Dermatol Ther (Heidelb) (2023) 13:769–785
https://doi.org/10.1007/s13555-023-00891-6

ORIGINAL RESEARCH

Patterns of Clinical Management of Atopic Dermatitis: A Survey of Three Physician Specialties in the Middle East

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Received: October 12, 2022 / Accepted: January 13, 2023 / Published online: February 7, 2023

ABSTRACT

Introduction: Atopic dermatitis (AD) is a complex inflammatory disease of the skin that has a significant impact on the well-being of patients and their families. The prevalence of AD has increased in developing countries and regions, including the Middle East. Despite similarities in the presentation of the disease, there is a lack of consistent management and treatment guidelines for AD. The objective of this survey was to develop further insight into the management patterns of AD from dermatologists, pediatricians, and primary care/family medicine physicians in the Middle Eastern nations of Egypt, Lebanon, the United Arab Emirates, and Saudi Arabia.

Methods: The survey was composed of 47 closed-ended, multiple-choice questions. These questions assessed physician and patient characteristics and treatment familiarity and approach.

Results: A total of 400 physicians, including 200 dermatologists, 100 pediatricians, and 100 primary care physicians, participated in the survey. The findings provide insight into the management of AD by physician specialty within the region. A diverse array of management approaches was observed for both referral patterns and treatments for AD in the Middle East.

Conclusion: The diversity of management tactics highlights the lack of a standard approach for the management of AD throughout the Middle East.

Keywords: Atopic dermatitis; Middle East; Survey; Practice; Treatment

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s13555-023-00891-6.

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Key Summary Points

This survey was designed to develop further insight into the management patterns of atopic dermatitis in Egypt, Lebanon, the United Arab Emirates, and Saudi Arabia.

A total of 400 physicians, including 200 dermatologists, 100 pediatricians, and 100 primary care physicians, participated in this survey.

The diversity of management approaches observed highlights the inadequacy of evidence for a standard approach for the management of atopic dermatitis throughout the Middle East.

Further insight into the regional unmet needs could also be utilized to develop improved treatment strategies throughout the region.

INTRODUCTION

Atopic dermatitis (AD) is a complex, chronic, inflammatory disease of the skin that usually arises during infancy. Multiple comorbidities are associated with AD and have a significant impact on the well-being of the patients and their families [1–4]. Long-term treatment is often required because of the recurrent and chronic nature of AD [5]. AD is characterized by intense pruritus, erythematous and eczematous lesions, and an impaired epidermal barrier [2, 6, 7]. About 90% of patients with AD present with mild-to-moderate disease, with about 10% experiencing severe forms of the disease [8]. The etiology of AD is complex and involves barrier defects, immune dysregulation, and environmental triggers, as well as genetic factors [9].

Globally, AD affects 15%–20% of children and 1%–3% of adults [10]. The prevalence of AD varies worldwide [11, 12]. Historically, the prevalence of AD throughout the Middle East has been lower than that in North America and Europe. However, the prevalence of AD is increasing in developing countries, including those in the Middle East, likely due to increasing urbanization and pollution [13–16]. Despite AD becoming a pressing health concern in the Middle East, it remains underrepresented in AD literature. Treatment for AD is further hindered throughout the Middle East due to the lack of regionally appropriate research and diagnostic tools, as well as gaps in the reporting and knowledge of AD [16, 17].

General treatment strategies for AD include hydration with emollients and moisturizers, short-term treatments with topical corticosteroids (TCSs), and long-term maintenance with topical calcineurin inhibitors (TCIs) or crisaborole [18]. Crisaborole ointment, 2%, is a nonsteroidal phosphodiesterase 4 (PDE4) inhibitor for the treatment of mild-to-moderate AD [19]. In the Middle Eastern nations surveyed in this study, namely Egypt, Lebanon, the United Arab Emirates (UAE), and Saudi Arabia, crisaborole has only recently been approved for the treatment of mild-to-moderate AD [20–25]. Patients whose AD is not controlled with topical therapies may utilize phototherapy or general systemic immunomodulators, such as methotrexate, azathioprine, and cyclosporine, or biologics such as dupilumab. Dupilumab is an interleukin 4 (IL-4) receptor antagonist that is administered subcutaneously for the treatment of moderate-to-severe AD and is approved in all of the countries surveyed in this study [26, 27]. The oral Janus kinase (JAK) inhibitors baricitinib (approved in Egypt), abrocitinib (approved in Egypt and the UAE), and upadacitinib (approved in the UAE and Saudi Arabia) can also be used for the treatment of moderate-to-severe AD [1, 25, 28, 29]. Several emerging therapies are also available, including tralokinumab and the topical JAK inhibitor ruxolitinib [18]. Tralokinumab is approved in the UAE for the treatment of moderate-to-severe AD, while ruxolitinib is not yet approved in the Middle East [26, 30].

Despite the similarities in the presentation of the disease globally, there is a lack of consistent management and treatment guidelines for AD in the Middle East. The primary objective of this

study was to gather further insight into the management patterns of AD, including patient profiles and treatment approaches, as reported by dermatologists, pediatricians, and primary care/family medicine (FM) physicians in the Middle East (Egypt, Lebanon, the UAE, and Saudi Arabia).

METHODS

A sample, composed of three physician fields (primary care physicians/FM physicians, pediatricians, and dermatologists) practicing in Egypt, Lebanon, UAE, and Saudi Arabia, was identified via multiple databases. The survey consisted of 47 closed-ended multiple-choice questions. Questions assessed physician characteristics (e.g., prescriber information, use of laboratory tests, referral patterns) and patient profiles, as well as treatment familiarity and approach. Results were provided as percentage ranges. This article is based on a previously conducted survey and does not contain any new studies with human participants or animals performed by any of the authors.

RESULTS

Physician Characteristics

A total of 400 physicians, including 200 dermatologists, 100 pediatricians, and 100 primary care physicians/FM physicians, participated in the survey. Physicians were evenly distributed across Egypt, Lebanon, UAE, and Saudi Arabia, with two-thirds (66%) having over 10 years of medical practice experience and a third (33%) having more than 20 years of experience. The majority of physicians across all specialties were more interested in AD (> 97%) than in alopecia areata (66%), psoriasis (72%), or vitiligo (60%), with results being similar across all countries.

Patient Characteristics

Across all examined nations, the median number of patients attended to by physicians per month was higher for AD/eczema (a total of ten) than for alopecia, psoriasis, and vitiligo combined (a total of nine). Most (71%) of the patients with AD were under 18 years of age (Supplementary Material Fig. 1). The majority (82%, 81%, and 76%) of AD cases observed in pediatric, adolescent, and adult patients, respectively, were mild-to-moderate in severity. Ratios were similar across all specialties and nations evaluated.

Approach to Management of AD

Treatment Approach

The majority (80%) of physicians followed treatment guidelines when treating AD, including 85% of dermatologists and 74% of primary care physicians (Fig. 1). American

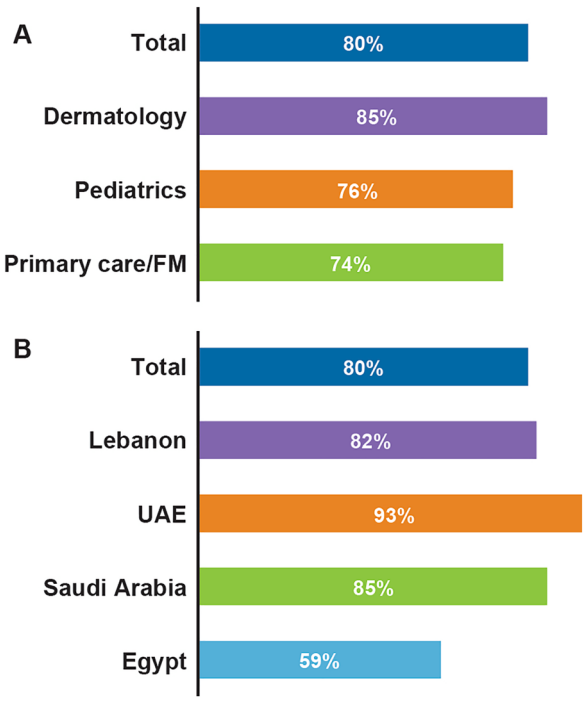

Fig. 1 Percentage (rounded up) of physicians following atopic dermatitis treatment guidelines by **A** physician specialty and **B** country. *FM* family medicine, *UAE* United Arab Emirates

Academy of Dermatology (AAD) guidelines were the most popular, followed by local national guidelines, the 2018 European Academy of Dermatology and Venereology (EADV) guidelines, and the 2018 AD Yardstick guidelines. The distribution observed for the use of the various AD treatment guidelines was similar across all countries examined.

TCSs were the most common treatment received by patients for mild-to-moderate AD (57% of patients); 59% of the patients treated by dermatologists received TCSs for the treatment of mild-to-moderate AD. Moreover, 40% of patients with mild-to-moderate AD received only emollients as a treatment for AD, making this the second most common treatment for mild-to-moderate AD (38% for dermatology patients and 49% for pediatric patients). Physicians reported that PDE4 inhibitors were used by only 11% of the patients with mild-to-moderate AD. In Lebanon and the UAE, 9% and 8% of the patients with mild-to-moderate AD received topical PDE4 inhibitors, respectively. The top treatments utilized were consistent among the countries evaluated. Overall, emollients and TCSs were the most preferred choices for the treatment of mild-to-moderate AD by all physicians, including dermatologists, and were followed by TCIs, oral corticosteroids, topical PDE4 inhibitors, and other treatments (Table 1, Supplementary Materials Table 1).

TCSs were also reported by physicians as the most common treatment for moderate-to-severe AD and were used by 62% of patients. Oral corticosteroids were reported by physicians as the second most common treatment for moderate-to-severe AD and were used by more than one-third (36%) of patients (Fig. 2). When treating moderate-to-severe AD, physicians overall preferred oral corticosteroids, followed by intravenous systemic corticosteroids, cyclosporin, oral JAK inhibitors, methotrexate, biologics, phototherapy, and other immunosuppressants. For moderate-to-severe AD, dermatologists preferred the initial prescription of oral corticosteroids, followed by systemic (non-oral) corticosteroids, biologics, cyclosporin and/or phototherapy, methotrexate, oral JAK inhibitors, and other immunosuppressants (Table 2).

Overall, most physicians (69%) reported not using a scoring tool when assessing whether a remission has been achieved in patients with AD; this was also reported by 59% of dermatologists, 81% of pediatricians, and 77% of primary care physicians. Less than one-third (29%) of dermatologists reported using the Eczema Area and Severity Index (EASI) scoring tool, and about one-fifth (23%) used the modified objective SCORing Atopic Dermatitis (SCORAD) scoring tool, with 17% using the Investigator's Static Global Assessment/Investigator Global Assessment (ISGA/IGA) scoring tools. A similar pattern was observed among all specialties and countries (Supplementary Material Fig. 2).

For the treatment of flares in patients with mild-to-moderate AD, over one-third (36%) of physicians and dermatologists mentioned prescribing TCSs for 3–7 days, followed by TCIs or

Table 1 Order in which physicians prescribe treatments for patients with mild-to-moderate atopic dermatitis by physician specialty (1 being the most favored treatment and 4 being the least favored)

Treatments	Overall	Dermatology	Pediatrics	Primary care
Emollients	1.6	1.6	1.3	1.8
Topical corticosteroids	1.6	1.6	1.7	1.6
Topical calcineurin inhibitors	2.7	2.5	2.8	2.8
Oral corticosteroids	3.1	3.1	3.1	3.0
Topical PDE4 inhibitors	3.5	3.5	3.7	3.5
Others	3.9	3.9	3.9	4.0

PDE4 phosphodiesterase 4

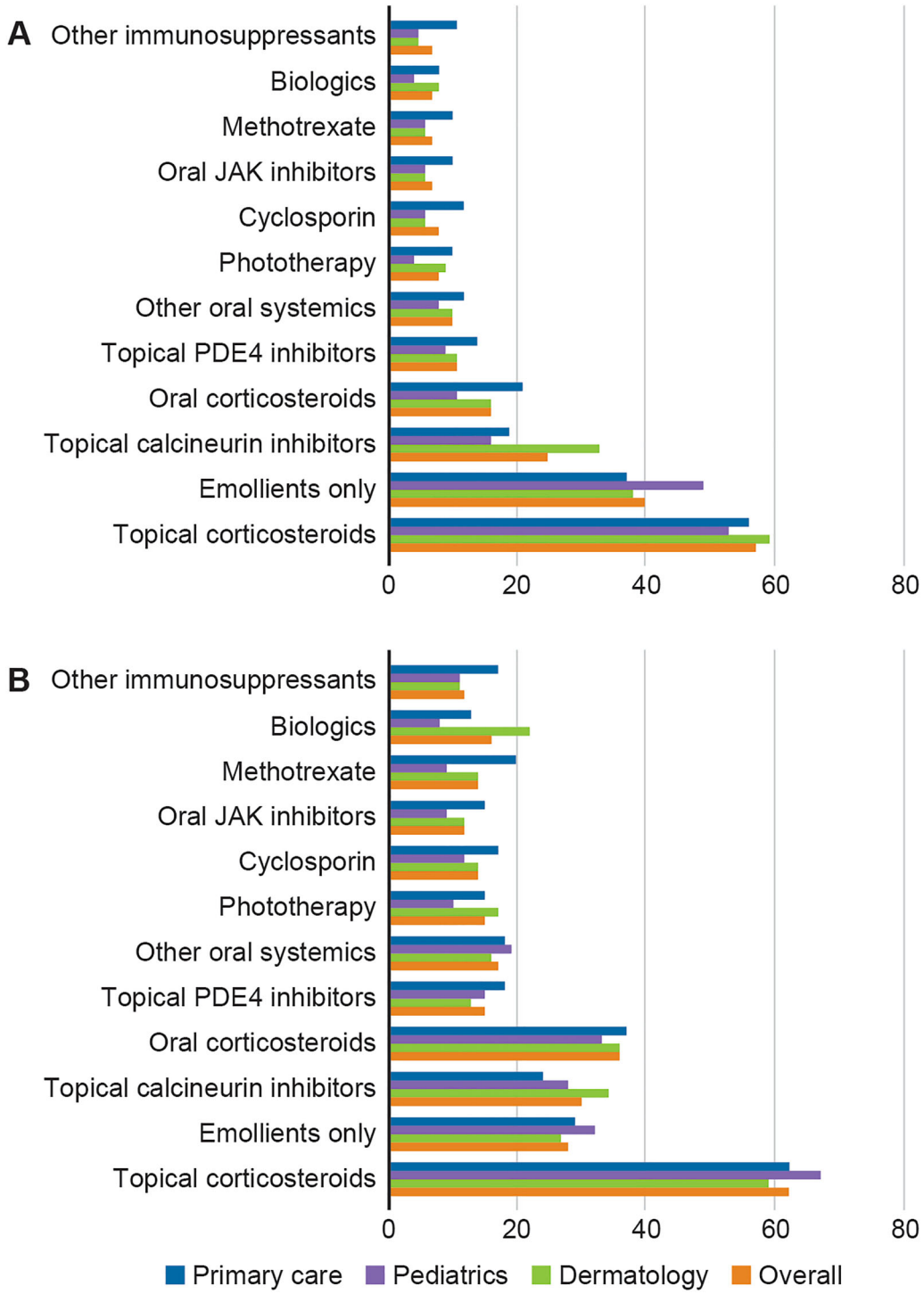

Fig. 2 Percentage (rounded up) of patients receiving different types of atopic dermatitis therapy by prescribing physician specialty for **A** mild-to-moderate AD and **B** moderate-to-severe AD. *AD* atopic dermatitis, *JAK* Janus kinase, *PDE4* phosphodiesterase 4

Table 2 Order in which physicians prescribe treatments for patients with moderate-to-severe atopic dermatitis by physician specialty (1 being the most favored treatment and 4 being the least favored)

Treatments	Overall	Dermatology	Pediatrics	Primary care
Oral corticosteroids	1.5	1.7	1.3	1.3
Systemic corticosteroids (non-oral)	3.1	3.0	3.2	3.3
Cyclosporin	3.3	3.4	3.3	3.1
Oral JAK inhibitors	3.5	3.9	2.8	3.2
Methotrexate	3.5	3.8	3.3	3.1
Biologics	3.8	3.3	4.5	4.5
Phototherapy	3.9	3.4	4.6	4.4
Other immunosuppressants	4.3	4.6	4.1	3.9

JAK Janus kinase

PDE4 inhibitors; about one-third (34%) of physicians (including 30% of dermatologists) mentioned prescribing oral steroids, followed by TCSs. About one-fifth (24%) of physicians and 29% of dermatologists prescribed TCSs and TCIs for 3–7 days, followed by TCIs. Only 6% of physicians and 7% of dermatologists prescribed TCSs and PDE4 inhibitors for 3–7 days, followed by PDE4 inhibitors. A similar pattern was observed among all other specialties and countries (Supplementary Material Fig. 3).

For the treatment of infected lesions in patients with AD, the majority (51%) of physicians (including 54% of dermatologists) chose short-term treatments with systemic antibiotics; about one-third (36%) of physicians (including 34% of dermatologists) chose topical antibiotics for the treatment of infected lesions. Topical antiseptics and topical antibiotics were the treatment of choice for 31% of physicians and 29% of dermatologists. A small number (6%) of physicians chose topical antiseptics alone as the treatment for such infected lesions. A similar overall pattern was observed throughout the countries examined (Supplementary Materials Fig. 4).

For the treatment of pruritus in patients with AD, the majority (74%) of physicians "often" prescribed antihistamines, including three-quarters (75%) of dermatologists, two-thirds (66%) of pediatricians, and most (81%) of primary care physicians.

About one-third (33%) of physicians (including 21% of dermatologists) did not use proactive therapy when managing mild-to-moderate AD. However, 37% of physicians (including 39% of dermatologists) prescribed TCSs and about a third (30%) prescribed TCIs (including 45% of dermatologists). A minority of physicians (11%, including 12% of dermatologists) prescribed topical PDE4 inhibitors (Supplementary Material Fig. 5).

Physician opinions were divided regarding the potential use of systemic JAK inhibitors for treating patients with moderate-to-severe AD. About 30% of all physicians (including 44% of dermatologists) stated having a high likelihood of using systemic JAK inhibitors for the treatment of AD. Alternatively, more than two-thirds (71%) of all physicians (including 58% of dermatologists) had a low likelihood of prescribing systemic JAK inhibitors for the treatment of moderate-to-severe AD. However, only 17% of pediatricians and 16% of primary care physicians stated having a high likelihood of using systemic JAK inhibitors for the treatment of AD. Percentages of physicians who were likely to use systemic JAK inhibitors for treating moderate-to-severe AD were similar across all examined nations (Supplementary Material Fig. 6).

Referral to Health Care Professionals and Diagnosis

Most (78%) patients with moderate-to-severe AD were directly treated by their respective physician (from whom patients were already receiving care) rather than being referred to another physician or specialist. Dermatologists reported treating the highest proportion (97%) of their incoming patients with AD, while pediatricians and primary care physicians treated 69% and 57% of their patients, respectively. The highest proportion of patients directly treated by their respective physician (90%) was in Lebanon, followed by UAE (74%), Saudi Arabia (74%), and Egypt (71%). Most pediatric (70%) and adult (61%) patients visited their respective physician without referrals rather than visiting one to whom they had been referred (13% and 27%, respectively).

In terms of referrals, more than half (52%) of all physicians referred their patients with AD to other physicians for advanced treatments or biologics rather than prescribing such treatments themselves. However, slightly more than one-third (35%) of all physicians prescribed advanced treatments or biologics themselves to their patients with AD; the number was considerably higher for dermatologists (61%) and much lower for pediatricians (6%) and primary care physicians (13%). The percentage of physicians who prescribed advanced treatments or biologics was highest in the UAE (46%) and Lebanon (45%), and lowest in Egypt (26%) and Saudi Arabia (23%). The most-referred group of patients for biologic/advanced treatments was those whose AD was not controlled via topical treatments; 60% of physicians agreed to the referral of such patients, followed by patients with multiple comorbidities (51%), patients who needed systemic therapies (50%), patients with moderate-to-severe AD (33%), and pediatric patients (10%). Observed ratios were similar among the surveyed nations.

Familiarity with Treatments

The topical nonsteroidal PDE4 inhibitor crisaborole was not well known by the surveyed Middle Eastern physicians, including those in Lebanon, Egypt, and the UAE (where crisaborole was recently approved for the treatment of mild-to-moderate AD, at the time of the survey). Crisaborole has not yet been approved in Saudi Arabia (at the time of this publication). Overall, only 7% of all physicians had extensive knowledge of crisaborole, with 5% having already prescribed crisaborole. More than one-third (38%) of physicians have never heard of crisaborole, 20% knew the drug by name, and 31% had limited knowledge of the drug. Such ratios were similar for dermatologists, with about one-third (31%) having never heard of crisaborole, only 7% knew extensively about the drug, and 7% had already prescribed it. Results were similar among all countries, aside from Egypt, in which more than half (55%) of the physicians had no knowledge of crisaborole (Fig. 3A,B). In the UAE, less than half (48%) of dermatologists and about one-fifth (28%) of pediatricians had limited knowledge of crisaborole. Only 8% of dermatologists had extensive knowledge of crisaborole and 4% had prescribed crisaborole to patients with AD. In Lebanon, less than a third of dermatologists (29%) and pediatricians (27%) had limited knowledge of crisaborole.

According to the physicians surveyed, 62% of all physicians, including about three-quarters (74%) of dermatologists, less than half (44%) of pediatricians, and about half (55%) of primary care physicians, were aware of advanced non-topical (systemic) AD treatments that were approved in their respective nations; this number was highest among UAE physicians (74%), followed by Saudi Arabian (63%), Lebanese (58%), and Egyptian physicians (52%). Dupilumab was the most recognized advanced AD treatment across all surveyed countries. It was recognized as an approved treatment for moderate-to-severe AD by more than half of all physicians (53%), including almost three-quarters (72%) of all dermatologists, one-fifth (20%) of pediatricians, and 15% of primary care physicians.

More than one-quarter (27%) of physicians were not familiar with abrocitinib, an oral JAK1 inhibitor for the treatment of moderate-to-severe AD, with more than one-third (36%) only knowing the drug by name. Less than one-third (29%) had limited knowledge of the drug, and only 9% knew “a lot” about the drug. Such

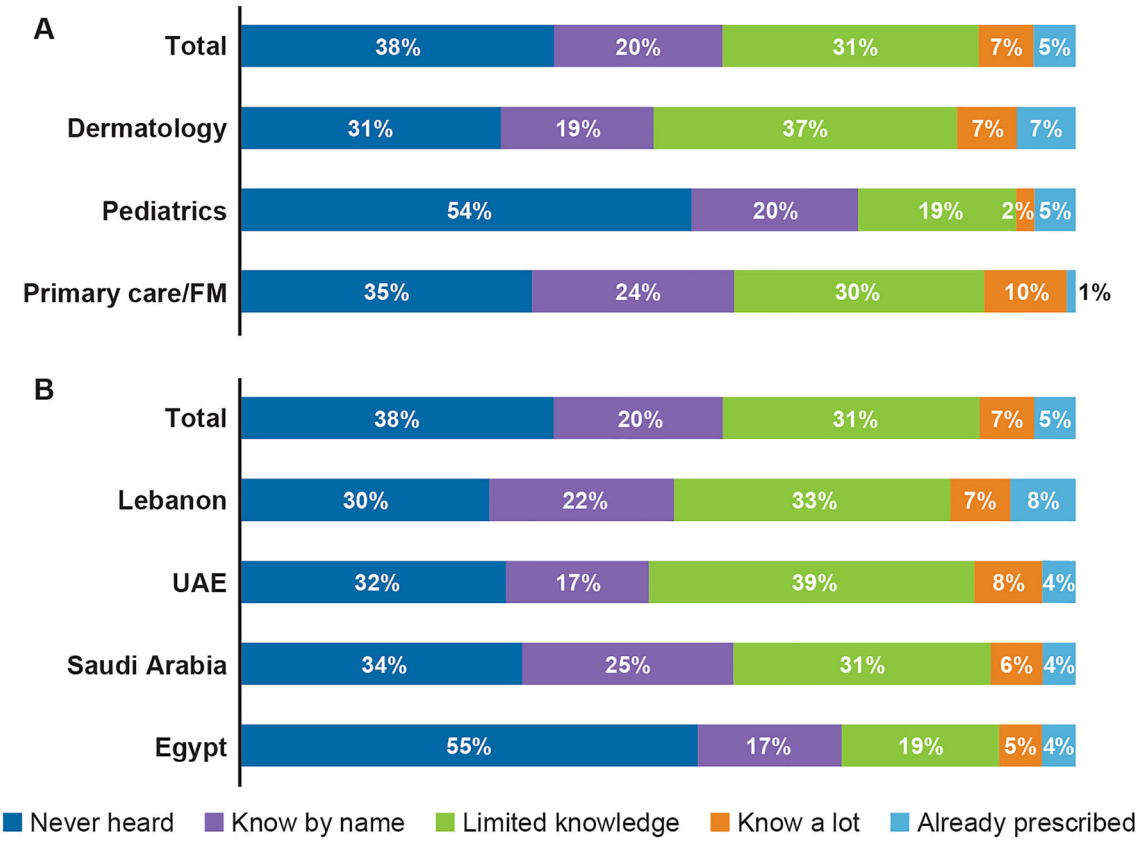

Fig. 3 Percentage (rounded up) of physicians that are familiar with crisaborole by **A** physician specialty and **B** by country. *FM* family medicine

ratios were similar among all the countries examined (Fig. 4A). Physicians described their likelihood of prescribing abrocitinib for the treatment of moderate-to-severe AD as an average of 4.3 on a 7-point scale, where 1 was least likely and 7 was most likely. Lebanese dermatologists were the most likely to prescribe abrocitinib (average likelihood of 5.1) (Fig. 4B). It is important to note that abrocitinib is not yet approved in the Middle East outside of the UAE and Egypt. At the time of the survey, abrocitinib was not approved for use in treatment in any of the surveyed countries [28].

Switching to Advanced Systemic Therapies

When treating patients with moderate-to-severe AD, most (59%) physicians identified intolerance to, or failure of, both oral corticosteroids and systemic immunosuppressants as the most common criterion for switching their patients to other advanced systemic therapies; this was followed by intolerance to, or failure of, oral corticosteroids (34%), then failure of topical treatments (32%) and systemic immunosuppressants (32%). The ratios observed were similar among the regions examined.

Less than two-thirds (61%) of all physicians reported consistently encountering the fear of topical and systemic corticosteroids (also referred to as steroid phobia or corticophobia) from patients or their caregivers; corticophobia is also consistently encountered by more than two-thirds (68%) of dermatologists, more than half (57%) of pediatricians, and slightly more than half (53%) of primary care physicians. The ratios observed were common to all regions (59% for Egypt, 56% for Lebanon, and 52% for Saudi Arabia), aside from the UAE, where more than three-quarters (78%) of physicians reported

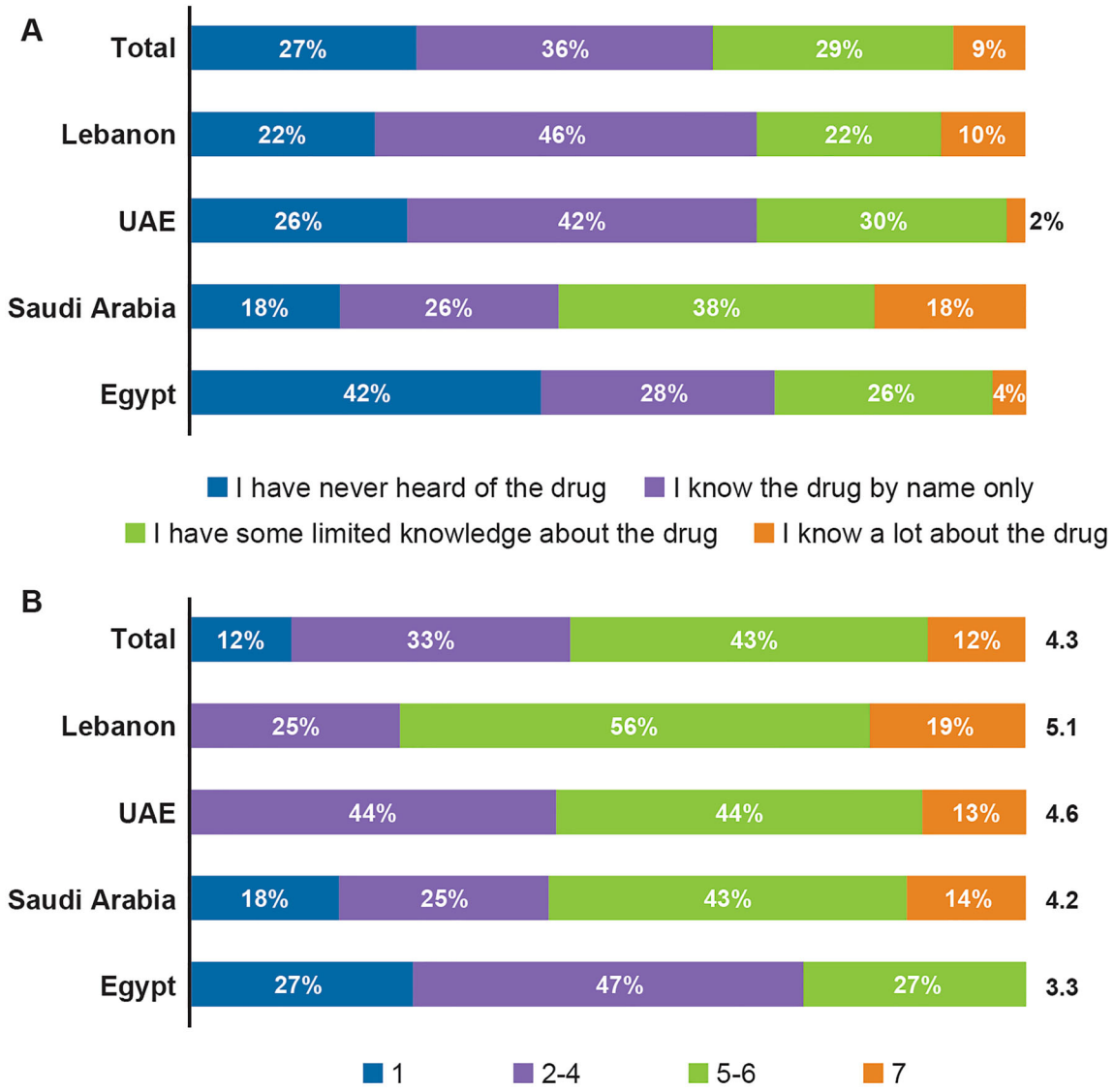

Fig. 4 **A** Percentage (rounded up) of physicians familiar with abrocitinib and **B** their likelihood of prescribing abrocitinib to patients with atopic dermatitis [on a scale of 1 (least likely) to 7 (most likely)] (average likelihood to prescribe abrocitinib shown at end of bars)

encountering patient corticophobia on a constant basis.

Overall, physicians rated ease of patient access to advanced systemic therapies as "fair" (an average of 4.5 on a 7-point scale, where 1 was "extremely easy" and 7 was "extremely difficult"). Observed ratios were similar across all specialties (4.4 for dermatologists, 4.7 for pediatricians, 4.5 for primary care physicians) and nations. According to the surveyed physicians, financial reimbursement for the use of advanced systemic therapy was common across the Middle East; overall, 63% of all systemic therapy treatments were partially reimbursed, 11% were fully reimbursed, and only 26% were not reimbursed. Drug reimbursement ratios were similar among all regions surveyed.

Factors Contributing to AD

The majority (81%) of physicians from all specialties stated that they felt genetic risk factors contributed to developing AD, followed by

environmental factors (78%), food allergies (58%), alterations in skin barrier (57%), and allergic asthma (54%). A similar trend was observed across all specialties and regions.

Unmet Needs

Almost half (48%) of all physicians listed treatments for patients with moderate-to-severe AD with better safety profiles as the greatest unmet need. The second-highest unmet need was treatments with a faster onset of action, as agreed upon by 44% of all physicians, with the third-highest unmet need being treatments with better efficacy profiles (40% of physicians). Ratios were similar across all specialties and countries examined. Treatments with better efficacy profiles, better safety profiles, and faster onset of action were given as the top three unmet needs in the treatment of mild-to-moderate AD. Observed ratios were similar across the specialties and countries examined (Supplementary Material Tables 2, 3).

The majority (80%) of physicians reported that it is "somewhat common to very common" for patients to have comorbidities with AD, with 7% reporting a high prevalence of comorbidities with AD. Only 13% of physicians reported that it is "not at all common" for patients to have comorbidities with AD. Results were similar across the specialties and countries examined. Asthma (79%) was the most common comorbidity for patients with AD, as reported by the physicians, followed by food allergies (68%), and hay fever (35%). Results were similar across specialties and countries.

Physicians chose long-term control of AD, efficacy in itch/pain reduction, and quick onset of action as the most sought-after treatment features when prescribing new treatments for AD. Results were similar across specialties and countries surveyed (Supplementary Material Tables 4, 5).

DISCUSSION

Surveyed physicians expressed interest in AD. An increased global prevalence of AD has generated increased interest and research into the disease, as well as new treatment strategies that have been, and are being, developed on the basis of research findings [31]. Moreover, across all surveyed nations, the median number of patients per month was higher for AD/eczema than for alopecia, psoriasis, and vitiligo combined.

Most (80%) of the surveyed physicians followed treatment guidelines when treating AD. Although guidelines utilized for the treatment of AD are similar globally, the Middle East faces several challenges in the treatment of AD with the use of such guidelines, with regional nonadherence to management guidelines being a major obstacle when treating AD. A Saudi Arabian case report cited the nonadherence of general practitioners to clinical guidelines, use of traditional medicine, and lack of access to systemic therapies as the main factors contributing to disease burden and severity in pediatric patients [16]. Treatment guidelines for AD recommended by the American Academy of Dermatology in 2014 include the use of TCSs and TCIs for mild AD, as well as phototherapy for the management of mild-to-moderate AD. Biologics and immunosuppressants are recommended for the treatment of moderate-to-severe AD [5, 32–34]. The European Academy of Dermatology and Venerology (EADV) guidelines from 2018, as well as an EADV position paper from 2020, also make similar recommendations for the treatment of AD with regard to the use of TCSs, TCIs, biologics, and immunosuppressants according to disease severity [32, 35, 36]. TCSs remain the primary anti-inflammatory treatment for AD [5, 36–38]. TCIs may be preferred for treating sensitive areas, including the face, neck, and genitals, and can be used with or instead of TCSs for long-term maintenance in patients with moderate-to-severe AD and has a steroid-sparing effect [5, 35–37, 39].

According to the surveyed physicians, TCSs were the most common treatment for mild-to-moderate AD and were used by 57% of patients. TCSs and other topical agents are often used as first-line therapy for mild-to-moderate AD [40]. The AAD 2014 guidelines recommend the use of emollients and topical anti-inflammatory therapies (such as TCSs and TCIs) prior to the use of systemic immunomodulatory agents. Systemic immunomodulatory agents are recommended

for patients when topical anti-inflammatory therapies, adjunctive methods, emollients, and/or phototherapy are unable to control the symptoms of AD [34]. Topical PDE4 inhibitors could be considered as an initial treatment option for mild-to-moderate AD prior to the use of oral treatments because the long-term use of oral corticosteroids is associated with a variety of systemic side effects, including telangiectasia and dramatic striae formation [8, 41].

Topical PDE4 inhibitors, such as crisaborole, represent a potential long-term option for improving the management of AD [8]. The PDE4 family is also an attractive target for the treatment of inflammation in AD [2]. Physicians reported that PDE4 inhibitors were used by only 11% of the patients with mild-to-moderate AD and only by 9% and 8% of patients in Lebanon and the UAE, respectively. Such results are likely because this survey was performed a few months following the registration of crisaborole in Lebanon, Egypt, and the UAE, potentially accounting for the low rates of crisaborole usage for the treatment of AD. Currently, crisaborole is approved for the treatment of AD in various countries and regions, including the USA, Lebanon, Egypt, and the UAE, but is not yet approved in Saudi Arabia (at the time of this publication) [20–25]. In the USA, crisaborole ointment is approved by the US Food and Drug Administration for the treatment of mild-to-moderate AD in adults and children 3 months of age and older [22]. Crisaborole is recommended by the 2018 AD Yardstick guidelines for the treatment of mild-to-moderate AD [2]. In addition, crisaborole was not well known by the surveyed Middle Eastern physicians, including those in Lebanon, Egypt, and the UAE, highlighting a lack of knowledge of novel treatments for AD and emphasizing the need to increase the awareness of and the accessibility to such treatments throughout the Middle East.

The surveyed physicians reported TCSs as the most common treatment for moderate-to-severe AD, with oral corticosteroids being the second most common treatment. The 2014 AAD guidelines recommend the use of systemic modalities mainly for patients with moderate-to-severe disease and for patients whose AD causes significant psychosocial impacts [34]. Nevertheless, topical agents remain the mainstay of AD treatments. In severe cases, topical agents are used in conjunction with systemic treatments or phototherapy for the treatment of AD [5].

The majority (69%) of surveyed physicians did not use a scoring tool when assessing whether a remission had been achieved in patients with AD, with a similar pattern observed among all specialties and countries. Such results align with the practical use of such assessments within clinical settings globally. EASI and SCORAD are the only AD-specific measures that have been validated enough to be used in clinical settings as well as in clinical trials. EASI is well validated and assesses both disease severity and extent; however, it does not account for patient-reported symptoms. There is a good correlation between EASI and quality-of-life index measures for AD. SCORAD incorporates both physician and patient observations and correlates with objective assessments such as EASI and IGA as well as quality-of-life measures [42]. In a US study of 678 patients with AD, about one-third of patients rated their disease severity differently from their respective physicians. Overall, agreement was moderate between physician- and patient-reported disease severity for AD, matching in about 70% of the cases. No difference was observed in agreement rates between patients and their physicians, based on physician specialty. Compared with patients, physicians were more likely to rate a higher severity for AD. Such results highlight the need for patient perspectives when assessing the severity of AD, as well as the need for scoring tools that allow for improved communication between patients and their physicians [43].

Interestingly, when treating pruritus in AD, the majority (74%) of physicians "often" prescribed antihistamines. Antihistamines have demonstrated little efficacy in the treatment of AD, and 2014 AAD guidelines do not recommend the use of antihistamines for the treatment of AD. The use of topical antihistamines for the treatment of AD was not recommended because of the risk of absorption and contact dermatitis [5].

Over one-third (37%) of physicians prescribed TCSs and about one-third (30%) prescribed TCIs (including 45% of dermatologists) as proactive therapy when managing mild-to-moderate AD. Because AD is a chronic disease, permanent treatment is often required. Regular use of emollients in mild cases of AD and in reactive therapy may be sufficient to control the disease. However, in cases with moderate-to-severe AD, proactive therapy with TCSs and TCIs may be necessary for long-term treatment. Systemic immunosuppressive drugs are often only needed in refractory cases [44].

Physician opinions were divided regarding the potential use of systemic JAK inhibitors for treating patients with moderate-to-severe AD. More than two-thirds (71%) of all physicians had a relatively low likelihood of prescribing systemic JAK inhibitors for the treatment of moderate-to-severe AD. JAK inhibition is associated with more rapid and sustained antipruritic effects compared with other drug classes [45]. JAK inhibitors include abrocitinib, baricitinib, and upadacitinib [18]. Abrocitinib is an oral JAK1 inhibitor that reduces IL-4 and IL-13 signaling (along with other cytokines associated with AD pathogenesis) and is used for the treatment of moderate-to-severe AD [46]. Abrocitinib is approved in several other countries and regions, including the USA, the UK, and the European Union (EU), but is not yet approved in any Middle Eastern countries, aside from the UAE and Egypt [28, 47, 48]. Baricitinib is a JAK inhibitor that shows high selectivity for JAK1 and JAK2 and is used for the treatment of moderate-to-severe AD; it is approved in various countries and regions, including the EU, the USA, and Egypt [49–51]. Upadacitinib is a selective JAK1 inhibitor that can also be used to treat moderate-to-severe AD and has been approved in a number of countries and regions including the EU, the USA, Saudi Arabia, and the UAE [1, 25, 29].

Less than two-thirds (61%) of all physicians reported consistently encountering the fear of corticosteroids from patients or their caregivers. Short-term use of systemic steroids can be effective for acute exacerbation of severe AD. However, long-term use of such systemic steroids has been known to cause serious adverse reactions, including hypertension, diabetes, and osteoporosis. It is thereby advised to administer systemic steroids specifically for the acute exacerbation of severe AD. A meta-analysis that examined TCS phobia in literature found the prevalence of such phobia to range from 21% to 83.7%. In two studies that examined corticophobia, patients with the phobia were found to have a higher rate of treatment nonadherence versus those without (49.4% versus 14.1% and 29.3% versus 9.8%) [52]. Accordingly, topical nonsteroidal treatments such as TCIs and PDE4 inhibitors could potentially be used as alternatives to systemic steroids as treatments for AD. A 48-week phase 3 pivotal study of the nonsteroidal PDE4 inhibitor crisaborole demonstrated that treatment with crisaborole resulted in a low frequency of treatment-related adverse events [53]. A parallel phase 4 study also showed that crisaborole was well tolerated and effective in patients as young as 3 months of age [19]. Such safety results provide promising alternatives for the treatment of AD in patients with corticophobia [19].

The majority (78%) of patients with AD were directly treated by their respective physician rather than being referred to another physician or specialist. A Saudi Arabian study found that patients often prefer seeing specialists rather than general practitioners, leading to long wait lists and delayed diagnoses [16]. Nevertheless, the referral of patients from primary care physicians to specialists may affect the patient evaluation process, treatment, and costs. Referrals may also affect the continuity of care and clinical outcomes [54]. Because of their limited formal training in managing skin disease, primary care physicians may lack confidence in the diagnosis and management of such diseases [14]. Referral to a dermatologist is suggested in patients with moderate-to-severe AD, especially if they have uncontrolled symptoms and/or are not responsive to therapy. A US study found that all physicians referred pediatric patients to other healthcare professionals more often for those with moderate-to-severe AD than for mild-to-moderate AD [55].

Almost half (48%) of all physicians listed treatments for patients with moderate-to-severe AD with better safety profiles as the greatest

unmet need. Treatments with better efficacy profiles, better safety profiles, and faster onset of action were given as the top three unmet needs in the treatment of mild-to-moderate AD. Emerging approaches that target individual inflammatory pathways will likely provide more therapeutic opportunities to benefit patients with AD [56]. Despite the substantial advancements in the treatment options of AD, the application of such new knowledge to the daily management of AD remains limited. Patient-reported disease burden is not translated to appropriate treatment approaches. Moreover, AD's negative economic burden on patients and their respective healthcare systems remains unaddressed. Improved diagnosis and treatment, improved knowledge and adherence to treatment guidelines, and improved patient and physician education are still required. In a survey of 37 clinicians, the need for effective topical treatments to improve long-term treatment adherence was recognized by the experts. Different types of topical treatments may be more suitable for one form of AD than another. Prescribing the most appropriate treatment has the potential to improve adherence to therapy. Moreover, experts agreed that corticophobia is associated with decreased adherence to steroid therapy in adult and pediatric patients. Experts agreed that corticophobia needs to be addressed via the implementation of new treatment strategies [40]. Moreover, early and effective interventions for AD may prevent the atopic march by restoring the skin barrier function, reducing inflammation, and reducing allergic sensitization [57].

As new treatments become readily available throughout the Middle East, they will likely be added to AD management plans when applicable. However, real-world data on the efficacy, safety, and tolerability of such drugs throughout the Middle East are needed. Ethnic and racial disparities in immune and genetic profiles associated with AD pathophysiology have been observed and may impact the efficacy and safety of AD treatments globally and within the Middle East [58–60]. Additionally, studies regarding the cost-effectiveness of such novel therapies are also needed due to the varying socioeconomic statuses of the regions within the Middle East. Ethnic, racial, and socioeconomic disparities between individuals with AD throughout the Middle East have not been addressed in this survey and could potentially serve as limitations to the study's results. The primary treatments and diagnostic tools for AD were developed using studies based on European and North American patients. Studies regarding the potential implications of regional phenotypic variations in Middle Eastern patients with AD on treatment safety and efficacy are needed [16].

CONCLUSIONS

Our findings provide insights into AD management by physician specialty throughout Lebanon, the UAE, Egypt, and Saudi Arabia. The diversity of management approaches that were observed for both referral patterns and treatments highlight the inadequacy of evidence for a standard approach for the management of AD throughout the four surveyed Middle Eastern countries. The multifactorial nature of AD makes the development of a standard management approach a major challenge. Moreover, the Middle East also faces several region-specific challenges in the treatment of AD, including physician nonadherence to AD management guidelines throughout the region, as well as the lack of access to treatments. Although this study examined the current AD management strategies across the Middle East, the effectiveness of such strategies was not addressed. Results from this study provide healthcare professionals insight into the array of management strategies utilized throughout the Middle East when treating AD. However, further research is needed to understand the effectiveness of such AD management strategies. Best practices could then be compiled to develop regional standardized guidelines for the treatment of AD. Additionally, as new treatments become readily available throughout the Middle East, they will likely be added to such AD management strategies when applicable, thereby improving the management of AD throughout the region. Nevertheless, development of such guidelines would be challenging due to the multifactorial nature of AD. Further insight into the regional

unmet needs could also be utilized to develop improved treatment strategies throughout the Middle East.

ACKNOWLEDGEMENTS

Funding. The preparation of this review was funded by Pfizer Gulf FZ LLC. Pfizer Gulf FZ LLC funded the journal's Rapid Service Fees.

Medical Writing/Editorial Assistance. Editorial/medical writing support under the guidance of authors was provided by Mark Bloom, PhD and David Gibson, PhD, CMPP, at ApotheCom, San Francisco, CA, USA, and was funded by Pfizer Gulf FZ LLC, Dubai, United Arab Emirates, in accordance with Good Publication Practice (GPP 2022) guidelines (*Ann Intern Med*. 2022; https://doi.org/10.7326/M22-1460).

Authorship. All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this article, take responsibility for the integrity of the work as a whole, and have given their approval for this version to be published.

Author Contributions. Conceptualization: Marcelle Ghoubar, Alfred Ammoury; Methodology: Marcelle Ghoubar (Sermo); Writing: All authors contributed to draft development and approved the final version of the manuscript for submission.

Disclosures. Nehal Hassan and Marcelle Ghoubar are employees of Pfizer Inc. Alfred Ammoury, Ahmed Ameen, Mahira Hamdy El Sayed, and Sultan Al-Khenaizan have nothing to disclose.

Compliance with Ethics Guidelines. This article is based on a previously conducted survey and does not contain any new studies with human participants or animals performed by any of the authors.

Data Availability. The datasets generated during and/or analyzed during the current study are published alongside this paper as supplementary material and are available from the corresponding author upon reasonable request.

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