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Knowledge, perceptions, facilitators, and barriers towards asthma self-management among patients: A systematic review of the literature

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ABSTRACT

Background: Asthma self-management is an effective approach that empowers patients with asthma to control their condition and reduce its impact on their daily lives.
Objective: This systematic review aims to synthesize evidence regarding the knowledge, perceptions, facilitators, and barriers related to asthma self-management among patients.
Methods: A systematic literature search was conducted across five databases (PubMed, Science Direct, Scopus, Web of Science, and Google Scholar) using specific key terms. Studies that reported knowledge, perceptions, facilitators and barriers towards asthma self-management were included. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed to report this review. All the data from included studies were analyzed through narrative synthesis approach.
Results: A total of 17 studies were included in this review. The findings indicated that most patients had inadequate knowledge of asthma self-management, particularly regarding asthma fundamentals, and inhaler techniques. Patients' cultural beliefs, and perceived social stigma influenced their self-management practices. Facilitators of asthma self-management included strong partnerships with healthcare providers, social support, access to medication, and having a written asthma action plan. Conversely, poor communication with healthcare professionals, travel, smoking, and workplace challenges were identified as barriers.
Conclusion: There is a pressing need for education and training programs to enhance understanding of the disease, and inhaler technique in patients with asthma. Healthcare professionals should create tailored asthma action plans according to patients' beliefs and needs. Moreover, healthcare policies should be developed to promote facilitators and address barriers, to ensure effective asthma management.

1. Introduction

Asthma is one of the most prevalent major non-communicable diseases that significantly affects patients' quality of life. Globally, asthma is ranked 16th among the main causes of years lived with disability and 28th among the primary causes of disease burden, as evaluated by disability-adjusted life years.[1] Around 300 million individuals have asthma globally, and it is expected that by 2025 an additional 100 million may be affected.[1]

The long-term goals of asthma management are symptom control and risk reduction. It requires an iterative cycle of assessment (e.g., symptom control, comorbidities, etc.), adjustment of treatment (i.e., pharmacological, non-pharmacological, and treatment of modifiable risk factors), and review of the response (e.g., exacerbations, symptoms, side effects, etc.). Pharmacological treatment options are corticosteroids [inhaled corticosteroids (ICS), oral corticosteroids (OCS)], bronchodilators [short-acting beta$_2$-agonist (SABA), and long-acting beta$_2$-agonist (LABA)], Leukotriene modifiers [Leukotriene receptor antagonists (LTRA)], and biologics (e.g., Omalizumab). Treating modifiable risk factors and multimorbidity, such as; exposure to smoking, air pollution,

Abbreviations: CAM, Complementary and alternative medicine; COPD, Chronic obstructive pulmonary disease; CRD, Chronic respiratory disease; GPs, General practitioners; HCPs, Healthcare providers; ICS, Inhaled corticosteroids; JBI, Joanna Briggs Institute; LABA, long-acting beta$_2$-agonist; LTRA, Leukotriene receptor antagonists; MeSH, Medical Subject Headings; OCS, Oral corticosteroids; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PICo, Population, Phenomenon of interest, Context; PROSPERO, International Prospective Register of Systematic Reviews; SABA, Short-acting beta$_2$-agonist; US, United States; USA, United States of America; UK, United Kingdom.

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and allergens, is also included in asthma management.[2]

A promising approach for treating chronic diseases is self-management. This approach goes beyond education to empower patients. This also actively recognises obstacles and finds solutions associated with their illness.[3] Self-management refers to the day-to-day management of chronic conditions by people throughout an illness.[4,5]

Self-management is defined by the United States (US) Institute of Medicine as *the duties that individuals must commence to live with one or more chronic diseases.*[6] *Having the self-assurance to deal with medical management, role management, and emotional management of their conditions is included in these duties.*[6] Self-management of asthma describes the actions that patients with asthma do to monitor and control their symptoms and to prevent exacerbation.[7] This includes effective use of inhaler, self-monitoring of symptoms, adherence to medications and appointments, and use of a written asthma action plan (WAAP) in order to being able to identify and respond to worsening symptoms.[2] An individual's willingness and ability to get involved in self-management may depend upon different factors like ethnicity, health-literacy and beliefs about asthma and medications.[2]

Self-management of asthma requires the patients to make behavioral, therapeutic, and environmental modifications following instructions from healthcare professionals.[8] It includes self-management discussion, and the provision of a personalized written asthma action plan[9,10] and when supported by healthcare professionals it improves asthma outcomes like fewer unscheduled clinic visits, less usage of healthcare resources, better asthma control and quality of life across all levels of asthma severity.[10,11]

According to the Australian Asthma Handbook, self-management should represent the patients as a active participants in an extensive asthma management program.[12] Patients with asthma need specific knowledge about their disease and its management to keep asthma under control.[13] Patients' perceptions regarding asthma and treatment goals influence their self-management behavior.[14] According to Corban and Straus, self-management must focus on patients' perceptions of their chronic condition and should be designed according to patient-perceived problems.[15] Considering patients' experiences and views regarding asthma and its treatment helps in effective asthma treatment.[16,17]

Existing systematic reviews in the literature reported the interventions related to asthma self-management,[18–20] barriers, and facilitators towards asthma self-management from healthcare providers, patients, carers, and adolescents perspectives.[21,22] However, there is a need to understand the patient's level of knowledge, beliefs/perceptions about asthma self-management, as there is a lack of evidence synthesis in literature regarding patients' level of knowledge and perceptions about asthma self-management. There is also a need to synthesize the latest findings about facilitators, and barriers towards asthma self-management to better understand the current scenario.

This systematic review aims to evaluate the existing literature on asthma self-management, primarily focusing on patients' level of knowledge and perceptions, as well as recognition of patients' reported facilitators and barriers to successful asthma self-management. Additionally, the systematic review also aims to report experiences of patients living with asthma. By summarizing the published literature in this area, it will help to understand the existing evidence and recognize future needs for research.

2. Methodology

2.1. Study design

This systematic review was registered with PROSPERO (CRD42024541400) and followed PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.[23]

2.2. Eligibility criteria

Due to the descriptive nature of this review PICo (Population, Phenomenon of interest, and Context) framework was used as a guide to select studies.[24] For detailed inclusion criteria see Table 1.

2.3. Exclusion criteria

Studies conducted with participants of age less than 18 years were excluded. Studies not published in the English language, and not available as full text were excluded. Study protocols, reports, commentaries, preliminary studies, pilot studies, editorials, book chapters, systematic reviews, conference abstracts, or meta-analyses, dissertations, and grey literature were excluded.

2.4. Search strategy

A systematic literature search was conducted from April 2024 until October 2024, on the following databases: PubMed, Web of Science, Scopus, Science Direct, and Google Scholar. Different search keywords (Box 1) were combined by using Boolean operators ("OR", "AND") to identify eligible studies however, the search strategy differed for each electronic database depending upon its features and the availability of advanced search options and thesauri. For example, MeSH (Medical Subject Headings) terms were used in PubMed. For detailed search queries applied in each database see (Appendix A Table A1).

2.5. Outcomes

The primary outcome of the systematic review was to explore the knowledge and perceptions of patients with asthma about self-management of their condition along with barriers and facilitators towards asthma self-management. The additional outcome was the asthma patient's experience with asthma.

2.6. Study selection

The PRISMA flow diagram describes the detailed study selection process (Fig. 1). In the initial search 46,850 potential articles were identified but due to the limit of a few databases only 23,176 articles were selected for screening. Using EndNote (version X8) reference software, one reviewer (SA) imported the search results from all databases and removed duplicates.

Study selection was done independently by two reviewers (SA and BA). Any disagreement or uncertainty regarding the studies' inclusion or exclusion during the screening process was resolved by discussion with other two reviewers (RH and SCO). After removing duplicates, 22,543 articles remained, and two reviewers (SA and BA) screened the titles and abstracts; after that, two reviewers (RH and SCO) confirmed the papers that were chosen. After excluding 22,499 articles that were irrelevant to the topic of study, 44 full-text articles were retrieved and assessed for eligibility. Separate full-text screening was conducted by two reviewers (SA and BA) during the second phase. Based on inclusion and exclusion criteria, 32 articles were excluded and 12 were included in the review.

Table 1
Framework for inclusion of studies in systematic review.

PICo	Population, Phenomenon of interest, context
P: Population	Asthma patients of age $\geq$ 18 years
I: Phenomenon of interest	Studies reported knowledge, perceptions, facilitators, and barriers towards asthma self-management
Co: Context	Any study setting including community, primary, and tertiary care in any country
Study design	Both qualitative and quantitative studies
Other	Studies published in the English language, available as full-text article, published from 2010 to 2024

Box 1
Search keywords

1. "Asthma"
2. "self-management" OR "disease management" OR "asthma self-management"
3. "knowledge" OR "awareness"
4. "perceptions" OR "beliefs" OR "believes" OR "perspective" OR "views"
5. "facilitators" OR "enablers"
6. "barriers" OR "challenges"

Following a reference list search of the included studies ($n = 3$) and an updated database search ($n = 2$), five more articles were included in the review. A total of 17 articles were included in the quality assessment.

2.7. Data extraction and analysis of studies

Two reviewers (SA and BA) independently extracted the data. Study characteristics (first author name, publication year, and country), study design, study aims, study population, sample size, data collection method, and relevant outcomes of the study were extracted on a data extraction sheet designed in Microsoft 365 excel version 2410.

A narrative synthesis approach was adopted to synthesize and interpret the findings due to methodological heterogeneity (variation in study design and risk of bias) of included studies.[25] Due to the overlap between quantitative and qualitative data, findings were identified and grouped based on the outcomes of the review. The extracted data was categorized into four primary outcomes knowledge, perceptions, facilitators, and barriers towards asthma self-management, and one additional outcome which is the patient's experiences with asthma. Knowledge was further divided into three categories: (1) knowledge about asthma, (2) knowledge about inhaler technique, peak flow meter, and asthma medication (3) knowledge on emergency response.

The perceptions were classified into one category: (1) perceptions about asthma medication, inhaler use, and complementary and alternative medicine (CAM) usage in asthma management.

Facilitators were divided into two categories (1) healthcare providers-related facilitators, and (2) patients-related facilitators. Similarly, barriers were classified into two categories: (1) healthcare providers-related barriers, and (2) patients-related barriers.

The additional outcome "patients' experiences with asthma" was divided into three categories (1) impact of asthma on daily activities, (2) impact of asthma on physical well-being, and (3) emotional consequences of asthma.

2.8. Quality assessment

The quality of qualitative studies was assessed by using the Joanna Briggs Institute (JBI) critical appraisal checklist for qualitative studies.[26] For quality assessment of quantitative studies JBI checklist for analytic cross-sectional studies, obtained from the official website, was used.[27] Quality assessment of included studies ($n = 17$) was performed independently by two reviewers (SA and BA). Any conflict or disagreement between two reviewers was resolved by consultation with other

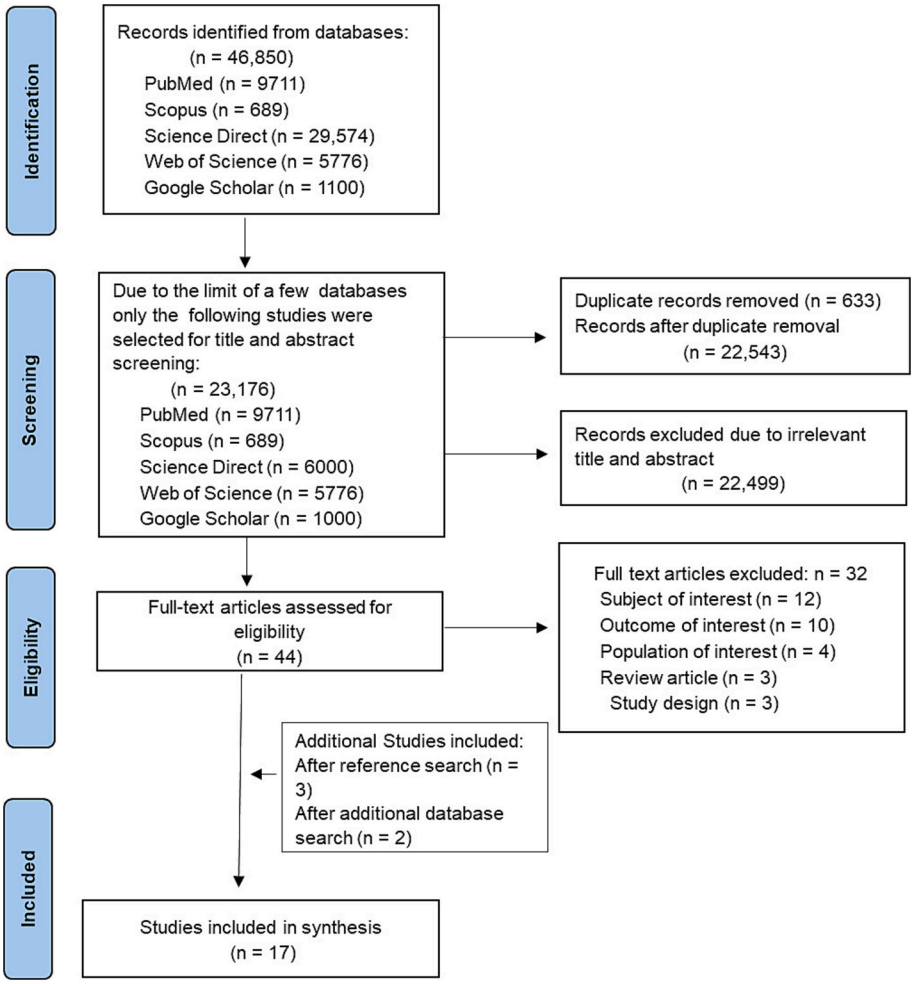

Fig. 1. PRISMA flow diagram of the studies selection process.

reviewers (RH and SCO).

3. Results

3.1. General characteristics of studies

Table 2 reports the characteristics and key findings of the included studies. Out of 17 studies included in the review, nine were qualitative studies,[28–36] eight were quantitative studies[37–44] and all the quantitative studies were cross-sectional in nature.

Eight studies were conducted in Asia (three studies from Saudi Arabia and rest of the five studies were from Iraq, India, Vietnam, Malaysia, and Singapore),[28,30,39–44] four studies were conducted in Europe (two studies from United Kingdom (UK), one from Sweden, Switzerland, and Italy),[31,35,37,38] three studies were conducted in America (two were from United States of America (USA), and one form Canada),[29,34,36] one study was conducted in Australia,[32] and one was conducted in New Zealand.[33] The number of participants in the studies varied from eight participants to 1442. A total number of eight quantitative studies presented a sample size of 2923 subjects, and a total number of nine qualitative studies presented a sample size of 280 subjects. Out of nine qualitative studies, two studies used in-depth interviews,[28,29] four used semi-structured interviews,[30,31,34,35] and three studies used focus group discussion[32,33,36] as a data collection tool. All the cross-sectional studies used questionnaire[37–44] as a data collection tool.

3.2. Methodological quality assessment

Tables 3 and 4 detail the quality assessment for each study. JBI critical appraisal checklist for qualitative studies has 10 questions with "yes", "no", "unclear", or "not applicable" options. JBI checklist for analytic cross-sectional studies comprises 8 questions with "yes", "no", "unclear", or "not applicable" options. The quality of the data was scored by assigning 1 point for each applicable item with yes and 0 point for each item with no, unclear, or not applicable. The quality percentage of studies was calculated using the following formula:

$$Quality\ percentage = \frac{sum\ of\ allocated\ point\ for\ each\ stated\ criteria}{Total\ number\ of\ stated\ criteria} \times 100$$

Study quality was graded based on the critical appraisal result according to the following criteria:

0–33 % of criteria met (low quality), 34–66 % of criteria met (medium quality), and 67 % or more of criteria met (high quality).[45–47]

All 17 studies were of high quality. Out of nine qualitative studies, three studies had a quality score of 7/10 (70 %),[29,30,36] five studies had a quality score of 8/10 (80 %),[31–35] and one study had a score of 9/10 (90 %).[28] Out of eight quantitative studies, three studies had a quality score of 6/8 (75 %),[37,38,42] three studies had a score of 7/8 (88 %),[40,41,44] and two had a score of 8/8 (100 %).[39,43]

3.3. Primary outcomes

3.3.1. Knowledge regarding asthma self-management

Knowledge about asthma self-management was reported in eight included studies.[30,37,39–44] Out of eight studies seven were cross-sectional studies[37,39–44] and one was a qualitative study.[30] According to studies conducted in Iraq ($n = 83$) and Vietnam ($n = 322$), less than 15 % of patients had good knowledge, fewer than 30 % had adequate knowledge and more than 60 % had poor knowledge about asthma self-management.[39,42] As stated by Wireklint et al. (2021), 63 % ($n = 1442$) patients with asthma in Sweden had moderate to complete knowledge of self-management procedures.[37] In India it was observed that 25.19 % ($n = 135$) of patients with asthma had good knowledge, 64.44 % had moderate knowledge, and more than 10 % of the participants had poor knowledge about asthma self-management.[40]

3.3.2. Knowledge about asthma

A total of six cross-sectional studies highlighted the findings of knowledge about asthma among patients with asthma[39–44].

Studies found significant gaps in patients' knowledge about asthma and its characteristics.[39–42,44] Less than 50 % of patients in Saudi Arabia ($n = 305$), Vietnam ($n = 322$), and Singapore ($n = 141$) knew that there is no known cure for asthma.[39,43,44] But, in Vietnam, 52 % of the patients thought that asthma could be cured, mostly by taking medicines and avoiding asthma irritants.[39] A study conducted by Elbur et al. (2017) in Saudi Arabia reported that 66 % ($n = 259$) of patients with asthma knew that asthma is uncurable.[41] While in India more than 50 % ($n = 135$) of asthmatic patients knew that asthma is a lung problem and family history can contribute towards asthma, while 21.5 % had knowledge that asthma causes narrowing in lung airways, and 67.4 % understood that dust, allergy, and smoking can trigger acute asthma.[40]

3.3.3. Knowledge about Inhaler technique, peak flow meter and asthma medication

Six studies reported about knowledge of inhaler technique and all of the studies were cross-sectional in nature.[39–44] The studies conducted in Saudi Arabia ($n = 2$), Singapore, Vietnam, and Iraq reported patients' lack of knowledge about proper inhaler use.[39,41–44] Only less than half of patients in Saudi Arabia ($n = 305$ and $n = 259$), Singapore ($n = 141$), and Vietnam ($n = 322$) were aware that they should inhale slowly while using an inhaler,[39,41,43,44] However, in India majority of patients knew that they should breathe slowly while using an inhaler and rinse their mouth after inhaler usage.[40] More than 50 % of patients in Singapore, Saudi Arabia, and Vietnam and 40 % of patients in India, knew that they should hold their breath after inhaler use.[39–41,43,44]

Knowledge about peak flow meter of patients with asthma was reported in two cross-sectional studies conducted in India and Saudi Arabia.[40,44] 43 % of patients in Saudi Arabia ($n = 305$) and 9.6 % of patients in India ($n = 135$), knew that peak flow meter can detect minor changes in lung function and be used for early recognition of symptoms.

One qualitative study[30] and five cross-sectional studies reported the knowledge of asthma medication among patients with asthma.[39,41–44] Studies revealed gaps regarding patients' knowledge of asthma medications.[30,39,41,42,44] Studies from Saudi Arabia (n = 3), and Vietnam[30,39,41,44] reported that patients with asthma had confusion about the role of reliever and preventer medication. In Vietnam, 35 % ($n = 322$) of patients stated that reliever medicine can help to stop future asthma flare-ups, and 36 % stated that preventer medicine can make you breathe better right after you take it.[39] According to Elbur et al. (2017), patients were unaware of preventer medication's role in the prevention of future symptoms and few patients did not know that frequent usage of reliever medications indicates a need for preventive medications.[41] However, in Singapore, 64.5 % ($n = 141$) patients were aware that preventer medicines help to stop future asthma flare-ups.[43]

3.3.4. Knowledge on emergency response

One qualitative study[30] and two cross-sectional studies reported the knowledge of patients with asthma on emergency response.[39,40]

The findings of a study conducted in Saudi Arabia highlighted the lack of awareness regarding asthma first aid guidelines and appropriate actions that need to be taken during asthma exacerbations.[30] According to Nguyen et al. (2018), 15.5 % of patients in Vietnam ($n = 322$) knew how to respond in a serious situation.[39] Most participants (83 %) in an Indian study ($n = 135$) were aware of taking fast-relief medication and going to the hospital during an emergency.[40]

3.3.5. Perceptions towards asthma self-management

Six studies reported the perceptions related to management of asthma by patients. All of the six studies were qualitative in nature[28–33]. In Canada, patients view asthma management as taking their

Table 2
Characteristics and key findings of studies included in the systematic review.

Source (first author, publication year, study location)	Study design	Aim/Objective	Study population/ sample size	Data collection method	Key findings
Koh et al. 2021, Malaysia[28]	Qualitative study	Exploration of the views, beliefs, and experiences that influenced the self-management practices of asthmatic adults.	Adults ≥18y /$n = 24$	In-depth interviews	Healthcare providers-related barriers to asthma self-management. Perception about asthma self-management, perception about inhaler use, and perception about utilization of CAM.
Ross et al. 2010, Canada[29]	Qualitative study	Exploration of the perceptions about self-management among people with severe asthma.	Adults ≥18y /$n = 8$	In-depth interviews	Healthcare providers-related Facilitators to asthma self-management. Healthcare provider and patient-related barriers to asthma self-management. Perception about asthma management.
Alzayer et al. 2020, Saudi Arabia[30]	Qualitative study	Exploration of the experience of Saudi participants in managing their asthma, and their perspectives about using future pharmacy-based services for asthma management.	Adults ≥18y /$n = 20$	Semi-structured interviews	Knowledge related to asthma medication's role and response in emergency Perception about asthma medication, inhaler usage, and CAM use in asthma self-management
Apps et al. 2019, UK[31]	Qualitative study	Exploration of attitudes of severe asthma patients about asthma, experiences of asthma management, and individual challenges, to asthma self-management.	Adults / $n = 29$	Semi-structured interviews	Patient-related barriers like workplace challenges hinder effective asthma self-management. Perception about asthma management, perception about asthma medication. Emotional consequences of asthma.
Andrews et al. 2010, Australia[32]	Qualitative study	Investigation of the experiences, attitudes, and opinions of adults with asthma regarding self-management of their disease.	Adults/$n = 22$	Focus group discussion	Healthcare providers-relatedfacilitators and patient-related facilitators to asthma self-management. Healthcare providers-related barriers and patient-related barriers to asthma self-management. Perceptions regarding asthma self-management.
Baggott et al. 2020, New Zealand[33]	Qualitative study	Exploration of the preferences of patients with mild-moderate asthma for asthma management and factors that influenced them.	Adults aged 18-75y/$n = 27$	Focus group discussion	Healthcare providers-related Facilitators and patient-related facilitators to asthma self-management. Healthcare providers-related barriers and patient-related barriers to asthma self-management. Perceptions regarding inhaler usage. Asthma impacts a patient's life and emotional consequences of asthma.
Newcomb et al. 2010, USA[34]	Qualitative study	Exploration of adult asthma patient's experiences with their own self-management behavior and their experiences working with their clinicians to control asthma.	Adults aged 18–74 y/$n =$ 104	Semi-structured interviews	Patient-related Barriers to asthma self-management like social constraints, and personal constraints. Healthcare providers-related barriers to asthma self-management like poor communication with clinicians.
Jackson et al. 2022, UK[35]	Qualitative study	Exploration of perspectives of older asthma adults about management of their condition; impact of asthma on their lives and progression of asthma symptoms over the years.	Adults≥60 y/ $n = 15$	Semi-structured interviews	Facilitators and barriers among older asthmatics to effective asthma self-management. Impact of asthma on patient life.
O'Conor et al. 2016, USA[36]	Qualitative study	To understand elderly asthma patient's experience with assuming self-management roles for their asthma to inform the design and implementation of a primary care-based strategy that could best support their asthma control.	Adults ≥50 y/ $n = 31$	Focus group discussion	Facilitators and barriers related to asthma self-management among older asthmatics. Impact of asthma on the physical well-being of the patient, impact of asthma on the emotional well-being of the patient.
Wireklint et al. 2020, Sweden[37]	Cross-sectional study	Determination of association of patient characteristics and healthcare-related factors with self-reported knowledge of self-management of worsening asthma.	Adults/$n =$ 1442	Patient self-reported questionnaire	Knowledge related to asthma self-management.
Londoño et al. 2015, Switzerland and Italy[38]	Cross-sectional study	To study the influence of health literacy and empowerment on asthma self-management.	Adults ≥18 y/ $n = 236$	Self-reported questionnaire	Patient-related facilitators to asthma self-management like judgment skills and empowerment positively influence several asthma self-management practices such as use of the medicines, timely medical consultation, and asthma triggers control.
Nguyen et al. 2018, Vietnam[39]	Cross-sectional study	To assess knowledge of asthma self-management among adult asthma patients in Ho Chi Minh City.	Adults ≥18 y/ n = 322	Asthma Self-Management Questionnaire (ASMQ)	Knowledge about asthma self-management. Knowledge about asthma, inhaler technique, asthma medication, and response in an emergency.
Kaur et al. 2019, India[40]	Cross-sectional study	Assessment of knowledge of patients regarding bronchial asthma self-management.	Adults/ n = 135	Self-constructed Questionnaire	Knowledge about asthma self-management. Knowledge about asthma, inhaler technique, peak flow

(*continued on next page*)

Table 2 (*continued*)

Source (first author, publication year, study location)	Study design	Aim/Objective	Study population/ sample size	Data collection method	Key findings
					meter usage knowledge, and response in an emergency
Elbur et al. 2017, Saudi Arabia[41]	Cross-sectional study	Identification of levels of self-management and control of asthma among Saudi patients, along with exploring the predictors of level of disease control.	Adults ≥18y/ n = 259	Asthma Self-Management Questionnaire (ASMQ)	Knowledge about asthma self-management. Knowledge about inhaler technique and asthma medication's role.
Abbas et al. 2019, Iraq[42]	Cross-sectional study	To determine the level of knowledge of self-management and asthma control and find out the relation between them in asthmatic patients.	Adults ≥18 y/ n = 83	Asthma Self-Management Questionnaire (ASMQ)	Knowledge about asthma self-management.
khor et al. 2024, Singapore[43]	Cross-sectional study	To evaluate self-management knowledge, relationship between levels of self-management knowledge and demographic factors, and asthma control in asthmatic adult patients.	Adults/n = 141	Asthma Self-Management Questionnaire (ASMQ)	Knowledge about asthma self-management.
Makki et al., 2024, Saudi Arabia[44]	Cross-sectional study	To determine the level of self-management and the level of Asthma control, and to investigate determinants of illness control in the patients from the Aseer region of Saudi Arabia.	Adult ≥18 y/n = 305	Asthma Self-Management Questionnaire (ASMQ)	Knowledge about asthma self-management.

y = years, n = sample size, USA = United States of America, UK = United Kingdom, CAM = complementary and alternative medicine.

Table 3
Summary of the quality assessment of quantitative studies.

Q NO.	Questions	Source							
		wireklint et al.[37]	Abbas et al.[42]	Londoño et al.[38]	Nguyen et al.[39]	Kaur et al.[40]	Elbur et al.[41]	Makki et al.[44]	Khor et al.[43]
1	Were the criteria for inclusion in the sample clearly defined?	N	N	Y	Y	N	Y	Y	Y
2	Were the study subjects and the setting described in detail?	Y	Y	Y	Y	Y	Y	Y	Y
3	Was the exposure measured in a valid and reliable way?	Y	Y	Y	Y	Y	Y	Y	Y
4	Were objective, standard criteria used for measurement of the condition?	Y	Y	Y	Y	Y	Y	Y	Y
5	Were confounding factors identified?	Y	Y	N	Y	Y	Y	Y	Y
6	Were strategies to deal with confounding factors stated?	Y	N	N	Y	Y	N	N	Y
7	Were the outcomes measured in a valid and reliable way?	N	Y	Y	Y	Y	Y	Y	Y
8	Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y	Y	Y
	Score	6	6	6	8	7	7	7	8
	Quality	(75 %) High	(75 %) High	(75 %) High	(100 %) High	(88 %) High	(88 %) High	(88 %) High	(100 %) High

Abbreviations: Q, question, N, no; Y, yes, Score: the quality assessment score ranged from 0 to 8 based on each question of the Joanna Briggs Institute (JBI) checklist.

medications, exercising, and trigger avoidance and they believed that asthma self-management requires a balance between the good with the bad (e.g. the good is related to patients' engagement in daily activities, and the bad is related to having asthma).[29] According to Andrews et al. (2013), patients perceived asthma self-management as a strong personal responsibility, and for them asthma self-management involves following a written asthma action plan, and management of asthma triggers and symptoms.[32] Patients in the UK felt uncertain about asthma management because they had minimum information about asthma.[31] The concept of "hot and cold" in asthma self-management, where consuming foods with properties opposite to the body's perceived constitution can neutralize the "hot" or "cold" nature of the condition, was a common approach among Malaysian patients.[28]

3.3.6. Perceptions about asthma medication, inhalers, and complementary and alternative medicine (CAM) use in asthma management

As reported by Apps et al. (2019), patients showed concerns about OCS side effects related to bone, skin, and liver health, diabetes, weight gain, depression, and mood changes.[31] Patients in Malaysia believed that using an inhaler could lead to dependency, headache, kidney damage, and carcinogenicity.[28] Due to the perception that asthma is a "seasonal/short-term issue", patients in Saudi Arabia were less inclined to take their preventer medications regularly.[30] The studies conducted in Malaysia and Saudi Arabia reported that patients perceived inhaler usage as a social stigma and felt embarrassed to use the inhaler in front of others.[28,30] The findings of Baggott et al. (2020) showed that patients' beliefs about the benefit and perceived necessity of reliever and preventer inhalers shape their self-management practices. Some patients considered preventer inhaler usage as optional, and some doubted its efficacy.[33]

Asthma patients from Saudi Arabia considered herbal medicine use as a safe substitute for Western medicine because they perceived the latter as a chemical with unfavorable side effects.[30] In Malaysia, patients considered family and friends' suggestions about the use of CAM, so they bought and used CAM, and over-the-counter medications for asthma management.[28]

Table 4
Summary of the quality assessment of qualitative studies.

Q No.	Questions	Source								
		Koh et al.[28]	O'Conor et al.[36]	Ross et al.[29]	Jackson et al.[35]	Apps et al.[31]	Andrews et al.[32]	Baggot et al.[33]	Alzayer et al.[30]	Newcomb et al.[34]
1	Is there congruity between the stated philosophical perspective and the research methodology?	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	Is there congruity between the research methodology and the research question or objectives?	Y	Y	Y	Y	Y	Y	Y	Y	Y
3	Is there congruity between the research methodology and the methods used to collect data?	N	N	N	N	N	Y	Y	N	N
4	Is there congruity between the research methodology and the representation and analysis of data?	Y	Y	Y	Y	Y	Y	Y	Y	Y
5	Is there congruity between the research methodology and the interpretation of results?	Y	Y	Y	Y	Y	Y	Y	Y	Y
6	Is there a statement locating the researcher culturally or theoretically?	Y	N	N	N	N	N	Y	N	Y
7	Is the influence of the researcher on the research, and vice-versa, addressed?	Y	N	N	Y	Y	N	N	N	N
8	Are participants, and their voices, adequately represented?	Y	Y	Y	Y	Y	Y	Y	Y	Y
9	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	Y	Y	Y	Y	Y	Y	N	Y	Y
10	Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Score	9	7	7	8	8	8	8	7	8
	Quality	(90 %) High	(70 %) High	(70 %) High	(80 %) High	(80 %) High	(80 %) High	(80 %) High	(70 %) High	(80 %) High

Abbreviations: Q, question, N, no; Y, yes, Score: the quality assessment score ranged from 0 to 10 based on each question of the Joanna Briggs Institute (JBI) checklist.

3.3.7. *Facilitators towards asthma self-management*

3.3.7.1. Healthcare providers-related facilitators. A total of three studies reported the healthcare providers-related facilitators and all of them were qualitative studies.[29,32,33] The studies conducted in Canada, Australia, and New Zealand[29,32,33] highlighted facilitators related to healthcare providers. Good communication between healthcare professionals and patients, usage of analogies by healthcare providers during information sharing with patients,[29] having an asthma-friendly doctor,[32] and positive relationships with healthcare providers[33] were preferences of patients for asthma self-management.

3.3.7.2. Patients-related facilitators. One cross-sectional study[38] and four qualitative studies reported the patient related facilitators towards asthma self-management.[32,33,35,36] According to Londoño et al. (2015), patient's judgment skills and empowerment had a significant and positive influence on several asthma self-management practices such as the use of medicines, timely medical consultation, and asthma triggers control.[38] In Australia, patient's self-efficacy, getting a plan for escalating symptoms, a strong sense of personal responsibility, and social support were reported as facilitators of asthma self-management.[32] Written asthma action plans, access to an inhaler, control over inhaler supply, and having a small, easy-to-use, portable fit-in-a-pocket inhaler were patient's reported facilitators in New Zealand.[33] Recognition of asthma triggers was reported as a facilitator in Australia and New Zealand.[32,33] In the UK, older asthmatics reported that social support in terms of living with another person facilitates medication reminders and symptom awareness.[35] But in the USA older patients reported that social support in terms of familial or paid assistance for cleaning and carrying groceries upstairs helped them in triggers avoidance and emotional support from family also facilitated asthma self-management.[36] The use of mobile applications and the internet to learn more about asthma, creating a reminder system or routine to take medications, and pharmacy home delivery service for refills were facilitators reported by older patients with asthma as well.[35,36]

3.3.8. *Barriers related to asthma self-management*

3.3.8.1. Healthcare providers-related barriers. Barriers related to healthcare professionals hinder patients' ability to effectively manage their asthma. In this review, five qualitative studies reported healthcare providers-related barriers.[28,29,32–34] Poor communication with the healthcare provider, ineffective doctor-patient partnerships, clinicians not giving enough time to patients, long waiting times for appointments, and care discontinuity due to the unavailability of assigned care providers were reported in Malaysia and USA.[28,34] According to Baggot et al. (2020), improper explanations about asthma and its treatment, conflicting advice, or misinformation from healthcare professionals were barriers related to healthcare providers.[33] General practitioners' (GPs) dependence on pamphlets of medicines as sources of information, use of professional language in written or oral information, and GPs recommendations to implement generalized self-management strategies for all patients were reported in Canada and Australia.[29,32]

3.3.8.2. Patients-related barrier. Seven studies described barriers that were related to asthma patients and all of them were qualitative studies.[29,31–36] Patients' lack of understanding or education about asthma and its management-related information was reported in Canada and New Zealand.[29,33] Comorbidities, omission of patients' health beliefs by the clinician during the discussion, travelling, employment loss, housing concerns, personal relationship encounters, inhaler technique challenges, and difficulties in accessing asthma medication were recognized as barriers in the USA.[34] Patients' workplace-related challenges like hiding symptoms from others because of the social stigma of having asthma, and conflicts with colleagues for having flexible working hours, time taken off for medical appointments, and a desk near a window were

only reported in the UK.[31] People smoking near patients with asthma, weather, menopausal effects, and the demands of shift work were identified as barriers to their self-management practices among patients with asthma in Australia.[32]

Older patients with asthma in the UK reported barriers related to asthma self-management which included: healthcare staff's lack of understanding about asthma, multimorbidity, and failure to obtain a timely appointment with primary care.[35] Fear of having side effects related to asthma medication, polypharmacy, forgetfulness, confusion about the direction of use and frequency of use of controller medication, and inability to always control the outdoor environment[36] were barriers to effective asthma self-management reported by older patients in the USA.

3.4. Additional outcomes

3.4.1. Patients' experiences with asthma

3.4.1.1. Asthma impact on patient's daily activities. The impact of asthma on patients' daily activities was reported by studies conducted in New Zealand, the UK, and the USA.[33,35,36] These included reduced physical activity, avoidance of previously enjoyable activities, lifestyle limitations such as not being able to have a pet, and restrictions on free movement.

3.4.1.2. Asthma impact on patient physical well-being. According to studies conducted in New Zealand and the USA, asthma affected patient's physical well-being.[33,36] In New Zealand, patients reported that nocturnal awakenings due to asthma and cough had a greater impact on their lives as compared to other symptoms like wheezing, and chest tightness.[33]

3.4.1.3. Emotional consequences of asthma. The studies conducted in New Zealand, the UK, and the USA highlight the emotional impact of asthma on patients.[33,35,36] Fear of having asthma flare-ups, fear of having no timely access to medication, death fear due to asthma, fear of being exposed to triggers, and no timely access to emergency[33,35,36] were emotional consequences of asthma reported by patients. In New Zealand and the UK, asthma restrictions affected the patient's social connections and social activities engagement leading to isolation.[33,35]

4. Discussion

The aim of this systematic review was to identify the knowledge, perceptions, facilitators, and barriers regarding asthma self-management among patients with asthma. Additionally, the review also explored the experiences of patients with asthma. Findings relevant to the objectives of the review were extracted from a total of 17 studies and synthesized narratively.

Regarding the knowledge about asthma self-management, the review findings highlighted that asthma self-management knowledge varies significantly among patients in various regions, including Vietnam, Singapore, Sweden, Saudi Arabia, India, and Iraq.[37,39–44] The review findings revealed specific areas of asthma self-management such as knowledge about asthma and its characteristics, the role of different asthma medications, the method of prevention of asthma attacks, and accurate use of an inhaler where patients' knowledge was lacking.

Asthma knowledge is an essential determinant of asthma self-management.[48] According to a study done in the USA, self-management behavior and asthma knowledge are positively correlated. The study's findings also supported the idea that knowing about the illness can boost one's confidence in managing it in practical situations.[49] The review also found a significant gap in patient's knowledge about the disease and its characteristics for instance, in India, only about half of patients understood that asthma is a lung problem, and nearly a quarter of patients knew it causes narrowing in lung airways.[40] Only a small percentage of patients were aware that asthma cannot be cured. This highlighted a necessary need for improving patient's education on the basic aspects of the disease.

Inhalation therapy is mostly used for the management of inflammatory respiratory diseases like asthma and chronic obstructive pulmonary disease (COPD).[50] Ensuring proper inhaler technique is a key for effective management of respiratory diseases.[51] It assures the medication supply to the lungs, maximizing its therapeutic benefits.[52] The review findings reported that a lower proportion of patients were aware that they should inhale slowly while using an inhaler. For instance, in Vietnam, only 22 % of patients responded correctly that they should inhale slowly while using an inhaler but the majority (64 %) of patients mentioned that they should inhale quickly while using an inhaler.[39] However, most patients mentioned that they should hold their breath for several seconds after inhaler use. These findings were reported by studies conducted in the Asia region (Singapore, Saudi Arabia, Vietnam, Iraq, and India). The findings correlate with other study results conducted in Asian countries, in which the majority of patients with asthma had poor inhaler technique and used inhaler device improperly.[53,54]

Findings highlighted patients' lack of knowledge about asthma medications. Patients were confused about the role of reliever and preventer medicines. Most patients were unaware that preventer medicines stop future asthma flare-ups and reliever medicines relieve asthma symptoms during an acute asthma attack. For example, in Vietnam nearly one-third of patients mentioned that preventer medicine could provide immediate relief and reliever medicine prevents future flare-ups.[39] This misunderstanding can lead to reduced medication adherence and ineffective management of asthma symptoms. Studies conducted on respiratory diseases also reported similar findings, such as a study that found that preventer medication is underused in asthma and COPD.[55] Another study indicated patients' overreliance on short-acting bronchodilators (reliever medication) in both asthma and COPD patients.[56,57]

Regarding the perceptions related to asthma self-management, review findings highlighted that patients' perceptions significantly influenced their self-management practices. Patients' perceptions of asthma management vary in various regions depending upon their personal and cultural beliefs, for example, Canadian patients perceived asthma management as primarily taking medications and avoiding triggers.[29] While Australian patients considered it as an intense personal responsibility since they perceived that asthma is something personal and it cannot be generalized.[32] Furthermore, cultural beliefs also impact patients' self-management practices, such as in Malaysia, patients believed in the 'hot and cold' concept of asthma self-management. Patients understood the 'hot and cold' concept in two main ways. Some believed that the body inherits a 'hot' or 'cold' constitution that contributes to asthma. For them, managing asthma meant eating foods with opposite 'hot' or 'cold' internal properties to balance the effects of asthma. Some viewed the 'hot and cold concept' as the difference in temperature. For them, if asthma symptoms were thought to be caused by cold, strategies were used to warm up the body with hot rubs, and hot foods to mitigate coldness.[28] The included studies in this review also reported patients' use of CAM due to social and cultural beliefs. It was found that cultural difference affects the ability to negotiate, manage, and adopt strategies to manage chronic diseases.[58] The patients' perceptions, and beliefs about asthma (particularly based on their understanding of asthma and treatment goals) also impact an individual's decision-making about their self-management behavior.[14]

Patients' perception of asthma treatment influenced their self-management practices. Findings revealed that patients' showed concerns about medication side effects, such as dependency and long-term health issues. Social stigma related to inhaler use and patients' perceived necessity of inhalers influenced their disease management practices. The other existing studies in the literature reported patient's concerns about the safety of inhaled steroids and fears of dependence upon asthma

medications.[59–61] A systematic review finding revealed that patients' perceived need for treatment, concerns related to asthma treatment side effects, and social stigma related to having an illness, as well as medication, influenced treatment adherence.[62]

Regarding facilitators related to asthma self-management, the review findings revealed facilitators that were particularly related to healthcare providers. Patients' related facilitators were also identified in the review. Good partnership and communication between health care providers and patients were reported facilitators for effective asthma management. Patients' perceived self-efficacy to gain information about the condition, to recognize asthma triggers, and have the competency to complete healthcare tasks facilitated asthma self-management. Practical aids, such as written action plans on asthma management and portable inhalers, were also beneficial for asthma self-management[33] social support, reminders about medication intake and pharmacy home delivery services for medication refills were some facilitators recognized by older patients with asthma.[35,36] Previously published studies highlighted the importance of better communication between healthcare providers (HCPs) and patients in effective self-management of asthma.[63–67] Studies also reported that social support from friends and family helped patients in asthma management by reminding medication intake and doing domestic chores.[63,66,68–70] Having a routine or setting reminders for medication intake were reported as facilitators of asthma self-management among adolescents in a published study.[67] So, our review findings related to asthma self-management facilitators are aligned with the findings of previously published literature.[63–70]

Regarding barriers related to asthma self-management, the review findings revealed patients reported barriers that were related to healthcare providers and patients. Poor communication with healthcare providers,[28,34] long waiting times for appointments, and discontinuity of care[34] were barriers related to healthcare providers. The lack of understanding about asthma,[29,33] patient's health beliefs about asthma management, the presence of comorbidities, travelling,[34] workplace challenges,[31] and environmental factors[32] were patients-related barriers. Polypharmacy, confusion about usage, frequency of medication, forgetfulness, and fear of having side effects of asthma medication[35,36] were reported by elderly patients. The review findings regarding asthma self-management barriers are aligned with the findings of existing studies. Poor communication between patients and healthcare providers, lack of knowledge about asthma and treatment, social stigma related to asthma and its medications use, and forgetfulness to take medicines at times are highlighted as a barrier to effective asthma self-management in a previously published study.[67] Patient's health beliefs, patients' concerns related to the side effects of medications, comorbidity, and long waiting time for appointments were also highlighted barriers in previously published studies.[68,71–73]

Regarding patients' experiences with asthma, findings highlighted the substantial impact of asthma on daily life. Asthma limits the patients' physical activities such as physical exertion, inability to have pets, and avoiding enjoyable activities.[33,35,36] Furthermore, asthma disturbed physical well-being, particularly nocturnal awakening due to symptoms including cough, which patients found more distressing than other symptoms like wheezing or chest tightness.[33] Emotionally, asthma induced fears related to flare-ups, access to medication, and social isolation due to activity restrictions and exposure to triggers.[33,35,36] Findings related to the experiences of patients with asthma were correlated with an interventional study that described patients' experiences with chronic respiratory disease (CRD) before and after intervention. Physical issues like physical inactivity, psychological issues like fear of the future, and social issues such as social stigma and social isolation were experiences reported by patients living with CRD.[74]

Corbin and Strauss[15] presented a self-management framework, that focuses on three different sets of activities: (1) medical management, which denotes to tasks such as taking medication, using an inhaler, and adhering to specific diet; (2) behavioral management, which refers to maintaining, changing, and making new meaningful behaviors or life roles in the context of a particular condition; and (3) emotional management, which requires patients to deal with the emotions such as frustration, fear, despair, and depression that are often experienced by chronically ill persons. The three sets of tasks outlined by the Corbin and Strauss framework are typically the focus of self-management support.[75] By following the Corbin and Strauss framework, the review findings are organized according to each of the three tasks, and a conceptual framework was developed (see Fig. 2).

Fig. 2 illustrates three tasks of asthma self-management: medical management, behavioral management, and emotional management. The review findings of knowledge, perceptions, facilitators, and barriers related to asthma self-management were classified into the above mentioned three management tasks accordingly. Medical management of asthma can be influenced by knowledge of inhaler technique, peak flow meter use, and asthma medicines along with patients' beliefs related to asthma medicines, and inhaler use. Easy access to asthma medicines, easy-to-use, and fit-in-a-pocket inhaler can facilitate the medical management of asthma. Similarly difficult access to asthma medicine and challenges in inhaler use can impede effective medical management of asthma.

Patients' beliefs that asthma self-management only requires trigger avoidance and exercising can affect their behavioral management practices. Recognition of asthma triggers and setting reminders for medication intake can facilitate, while weather and passive smoking can impede the behavioral management of asthma.

Emotional management of asthma can be influenced by social stigma related to inhaler use. Self-efficacy of patients with asthma and emotional support from family members can help in effective emotional management of asthma. While fear of having side effects of asthma medicines can make it challenging.

These elements highlight the multifaceted approach required for effective self-management in patients with asthma, emphasizing the interconnection between practical knowledge, individual perceptions, and external and internal factors that facilitate or impede these tasks.

4.1. Practical and future implications

The findings recommend a critical need for targeted asthma educational programmes to enhance patients' knowledge and self-management of asthma. Healthcare professionals should focus on improving communication, offering individualized asthma action plans, and addressing patients perceptions that impede effective management. These include concerns related to asthma medication side effects, patients-perceived social stigma about inhaler use, and cultural beliefs about asthma and its management. Comprehensive asthma education and support systems should be incorporated into primary care through policy initiatives, particularly for vulnerable groups such as elderly persons. Future research should explore the development and effectiveness of tailored strategies to address the barriers identified and to improve asthma outcomes.

4.2. Strengths and limitations

The strengths of this review include the multi-database search strategy, the inclusion of quantitative and qualitative studies, and the participation of two reviewers at every phase including screening of articles and assessing eligibility and quality of included articles.

This study is the first in our knowledge to synthesize the available literature on asthma self-management-related knowledge, perceptions, facilitators, and barriers to provide an overview of asthma self-management from an adult patient's perspective.

There are a few limitations in this review. First, it only included articles published in the English language, so some relevant studies in other languages may have been missed. It only included articles which are published between 2010 and 2024 in order to ensure that review report findings that are relevant to latest health scenarios and

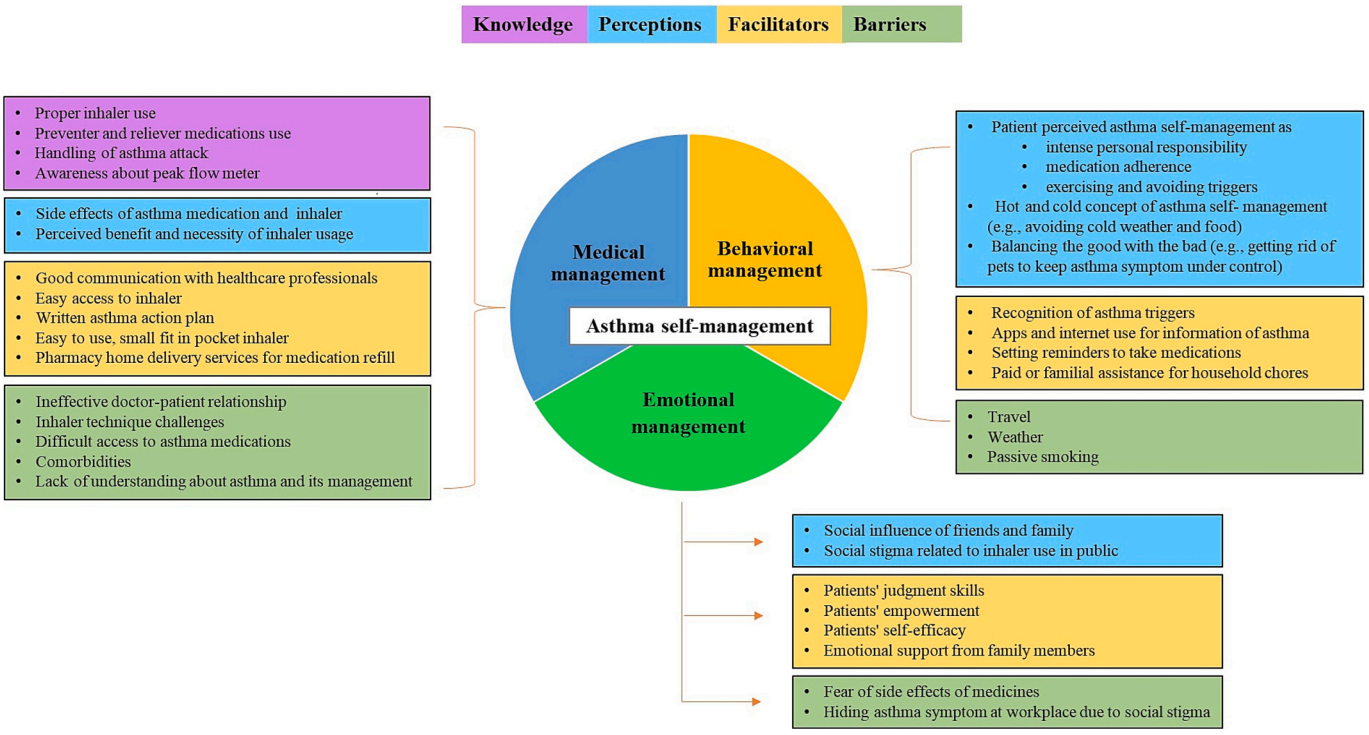

Fig. 2. Review findings related to asthma self-management tasks (medical, behavioral, and emotional management).

guidelines. So relevant studies which were published before 2010 may have been missed. Grey literature is not included in the review, hence, some relevant information may have been missed. Finally, the heterogeneous nature of the included studies may have reduced the ability to summarize the key findings of the asthma self-management-related knowledge, perceptions, barriers, and facilitators. Though, perceptions, facilitators, and barriers towards asthma self-management were reported mostly by qualitative studies and these studies typically use purposive sampling with sample size based on data saturation rather than any statistical approach. This may limit the generalizability of findings from qualitative studies on a large population. Moreover, qualitative studies used different data collection methods like focus group discussion, semi-structured interviews, so variation in data collection method might have caused variation in study findings. This may have led to variation in data reporting and ultimately reduced the homogeneity of review findings. Another limitation of this review is population, because we only reported the perspective of adult patients, we did not include the perspective of elderly and carers of children. This may have reduced its ability to generalize the current findings on all patients with asthma.

5. Conclusion

The findings reveal that patients have less knowledge about asthma self-management, mainly about disease characteristics and proper inhaler technique. This underlines the necessity for comprehensive patient education programs, to improve patients' knowledge about asthma and its management. The patients' cultural beliefs, personal health beliefs, and social beliefs shape their asthma self-management practices. These beliefs and concerns should be addressed for effective asthma management. This review also highlighted barriers and facilitators related to effective asthma self-management reported by patients. Strategies should be developed to address these barriers and promote facilitators. By focusing on these areas, we can improve asthma self-management practices and eventually improve health outcomes for patients with asthma globally.

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Declaration of competing interest

Authors declare no competing interest.

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