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REVIEW ARTICLE

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A systematic review on the impact of pharmacist-provided services on patients' health outcomes in Arab countries

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Abstract

What is known and objective: The pharmacist's role has evolved dramatically over the last few decades and shows considerable impact globally. The aim of this systematic review was to describe the nature and extent of studies evaluating the impact of pharmacist-provided services on clinical, humanistic and economic outcomes in different healthcare settings across the Arab world.

Methods: A systematic literature search was conducted using the following databases from their inception until June 2020: Cochrane, Embase, MEDLINE, PubMed, ScienceDirect and Scopus. Reporting was done according to PRISMA guidelines, and the quality assessment utilized the Mixed Methods Appraisal Tool.

Results and discussion: Thirty-five eligible studies were included in this review, the majority of which were randomized controlled trials (RCT) ($n = 26$) conducted in hospital settings ($n = 26$). Most of the studies involved patients with specific medical conditions ($n = 29$) and pharmacist's interventions involved mainly medication therapy management ($n = 32$), counselling and education ($n = 29$), and medication therapy recommendations ($n = 12$). Several studies showed a positive impact (i.e., a statistically and/or clinically significant difference in favour of pharmacist-provided care or intervention) of pharmacist-provided services on clinical ($n = 28$), humanistic ($n = 6$) and economic ($n = 5$) outcomes. Conversely, five studies showed neutral or mixed effect of pharmacist interventions on clinical and humanistic outcomes.

What is new and conclusion: The findings of this systematic review demonstrate a positive impact of pharmacist-provided services on clinical, humanistic and economic outcomes across diverse settings in the Arab world. Most of the included studies evaluated clinical outcomes and were from hospital setting. Directed approaches are needed to advance pharmacy practice across various healthcare settings in the Arab world.

KEYWORDS
clinical pharmacy, health outcomes, pharmacists, pharmacy practice, systematic review

1 | WHAT IS KNOWN AND OBJECTIVE

The role of the pharmacist has advanced over the last few decades from an emphasis on medication compounding and dispensing, to patient-centred care, primarily intended to achieve definite outcomes aimed at improving the patient's quality of life (QoL).[1,2] Increasing healthcare demands, complexity of chronic medication regimens and poor adherence to medications, have led to pharmacists assuming the role of medication therapy experts and undertaking more advanced clinical roles such as medication therapy management (MTM), medication reconciliation, health promotion, disease prevention, prescribing and patient education[3-5] through collaborative care and direct patient interactions.[6] Therefore, pharmacists must now possess specific knowledge and skill competencies, attitudes and professional behaviours that support their advanced clinical role when working in collaboration with other members of the healthcare team. Furthermore, the World Health Organization (WHO) developed the concept of "the seven-star pharmacist" highlighting the need for a well-rounded pharmacist who functions as a caregiver, communicator, decision-maker, lifelong learner, leader, manager, and teacher.[7]

Many factors, including, but not restricted to, availability of resources, legislations, licensing requirements, pharmacy education programs, in-service training, demands and social needs, influence pharmacy practice evolution.[8,9] The Pharmacist's professional roles and advancements vary globally with the clinical roles being unrecognized and underutilized in various healthcare settings in developing countries.[10-13] A Cochrane systematic review of 11 studies from middle-income countries aimed at comparing pharmacist-provided services to usual care, highlighted that pharmacist-provided services could improve clinical outcomes and decrease utilization of healthcare services.[3] Unfortunately, the impact and scope of pharmacist-provided care across Arab countries are under-researched.[14]

In general, the status of pharmacy practice in the Arab world varies between different countries due to differences in educational programs, health systems and regulatory frameworks. However, many similarities exist in terms of facilitators and challenges to practice due to close geographical proximity, common language, culture and history.[14] These similarities and differences merit conducting a systematic review within this geographical region. To our knowledge, no previous systematic reviews have explored the scope and impact of pharmacist-provided care in Arab nations. One systematic review relating to medication errors reported in Middle Eastern countries identified four interventional studies examining the impact of clinical pharmacists on medication error reduction in Qatar, United Arab Emirates (UAE), Iran and Egypt.[15] Another systematic review examined the impact of antimicrobial stewardship strategies on antibiotic appropriateness and prescribing behaviours in the Middle East and reviewed recommendations made for program development.[16] Recommendations from Jordan, UAE, Qatar, Saudi Arabia and Lebanon included providing clinical pharmacists with a more central role in the administration and prescription of antibiotics. Furthermore, inclusion within the interprofessional team was proposed, allowing opportunities to educate other members of the healthcare team and ensuring safe and appropriate prescribing of antibiotics.[16]

Another systematic review investigating pharmacists' intervention programs in patients with diabetes, in Arab countries, identified six studies from Jordan, UAE, Sudan and Iraq.[17] These studies showed significant improvements in adherence, patient's knowledge and clinical outcomes.[17] One systematic review examined public attitudes in Arabic-speaking Middle Eastern countries towards the community pharmacists' role and services, highlighting the public's general perception that these provide business-orientated services.[18] Additionally, it was seen that the public perception of the role of the pharmacist in clinically orientated services was low.[18] The majority of pharmacists in the Arab world work in community pharmacies.[9] However, pharmacists with more advanced degrees, additional credentials and experience tend to work in hospitals where, in some countries like Qatar, pharmacy practice can be more clinically orientated.[9,10,14] Numerous barriers to clinical pharmacy practice exist in the Arab world. These include poor public image, lack of patient trust, lack of acceptance of advanced clinical pharmacist's roles by other healthcare professionals and restricted regulatory requirements that do not reflect the advancement of the pharmacy profession.[14,19-22]

Although there is evidence in the literature, particularly systematic reviews, on the benefits of pharmaceutical care interventions by pharmacists within different healthcare settings,[23-28] there is a need to evaluate the impact holistically through a multidimensional assessment of clinical, economic and humanistic outcomes.[29] While several studies have focused on pharmacist-provided services and interventions within selected Arab countries, the provision and impact of these services show significant variability. Therefore, there is a need to explore these service impacts, and their potential contribution towards improving patient care and health outcomes in the region. The aim of this systematic review was to describe the nature and extent (i.e., to characterize and quantify) of studies evaluating the impact of pharmacist-provided services on clinical, humanistic and economic outcomes in the Arab world.

2 | METHOD

2.1 | Data sources and search strategy

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[30] A systematic literature search of published studies was conducted using the following electronic bibliographic databases from their inception to June 2020: Cochrane, Embase, MEDLINE via ProQuest, PubMed, ScienceDirect and Scopus. Search terms from different categories were combined using Boolean operators:

- pharma*related [i.e., pharmacy and pharmacist] AND

- intervention OR service OR care-related AND
- region related [all Arab countries listed under Arab League classification (i.e., Yemen OR United Arab Emirates OR Tunisia OR Syria OR Sudan OR Somalia OR Saudi Arabia OR Qatar OR Palestine OR Oman OR Morocco OR Mauritania OR Libya OR Lebanon OR Kuwait OR Jordan OR Iraq OR Egypt OR Djibouti OR Comoros OR Bahrain OR Algeria OR gulf OR GCC OR Arab OR Middle East)]

The search strategy was limited to human studies and was customized according to each individual database. Mesh terms and Emtree were utilized for PubMed and Embase databases, respectively. The reference lists of the identified studies for full-text screening were manually reviewed to identify any additional studies meeting the review criteria that were not electronically identified. All search results were imported into EndNote® X9, where duplicates were removed.

2.2 | Eligibility criteria and studies selection

The inclusion criteria for the selected studies included the following: (1) involved pharmacist-provided intervention or service where it was compared with another group such as standard care (non-pharmacist intervention) for all types of patient-related outcomes; (2) institutionalized and non-institutionalized setting; (3) utilized quantitative study design, including randomized controlled trial (RCT), quasi-experimental study, before-and-after study, and cohort study designs; (4) published in English, Arabic or French; and (5) conducted in an Arabic-speaking country based on the Arab League classification, which includes 22 countries: Algeria; Bahrain; Comoros; Djibouti; Egypt; Iraq; Jordan; Kuwait; Lebanon; Libya; Mauritania; Morocco; Oman; Palestine; Qatar; Saudi Arabia; Somalia; Sudan; Syria; Tunisia; UAE; and Yemen.[31]

Studies were excluded from the review if: (1) they reported only perceptions, attitude, views, knowledge and awareness by pharmacists, other health professionals, or patients on pharmacist's role; (2) the intervention was not exclusively provided by the pharmacist themselves as it will be difficult to quantify and separate the pharmacist's input and impact from the rest of the healthcare team members; and (3) they were based on reviews, letters, editorials, commentaries, thesis, studies with no control or no comparison groups (e.g., qualitative studies and case studies), abstracts from conference proceedings, systematic reviews and meta-analyses.

The studies' screening followed a three-phase process: first by the title, followed by the abstract, and finally the full-text. A full-text article was retrieved if it met the inclusion criteria. The search process and full-text screening were done by two independent reviewers (SA, RA or LN) and any uncertainty or disagreement was resolved through discussion with a third reviewer (AE or AA).

2.3 | Data extraction and validity assessment

The data from each included study were extracted independently by two authors (SA, RA or LN) using a standardized data extraction sheet that included the following information: author, year, country, study design, study setting, population, description of pharmacist's intervention, sample size, a summary of key findings, outcome measures and impact. Wherever possible, intervention description was based on the Descriptive Elements of Pharmacist Intervention Characterisation Tool (DEPICT2).[32] Any discrepancy in data extraction between the two reviewers was reconciled via a third reviewer.

2.4 | Definition of outcome measures

The term positive impact was used for primary and secondary outcomes that were improved or deemed significant after pharmacist's intervention, while negative impact was used to describe outcomes that worsened after pharmacist's intervention or were significant in favour of the comparative intervention. In other words, positive impact refers to a statistically and/or clinically significant difference in the outcome(s) of interest in favour of pharmacist-provided care or intervention, while negative impact implies a statistically and/or clinically significant difference in favour of the comparative intervention (e.g., standard care or no intervention). Outcomes with no differences or no statistically significant differences were referred to as neutral. Standard care was defined as the care where the pharmacist's role was traditional (i.e., pharmacist's role was limited to dispensing of medications without significant contribution to the clinical management or patient-centred care) or when there was no pharmacist included in the multidisciplinary team. Clinical outcome refers to changes in health status or an event that happens due to an intervention. Economic outcome refers to the effect of an intervention on direct, indirect and intangible costs, and humanistic outcome is the impact of an intervention on patient functional status, QoL or satisfaction.[29]

2.5 | Quality assessment

The methodological quality of the included studies was assessed through utilization of the Mixed Method Appraisal Tool (MMAT).[33] This was aimed at evaluating the quality of the included studies as part of best practices for conducting and reporting systematic reviews. The MMAT is a critical appraisal tool that can be used for assessing both quantitative RCTs and quantitative non-randomized control trials. Although the reliability of the tool was moderate to perfect,[34] the content validity of the latest version (i.e., MMAT-v2018) was improved following a modified e-Delphi study.[35] The developers of the updated MMAT tool recommend against assigning an overall score to the adjudicated studies, and instead, they advise providing a detailed description of each criterion.[33] Two reviewers (SA, RA or LN) independently assessed the methodological quality of all the included studies, which were then compared and any differences were examined again and discussed with the entire research team.

3 | RESULTS

3.1 | Search and study selection

About 4927 articles were retrieved from the electronic database searches. An additional nine articles were manually identified from the reference lists. After removal of duplicates, 3263 articles were reviewed for title and abstract screening, of which 3167 were excluded as they did not meet the inclusion criteria. No studies in Arabic were identified, and three studies in French were excluded for not meeting the eligibility criteria. Therefore, 96 studies underwent a full-text review, of which 61 were excluded. (Figure 1). Most of the full-text articles were excluded due to reporting other outcomes of interest, a non-pharmacist-led intervention or no comparison group.

3.2 | Characteristics of studies included

Of the 35 studies included, 30 articles reported clinical outcomes,[36-65] while eight articles reported humanistic outcomes[39,43,52,56,62,66-68] and six presented economic outcomes.[49,54,64,69,70] Ten studies reported multiple outcomes.[39,43,46,49,52,54,56,62,64,69] The majority of the included studies were RCTs (n = 26), conducted in Jordan (n = 20) and in hospital settings (n = 26) (Table 1). Most of the studies involved patients with specific medical conditions, including diabetes (n = 8),[36-43] asthma (n = 4),[44-46,69] hypertension (n = 4),[50-53] receiving warfarin therapy (n = 4)[47-49,71] and other medical conditions (n = 9).[55-57,59,60,62-64,68] The remaining studies (n = 6)[58,61,65-67,70] included generic characteristics such as patients for discharge[58] or patients receiving polypharmacy.[61] The pharmacist's intervention involved mainly one or more of the following, MTM (n = 32),[36-58,60-64,66-69] pharmacist-led counselling or education (n = 29)[36-53,55-57,60,62,63,65-69] and medication recommendations to physicians (n = 12).[36,39,40,51,54-56,58,61,63,64,70]

3.3 | Impact of pharmacist's intervention

3.3.1 | Impact on clinical outcomes

Of the 35 included studies, 30 reported clinical outcomes of which 28 were positive (Table 2). Of these, 10 studies focused on patients with different cardiovascular diseases (CVDs), eight on patients with diabetes, three on pulmonary conditions and eight involved a variety of other conditions or did not report the disease state. Overall, pharmacist-provided interventions had positive impacts on all the reported clinical outcomes, except for two studies that reported a neutral impact. In the first of these, the pharmacist encouraged shared decision-making among the patients and studied its impact on depression outcomes,[62] while the second study focused on the impact of pharmacy-based services on the overall survival of cancer patients.[59] For diabetes-related studies, five of them included patients with type 2 diabetes,[36,39-42] two included women with gestational diabetes,[37,43] and one was not specific.[38] All of the eight studies showed a significant difference in haemoglobin A1C (HbA_{1c}) in favour of the pharmacist-provided intervention. The two gestational diabetes studies reported maternal complications, which significantly improved with pharmacist interventions.[37,43]

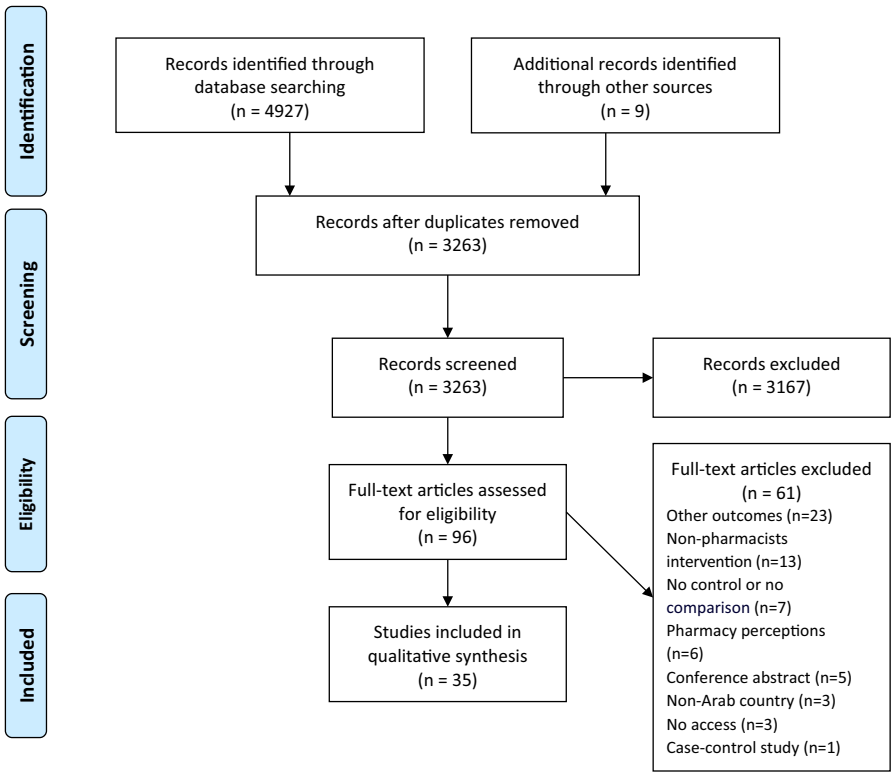

FIGURE 1 PRISMA flow diagram of the systematic review process

TABLE 1 Characteristics of included studies

Country	Number of studies
Jordan	20
Saudi Arabia	4
Sudan	3
United Arab Emirates	2
Egypt	2
Qatar	1
Iraq	1
Lebanon	1
Oman	1
Setting	**Number of studies**
Hospital	26
Community pharmacy	5
Primary care	4
Study design	**Number of studies**
Randomized controlled trial	26
Pre-post study	8
Retrospective cohort study	1

Of the three studies involving patients with asthma, one focused on paediatrics.[45] The first study used an asthma control test (ACT) to determine the effect of pharmacist care, while the second used a childhood ACT.[44,45] The third study reported asthma-related outcomes such as nocturnal symptoms.[46] All of the three studies showed a positive improvement after implementing pharmacist interventions. Additionally, with the four studies relating to patients with hypertension, more patients in the intervention group achieved their blood pressure goals compared to the control group.[50-53] A RCT including adults with any type of CVD illustrated the positive effects of pharmacy-led services on various surrogate markers (including Hb_{A1c}, blood pressure and lipid profile).[54]

The effect of pharmacist-provided care on anticoagulation therapy was reported in three studies, where the investigators included patients on warfarin and recorded the effect of pharmacist care on international normalized ratio (INR) control.[47-49] Two studies that used pre-post design demonstrated a significant increase in the proportion of patients with INR within the therapeutic range.[47,49] One retrospective cohort study by Elewa et al. also found that a high percentage of patients in the intervention group experienced a therapeutic INR compared to the control group.[48]

The impact of pharmacist-provided care was also recognized in improving clinical outcomes in studies that focused on patients with dyslipidaemia,[55] heart failure,[56] polycystic ovary syndrome,[57] anaemia,[60] metabolic syndrome[63] and hepatitis C.[64] Moreover, this positive impact was also demonstrated in studies that did not include patients with specific medical conditions, but focused on patients with polypharmacy or multiple chronic conditions.[58,61] Other studies reported a positive effect of pharmacist care on hospitalization,[46,54,58,65] sickness days[46] and emergency department visits.[58,65]

3.3.2 | Impact on humanistic outcomes

Of the 35 included studies, nine studies investigated different humanistic outcomes including QoL (n = 7) and satisfaction (n = 2) (Table 2). Six positive influences of pharmacist care on humanistic outcomes were reported in five of the studies,[39,43,52,56,62] while three studies exploring the impact on QoL showed a neutral effect.[66-68] In one of these, the intervention consisted of a single educational session delivered to patients with chronic obstructive pulmonary disease (COPD) without any written materials or follow-up visits/calls to serve as a constant reminder.[68] The other two studies were conducted in a community pharmacy and outpatient clinic on patients with serious health issues without specifying a particular medical condition, and the intervention involved home visits without providing medication leaflets or follow-up visits.[66,67]

However, the pharmacist-led interventions significantly improved the QoL in three studies that included patients with heart failure,[56] gestational diabetes[43] and hypertension,[52] where a variety of tools were utilized to assess the QoL. In two studies, the pharmacist intervention comprised structured pharmaceutical care services,[43,56] while in a further study it was an educational session supported with written materials.[52] The pharmacist-provided services also had a significant positive effect on patient satisfaction and sickness days.[39,62]

3.3.3 | Impact on economic outcomes

Out of the 35 studies included, six reported economic outcomes with the pharmacist care or service leading to a positive economic impact in five studies.[49,54,64,69,70] Cost reduction was reported as the economic benefit of the interventions via reducing medication costs,[64,69,70] length of hospitalization[54] and INR testing cost.[49] One of the studies also reported a net benefit of more than US$7.5 million per year as a result of reducing medication cost.[69]

3.4 | Quality of studies

The quality assessment of the RCTs and non-RCTs is presented in Tables 3 and 4. Sixteen of the 26 RCTs used the appropriate randomization technique described, while the remaining ten did not mention the method used for allocation concealment and mainly used the term "simple randomisation." Most of the RCTs (n = 19) reported that the intervention groups were comparable to the control or comparison groups at baseline. Almost all of the studies had complete outcome data, except one in which the dropout rate was greater than 25% at follow-up.[60] Only three studies reported sufficient

TABLE 2 Characteristics of included studies and impact of pharmacist's care on clinical, humanistic, economical outcomes in Arabic countries

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Clinical outcomes						
Diabetes						
Mouhtadi et al (2018)	Lebanon, Community pharmacy	Before-after study, Adults with type 2 diabetes	*N* = 200 Pharmacist-physician collaboration Provision of pharmaceutical care services	*N* = 200 Standard care	**HbA1c** (12 months): Significant reduction from 7.5% to 6.8% *(p = 0.04)* **Fasting blood glucose (FBG)** (12 months): Significant reduction from 155 mg/dl to 125 mg/dl *(p < 0.001)*	Positive
Batta et al (2018)	Jordan, Hospital	RCT, Pregnant (20–28 weeks) diabetic patients (type 1, type 2, gestational)	*N* = 51 Clinical pharmacist services	*N* = 34 Standard care	**HbA1c** (6 weeks postpartum): I: reduction of 0.54, C: reduction of 0.08, *(p < 0.04)* Maternal complications: *(p < 0.05)* Caesarian section deliveries: *(p = 0.04)* Severe hypoglycaemia: *(p = 0.049)*	Positive
Abuloha et al (2016)	Jordan, Hospital	RCT, Adults with uncontrolled diabetes on insulin	*N* = 50 Clinical pharmacist collaborated with physician to manage insulin therapy Patient counselling and follow-up	*N* = 50 Standard care	**HbA1c** (3 months): I: significant reduction from baseline by 1% *(p < 0.001)*, C: insignificantly reduction by 0.23% *(p < 0.241)* HbA1C significant difference between arms *(p < 0.013)*	Positive
Ahmad et al (2015)	Sudan, Hospital	RCT (Before-after study), Adults with type 2 diabetes	*N* = 200 Clinical pharmacist services	*N* = 100 No clear description	**HbA1c** (3 months): I: 9.3± 1.7%, C: 10.4±0.1.8% HbA1c (6 months): I: 7.8± 1.9% *(p < 0.001)*, C: 9.5±2.0% *(p < 0.394)* **Post prandial blood sugar** (3 months): I: 8.2±2.2 mmol/L, C: 10.5±2.1 mmol/L Postprandial blood sugar (6 months): I: 7.4±1.7 mmol/L *(p < 0.001)*, C: 10.4±2.0 mmol/L *(p < 0.84)*	Positive
Wishah et al (2015)	Jordan, Hospital	RCT, Adults with type 2 diabetes	*N* = 52 Provision of pharmaceutical care services in collaboration with physicians	*N* = 54 Standard care	**HbA1c** (6 months): I: mean reduction of 1.7%, C: 0.3%, *(p < 0.05)*	Positive
Mahwi et al (2013)	Iraq, Primary care setting	RCT, Adults with type 2 diabetes	*N* = 65 Provision of pharmaceutical care services	*N* = 65 Standard care	**HbA1c** (15 weeks): I: significant reduction by 2.33% *(p < 0.05)*, C: non-significant reduction by 0.47% *(p < 0.341)* **FBG:** I: significant reduction from 249.4 mg/dl to 196.4, *(p = 0.001)*, C: non-significant reduction from 211.1 mg/dl to 195.4 mg/dl *(p < 0.196)*	Positive
Jarab et al (2012)	Jordan, Hospital	RCT, Adults with type 2 diabetes	*N* = 85 Ensured evidence-based anti-diabetic therapy was given Patient counselling and follow-up	*N* = 86 Standard care	**HbA1c** (6 months): I: mean reduction of 0.8%, C: 0.1%, *(p < 0.019)*	Positive

TABLE 2 (Continued)

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Elnour et al (2008)	United Arab Emirates, Hospital	RCT, Women with gestational diabetes	*N* = 108 Provision of structured pharmaceutical care services Patient counselling	*N* = 72 Standard care	**HbA1C** (6 months postnatal): significant reduction in the intervention as compared to the control *(p < 0.05)* Maternal complications significant reduction in the intervention as compared to the control *(p < 0.05)* Neonatal complications: significant reduction in the intervention as compared to the control *(p < 0.05)*	Positive
Pulmonary diseases						
Basheti et al (2018)	Jordan, Hospital	Before-after study, Patients with asthma	*N* = 140 Show-and-Tell inhaler technique counselling service	*N* = 125 No clear description	**Asthma control test (ACT)** (3 months): mean score increased by 7.54 *(p < 0.001)*	Positive
Almomani et al (2017)	Jordan, Hospital	RCT, Paediatric patients with asthma	*N* = 101 Face-to-face interview at baseline Patient counselling and follow-up	*N* = 105 Standard care	**Childhood ACT** (6 month): I: 80% had controlled asthma, C: 40.2% *(p < 0.001)*	Positive
Abdelhamid et al (2008)	Sudan, Hospital	RCT, Adult asthma patients	*N* = 60 Pharmacist identified drug-related problems Patient counselling and follow-up	*N* = 40 -Standard care	**Frequency of acute attacks per week** (22 weeks): I: mean reduction 1.91, C: 1.0, *(p = 0.03)* **Frequency of nocturnal asthma symptoms per week:** I: 3.5, C: 1.1 *(p < 0.05)* **Frequency of using inhaled β2 agonists per week** (22 weeks): I: 19.9, C: 3.3, *(p = 0.03)* **Sickness days** (22 weeks): I: mean reduction 1.4, C: 1.0 *(p < 0.05)* **Hospitalization rate** (22 weeks): I: *(p < 0.05)*, C: *(p > 0.05)*	Positive
Cardiovascular diseases						
Ahmed et al (2017)	Sudan, Hospital	Before-after study, Adult patients on warfarin	*N* = 135 Clinical pharmacist adjusted warfarin dose based on INR Patient counselling	*N* = *N*/A Standard care	**INR** (1 year): 51.5% had levels within the therapeutic range before as compared to 68.3% after the intervention, *(p < 0.01)*	Positive
Elewa et al (2016)	Qatar, Hospital	Retrospective cohort study, Adult patients on warfarin	*N* = 78 Clinical pharmacist-managed anticoagulation clinic	*N* = 200 -Standard care	**-INR** (1 year): I: 81.8% had levels within the therapeutic range, C: 69.8%, *(p < 0.001)*	Positive
Dib et al (2014)	Saudi Arabia, Primary care setting	Before-after study, Patients on warfarin	*N* = 578 Clinical pharmacist-managed anticoagulation clinic	*N* = 578 Standard care	**INR** (6 months): 48% had levels within the therapeutic range before the intervention as compared to 59% after the intervention	Positive

(Continues)

TABLE 2 (Continued)

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Mahmoud et al (2017)	Saudi Arabia, Hospital	Before-after study, Adults with hypertension	*N* = 137 Clinical pharmacist services Patient counselling	*N* = 137 Standard care	**Systolic BP** (4 months): significant reduction by 5.4 mmHg *(p = 0.001)* **Diastolic BP** (4 moths): significant reduction by 2.7 mmHg *(p = 0.005)* **Rate of BP controlled:** 59.1% had BP controlled after as compared to 45.3% before intervention	Positive
Qudah et al (2016)	Jordan, Hospital	RCT, Adults with hypertension	*N* = 29 Pharmacist provided recommendations based on condition (in collaboration with physician) Patient counselling	*N* = 27 Standard care	**BP control** (3 months): I: 46% in the intervention achieved BP target, C: 14.3% achieved BP target *(p = 0.02)*	Positive
Ebid et al (2014)	Egypt, Hospital	RCT, Adults with hypertension	*N* = 140 Patient counselling	*N* = 140 -Standard care	**BP control** (3 months): I: significant improvement of 79.2%, C: 64.5% *(p = 0.018)*	Positive
Albsoul-Younes et al (2011)	Jordan, Hospital	RCT, Adults with hypertension	*N* = 136 Patient counselling and follow-up	*N* = 130 -Standard care	**BP control** (9 months): I: 79.4% achieved goal, C: 65.6% *(p = 0.01)*	Positive
El-Refae et al (2017)	Jordan, Hospital	RCT, Adults with cardiovascular diseases	*N* = 50 Clinical pharmacist services	*N* = 50 Standard care	**Mean hospitalization length:** I: 4 days, C: 6 days, *(p = 0.004)* **Surrogate markers** (HbA1c, systolic BP, total cholesterol and LDL) (3 months): improved in the intervention as compared to the control (*p* value not reported)	Positive
Tahaineh et al (2011)	Jordan, Primary care setting	RCT, Adults with dyslipidaemia	*N* = 90 Worked closely with physicians on controlling lipid Patient counselling and follow-up	*N* = 69 Standard care	**LDL control** (6 months): I: significant increase in controlled patients from 24.7% to 94.5%, C: from 28.8% to 71.2%, significant difference in the percentage of controlled patients between arms *(p < 0.001)*	Positive
Sadik et al (2005)	United Arab Emirates, Hospital	RCT, Adults with heart failure	*N* = 109 Pharmacist discussed drug therapy with physicians Provision of structured pharmaceutical care services Patient counselling	*N* = 112 -Standard care	**2 min walk test** (12 months):I: increased from 124 m to 140.2 m, C: reduced from 120.8 to 117.2 m, *(p < 0.05)* **Forced vital capacity (FVC)** (12 months): I: increased from 2.41L to 31.6L, C: increased from 2.31L to 27.8L, area under the curve for intervention showed significant difference compared to control *(p < 0.05)*	Positive

TABLE 2 (Continued)

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Other conditions						
Alkoudsi et al (2020)	Jordan and Syria, Community pharmacy	RCT, Female with polycystic ovarian syndrome (PCOS)	*N* = 63 Provision of pharmaceutical care service	*N* = 62 Standard care	**Beck Anxiety Inventory (BAI) questionnaire** (4 months, Jordan): the mean score reduced by 1.64 *(p < 0.01)* **BAI questionnaire** (4 months, Syria): the mean score reduced by 1.77 *(p < 0.007)* **Beck Depression Inventory (BDI) questionnaire** (4 months, Jordan): the mean score reduced by 0.24 *(p < 0.721)* **BDI questionnaire** (4 months, Syria): the mean score reduced by 0.88 *(p < 0.141)*	Positive
Al-Hashar et al (2018)	Oman, Hospital	RCT, Adults admitted to medical ward on at least one home medication	*N* = 306 Medication reconciliation and patient follow-up	*N* = 316 Standard care	**Died after discharge** (30 days): I: 2.4%, C: 1.9% *(p = 0.784)* **Hospitalization due to ADEs** (30 days): I: 9.1%, C: 16% *(p = 0.04)* **Emergency department visit** (30 days) (median): I: 46, C: 59 *(p < 0.344)* **Unplanned hospital visits** (30 days) (median): I: 50, C: 61 *(p < 0.639)* **Unplanned hospital readmission** (30 days) (median): I: 39, C: 44 *(p < 0.907)*	Positive
Eldeib et al (2018)	Egypt, Hospital	RCT, Adults with metastatic colorectal or gastric adenocarcinoma on capecitabine based chemotherapy	*N* = 44 Pharmacist services Patient follow-up	*N* = 38 Standard care	**Overall survival** (1 year): I: median survival 10.133 months, C: 8.10 months *(p = 0.477)* **Progression free survival** (1 year): I: median survival 5.2 months, C: 6.133 months *(p = 0.841)*	Neutral
Tahaineh et al (2018)	Jordan, Primary care setting	RCT, Adults with iron deficiency anaemia	*N* = 43 Patient counselling	*N* = 39 Standard care	**Haemoglobin control** (6 weeks): I: 86% of patients within the target range, C: 59%, difference in the percentage of controlled patients between arms *(p < 0.006)*	Positive
Basheti et al (2016)	Jordan, Community pharmacy	RCT, Adults with >3 chronic medications	*N* = 82 Clinical pharmacist conducted medication management review (MMR)	*N* = 83 Clinical pharmacist conducted MMR; however, recommendation done only by physician	**Mean glucose levels** (average 3.39 months): I: 99.08 mg/dL, C: 115.58 mg/dL, *(p < 0.001)* **Blood pressure levels** (average 3.39 months): I: 110.4/81.6 mmHg, C: 125/88.7 mmHg, *(p < 0.001)* **Triglyceride levels** (average 3.39 months): I: 148.5 mg/dL, C: 170.74 mg/dL, *(p = 0.001)*	Positive

(Continues)

TABLE 2 (Continued)

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Aljumah et al (2015)	Saudi Arabia, Hospital	RCT, Adults with major depressive disorder	*N* = 119 Pharmacist-led shared decision-making session Patients follow-up	*N* = 120 Standard care	**Montgomery-Asberg Depression Rating Scale** (at 6 months): Moderate severe depression score of 20.65 vs. 20.86, no significant difference between intervention and control *(p = 0.897)*	Neutral
Hammad et al (2011)	Jordan, Hospital	RCT, Adults with metabolic syndrome	*N* = 112 Pharmacist-physician collaboration practice Patient counselling	*N* = 90 Standard care	**Presence of metabolic syndrome:** I: 39.1% shifted from metabolic syndrome to no metabolic syndrome, C: 24.7%, *(p = 0.032)*	Positive
Almahdi et al (2020)	Saudi Arabia, Hospital	Before-after study, Adults with hepatitis C virus (HCV)	*N* = 371 Provision of pharmaceutical care services	*N* = 121 No description provided	**Sustained virologic response (SVR):** tested in only 74% of patients and cure rate was 97%	Positive
Salameh et al (2019)	Jordan, Hospital	RCT, Adult patients for discharge	*N* = 102 Clinical pharmacist services Patient counselling	*N* = 98 Standard care	**Emergency department visits:** I: 7.8% of discharged, C: 15.3%, *(p>0.05)* **Re-hospitalization:** I: 2.9% of discharge, C: 7.1%, *(p>0.05)*	Positive
Humanistic outcomes						
Quality of life (QoL)						
Aljumah et al (2015)	Saudi Arabia, Hospital	RCT, Adults with major depressive disorder	*N* = 119 Pharmacist-led shared decision-making session Patient follow-up	*N* = 120 -Standard care	**QoL** as measured by EQ−5D score (6 months): no significant difference between intervention and control *(p = 0.722)*	Positive
Basheti et al (2016)	Jordan, Hospital	RCT, Adults with chronic diseases	*N* = 50 Pharmacist home visit	*N* = 50 Pharmacist home visit (1 hour) only to gather baseline information without counselling	**QoL** as measured by EQ−5D score (3 months): I: increased from (0.71±0.21)/1 to (0.82±0.22)/1 *(p = 0.001)*, C: increased from (0.69±0.21)/1 to (0.79±0.21)/1 *(p = 0.001)*, no significant difference between intervention and control *(p = 0.442)*	Neutral
Basheti et al (2018)	Jordan, Community pharmacy	RCT, Adults with alarming health issues	*N* = 42 Pharmacist home visit	*N* = 42 Pharmacist home visit (1 hour) only to gather baseline information without counselling	**QoL**: as measured by the Demographic and Quality of Life Questionnaire (EQ−5D) (3 months): I: increased from (0.94±0.1)/1 to (0.96±0.11)/1 *(p = 0.244)*, C: increased from (0.90±0.14)/1 to (0.91±0.12)/1 *(p = 0.146)*	Neutral
Ebid et al (2014)	Egypt, Hospital	RCT, Adults with hypertension	*N* = 140 Patient counselling	*N* = 140 Standard care	**QoL** as measured by a structured questionnaire by Biradar et al, 2012 (3 months): Significant improvement in the intervention arm as compared to the control in five out of the five domains *(p < 0.05)*	Positive

TABLE 2 (Continued)

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Elnour et al (2008)	United Arab Emirates, Hospital	RCT, Women with gestational diabetes	*N* = 108 Provision of structured pharmaceutical care service Patient counselling	*N* = 72 Standard care	**QoL** as measured by the MOS 36-item short-form health survey (SF36)(6 months postnatal): Significant improvement in the intervention arm as compared to the control in four out of the six domains *(p < 0.05)*	Positive
Jarab et al (2011)	Jordan, Hospital	RCT, Adults with chronic obstructive pulmonary disease (COPD)	*N* = 66 Patient counselling	*N* = 67 Standard care	**QoL** as measured by the St George Respiratory Questionnaire (SGRQ)(6 months): I: Improvement of 2.9 in the total score, C: Improvement of 2.1 in the total score, *(p = 0.51)*	Neutral
Sadik et al (2005)	United Arab Emirates, Hospital	RCT, Adults with heart failure	*N* = 109 Pharmacist discussed drug therapy with physicians Provision of structured pharmaceutical care services Patient counselling	*N* = 112 Standard care	**QoL** as measured by Minnesota Living with Heart Failure Questionnaire (MLHFQ) (12 months): I: significant improvement from ≈50 total score to ≈30, C: no significant improvement ≈50 at baseline and 12 months, *(p < 0.05)*	Positive
Satisfaction						
Ahmad et al (2015)	Sudan, Hospital	RCT, Adults with type 2 diabetes	*N* = 200 Clinical pharmacist services Patient counselling	*N* = 100 Standard care	**Patient satisfaction questionnaire** (6 months): I: Positive improvement in three out of the seven questions *(p < 0.05)*, C: Positive improvement in one out of the seven questions *(p > 0.05)* **Diabetes satisfaction questionnaire** (6 months): I: Positive improvement in six out of the seven questions *(p < 0.05)*, C: Positive improvement in one out of the seven questions *(p > 0.05)*	Positive
Aljumah et al (2015)	Saudi Arabia, Hospital	RCT, Adults with major depressive disorder	*N* = 119 Pharmacist-led shared decision-making session Patient follow-up	*N* = 120 Standard care	**Treatment satisfaction questionnaire for medication (TSQM)** (6 month): I: total score of 88.71/100, C: total score of 82.89/100 *(p < 0.0001)*	Positive
Economic outcomes						
Cost saving						
Basheti et al (2017)	Jordan, Community pharmacy	Before-after study, Asthma patients on inhaler prescriptions	*N* = 51 Patient counselling	*N* = 51 Assess patients use technique at baseline before receiving intervention	**Cost saving** (estimated based on baseline and 3 months follow-up): 8 040.2 USD estimated saving per year based on the cost of inhaler misuse	Positive
Dib et al (2014)	Saudi Arabia, Primary care setting	Before-after study, Patients on warfarin	*N* = 578 Clinical pharmacist-managed anticoagulation clinic	*N* = 578 Standard care	**Annual cost saving:** decreased by 10 000 USD due to more patients having INR within the therapeutic range	Positive

(Continues)

TABLE 2 (Continued)

Author (year)	Country, setting	Study design, patient characteristics	Description of pharmacist intervention (sample size)	Description of comparator[b] (sample size)	Summary of key findings	Impact[a]
Direct medication cost						
Aljbouri et al (2013)	Jordan, Hospital	Before-after study, Patients admitted to the ICU and on parenteral anti-infective or cardiovascular medications	*N* = 51 575 medications Implementing a clinical pharmacist in the ICU department	*N* = 77 297 medications Standard care	**Direct medication cost:** decrease in consumption rate of drugs resulted in total direct medication cost reduction of 149 946.80 JD (211574.90 USD) representing 35.8% cost saving over a period of 10 months	Positive
Almahdi et al (2020)	Saudi Arabia, Hospital	Before-after study, Adults with hepatitis C virus (HCV)	*N* = 371 Provision of pharmaceutical care services	*N* = 121 No description provided	**Direct medication cost:** total medication cost reduction by 38%, *(p < 0.001)*	Positive
Other outcomes						
Basheti et al (2017)	Jordan, Community pharmacy	Before-after study, Asthma patients on inhaler prescriptions	*N* = 51 Patient counselling	*N* = 51 Assess patients use technique at baseline before receiving intervention	**Net benefit** (estimated based on baseline and 3 months follow-up): 7 720.2 USD per year	Positive
El-Refae et al (2017)	Jordan, Hospital	RCT, Adult patients with cardiovascular diseases	*N* = 50 Clinical pharmacist services	*N* = 50 Standard care	**Hospitalization cost** (comparing the expected cost to the actual cost after 3 months): I: significantly reduced from 319.84 JD to 260.77 JD, *(p < 0.006)*, C: significantly increased from 256.50 JD to 333.30 JD, *(p < 0.002)*	Positive

[a]Positive impact: improvement after implementing the pharmacist's intervention, negative impact: deterioration after implementing intervention, neutral: no difference

[b]Standard care: care where the pharmacist role is traditional (i.e., pharmacist role was limited to dispensing without significant contribution to the clinical management) or when there was no pharmacist included in the multidisciplinary team

blinding of outcome assessment,[43,56,58] while 15 studies did not provide information about blinding. All patients in the RCTs were adherent to the assigned intervention, except for one study.[40] For the non-RCTs ($n = 9$), most of the studies ($n = 6$) were of good quality as they addressed all the components of the MMAT tool,[44,47-50,69] except for three studies in which the first one did not account for confounders;[70] the second, neither accounted for confounder nor had a complete data outcome;[64] and in the last, it was not obvious if the intervention was administered as intended or if there was complete outcome data.[36]

4 | DISCUSSION

The primary purpose of this study was to systematically review the literature to describe the nature and extent of studies that evaluate the effect of pharmacist-provided care on clinical, humanistic and economic outcomes in the Arab world. The outcomes of this review shed light and provide evidence for the benefits gained from pharmacist-provided care in managing a wide range of clinical conditions in hospital, ambulatory clinic and community pharmacy settings. The majority of the studies ($n = 30$, 85.7%) showed a positive impact, one study (2.9%) showed mixed effects,[62] while four (11.4%) reported neutral effect[44,59,61,67] when compared with usual care. The studies included in the review indicate that pharmacist-delivered interventions can improve the outcomes of many chronic conditions, including, but not restricted to, diabetes, hypertension, dyslipidaemia, CVDs and asthma, by demonstrating significant improvements in Hb_{A1c}, blood pressure, LDL level and asthma control. An umbrella review summarizing the evidence from 15 systematic reviews and/or meta-analyses on chronic disease management in community pharmacies identified that pharmacist-led interventions had a positive impact on the clinical outcomes of diabetes, asthma, COPD, hypertension, dyslipidaemia and heart failure.[72] In addition, a previous Cochrane review had reported that pharmacists providing non-dispensing services in low- and middle-income countries may improve clinical outcomes and QoL of patients with chronic conditions and reduce health service utilization.[3] This review included two studies from the Arab region (Egypt[52] and Sudan[46]). In addition to this, another systematic review assessed the impact of clinical pharmacists on health outcomes in Jordan which identified 21 studies of moderate quality.[73] The current systematic review is the first conducted to describe and characterize the impact of pharmacist's care on health outcomes from the context of 22 Arabic-speaking nations. Furthermore, with the expanding scope of the pharmacists' practice within the region, this review was able to shed light on these increasing roles.

Similarly, another systematic review was conducted on the effect of pharmacist intervention on outcomes of diabetes management among adults in the United States (US).[74] The review showed that patients receiving pharmacist care, including self-care management education, lifestyle counselling, visits, telephone contact, drug reviews and recommendation to physicians, had significantly improved clinical outcomes (Hb_{A1C}). Moreover, the findings showed that a greater benefit was observed when prescribing authority was granted to the pharmacist. In the current review, four studies showed an improvement in Hb_{A1C} between the intervention and control groups in the range of 0.77–1.86%.[38,40-42]

Furthermore, a systematic review of pharmacist care in hypertension management, with the main intervention being medication management and hypertension education, reported a significant reduction in systolic blood pressure (10.7 ± 11.6 mm Hg) with no significant reduction detected in the control group (3.2 ± 12.1 mm Hg).[75] In the present review, Ebid's study showed a decline of 8.2 mmHg in the intervention vs. 5.4 mmHg in the control, suggesting a significantly higher blood pressure control in the intervention group ($p = 0.018$).[52] In addition, four other included studies were also consistent with this finding showing an improved blood pressure control in the intervention group when compared to the control group.[50,51,53,61] Moreover, a further study carried out in Canada on asthma patients showed a reduction in the days taken off work or school by 0.6 days/month and an improvement in overall QoL of 19% in the pharmacist care group.[76] Similarly, patients with asthma who received pharmacist care had a significant reduction in the days/weeks of sickness and hospitalization, while those in the control group showed an increase.[46] This shows consistent and significant benefits of pharmaceutical care service in these patients. Another systematic review reported that patients who received pharmacist-provided anticoagulation care received fewer INR test measurements and improved rate of therapeutic INRs.[77] This is consistent with Dib et al.'s study where higher therapeutic INRs were observed after attending the pharmacist-managed clinic as compared to no pharmacist management (59% vs. 48%).[49] Furthermore, Elewa et al.'s study confirmed that patients receiving pharmacist-involved warfarin therapy management achieved therapeutic INR faster than those who received usual care (81.8% vs. 69.8%, $p < 0.001$).[48]

Economic benefits were observed in a study conducted between Jordan and Australia on patients with asthma receiving pharmaceutical care, where the annual cost savings due to inhaler misuse was estimated to be US$8,040, implying US$164 saved per patient.[69] A significant cost saving was also noticed in Australia with a net benefit of US$5,841.9, corresponding to US$119.2 per patient. Another systematic review of eight studies looking at cost-effectiveness of medication review conducted by a pharmacist in geriatric care facilities in the United States, UK, Singapore and Switzerland showed a significant drug-cost saving.[78] In this review, the economic outcome was the lowest outcome observed ($n = 6$) with none of the included studies specifically focusing on full economic evaluations of pharmacist-provided services. This needs to be considered in future studies as economic impacts are important drivers for change, justifying the need for pharmacist-led services, resource allocation and guiding the choice of cost-effective services.[79]

Findings from this review showed that most of the included studies were from hospital settings with the fewest coming from community and primary care settings. This highlights the lack of 'pharmacist-provided services' in the later within Arab countries,

TABLE 3 The quality assessment of included articles: Quantitative randomized controlled trials

	Quantitative randomized controlled trials	Randomization appropriately performed?	Are the groups comparable at baseline?	Are there complete outcome data?	Are outcome assessors blinded to the intervention?	Did the participants adhere to the intervention?
1.	Abdelhamid et al (2008)	No	No	Yes	Cannot tell	Yes
2.	Abuloha et al (2016)	Yes	Yes	Yes	Cannot tell	Yes
3.	Ahmad et al (2015)	Yes	No	Yes	Cannot tell	Yes
4.	Albsoul- younes et al (2011)	Cannot tell	Yes	Yes	No	Yes
5.	Al-Hashar et al (2018)	Yes	Yes	Yes	Yes	Yes
6.	Aljumah et al (2015)	Yes	Yes	Yes	No	Yes
7.	Alkoudsi et al (2020)	Yes	Yes	Yes	Cannot tell	Yes
8.	Almomani et al (201)	Yes	Yes	Yes	Cannot tell	Yes
9.	Basheti et al (2018)	Yes	Yes	Yes	No	Yes
10.	Basheti et al (2016)	Yes	No	Yes	Cannot tell	Yes
11.	Basheti et al (2016)	Yes	Yes	Yes	No	Yes
12.	Batta et al (2018)	No	Yes	Yes	Cannot tell	Yes
13.	Ebid et al (2014)	No	Yes	Yes	Cannot tell	Yes
14.	El-Refae et al (2017)	Yes	Cannot tell	Yes	Cannot tell	Yes
15.	Elnour et al (2008)	No	Yes	Yes	Yes	Yes
16.	Eldeib et al (2018)	No	Yes	Yes	No	Yes
17.	Hammad et al (2011)	No	Yes	Yes	Cannot tell	Yes
18.	Jarab et al (2011)	Yes	Yes	Yes	Cannot tell	Yes
19.	Jarab et al (2012)	Yes	Yes	Yes	Cannot tell	Yes
20.	Mahwi et al (2013)	No	Cannot tell	Yes	Cannot tell	Yes
21.	Qudah et al (2016)	Yes	Yes	Yes	Cannot tell	Yes
22.	Salameh et al (2019)	Yes	Yes	Yes	No	Yes
23.	Sadik et al (2005)	Yes	Cannot tell	Yes	Yes	Yes
24.	Tahaineh et al (2011)	No	Cannot tell	Yes	Cannot tell	Yes
25.	Tahaineh et al (2018)	Yes	Yes	No	Cannot tell	Yes
26.	Wishah et al (2015)	No	Yes	Yes	No	Cannot tell

TABLE 4 The quality assessment of included articles: Quantitative non-randomized

Quantitative non-randomized	Are the participant's representatives of the target population?	Are measurements appropriate regarding both the outcome and intervention (or exposure)?	Are there complete outcome data?	Are the confounders accounted for in the design and analysis?	During the study period, is the intervention administered (or exposure occurred) as intended?
Ahmed et al (2017)	Yes	Yes	Yes	Yes	Yes
Al jbouri et al (2012)	Cannot tell	Yes	Yes	No	Cannot tell
Almahdi et al (2020)	Yes	Cannot tell	No	No	Cannot tell
Basheti et al (2018)	Yes	Yes	Yes	Yes	Yes
Basheti et al (2017)	Yes	Yes	Yes	Yes	Yes
Dib et al (2014)	Yes	Yes	Yes	Yes	Yes
Elewa et al (2016)	Yes	Yes	Yes	Yes	Yes
Mahmoud et al (2017)	Yes	Yes	Yes	Yes	Yes
Mouhtadi et al (2018)	Yes	Yes	Cannot tell	Yes	Cannot tell

which is unfortunate as community pharmacies in the Middle East are mostly privately owned and business orientated.[10,14] In contrast to our findings, a systematic review of 30 RCTs, the majority of which were conducted in North America, investigated the impact of pharmacist's care in managing risk factors associated with CVDs. This assessment found that the majority of the included studies were conducted in outpatient clinics (20 studies).[25] It is apparent that hospital pharmacies, especially in the Middle East, tends to attract pharmacists with advanced postgraduate degrees and advanced training.[14] The reasons for this include the fact that many of the laws in this region governing community pharmacy practice are outdated and do not reflect the advancement witnessed in the pharmacist's role and scope of practice. Furthermore, there is resistance to expanding the role of pharmacists in some settings, concern by physicians of boundary encroachment, a negative professional image and public expectation of the pharmacist's role.[10,14,19] Furthermore, the lack of compensation for providing pharmacist-provided services in the community coupled with a low salary could have contributed to the lack of advancement in their role.[10] These barriers can have an impact on clinical practice and patient outcomes.[14] One systematic review exploring public attitudes towards community pharmacies in Arabic-speaking Middle Eastern countries highlighted limited awareness and appreciation of pharmacist's role in clinically orientated services, which could be attributed to the lack of community pharmacists' involvement in these services.[18] Pharmacists from different practice settings in Qatar, including community, hospital and primary care were frustrated with the lack of trust and respect by patients with many viewing them as vending machines for medications.[10] Momentum from exploring pharmacist-provided services in community and primary care, as seen in this study, needs to be encouraged and supported to develop new clinical orientated pharmacy services within these settings.

On a positive note, pharmacy education within the Middle Eastern region is rapidly evolving which will positively influence pharmacy practice in hospital and community settings.[80] Several countries in the region have introduced residency hospital programmes and Doctor of Pharmacy degrees, with an emphasis on clinically orientated patient care, to replace the traditional pharmacy curriculum.[80] Additionally, a number of countries in the region, such as Lebanon, Qatar, Saudi Arabia and UAE, are seeking Northern American international accreditation of their pharmacy degree programmes as part of ongoing quality improvement processes in line with contemporary pharmacy practice standards and better marketing and recognition.[81]

Although this systematic review was intended to represent the 22 Arab nations, the review covered only 10 of these countries, meaning that we did not find any eligible studies from the remaining 12 Arabic-speaking nations. This could raise concerns regarding the impact of pharmacist care on health outcomes and the level of advancement in pharmacy practice in those countries. Consequently, the transferability and the generalizability of the findings from this review may not necessarily apply to those countries. Although the reasons for the lack of published studies from those countries have

not been investigated, it could merely be due to the geopolitical instability and socioeconomic pressures some of the Arab countries in the region such as Syria, Lebanon, Palestine, Iraq and Yemen may be experiencing.[9,80,82]

It is worth noting that the studies included were very heterogeneous in terms of their design and methodology, outcome measures and setting; thus, conducting a meta-analysis on the effect of different pharmaceutical interventions was not feasible and not intended as we anticipated from the outset. This could be attributed to the fact that the recent shift to clinically orientated pharmacy services and lack of clear pharmaceutical care practice standards, in the region, had an effect on reproducibility to compare effectiveness.[83] Therefore, the findings should be interpreted with caution. Other limitations included not checking additional sources of grey literature such as theses and conference proceedings. Furthermore, we have included non-RCT studies such as quasi-experimental, pre-post and cohort studies which are highly prone to different types of biases and may inherently not establish cause-effect relationships. In addition, such studies are highly prone to selection bias, information bias and reporting bias. It is difficult to eliminate the effect of important confounders and co-interventions in these study designs. True experimental studies using RCTs, if well-designed and conducted, are devoid of most of these biases that are inherent in non-randomized studies.[84,85]

More robust studies with a high representative sample are needed to gain a comprehensive understanding of the impact of pharmacist-provided services on patient outcomes and encouraging more pharmaceutical outcome research among different Arab nations. A lack of recognition of the impact of pharmacists can increase the burden on the healthcare system with increased healthcare costs. Further studies are required to understand the long-term effects of pharmacist care on clinical, humanistic and economic outcomes in the Arab world and to empower pharmacists to take greater roles in patient care. The direction of future research in the region could include studies investigating pharmacists' perceptions about their clinical role and their ability to provide effective patient care and patients' perspectives about pharmacists' clinical role. Moreover, the perspectives of patients and other healthcare professionals on the impact of the pharmacist role should be explored further.

5 | WHAT IS NEW AND CONCLUSION

This study contributes to an evolving body of literature, highlighting the impact of pharmacist-provided services on health outcomes in Arab countries. Overall, this review has demonstrated the positive impacts of pharmacist care on clinical, humanistic, and economic outcomes across diverse settings including hospitals, outpatient clinics and community pharmacies. Most of the studies included evaluated clinical outcomes from hospital settings with the fewest coming from community and primary care settings. Directed approaches are needed to move the profession forward in the region. Furthermore, there is a need to improve the quality of research in terms of its design and methodology, outcome measures and setting through a standardized approach.

CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

PATIENT CONSENT STATEMENT

Not applicable.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

DATA AVAILABILITY STATEMENT

Not applicable.

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