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Article

Understanding Physicians' Journeys with Corticosteroids – Experiences, Knowledge, and the Shadows of Fears

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Abstract: Background: Corticosteroids (CS) are crucial for managing various medical conditions, but long-term use is associated with significant risks. Balancing the therapeutic benefits and potential hazards requires careful prescription and monitoring. This study explores Jordanian physicians' knowledge, experiences, and concerns regarding CS prescriptions. **Methods:** This was a cross-sectional study conducted between March and August 2023, using an online link distributed using social media platforms. **Results:** A total of 171 physicians enrolled in the study were predominantly male, with a median age of 31 years. Two-thirds worked in central Jordan, and one-third were general practitioners. The majority (86.5%) had experience both in topical (83.1%) and injectable (81.1%) dosage forms. Physicians demonstrated high knowledge (median score 11/11) and major concerns (median fear score 3.5/5) about CS. Major worries included the risk of osteoporosis (73.7%) and hyperglycemia (66.7%). Sociodemographic factors did not significantly impact their knowledge or fears. **Conclusion:** Our study showed that physicians have a high knowledge level about CSs but have major concerns about CS side effects, particularly osteoporosis and hyperglycemia. These findings highlight the need for targeted interventions to address these fears, enhancing physician confidence and improving patient management outcomes.

Keywords: physicians; corticosteroids; experiences; knowledge; fears

1. Introduction

Corticosteroids (CSs) play an important role in managing a variety of medical illnesses, particularly those involving inflammation and immune-mediated disorders [1,2]. CSs exert the pharmacological effect by reducing symptoms, easing disease severity, and improving the quality of life [3]. However, it is critical to recognize the hazards associated with the long-term utilization of corticosteroids, mainly infections, osteoporosis, hyperglycemia, cardiovascular diseases, and immunosuppression [1,4]. It is extremely integral to assess the therapeutic benefits with the potential dangers before prescribing corticosteroids in clinical practice [2]. To achieve the appropriate and professional decision, corticosteroids must be prescribed and monitored with caution through

choosing the right drug, correct dosage, and appropriate duration. Healthcare providers must critically evaluate individual patient's past and present medical history, and other pertinent considerations [5]. Furthermore, regular monitoring of side effects and adjusting the treatment plan accordingly are crucial to mitigate potential harm.

Awareness of corticosteroid dosage recommendations and associated dangers among patients and healthcare professionals is critical for achieving optimal therapeutic benefits. Structured communication, tailored education, and collaboration between patients and healthcare providers contribute to safer and more successful therapeutic strategies in medical practice [5,6]. For an effective administration of corticosteroid drugs, effective collaboration and integration between physicians and pharmacists play an integral and complementary role in improving medical practice with minimal toxicity [7]. Physicians provide the clinical knowledge and expertise in prescribing, monitoring, and changing treatment plans, while pharmacists contribute to dispensing appropriate medications, raising patient education, and enhancing the reporting of drug interactions [8,9]. This joint effort assures comprehensive care and improves patient outcomes. Accordingly, continuing education and professional development are essential for healthcare professionals to advance their expertise and keep abreast of medical practices [10]. This continuous commitment to learning ensures delivery of the best treatment standard with exposure to minimal adverse effects associated with the use of corticosteroids [11,12].

Assessing physicians' awareness and experience can shed light on the current prescribing practices [13]. Understanding the challenges or misunderstandings provides a valuable tool to guide future actions that are targeted at increasing prescription accuracy, appropriateness, and adherence to recommendations. This strategy serves as a foundational direction to conduct targeted educational efforts, which leads to improved practices, strengthened confidence, and enhanced patient outcomes in the context of corticosteroid prescribing and dispensing [14,15]. In a study based on population data, less than one-third of patients received regular clinical and biological monitoring prior to initiating CS, indicating a deficiency in prescribers' awareness of potential risks [16]. On the other hand, Kang et al. noted that Korean community pharmacists possess ample knowledge and awareness to advise patients on the proper usage of CS [17]. In contrast, an Egyptian study revealed that pharmacists possess insufficient knowledge and defective practices concerning CS in asthma management [18].

Additionally, assessing fear or concerns about prescribing and dispensing corticosteroids is important for understanding the psychological barriers that healthcare professionals may face [5]. This information can guide the development of supportive resources and strategies to alleviate concerns and build confidence. However, the scarcity and inconsistent nature of existing research addressing the perceptions of healthcare workers about CS reveal a significant gap in the literature, which has the potential to impair the safe and effective use of these drugs in clinical practice. By addressing these considerations and given the scarcity of data offering a full assessment of knowledge, experience, and fears regarding CS among healthcare workers, this research endeavors aimed to assess the knowledge, experiences, and fear towards prescribing corticosteroids among Jordanian healthcare physicians.

2. Materials and Methods

An online questionnaire was employed in this cross-sectional investigation. Data was gathered between March and August 2023, using social media such as Facebook, LinkedIn, and WhatsApp. The questionnaire was intended to be a self-administered tool. Any licensed physician who practices in Jordan and is willing to answer the questionnaire is eligible to participate. Participation was anonymous and entirely optional. Each participant received study details at the beginning of the questionnaire, along with an online consent form to complete if they wished to proceed with the questionnaire. The Faculty of Pharmacy, Applied Science Private University, Amman, Jordan's Institutional Review Board (or Ethics Committee) has obtained ethical approval (Approval number: 2022-PHA-24).

2.1. Sample size

The sample size has been calculated using Open-Source Epidemiologic Statistics for Public Health (OpenEpi) Version 3.01, with a margin of error of 5% and a confidence level of 90%. The approach of practical snowball sampling was employed to recruit participants. For this study, considering that there are 42,364 registered physicians in Jordan [20] and a 95% confidence interval, the minimal sample size needed is 170 participants [19].

2.2. Study Tool

The study questionnaire was developed utilizing the essential principles for efficient survey design [21], and based upon previous validated surveys in the literature [22–25]. Combining data from multiple sources resulted in a pool of questions relevant to the objectives of the study. Five academics assessed the content validity of the study tool prepared in English. The questionnaire was piloted on 10 participants (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. Cronbach's alpha was also checked ($\alpha=0.85$), accordingly the scale's reliability and internal consistency were confirmed.

The questionnaire comprised four sections with multiple choice questions: section I comprised of sociodemographic characteristics (5 questions), section II included the assessment of knowledge about CS (11 questions), section III covered the experience with CS prescription (5 questions), and section IV assessed fears and preferences toward CS prescription (10 questions).

Regarding the 11 knowledge assessment items were used to compute the cumulative knowledge score. Physicians received 1 point for each correct answer and 0 points for each incorrect answer, resulting in a knowledge score that can range from 0 to 11. Additionally, participants' responses regarding the fear score were documented using a Likert scale with a maximum of five points, with options including "strongly disagree" (1), "disagree" (2), "neutral" (3), "agree" (4), and "strongly agree" (5).

2.3. Statistical Analyses

Data were extracted from Google Forms as an Excel sheet and were then exported to Statistical Package for Social Sciences version 25.0 (IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA) for statistical analysis. The descriptive analyses were conducted using median and Interquartile Range (IQR) for continuous variables and frequency and percentages for categorical variables. Univariate linear regression analysis investigated independent factors that may affect the participants' knowledge and fears about CS. Variables were selected after checking their independence, where tolerance values > 0.1 and Variance Inflation Factor (VIF) values < 10 were checked to indicate the absence of multicollinearity between the independent variables in regression analysis. Variables that were found to be significant on a single predictor level ($p < 0.25$) were entered into multiple linear regression analyses. None of the included variables showed multicollinearity; thus, none was eliminated. Statistical significance was considered at $p \leq 0.05$.

3. Results

3.1. Sociodemographic Characteristics of the Study Participants

In this research, 171 physicians volunteered to participate. Their median age was 31.0 years, with an interquartile range of 8.0. Most were male, accounting for 105 individuals (61.4%), and nearly two-thirds were working in central Jordan, totaling 111 participants (64.9%). In terms of their medical specialties, approximately one-third of the physicians were general practitioners (GPs) ($n= 64$, 37.4%), while 12.3% of them were family medicine specialists ($n= 21$). Further information on their sociodemographic characteristics can be found in Table 1.

Table 1. Socio-demographic characteristics of the study respondent (n= 171).

Parameter	Median (IQR)	n (%)
Age (years)	31.0 (8.0)	
Gender		
Males		105 (61.4)
Females		66 (38.6)
Physicians site of work		
Hospital		94 (55.0)
Private clinic		25 (14.6)
Health center		40 (23.4)
Others		12 (7.0)
Location of work		
North of Jordan		45 (26.3)
Center of Jordan		111 (64.9)
South of Jordan		15 (8.8)
Physicians specialty		
GP (General practitioner)		64 (37.4)
Family medicine		21 (12.3)
Dermatology		3 (1.8)
Gastroenterology		1 (0.6)
Hematology-Oncology		2 (1.2)
Nephrology		1 (0.6)
Neurology		1 (0.6)
Psychiatry		1 (0.6)
Pulmonology		1 (0.6)
Rheumatology		1 (0.6)
Others		75 (43.9)

IQR: interquartile range.

3.2. Physicians' Experience with Prescribing Corticosteroids

Regarding the experience of physicians in prescribing CS, as indicated in Table 2, a significant majority of them, totaling 148 individuals (86.5%), reported having such experience. Among those who had dispensed CS, the most frequently prescribed dosage form was topical (123 out of 148, 83.1%), followed by injectable forms (121 out of 148, 81.8%). Furthermore, the primary reasons for physicians prescribing CS were related to treating respiratory diseases (129 out of 148, 87.2%), followed by dermatological conditions (122 out of 148, 82.4%). Additionally, the most prevalent side effects of CS experienced by patients, as reported by the physicians, included diabetes (84 out of 148, 56.8%), increased appetite (82 out of 148, 55.4%), and high blood pressure (62 out of 148, 41.9%).

Table 2. Physicians' experience with corticosteroids (n= 171).

Questions	n (%)
Have you ever prescribed corticosteroids for any reason?	
Yes	148 (86.5)
No	15 (8.8)
Maybe	8 (4.7)
The dosage form of corticosteroids you have prescribed§	
Topical (e.g., cream or ointment)	123 (83.1)
Inhaler or nebulizer	114 (77.0)
Tablets	110 (74.3)
Injection	121 (81.8)
Drops (e.g., eye drops)	69 (46.6)
The indication for corticosteroid you have prescribed§	
Respiratory disease (e.g., Asthma, COPD)	129 (87.2)
COVID-19	92 (62.2)
Dermatological disease (e.g., eczema)	122 (82.4)
Joint or rheumatological diseases	62 (41.9)
GIT immunological diseases (e.g., Crohn's disease)	41 (27.7)
Systemic immunological disorders (e.g., Multiple Sclerosis)	50 (33.8)
Did you ever experience any of the following side effects with your patients?§	
Increased appetite – potentially leading to weight gain	82 (55.4)
Acne	41 (27.7)
Thinned skin that bruises easily	35 (23.6)
Increased risk of infections	59 (39.9)
Mood changes, mood swings, and depression	59 (39.9)
Diabetes	84 (56.8)
High blood pressure	62 (41.9)
Osteoporosis (weak and brittle bones)	33 (22.3)

§ Percentages calculated out of 148.

Physicians reported the main reasons for choosing to prescribe CS to their patients. First and foremost, the ability of CS to rapidly alleviate patients' symptoms was a major factor, with 113 out of 148 physicians (76.4%) identifying this as a key consideration. Additionally, many physicians noted that CS were deemed the most effective treatment options for their patients' conditions, aligning with recommendations found in treatment guidelines, as reported by 102 out of 148 physicians (68.9%). Additional reasons can be found in Figure 1.

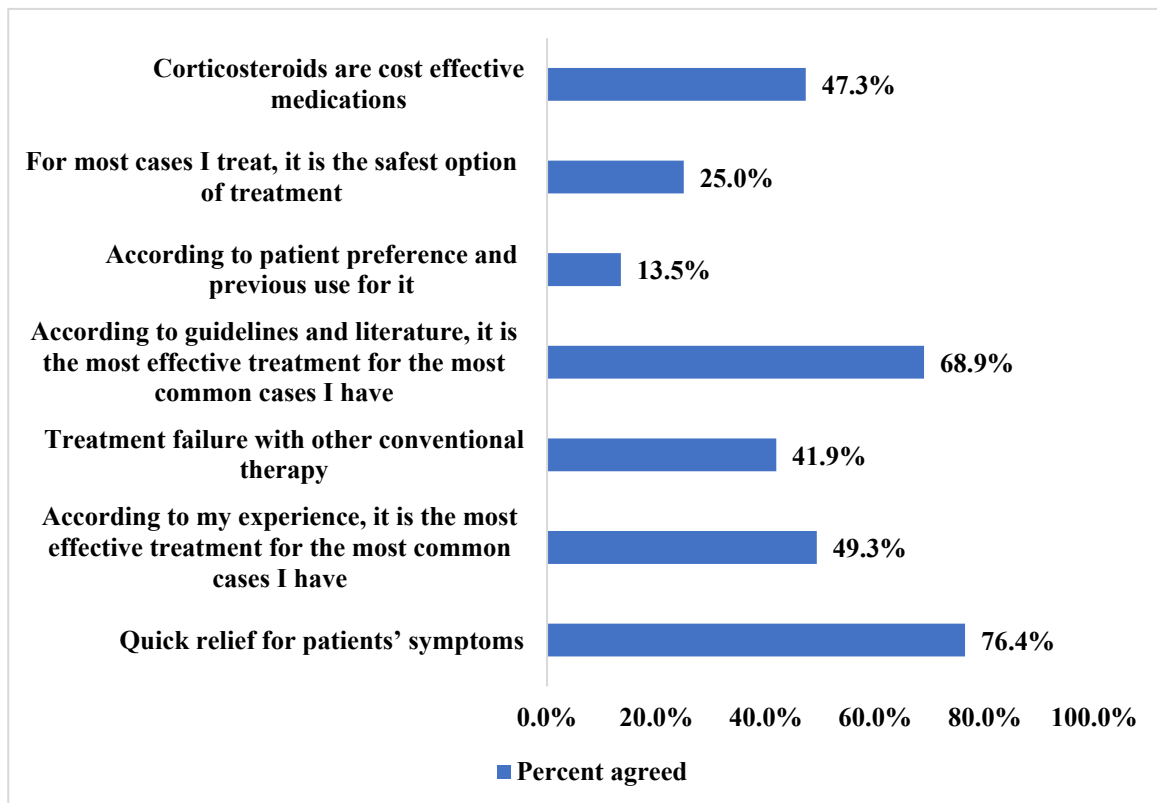


Figure 1. Reasons why physicians choose corticosteroids for the treatment (Percentages calculated out of 148).

3.3. Physicians' Knowledge about Corticosteroids

Overall, physicians demonstrated a high level of knowledge about CS, as indicated in Table 3. Their median knowledge score was 11.0 out of a maximum of 11.0, with an IQR of 1.0. The majority of physicians were well-informed, with 170 out of 171 (99.4%) correctly recognizing that CS can lead to weight gain. Additionally, 168 out of 171 physicians (98.2%) were aware that prolonged treatment with high doses of CS could pose problems for certain individuals. Furthermore, 167 out of 171 (97.7%) understood that when discontinuing long-term CS use, the doses should be reduced gradually over several weeks or months.

Table 3. Physicians' knowledge about corticosteroids medications (n= 171).

Statement	Correct answer	Percentage of patients correctly answered n (%)
Corticosteroids, often known as steroids, are anti-inflammatory medicine.	True	156 (91.2)
Corticosteroids are man-made hormones normally produced by the adrenal glands.	True	154 (90.1)
Corticosteroids are mainly used to reduce inflammation and suppress the immune system.	True	162 (94.7)

Corticosteroids are used to treat various health conditions (e.g., asthma, eczema, COVID-19 etc.)	True	163 (95.3)
Prolonged steroid treatment at high doses – particularly with steroid tablets – can cause problems in some people.	True	168 (98.2)
The used dose needs be reduced slowly over few weeks or months before stopping corticosteroids if have been taking them long time.	True	167 (97.7)
Corticosteroids can cause weight gain	True	170 (99.4)
Corticosteroids can cause thinned skin that bruises easily	True	154 (90.1)
Corticosteroids can cause increased risk of infections	True	161 (94.2)
Corticosteroids can cause mood changes	True	143 (83.6)
Corticosteroids can cause high blood glucose	True	151 (88.3)
Knowledge score (out of 11), median (IQR)		11.0 (1.0)

3.4. Physicians' Fears toward Corticosteroids Prescribing

Physicians displayed a high fear score with a median score of 3.5 out of a possible 5.0 (IQR= 0.8) concerning the prescribing of CS, as shown in Table 4. The primary concerns that physicians had when it came to prescribing CS were related to the risk of osteoporosis in their patients, with 126 out of 171 (73.7%) expressing this fear, as well as the risk of hyperglycemia, which was a concern for 114 out of 171 (66.7%) physicians. Additionally, physicians were apprehensive about the potential risk of elevated blood pressure among their patients, with 108 out of 171 (63.2%) indicating this as a source of fear.

Table 4. Fears toward corticosteroids prescription among study participants (n= 171).

I am afraid to prescribe corticosteroids due to.....	Percent agreed/strongly agreed
Risk of weight gain among my patients	100 (58.5)
Risk of hyperglycemia among my patients	114 (66.7)
Risk of increased blood pressure among my patients	108 (63.2)
Risk of osteoporosis among my patients	126 (73.7)
Risk of patient's addiction to this medication and not being able to live without it	73 (42.7)
Risk of developing adrenal insufficiency after stopping the corticosteroids among my patients	85 (49.7)
Dosage form (oral and injectable) more than the topical products	100 (58.5)
Risk of patient's-social refusal if they know about the corticosteroids use	92 (53.8)
Risk of depression of mood swings among my patients	72 (42.1)
Risk of any unknown/untreatable side effects among my patients	77 (45.0)
*Fears score, median (IQR)	3.5 (0.8)

* (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.

3.5. Predictors of Factors Affecting Physicians' Knowledge about Corticosteroids

The regression analysis conducted to assess the factors influencing physicians' knowledge about CS, as presented in Table 5, revealed that none of the examined sociodemographic factors (including age, gender, site of work, and location of work) had a significant impact on physicians' knowledge about CS.

Table 5. Assessment of factors associated with participants' knowledge about corticosteroids (n=171).

Parameter	Knowledge score			
	Beta	P-value#	Beta	P-value\$
Age (years) (median (IQR))	0.157	0.040 [^]	0.131	0.096
Gender	Reference			
Males				
Female	-0.141	0.065 [^]	0.110	0.162
Site of work	Reference			
Hospital setting				
Others	-0.015	0.841	---	---
Location of work	Reference			
Center of Jordan				
Others	-0.007	0.927	---	---

using simple linear regression, \$ using multiple linear regression, [^] eligible for entry in multiple linear regression.

3.6. Predictors of Factors Affecting Physicians' Fears towards Corticosteroids

Furthermore, the regression analysis conducted to examine the factors affecting physicians' fears of CS, as shown in Table 6, indicated that none of the sociodemographic factors under consideration (such as age, gender, site of work, and location of work) had a significant influence on physicians' fear of CS.

Table 6. Assessment of factors associated with participants' fears from corticosteroids.

Parameter	Fear score			
	Beta	P-value#	Beta	P-value\$
Age (years) (median (IQR))	-0.112	0.145	---	---
Gender	Reference			
Males				
Females	0.030	0.694	---	---

Residence area				
Urban	Reference			
Rural	0.074	0.337	---	---
Physicians site of work				
Community pharmacy	Reference			
Others	0.000	0.999	---	---
Location of work				
Center of Jordan	Reference			
Others	0.029	0.706	---	---

using simple linear regression, \$ using multiple linear regression.

4. Discussion

This cross-sectional study is the first of its kind to assess the knowledge, experiences, and fear of prescribing corticosteroids among Jordanian healthcare physicians. This approach allowed any licensed physician to participate in the study, which helped provide a broad spectrum of viewpoints, perspectives, and experiences.

The results showed that more than 86% of the doctors had prescribed corticosteroids in the form of topical preparations, injections, inhalers, tablets, and, to a lesser extent, drops. This indicates that most of the participating physicians were exposed to corticosteroids during their work and thus must have information about these medications' indications, dosage, and possible side effects.

These medications were mostly prescribed for respiratory and dermatological conditions. This is similar to what was reported in a study conducted in Egypt, where the most common reasons to prescribe corticosteroids were dermatological or respiratory conditions [5]. Additionally, in a study conducted in the Republic of Kosovo, it was found that corticosteroids were mostly prescribed to treat allergies, urticaria, atopic dermatitis and bronchial asthma [26]. Moreover, in a study conducted in the United States to explore the short-term use of corticosteroids, it was found that upper respiratory tract infections, spinal conditions, and allergies were the most common indications for the prescription of corticosteroids [27]. Similarly, respiratory diseases were the most frequently recorded indication for oral corticosteroid treatment, as found in a study conducted in the United Kingdom [28].

The prescription of topical preparations of corticosteroids was found to be the most commonly prescribed dosage form in the Republic of Kosovo [26], similar to the findings of this study. Additionally, topical or inhalational dosage forms were found to be the most commonly prescribed dosage forms in Egypt [5]. In this study, the side effects reported by the patients to the physicians in Jordan were increased appetite, hyperglycemia, and hypertension. Increased appetite, mood changes, swings, and depression were reported as the most common side effects noted by COVID-19 patients who were treated with corticosteroids in six Arab countries, including Egypt, Iraq, Jordan, Saudi Arabia, Sudan, and Syria [6]. However, in Egypt, physicians reported an increased risk of infection and hypertension as the most noted side effects of corticosteroids that their patients suffered from [5]. Similarly, in the United States, it was reported that the use of corticosteroids was linked with an increase in the rates of sepsis, venous thromboembolism, and fracture [27].

The physicians participating in this study stated that corticosteroids effectively treated their patients' complaints and/or were the drug of choice, as stated in the guidelines. Similar findings were

reported by physicians in Egypt [5], and the physicians in the Republic of Kosovo [26], who reported that treatments with corticosteroids were successful.

The physicians participating in this study showed high knowledge regarding corticosteroids as the median knowledge score was 11 out of 11, with an IQR of 1.0. Physicians were also found to have good knowledge regarding corticosteroids in studies conducted in Egypt [5,6] and Iraq [6], unlike the physicians in Saudi Arabia [6,10] and in Maiduguri, which is in North-eastern Nigeria [29], where physicians were found to have inadequate knowledge about corticosteroids.

In this study, osteoporosis, hyperglycemia and hypertension were the most common side effects that the physicians feared when prescribing corticosteroids. Adrenal insufficiency, hyperglycemia and hypertension were also reported as the main reasons that physicians in Egypt feared prescribing corticosteroids to their patients [5]. Physicians in the Republic of Kosovo [26] were also found to have concerns when prescribing corticosteroids regardless of its efficiency. These results are also in accordance with the findings that around 40% of the doctors in the Republic of Macedonia have concerns regarding the use of topical corticosteroids [30].

The results of this study showed that although Jordanian physicians fear the side effects of corticosteroids, they are willing to prescribe them to their patients if they are the treatment of choice to alleviate their patients' complaints. They also know about these medications' indications, proper use, and side effects, regardless of age, gender, specialty, and practice location. This high knowledge can be since physicians in Jordan are required to engage in continuing professional development (CPD) education in order to renew their license every five years, which helps them to keep their medical information up to date [31].

5. Conclusions

This cross-sectional study sheds light on Jordanian healthcare physicians' knowledge, experiences, and fears regarding corticosteroid prescriptions. With a diverse sample, the study reveals a prevalent use of corticosteroids, primarily for respiratory and dermatological conditions. Despite the high fears of side effects, including osteoporosis, hyperglycemia, and hypertension, physicians remain willing to prescribe corticosteroids when deemed the optimal treatment. Moreover, the study underscores the high knowledge level of Jordanian physicians, attributed to mandatory continuing professional development. Finally, this research emphasizes the critical role of ongoing medical education in fostering physicians' confidence and knowledge. The insights gained can inform targeted interventions to address concerns and optimize corticosteroid use in Jordan's healthcare landscape.

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