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Understanding the Management of Hypertension and Dyslipidaemia in UAE Population: An Evidence-based Mapping of Literature

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Abstract

The increased prevalence of hypertension and dyslipidaemia specifically in the young population necessitates the identification and quantification of literature gaps in the different phases (awareness, screening, diagnosis, treatment, adherence, and control) of patient management in the UAE for better clinical outcomes. This semi-systematic review identified relevant articles through structured and unstructured searches. Studies on adult populations published (2010-2019) in English and providing data on phases of management of hypertension or dyslipidaemia in the UAE were retrieved. Quantitative data were represented as weighted means. In total, 11 studies on hypertension and six studies on dyslipidaemia were included for the final analyses. The pooled prevalence of hypertension and dyslipidaemia was 24.8% and 43.8%, respectively. The estimates indicated that a few patients (range: 6.8%-17.3%) were aware of their condition, where 63.2% and 49.3% were screened for hypertension or dyslipidaemia, respectively. Approximately two-thirds of patients were on antihypertensive and lipid-lowering medications, whereas 68.4% of patients were adherent to antihypertensive treatment. No data are available on adherence to dyslipidaemia treatment. Control of both risk factors was poor (range: 12.7%-27.8%). The semi-systematic approach identified limited to no data on different phases of management of hypertension and dyslipidaemia, indicating a need for generating country-specific real-world data.

Keywords: hypertension, dyslipidaemia, cardiovascular diseases, cholesterol, prevalence.

INTRODUCTION

The number of deaths worldwide attributed to non-communicable diseases (NCDs) increased by a staggering 18.5% from 2010 to 2019[1]. Among the NCDs, cardiovascular diseases (CVDs) remain a major cause of mortality, accounting for 18.6 million deaths, which increased by 17.1% from 2010 to 2019 [1] .

In the Eastern Mediterranean region, 54% of deaths from NCDs were due to CVDs.[2] A multinational, cross-sectional Africa Middle East Cardiovascular Epidemiological (ACE) study reported high prevalence of cardiovascular (CV) risk factors (dyslipidaemia: 70% and hypertension: 43%) in a young population (mean age: 46 years) attending outpatient general practice clinics [3]. In the United Arab Emirates (UAE), CVDs contributed to 36.7% of all deaths in 2017 [4] whereas a high prevalence of dyslipidaemia (74.0%) and hypertension (43.0%) was noted in the young population aged 45.1 years [5]. Moreover, the increasing adoption of urban lifestyle and consumption of calorie-rich, processed, or pre-packed food with poor nutritional value have likely contributed to higher susceptibility to CVDs in the UAE [6, 7].

Hypertension and dyslipidaemia are considered as important modifiable risk factors for CVDs [8]. A tighter control of these risk factors in addition to a healthy lifestyle can significantly reduce morbidity and mortality due to CVDs [9,10]. Furthermore, primary prevention of CV risk factors can be achieved by opportunistic screening [3]. However, targeted screening or screening programs that employ point-of-care (POC) screening are lacking in the UAE

[11]. Moreover, most health insurance plans do not completely cover the cost of initial screening or testing [12]. Recent estimates indicate that 30% of participants (N = 1367) had poor knowledge of coronary heart disease risk factors and symptoms, which further decreased to <20% in adult women with some formal education [13, 14]. It is also important to consider the prevalence of these risk factors among expatriates (with diverse national, socioeconomic, racial, educational, or ethnic backgrounds and lifestyle) who account for about 90% of the total population in the UAE [15].

To reduce CVD mortality, the Ministry of Health and Prevention implemented National Multisectoral NCD Action plan has been aligned with the targets and indicators set by the World Health Organization (WHO) and sustainable development goals for 2030 [16]. This plan focuses on strategic areas: NCD governance, prevention and awareness, early diagnosis, and management of NCDs through research, monitoring, and evaluation [16]. Such action plans would benefit immensely if locally relevant and accurate data are made available to highlight gaps in evidence and to provide locally relevant recommendations to ensure patient-centric approaches at each stage of management of NCDs. In this context, common touchpoints such as awareness, screening, diagnosis, treatment, and adherence need to be explored in a systematic manner for better outcomes [17]. As systematic reviews and/or meta-analyses are resource-intense, we considered the "evidence mapping approach" to synthesize evidence from the literature in a systematic manner [18, 19]. Furthermore, the data generated through this method allows validation by the local experts [18]. This systematic approach can help healthcare practitioners and policymakers to design solutions for addressing current healthcare challenges and quality of care [20]. The objective of this semi-systematic review is to quantify the different phases of management (awareness, screening, diagnosis, treatment, adherence, and control) of hypertension and dyslipidaemia in the UAE population.

METHODS

Research Questions

To achieve the study objectives, we identified two research questions that would help in formulating the scope of mapping:

- What evidence exists regarding the management of hypertension or dyslipidaemia in the UAE population?
- Which areas of management need more attention for better patient care?

Study Design

To address the research questions, a multicomponent search approach was followed where structured and unstructured searches were conducted. The data were synthesized and validated, and quantitative mapping of different phases (awareness, screening, diagnosis, treatment, adherence, and control) of hypertension and dyslipidaemia management in the UAE was performed. The study followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines[21] but with a minor modification to conform to the scope of this study.

Data Mining

Data mining was divided into three steps: 1) Record identification through structured and unstructured searches; 2) Screening of articles as per definitions and eligibility criteria; 3) Inclusion of shortlisted studies for analysis.

Search Strategies

A structured search was conducted on electronic databases (Embase and MEDLINE) using search strings. Search strings included a combination of MeSH terms, their synonyms, and phases of management of hypertension or dyslipidaemia in the UAE. Unstructured search was conducted using Google (included a combination of the key MeSH terms from the systematic literature search), Incidence and Prevalence Databases, WHO, and National Ministry of Health, and national clinical practice and relevant treatment guidelines. No time window was applied for retrieving unstructured records (Supplementary Table 1). However, based on personal knowledge of the authors, additional articles were also considered for inclusion to supplement the data.

Definitions and Eligibility Criteria

On the basis of the research questions, the definitions of the different phases (awareness, screening, diagnosis, treatment, adherence, and control) of management of hypertension (Supplementary Table 2) and dyslipidaemia (Supplementary Table 3) were determined. Studies involving human subjects (adult populations aged ≥18 years) that were published between January 01, 2010 and December 31, 2019 and providing data on one or more phases of management of hypertension or dyslipidaemia in the UAE were selected. Data on hypertension were included when average systolic blood pressure (SBP) was ≥140 mm Hg and/or average diastolic blood pressure was ≥90 mm Hg.[22,23] Studies reporting hypercholesterolemia with average total cholesterol of ≥5 mmol/L or ≥200 mg/dL[24, 25] were considered for further screening.

Systematic reviews and/or meta-analyses, narrative reviews, randomised controlled studies, and observational studies were included, whereas case studies, letters to the editor, editorials, and studies involving specific subgroups (pregnant patients, patients with other comorbidities) were excluded (Supplementary Table 1).

Study Selection

A reviewer conducted both structured and unstructured searches and screened articles based on the title and abstract against the eligibility criteria. A second reviewer conducted a detailed review of general information including title, article citation, author names, year of publication, abstract, study design, study participants, study settings, and shortlisted studies for analysis. Disagreements in the selection of studies were resolved through discussions between the two reviewers. Methodology has been described in detail elsewhere [26].

Data Extraction and Evidence Synthesis

Once records were shortlisted after manual screening, relevant data on different phases of management of hypertension and dyslipidaemia were exported to Microsoft Excel. Quantitative data on different phases of management were pooled from the final records and represented as weighted means.

RESULTS

Screening of Relevant Articles

Hypertension

A total of 116 articles from the structured search and 5 articles from the unstructured search were retrieved on hypertension. A majority of the studies from the structured search (n = 106) were excluded during screening for not including adult participants (n = 9), not representing national data (n = 3), not being as per inclusion criteria (n = 9), not on hypertension (n = 52), not reporting the stages of hypertension management (n = 17), duplication (n = 1), or enrolling specific patient subgroups (such as patients with comorbidities, pregnant women; n = 15); only ten articles from the structured search and all five articles from the unstructured search were considered for further detailed review. Of these, four records each from structured[27–30] and unstructured search[25, 31–33] were included. Based on personal knowledge of the authors, three more studies were identified and included to supplement the search [5, 34, 35]. Finally, four articles from the structured search[27–30] and seven articles (including two nation-wide survey reports and five articles) from the unstructured search were shortlisted [5,25,31–35]. The literature search and record selection processes are summarised in a PRISMA flow chart (Figure 1a).

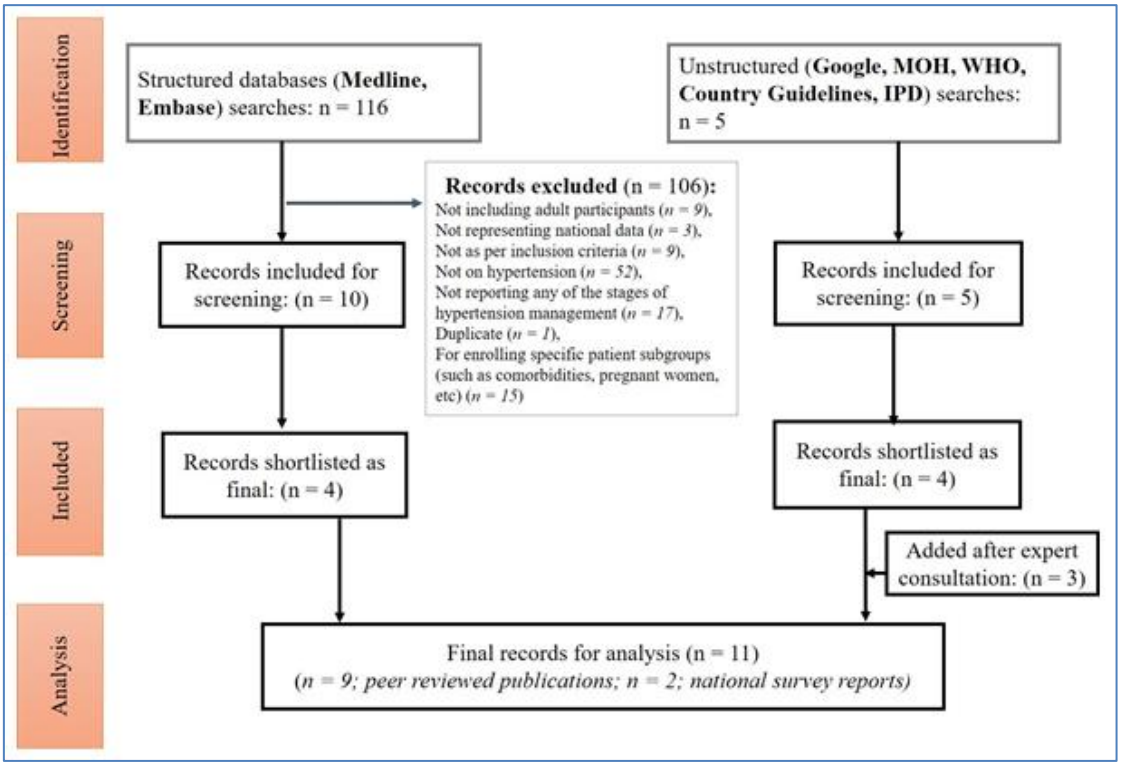

Fig-1a: Flowchart of literature search results and inclusion of studies on hypertension. IPD, Incidence and Prevalence Databases; MOH, Ministry of Health; WHO, World Health Organization

Description of Included Studies: Hypertension

The finalised studies included three cross-sectional studies; two prospective, one retrospective, and one nation-wide screening program; one subanalysis of epidemiological study; one registry analysis; and two nation-wide surveys (Table 1). The studies mentioned below were included as the final records for the following reasons:

A retrospective cohort study by Al-Shamsi *et al*. estimating the 9-year incidence rate of CVDs reported SBP as one of the risk factors among adults with no history of CVD and at least one CVD risk factor. This longitudinal study reported the prevalence (34.2%) and treatment (53.5%) of hypertension [30]. The Prospective Urban Rural Epidemiology (PURE) study conducted in four Middle Eastern countries including the UAE emphasized on focused screening and treatment of hypertension, especially in rural communities, men, and younger population. Age-standardised hypertension prevalence (52%), awareness (47%), diagnosis (47%), treatment (45%), and control (14%) for the UAE population were reported in this study [29]. The ACE study reported prevalence of hypertension (43%) in young population aged 45.1 years [5]. A cross-sectional study reported data on prevalence (30.5%), awareness (24%), diagnosis (24%), treatment (48.5%), and control (8.3%) of hypertension in young South Asian males (N = 1375; mean age: 34.0 years) who constitute a majority of the immigrant population in the UAE [15, 34]. Weqaya, a population-wide (N = 50,138) CV screening program estimated prevalence of hypertension in young participants as 23.1% (mean age: 36.82 years) [27]. Four studies reported the rate of adherence to antihypertensive medication in the UAE [28, 31, 32, 35]. Two nation-wide surveys, namely the WHO-STEPS survey (N = 8214)[25] and the UAE National Health survey report (N = 10,000)[33] provided data on all phases of management except for adherence to hypertensive treatment.

Among these studies, Yusufali *et al*. reported higher prevalence (52%) of hypertension compared with other studies [5, 25, 27, 29, 30, 34]. Noncompliance to antihypertensive treatment ranged between 15% and 45%[28,31,32,35] and control of hypertension ranged between 8.3% and 14% [25, 29, 34].

Table-1: Overview of Studies on Hypertension and Dyslipidaemia Included in the Final Analysis

First author, publication date	Brief Study Details	Sample Size(n);	Prevalence (%)	Awareness (%)	Screening (%)	Diagnosis (%)	Treatment (%)	Adherence (%)	Control (%)
Studies on Hypertension									
Non-communicable Disease Risk Factor Survey (STEPS). (2017 2018)[25]	Population-based survey of adults >18 years. Initially, population divided into Emirati and non-Emirati	8,214	28.8	x	63.2	x	77.9	x	13.3
UAE National Health Survey Report (2018)[33]	Nationally representative survey	10,000	x	13.6	x	13.6	x	x	x
Bader RJ *et al.* (2015)[32]	Cross-sectional, multicentre study in Ajman Emirate. Patients from outpatient clinics were interviewed on the basis of a questionnaire about sociodemographic and clinical data, and completed the Morisky Medication Adherence Scale.	250	x	x	x	x	x	54.4	**x**
Gaili AA *et al.* (2016)[31]	Cross-sectional study in the UAE. A questionnaire was delivered to a random sample of hypertensive patients in Abu Dhabi, Sharjah, and Ajman.	385	x	x	x	x	x	84.4	x
Shehab A *et al.* (2016)[35]	Prospective interventional study. Patients with CVDs from 3 family medicine clinics in Al-Ain, UAE, were recruited. Patient responses to a validated BMQ were assessed.	300	x	x	x	x	x	70.5	x
Al-Zakwani I *et al.* (2011)[28]	Use of quadruple EBM combination (antiplatelet therapy, angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker, beta-blocker, and lipid-lowering agent) concurrently at discharge among patients with ACS in 6 Middle Eastern countries.	8,154	x	x	x	x	x	68	x

First author, publication date	Brief Study Details	Sample Size(n);	Prevalence (%)	Awareness (%)	Screening (%)	Diagnosis (%)	Treatment (%)	Adherence (%)	Control (%)
Yusufali AM *et al.* (2017)[29]	Prospective Urban Rural Epidemiology study enrolled participants from 52 urban and 35 rural communities from four countries in the Middle East.	917	52	47	x	47	45	x	14
Hajat C *et al.* (2012)[27]	Use of self-reported indicators, anthropometric measures, and blood tests to screen adults aged ≥18 years participating in a population-wide CV screening program.	50,138	23.1	x	x	x	x	x	x
Shah SM *et al.* (2015)[34]	A representative sample of South Asian adult (≥18 years) immigrant male nationalities in Al Ain, UAE, was recruited. Information related to socio-demographics, lifestyle factors, history of diagnosis, and treatment of hypertension was collected.	1,375	30.5	24	x	24	48.5	x	8.30
Al-Shamsi S *et al.* (2019)[30]	A retrospective cohort study of patients who did not have a history of CVDs and who had ≥1 CVD risk factors. Multivariable Cox proportional hazards regression analyses were used to examine the predictors of major CVD events (MI, stroke, and acute peripheral arterial occlusion).	977	34.2	x	x	x	53.5	x	x
Radaideh G *et al.* (2017)[5]	A subanalysis evaluating the prevalence of CV risk factors in rural and urban cohorts attending general practice clinics.	495	43	x	x	x	x	x	x
"Studies on Dyslipidaemia"									
Non-communicable Disease Risk Factor Survey (STEPS) 2017-2018[25]	A population-based survey of adults >18 years. Initially, population was divided into Emirati and strata and non-Emirati.	8,214	43.7	6.8	49.3	6.8	68.2	x	x
Rashid F *et al.* (2019)[36]	A retrospective analysis of the electronic medical records of all patients who attended the Dubai Health authority between 2012 and 2016.	26,647	x	x	x	x	x	x	27.80
Hajat C *et al.* (2012)[27]	Use of self-reported indicators, anthropometric measures, and blood tests to screen adults aged ≥18 years participating in a population-wide CV screening program.	50,138	44	x	x	x	x	x	x
Al-Shamsi S *et al.* (2019)[30]	A retrospective cohort study including patients who did not have a history of CVD and who had ≥1 CVD risk factors. Multivariable Cox proportional hazards regression analyses were used to examine the predictors of major CVD events, namely MI, stroke, and acute peripheral arterial occlusion.	977	x	x	x	x	49.2	x	x
Radaideh G *et al.* (2017)[5]	This subanalysis evaluated the prevalence of cardiovascular risk factors in the UAE, particularly in rural and urban cohorts attending general practice clinics.	495	74	x	x	x	x	x	x
Khan NS *et al.* (2017)[37]	This cross-sectional questionnaire-based survey assessed the prevalence and perception of risk factors of CVD among adults in the UAE	700	11.8	x	x	x	x	x	x

ACS, acute coronary syndrome; BMQ, brief medication questionnaire; CV, cardiovascular; CVD, cardiovascular disease; EBM, evidence-based medication; MI, myocardial infarction; UAE, United Arab Emirates.

Dyslipidaemia

A total of 200 articles from the structured search and 3 articles from the unstructured search were retrieved for the UAE population. A majority of the studies from the structured search (n = 194) were excluded during screening for not including adult participants (n = 8), not representing national data (n = 4), not being as per inclusion criteria (n = 11), not on dyslipidaemia (n = 26), not reporting any of the stages of dyslipidaemia management (n = 56), duplicate entry (n = 2), or enrolling specific patient subgroups (such as patients with comorbidities, pregnant women; n = 87). Only six articles from the structured and three articles from the unstructured search were considered for further detailed review. Of these, four articles from the structured and one subanalysis of epidemiological study from the unstructured search were shortlisted for the final analysis [5, 27, 30, 36, 37]. Based on personal knowledge of the authors, one more article was identified and included to supplement the search [25]. The literature search and record selection processes are summarized in a PRISMA flow chart (Figure 1b).

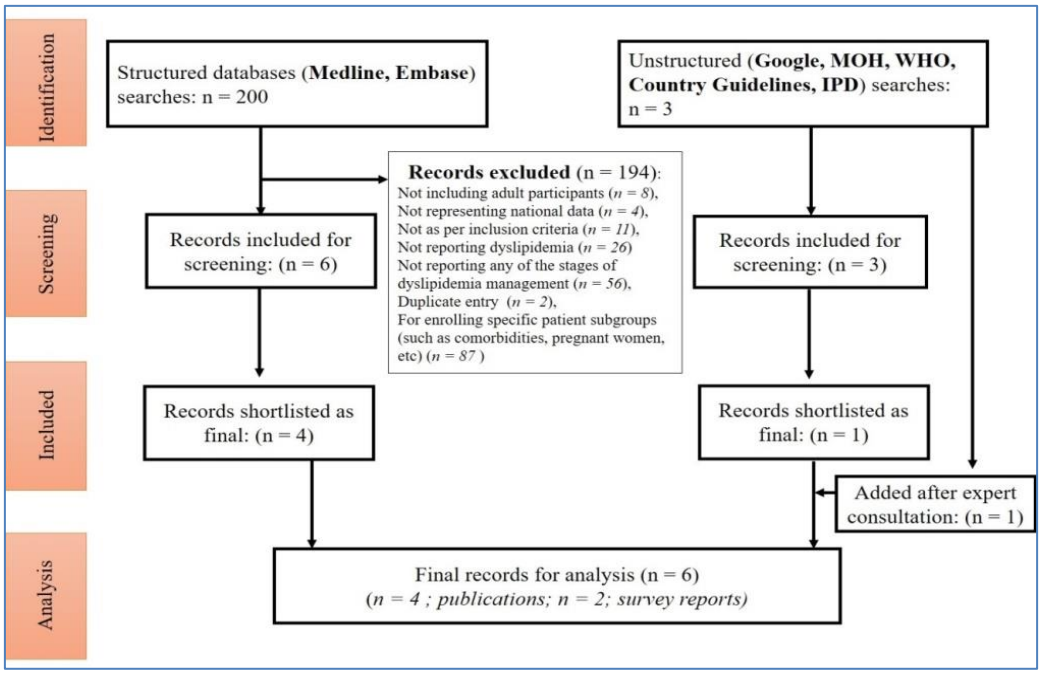

Fig-1b: Flowchart of literature search results and inclusion of studies on dyslipidaemia. IPD, Incidence and Prevalence Databases; MOH, Ministry of Health; WHO, World Health Organization

IPD, Incidence and Prevalence Databases; MOH, Ministry of Health; WHO, World Health Organization

Description of Included Studies: Dyslipidaemia

Studies selected for the final analyses included two retrospective studies, one nation-wide screening program, one subanalysis of epidemiological study, and two surveys (Table 1) [5,25, 27,30,36,37]. Except for a nation-wide survey, the reasons for including the following studies are discussed further:

The ACE study (N = 495) reported high prevalence of dyslipidaemia in young population (74%; mean age: 45.1 years) [5]. Weqaya, reported the prevalence of dyslipidaemia as 44% in young participants aged 36.82 years.[27] A cohort study including individuals with no history of CVDs but ≥1 risk factor reported that 49.2% were receiving lipid-lowering medication [30]. In a large retrospective study of patients with diabetes and CV or renal complications (N = 26,647), 27.8% achieved the low-density lipoprotein (LDL) target of <70 mg/dL [36]. A cross-sectional questionnaire-based survey that included 51.2% of young adults (18-25 years) estimated dyslipidaemia prevalence at 11.8% [37].

The prevalence of dyslipidaemia varied between 11.8% and 74%[5, 25, 27, 37] whereas the proportion of patients receiving dyslipidaemia treatment was reported as 49.2% and 68.2% in two separate studies [25, 30]. No study provided quantitative data on patient adherence to lipid-lowering medications in the UAE population.

Data Synthesis and Evidence Mapping

A bubble plot was used to synthesize the final data. The different phases of management of hypertension and dyslipidaemia are mapped along the X-axis, and the number of evidence items available for each phase are plotted along the Y-axis. The bubble size represents the proportion of individuals at each stage, represented as weighted means or single value (Figure 2).

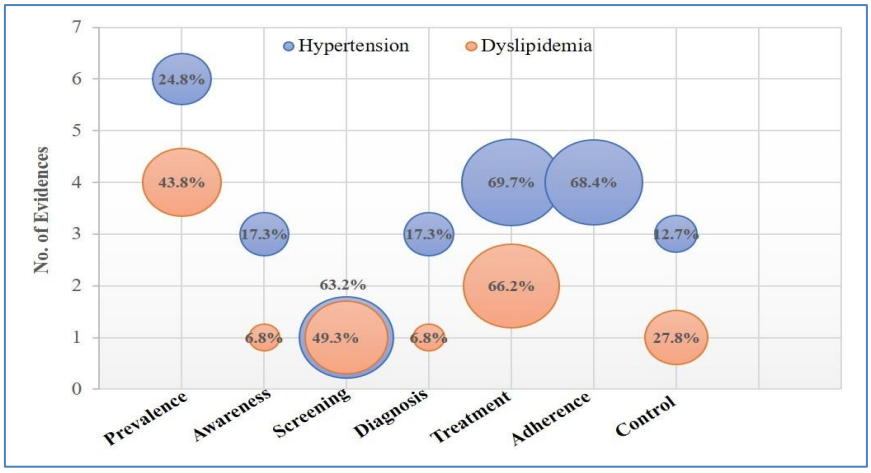

Fig-2: Evidence mapping of different phases of management of hypertension and dyslipidaemia

The pooled prevalence of hypertension (n = 6 studies) and dyslipidaemia (n = 4 studies) was 24.8% and 43.8%, respectively. Pooled estimates indicated low levels of awareness of hypertension (n = 3 studies; 17.3%). Awareness of dyslipidaemia was poor (n = 1 study; 6.8%). The proportion of patients who were screened for hypertension and dyslipidaemia was 63.2% and 49.3%, respectively. Approximately two-thirds of the patients were on antihypertensive and lipid-lowering treatment, whereas 68.4% of patients (n = 4 studies) showed adherence to antihypertensive treatment. None of the articles reported adherence to dyslipidaemia treatment. Control of hypertension was poor (n = 3 studies: 12.7%), whereas target LDL cholesterol (LDL-C) levels were achieved in 27.8% of patients.

DISCUSSION

This is the first semi-systematic review that identifies evidence gaps in the management of hypertension and dyslipidaemia in the UAE. In total, eleven studies on hypertension and six studies on dyslipidaemia were considered relevant for the final analysis, whereas no study reported data on adherence to dyslipidaemia treatment in the UAE.

Comparison with Other Studies on Hypertension

The pooled prevalence of hypertension (24.8%) from our analyses was consistent with the projected prevalence reported by the WHO (28%) and DISCOVERY study (31%) for the UAE [2, 11]. Awareness was defined as either self-reported or any prior diagnosis of hypertension or high serum total cholesterol level by a healthcare professional [38]. Our data suggest that awareness of hypertension was poor (17.3%) and similar to a cross-sectional study that showed similar rates of awareness of heart disease and associated risk factors (19.4%) among Emirati women [14]. The rate of adherence to antihypertensive treatment observed in our study (68.4%) was comparable with the rate reported in other Middle Eastern countries (50%-67%) [39], but greater than that in the global population (<50%).[40] Although we report high adherence to medication compared with published reports, it did not translate to achieving the target blood pressure level. Control of hypertension in the pooled analyses (12.7%) was much lower than the rates shown in Middle Eastern (57.5%) and global reports (28.4%) [9, 41] .

Comparison with Other Studies on Dyslipidaemia

The pooled prevalence (n = 4 studies) of dyslipidaemia was 43.8%, whereas other published studies reported this to be between 36% and 73% [11, 42, 43]. Our findings showed that LDL-C levels were controlled (<70 mg/dL) only in 27.8% of the population; however, a higher proportion of patients (49.5%) from the UAE and Kuwait achieved LDL-C goals, as reported by the Dyslipidaemia International Study (DYSIS) [44]. This large variation in data could possibly be due to study design, patient selection, and baseline or other clinical characteristics of the participants.

Despite the high number of enrolees in the Weqaya screening (>50,000 participants)[27] and nation-wide surveys conducted by the Ministry of Health UAE (10,000 participants)[33], and the WHO (>8000 participants)[25], these studies limited their objectives to screening or treatment but did not provide insights to initiate local research and highlight knowledge gaps, which is essential for the prevention and control of hypertension or dyslipidaemia.

Patient-Centric Recommendations for Better Patient Care

Mapping of evidence around the identified phases of patient management indicated major gaps and highlight areas that need further research attention while simultaneously presenting numerous research opportunities in the context of comprehensive management of hypertension and dyslipidaemia in the UAE. Recommendations focusing on each phase of management in the context of the UAE healthcare are provided in **Table 2**.

Table-2: Summary of Recommendations for Better Patient Outcomes for Hypertension and Dyslipidaemia

Phases of Management	Recommendations
Awareness	Detailed discussions of CV risk factors with patients during clinic visit Dissemination of CV risk factors through patient brochures published in local language, internet campaigns, social media, friends and family members, health campaigns, lectures, field visits, and magazines Facilitate community education and community participation in health-promoting activities in specific subgroups including women (especially ≥45 years of age),[14] younger population[5], geriatric population, people with other comorbidities, and expatriates[15]
Screening and Diagnosis	Consider PCPs clinics as an alternative to the comprehensive time-consuming population-wide screening Targeted screening particularly among individuals who are at risk for CVDs[5] Availability of portable touchscreen devices in waiting rooms may increase the possibility of self-reporting of health risk factors[45] Simple and accessible POC laboratory testing can be installed at malls, labour camps, and healthcare centres in the UAE[11] Develop risk stratification tools for primary and secondary prevention of CVDs[17]
Treatment	Urge individuals who are at risk for hypertension or dyslipidaemia to visit healthcare provider and follow healthy lifestyle Clinicians to consider patient-related factors such as age, gender, income, relationship with provider, and psychological health, in addition to medication cost, perceived effect of medication, and use of traditional medicines,[32,46] and provide clear instructions regarding medication intake[46]
Adherence	Improve adherence of medication through treatment simplification, by providing feedback, through self-monitoring of blood pressure, by using pill boxes, and by employing motivational interviewing[47] Track adherence by conducting questionnaire-based patient interviews, ambulatory blood pressure monitoring, measurement of drug levels (for antihypertensive drugs, urine testing is preferred), or through installing an app on mobile[46]

CV, cardiovascular; CVD, cardiovascular disease; PCP, primary care physician; POC, point-of-care; UAE, United Arab Emirates.

Recommendations for Government and Policymakers

Healthcare research should be prioritised to generate more data on patient-centric outcomes by focussing on touchpoints that are common along NCD management.

Policymakers and health system managers can amend current health policies and recommendations, inform resource allocation, and develop healthcare workforce capability, thus improving efficiency. Recommendations for the government and policymakers for a focused approach are given in Table 3.

Table-3: Summary of Recommendations for Government and Policymakers

Prevention strategies to control increasing burden/prevalence
Launching campaigns explaining the benefits of restricted sodium intake in diet. Reducing sodium intake by 15% in 23 low- and middle-income countries can prevent about 8.5 million deaths over a 10-year period[48]
Real-world data on prevalence
Creating comprehensive registries to track patient data and to simplify and standardize treatment protocols[48,49]
Awareness
Public places or programs can be used as platforms for educating people for making more healthy lifestyle choices[48]
Increasing investments into researching chronic diseases to generate more local data, which can drive healthcare delivery[50]
Screening strategies
Collaboration with national societies to develop clinical and public national guidelines on CVDs[51]
Encouraging the use of risk prediction tools by healthcare providers developed by the WHO based on regions of countries. Defining "high-risk" population using these tools will help resource allocation to the needy population
Ensuring treatment adherence
Controlling the costs of medications to ensure ease of access and treatment adherence

CVD, cardiovascular disease; UAE, United Arab Emirates; WHO, World Health Organization.

Supplementary Table-1: Strategy for Structured Literature Search

Hypertension		
Search String	**Inclusion Criteria**	**Exclusion Criteria**
(hypertension **OR** blood pressure **OR** hypertensives) **AND** (epidemiology **OR** prevalence **OR** incidence **OR** national **OR** survey **OR** registry) **AND** (awareness **OR** knowledge **OR** health literacy **OR** screening diagnosis **OR** diagnosed **OR** undiagnosed **OR** treatment **OR** treated **OR** untreated **OR** control **OR** controlled **OR** uncontrolled **OR** adherence **OR** compliance **OR** adhere **OR** therapy **OR** non-adherence) **AND** United Arab Emirates	Time period: January 1, 2010 to December 31, 2019 Language: English Species: Humans, Human Hypertension Relevant patient journey data available United Arab Emirates	<18 years of age Not hypertension Relevant patient journey data NA Full text NA Specific patient subgroups such as patients with comorbidities, pregnant women Not English language Case studies, letter to editors, editorials Duplicate records Data lacking national representativeness Data not from representative country
Dyslipidaemia		
(dyslipidemia **OR** hypercholesterolemia **OR** cholesterol **OR** triglycerides **OR** LDL) **AND** (epidemiology **OR** prevalence **OR** incidence **OR** national **OR** survey **OR** registry **OR** Statistics) **AND** (health literacy **OR** screening **OR** awareness **OR** knowledge **OR** treated **OR** treatment **OR** diagnosis **OR** undiagnosed **OR** diagnosed **OR** therapy **OR** controlled **OR** control **OR** uncontrolled **OR** adherence **OR** adhere **OR** compliance) **AND** United Arab Emirates **OR** Algeria **OR** South Africa **OR** Africa **OR** Egypt **OR** Saudi Arabia **OR** Middle East	Time period: January 1, 2010 to December 10, 2019 Language: English Species: Humans, Human Dyslipidaemia, hypercholesterolemia, triglycerides Relevant patient journey data available United Arab Emirates	<18 years of age Not dyslipidaemia Relevant patient journey data NA Full text NA Specific patient subgroups such as patients with comorbidities, pregnant women Not English language Case studies, letter to editors, editorials Duplicate records Data lacking national representativeness Data not from representative country

LDL, low-density lipoprotein; NA, not available.

Supplementary Table-2: Definitions of the Different Phases of Management of Hypertension [22,23,38]

Criteria	**Definitions**
Hypertension	Hypertension was defined as % of respondents having average SBP ≥140 mm Hg and/or average DBP ≥90 mm Hg
Awareness	Self-reported or any prior diagnosis of hypertension by a healthcare professional
Screening	Proportion of respondents who had their BP measured by a doctor or any other health worker
Diagnosis	Patients diagnosed with hypertension by a healthcare professional
Treatment	Use of antihypertensive medication for the management of high BP
Adherence	Proportion of respondents indicating adherence and/or compliance to the prescribed BP medications
Control	Proportion of patients achieving a target BP of ≤140/90 mm Hg with treatment

BP, blood pressure; DBP, diastolic blood pressure; SBP, systolic blood pressure.

Supplementary Table-3: Definitions of the Different Phases of Management of Dyslipidaemia[25]

Criteria	**Definitions**
Dyslipidaemia/hypercholesterolemia	Dyslipidaemia/hypercholesterolemia was defined as TC of ≥5.0 mmol/L or ≥200.0 mg/dL
Awareness	Self-reported or any prior diagnosis of high total serum cholesterol by a healthcare professional
Screening	Proportion of respondents who had their cholesterol levels measured by a doctor or any other health worker
Diagnosis	Patients diagnosed with hypercholesterolemia disorder by a healthcare professional
Treatment	Use of medications for management of the respondent's high cholesterol
Adherence	Proportion of respondents indicating adherence and/or compliance to the prescribed cholesterol-lowering medications
Control	Target TC level ≤5.0 mmol/L or ≤200 mg/dL during treatment.

TC, total cholesterol

Limitations

This semi-systematic review has some limitations. Data on different phases of management of hypertension and dyslipidaemia were not consistently available in all articles, which made pooling of data difficult. Hence, we addressed this by assigning weight to each phase of management depending on the sample sizes of the included articles while calculating weighted means. It is important to note that evidence maps can provide a brief overview; however, they do not provide evidence of effectiveness of any treatment approach or outcomes in patients with hypertension or dyslipidaemia. Unlike systematic review, evidence mapping does not look at the quality of the articles selected for the analysis. However, we ensured that the data were relevant in the context of the UAE population.

CONCLUSION

This is the first comprehensive evidence-based mapping of literature on different phases of management of hypertension and dyslipidaemia in the UAE population. Although we performed a comprehensive review to gather locally relevant data, the number of studies discussing patient-centric outcomes for the management of hypertension and dyslipidaemia is limited. Addressing data gaps at different stages of patient management would need a multi-disciplinary effort at the national, healthcare, and population levels to reduce the burden of hypertension and dyslipidaemia. Finally, this study may provide a basis for research priority settings and guidance to practice and amend health policies in the context of the UAE.

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Declaration of conflicting interests

Dr. Samer Ellahham, Dr. Wael Almahmeed and Dr. Lina Yassine declare that there is no conflict of interest. Dr. Kanwal Saeed is employed in Pfizer Upjohn.

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