2](#) (a, b).

Multiple linear regression results did not show any significant association between the knowledge/fear scores and sociodemographic variables.

4. Discussion

This study was the first to investigate the differential knowledge, attitudes, and practices of pharmacists and physicians practicing in Egypt concerning corticosteroids, without restricting our focus to particular sectors or specialties. Therefore, any licensed pharmacist or physician practicing in Egypt was eligible to participate in the study. This inclusive approach enabled us to capture a diverse range of perspectives and experiences, which can inform

Table 4
Fears toward corticosteroids prescription/dispensing among health care providers (n = 600).

I am afraid to prescribe/dispense corticosteroids due to.....	Pharmacist (n = 303)	Physician (n = 297)	P-value
• Risk of weight gain among my patients	3.86 ± 1.2	3.48 ± 1.0	0.091
• Risk of hyperglycemia among my patients	4.32 ± 1.0	4.27 ± 1.2	0.731
• Risk of increased blood pressure among my patients	4.27 ± 1.6	4.31 ± 1.0	0.811
• Risk of osteoporosis among my patients	4.10 ± 1.0	4.19 ± 2.0	0.991
• Risk of patient's addiction to this medication and not being able to live without it	3.33 ± 1.2	3.13 ± 1.0	0.461
• Risk of developing adrenal insufficiency after stopping the corticosteroids among my patients	3.98 ± 1.0	4.31 ± 1.8	<0.001
• Higher risk of side effects with oral and injectables dosage forms compared to topical preparations	3.97 ± 2.0	4.38 ± 1.0	<0.001
• Risk of patient's-social refusal if they know about the corticosteroids use	3.11 ± 1.2	4.27 ± 1.2	<0.001
• Risk of depression of mood swings among my patients	3.13 ± 1.0	3.42 ± 1.0	0.047
• Risk of any unknown/untreatable side effects among my patients	3.12 ± 1.0	4.23 ± 1.8	<0.001
*Fears score (Mean ± STD)	3.72 ± 1.8	4.00 ± 1.4	0.003

* (1.00–1.66): Low score on the Likert scale, (1.67–3.32): Moderate score on the Likert scale, (3.33–5.00): High score on the Likert scale. Significance measure at P < 0.05 and presented in bold: using Unpaired t-test.

and guide future research and clinical practice in this field. The results of the present study showed that the surveyed pharmacists possessed significantly higher scientific knowledge than physicians. While discussing the knowledge levels among healthcare professionals, it is essential to identify its major determinants, namely, level of education and years of experience ([Elkin and Gorman 2002](#), [Saab et al., 2003](#)). The results of the current study showed that surveyed physicians had a higher level of academic achievement compared to pharmacists. Specifically, 64.9% of the physicians had postgraduate studies vs 42.2% for pharmacists. Additionally, surveyed physicians had more years of experience in their respective fields, with a mean of 10 versus 5 years among pharmacists. Despite the aforementioned differences favoring physicians, they scored lower than pharmacists (11.29 versus 10.16, respectively). Among different questioned areas of knowledge, the primary distinction between both professions appeared mainly in comprehensive familiarity with indications, adverse effects, and proper directions of use, particularly those related to dose tapering, favoring pharmacists. So far, no comparative investigations have been conducted on healthcare providers' knowledge regarding CS. However, our results align with previous research that documented a gap in knowledge among physicians. [Alsukait et al. \(2017\)](#) reported inadequate knowledge towards topical CS among Saudi primary care physicians. The distinction in the focus of undergraduate educational programs between both professions could explain this. The pharmacy programs are more related to pharmacology and pharmaceutical care, while medicine is more disease-oriented ([Keijsers et al., 2014](#)). The consequences of this lack of knowledge among physicians have been widely reported. A recent study found that over 65% of identified drug-related problems were linked to drug indications (37.3%) and dosing (29.6%) without specifying particular medications ([Berger et al., 2022](#)). In this study, physicians had a high acceptance rate (93%) for interventions suggested by pharmacists, indicating that they trust the pharmacists' knowledge as drug experts ([Berger et al., 2022](#)).

The current analysis of prescribing/dispensing patterns of different dosage forms revealed that pharmacists mostly recommended topical medications while systemic dosage forms were the least utilized. Although some topical CS are prescription-only drugs (([HPRA](#)) 2023), community pharmacists in developing countries, including Egypt, tend to prescribe and dispense them to treat simple skin conditions, especially in rural areas where access to healthcare providers may be limited. In the present study, almost one-third of the surveyed pharmacists work in community pharmacy settings where most patients have minor ailments. Additionally, about half of the surveyed pharmacists worked in governmental hospitals where different drug distribution systems were implemented. Thus, not all hospital pharmacists have the potential to see the patient's prescriptions declaring diagnosis as in the floor stock system. Accordingly, this might explain the lower incidence of dispensing systemic dosage forms among pharmacists to patients with major ailments such as GIT and systemic immunological disorders mostly managed in tertiary care centers. In line with this explanation, the findings of [Prasad et al.](#) documented the lack of pharmacists' confidence in managing patients with inflammatory bowel diseases ([Prasad et al., 2020](#)).

In the current study, pharmacists and physicians perceived CS as a quick relief option for patients. This could be illustrated as these medications can rapidly reduce inflammation and relieve symptoms such as pain, edema, and redness ([Watanabe and Bruera 1994](#), [Vyvey 2010](#)). In addition, both professions considered CS cost-effective compared to other medications. This is due to the availability of generic forms, which are less expensive than brand-name drugs ([FDA, 2021](#)). These results should be interpreted with caution as it's important to note that the cost-effectiveness of CS

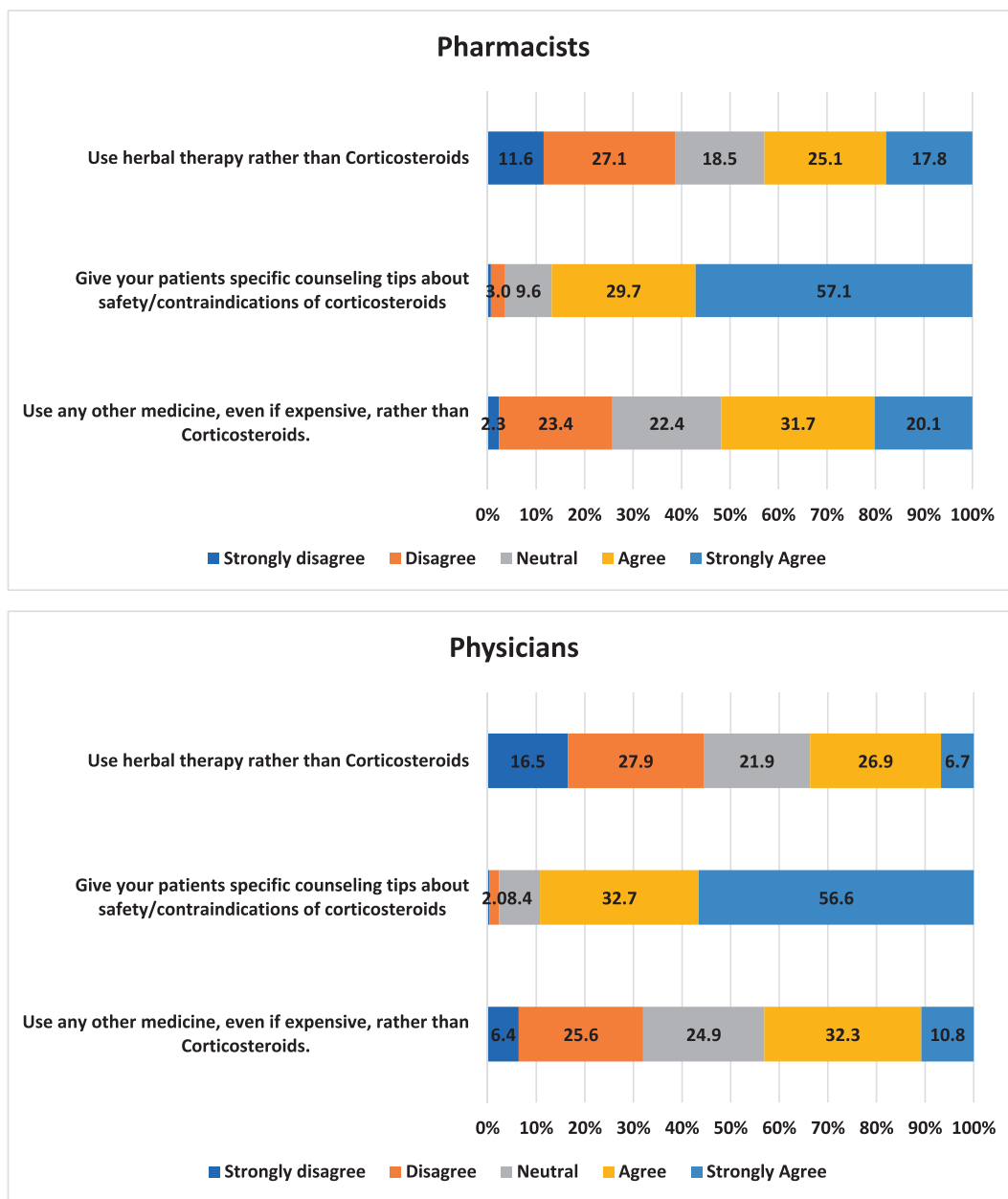


Fig. 2. Preferences of health care providers toward corticosteroids prescription/dispensing. a) Pharmacists (n = 303), b) Physicians (n = 297).

depends on the specific condition being treated and the duration of use (WHO, 2023). Therefore, it's essential for healthcare providers to carefully consider the benefits and risks of CS treatment for each patient and adjust treatment accordingly.

As some patients might prefer using CS due to their fast-acting nature, we incorporated patient preference when assessing healthcare provider's experiences about CS. Our results showed that pharmacists were significantly more likely to report patient preference as a reason for choosing corticosteroids (N = 33, 19.5%) compared to physicians (N = 11, 4.9%) (p < 0.001). This may be related to the fact that patients have easier access to pharmacies than clinics, particularly for respiratory and dermatological conditions.

Physicians in the current study significantly preferred CS for their patients. They perceived CS as the most effective treatment option per their clinical experience and according to guidelines. It is important to be alert when discussing this information, as the rational use of CS depends on several factors, including the

underlying condition, the severity of the symptoms, and the individual patient's medical history (Kirby 1989). Corticosteroids are not always the most effective or appropriate treatment option, as supposed by the surveyed physicians. For example, biological agents are more effective in controlling symptoms and reducing disease progression in certain chronic inflammatory conditions (Feuerstein et al., 2020, Fraenkel et al., 2021). Hence, physicians should stay up to date with the latest guidelines related to medication management. Therefore, evaluating each patient's situation is essential to optimize management plans carefully. These findings correlate to the lack of knowledge regarding proper indications experienced by the physicians analyzed in our study compared to pharmacists. Besides, it reveals the value of interprofessional collaborative efforts during patient management.

Regarding side effects experienced by our surveyed participants with their patients, higher trends were detected among pharmacists in all adverse effects questioned. This is explained as pharma-

cists are often the first point of contact for patients who experience medication side effects (Tsuyuki et al., 2018). They can provide counseling on managing side effects and may recommend over-the-counter remedies. Pharmacists markedly faced acne and thin skin compared to physicians' experience. This is perhaps explained by their practice settings, where community pharmacies are often accessed for minor skin problems. Contrarily, similar trends among both professions were detected regarding experiences with mood changes and depression. This is explained as depression may not always present with obvious physical symptoms, making it difficult for pharmacists to recognize it (Scheerder et al., 2008). Additionally, pharmacists may not have specialized training in mental health (Liekens et al., 2012, Xi et al., 2019). However, they can still be essential in monitoring and managing medication-related side effects, including those related to CS. Healthcare providers must work together to ensure that patients receive comprehensive care that addresses their physical and mental health needs.

With a marginal significance, physicians demonstrated better scientific knowledge about osteoporosis as a potential side effect of longterm CS treatment compared to pharmacists. It is worth noting that pharmacists and physicians may have different areas of expertise and responsibilities when it comes to managing osteoporosis. In practice, it is possible that pharmacists encounter osteoporosis more frequently as a side effect of medications because they are more involved in dispensing medications and monitoring patients for adverse effects, such as bone loss, which is a recognized side effect of corticosteroids. On the other hand, certain specialties of physicians may not encounter these side effects in their patients through their daily practice, which could explain the higher percentage of pharmacists who reported experiencing these side effects with their patients. Overall, these findings highlight the importance of interdisciplinary collaboration between healthcare professionals in the management of osteoporosis and other chronic diseases.

The two professions demonstrated high levels of fear, with physicians acknowledging significant concerns about prescribing CS compared to those pharmacists. The main worries of physicians were attributed to the potential risk of adrenal insufficiency in their patients after medication cessation. This fear was consistent with the physicians' limited knowledge concerning the appropriate tapering of corticosteroid doses. Pharmacists may have more specialized knowledge of medication management and dosing, an essential aspect of their training and practice. They can provide valuable support to physicians and patients regarding the appropriate tapering of corticosteroid doses to ensure optimal care.

Our study's findings have broader implications for the healthcare system and the community in Egypt, where corticosteroids are widely used for various medical conditions. Our findings can inform targeted interventions and educational initiatives that improve the quality of care and patient safety by addressing the identified knowledge gaps and misconceptions among healthcare professionals.

This study has several limitations. First, the small sample size and the exclusive representation of Egyptian healthcare providers would hinder our findings' generalizability to other countries with different healthcare systems and economic conditions. Future studies should involve multiple countries which will provide a foundation for conducting comparative research that explores the similarities and differences in aspects of prescribing and dispensing corticosteroids across different countries and healthcare systems. Selection bias related to the snowball technique, utilized for data collection, represents another notable limitation. The reliability and authenticity of study data due to response bias may be compromised by online surveying of participants instead of a face-to-face meeting. Future qualitative research using theoretical frameworks of data collection and analysis will provide detailed

insights into the experiences and perspectives of health care professionals that may not be captured by quantitative research methods.

5. Conclusion

The results of the current study provide valuable insights into the disparities in knowledge and practice between pharmacists and physicians. Our findings indicate that pharmacists possess better scientific knowledge related to corticosteroids compared to physicians, while physicians expresses greater concerns regarding the prescription of CS. Based on these findings, pharmacists and physicians should collaborate to provide comprehensive, patient-centered care that maximizes the benefits of CS while minimizing their risks.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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