



Factors affecting self-medication practices among people living with type 2 diabetes in India- A systematic review



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ABSTRACT

Self-medication practices of type 2 diabetes in India include the use of both traditional and western medications. It is important to understand the factors influencing self-medication. A total of 3257 studies were screened and nine studies (six quantitative and three qualitative) were included. The Hawker tool and Joanna Briggs Institute Critical Appraisal tool were used to assess the quality of studies. The findings of the quantitative studies were descriptively analysed while thematic analysis was performed to identify key themes from the qualitative studies. The analysis indicated that participants had greater trust in traditional medications regardless of their socioeconomic and/or educational backgrounds as these were often recommended by friends and family members. Low cost, ease of availability and perceived lower side effects of traditional medications were some of the factors contributing to greater trust. It is suggested that ongoing management of type 2 diabetes requires stringent policies and regulations in the dispensing of traditional and western medications. Continual education to inform people on the use of self-medications and its possible adverse effects is also required.

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1. Introduction

Diabetes (type 1 and type 2) is a metabolic disorder affecting an estimated 463 million people worldwide in 2019 (approximately 90% are type 2 diabetes) and is predicted to affect about 700 million people by the year 2045 [1]. Approximately 77 million people in India are living with diabetes, making up the second-highest population of people with diabetes in the world, with a prevalence of 8.9% [1]. Despite being a leading producer of pharmaceuticals, with a considerable market of generic medications [2], evidence suggests that people living with diabetes in India prefer treatment with traditional medications over western medications [3–5]. Affordability and availability appeared to be the two key barriers to taking western medications [2].

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According to the World Health Organization (WHO) [6], self-medication is defined as use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent diseases or symptoms [6]. Self-medication practices include taking traditional medications without proper medical advice, using old prescription drugs or unused drugs from friends and family members [7]. Conventional traditional medications used in India to treat diabetes include bitter gourd, neem, aloe vera, fenugreek seeds, garlic and cinnamon [8,9].

Self-medication practices are common across India as evident from a meta-analysis by Rashid and colleagues [10] which reported that the prevalence of self-medication practices ranged from 8.3% to 88.2% with a mean prevalence of 53.6%. Previous research with people living with chronic disease who self-medicate indicated that despite going for repeated visits to their doctor, the treatment plan would remain the same and thus they felt it was justified to continue self-medications with a belief that no harm will be caused [11].

Self-medication practices can lead to detrimental effects including the wrong diagnosis of the condition, irrational use of

medications, side effects, development of resistance to medications, and avoiding or delaying primary care doctor attendance and advice [12]. As diabetes affects such a large number of people and the use of traditional medications remains to be highly prevalent despite concerns over the likelihood of adverse effects, it is important to understand why people living with type 2 diabetes in India continues to practice self-medication. Whilst empirical studies conducted in India focused on self-care activities and prevalence of self-medication practices [13,14] to the best of our knowledge, there is yet to be a systematic review conducted using Indian data to identify the factors that facilitate self-medication practices. Therefore, this review aims to identify the factors affecting self-medication practices for people living with type 2 diabetes in India.

2. Materials and methods

This protocol was registered under PROSPERO. Registration number: CRD42020151428 on April 29, 2020.

2.1. Eligibility criteria

2.1.1. Inclusion

1. Studies conducted in India which included adults above 18 years and clinically diagnosed with type 2 diabetes.
2. People who report self-medication or self-titration of diabetic medications or the use of traditional medications or combination of all.

2.1.2. Exclusion

1. Studies conducted outside India, people with Type 1 diabetes, gestational diabetes.
2. Case studies, case reports, narrative reviews, systematic reviews, meta-analysis, conference abstracts.

2.2. Search strategy

The authors RK, SG and JT were involved in designing and review of the study. RK and SG finalised the search terms (Table 1). Studies related to self-medication practices in India were included from eight electronic databases CINAHL, CAB Abstracts, Embase, Medline, ProQuest central, Sociological abstracts, Web of Science and Google Scholar (first ten pages). (Appendix 1).

The search was limited to humans and search terms were combined by using Boolean apparatus and mesh terms* to broaden the search. Further, manual searching was performed by checking the reference list of included studies for related studies and review articles.

All the studies were imported into Covidence [15], where the screening of studies was performed. Two reviewers (RK and AA) conducted the title and abstract, full-text screening of studies based on the inclusion and exclusion criteria. SG, JT, CT and MJ resolved

any conflicts. The full-text papers which satisfied the inclusion criteria were screened for data extraction.

2.3. Data extraction

Two reviewers (RK and AA) performed the data extraction of included studies. The data extraction form consisted of name of the assessor, name of the journal, title of the study, name of the author, year published, country and place where the study was conducted, Settings (workplace and/or geographical location), aim of the study, study design, method of analysis, inclusion and exclusion criteria, total number of participants, participant characteristics (Age, Gender, Occupation, Education etc.), outcomes of the study (the type of system practiced for self-medication, reason for self-medication practices, source of information for self-medication, awareness of side effects from self-medication practice, medications used in self-medication, patient beliefs and barriers towards taking of medications in diabetes mellitus). SG, JT, CT and MJ reviewed the data extraction documents.

2.4. Assessment of quality

Two reviewers (RK and AA) conducted the quality assessment of studies. The quality assessment of qualitative studies was performed using the Hawker tool [16] and quantitative studies by Joanna Briggs Institute Critical Appraisal tools for use in JBI Systematic Reviews [17].

2.5. Data analysis

2.5.1. Quantitative studies

Baseline demographic characteristics such as age, gender, occupation, level of education, socioeconomic status, and results of the studies such as reasons for self-medication practices, information sources for self-medication practices were descriptively analysed. Further likelihood calculations for categorical outcomes and meta-analysis for continuous outcomes were performed when appropriate.

2.5.2. Qualitative studies

Qualitative studies were organised thematically and analysed according to key themes highlighting the facilitators and barriers to the use of self-medication among people living with type 2 diabetes in India. The key themes included: perceived benefits of the use of traditional medications, perception on side effects of medications, sources of information on self-medication and cost of health care.

The data analysis was performed by two reviewers (RK and AA). Any conflicts were resolved by a third reviewer (SG).

3. Results

A total of 3257 studies were identified from the initial search in eight databases. Out of these, 1165 were duplicated and the duplicates were removed. The remaining 2092 studies were screened by title and abstract from which 2077 were excluded based on the

Table: 1

Search terms used for the study.

Search terms
Type 2 Diabetes OR Diabetes Type 2 OR type II diabetes OR Non- insulin Dependent Diabetes OR diabetes Mellitus Attitude OR opinion OR Perspective OR Perception OR Knowledge OR Understanding OR Experience OR Behavior* OR Practice Medication* OR Self-Management OR hypoglycemic* OR Antidiabetic* OR Self-care India* 1 AND 2 AND 3 AND 4

exclusion criteria. The full text from 15 studies were screened, of which six studies were excluded (five had no information on self-medication practices, one did not specify type 2 diabetes). Finally, nine studies were included in the review (three qualitative and six quantitative). The flow chart of the screening process is presented in Fig. 1.

3.1. Quality assessment

The findings of the quality assessment of qualitative and quantitative studies are presented in Appendix 2 and 3. The scoring of qualitative studies were on the basis on the Hawker Tool [16]. Studies were considered Good = 4, Fair = 3, Poor = 2 and, Very Poor = 1.

The scores of three qualitative studies were 35/36 [18], 27/36 [19] and 32/36 [20]. Two qualitative studies [19,20] were both rated very poor in individual items such as ethics, bias and data analysis. (Appendix 2).

All six quantitative studies were rated as good using the Joanna Briggs Institute tool [17]. The sample frame, study subjects, settings of the study and methods used for identification of condition were appropriate in all six studies [3–5,21–23]. In three studies [21–23] sample size calculations were not provided and in one study [3] the targeted recruitment number was not achieved. The details of statistical methods used were not mentioned in two studies [4,5]. (Appendix 3).

3.2. Synthesis of quantitative studies

3.2.1. Design and setting

Six studies (n = 1637) were included in the synthesis. The age of participants ranged from 40 to 60 years [3–5,21–23]. Among the three out of six studies which reported the ratio of male and female participants, there were more male participants than female (54%

compared to 45%) [3,21,23]. Participants reported having been diagnosed with type 2 diabetes ranged from 5 to 30 years [3,21,23]. The studies represented populations across India, with four studies [3–5,23] conducted in the northern part of India and two studies [21,22] conducted in the southern part of India.

Other baseline characteristics from these quantitative studies include the economic status and literacy levels. The educational status of participants was discussed in four studies [4,5,21,23]. Two of these four studies included the same cohort [4,5]. The educational status as defined by the authors of these studies (n = 1282) [4,5,21,23] was categorised similarly and included: illiterate (22.2%) [4,5,21,23], primary/middle (31.7%) [4,5,21,23], high school (24.7%) [4,5,21] and graduate and above (21.3%) [4,5,21,23]. The socioeconomic status of participants was reported in the three studies (n = 1046) [4,5,21]. The definition of each level of socioeconomic status was not reported in these studies. Overall, 35.1% [4,5] and 20.3% [5,21] of participants belong to low and middle socioeconomic status, respectively. Of which, Kumar et al. [4] grouped the socioeconomic status of participants as low (34.68%), middle/high (65.31%). Another study [5] grouped as low (39.8%), middle (35.5%), high (24.7%). Last study [21] grouped as lower-middle (23.3%), middle (61.7%), upper-middle (15%). The characteristics of participants in these studies are presented in Table 2.

3.2.1.1. *Self-medication practices.* All six included quantitative studies [3–5,21–23] evaluated the facilitators for taking traditional medications over western medications.

3.2.1.2. *Use of traditional medications.* Out of the total participants included in six quantitative studies (n = 1637), 580 participants from two studies [4,5] stated that they received additional relief from diabetes by taking traditional medications. Additionally, 56 (16.8%) participants from Kumar et al. [4] stated that low cost and easy availability of traditional medications were reasons for self-

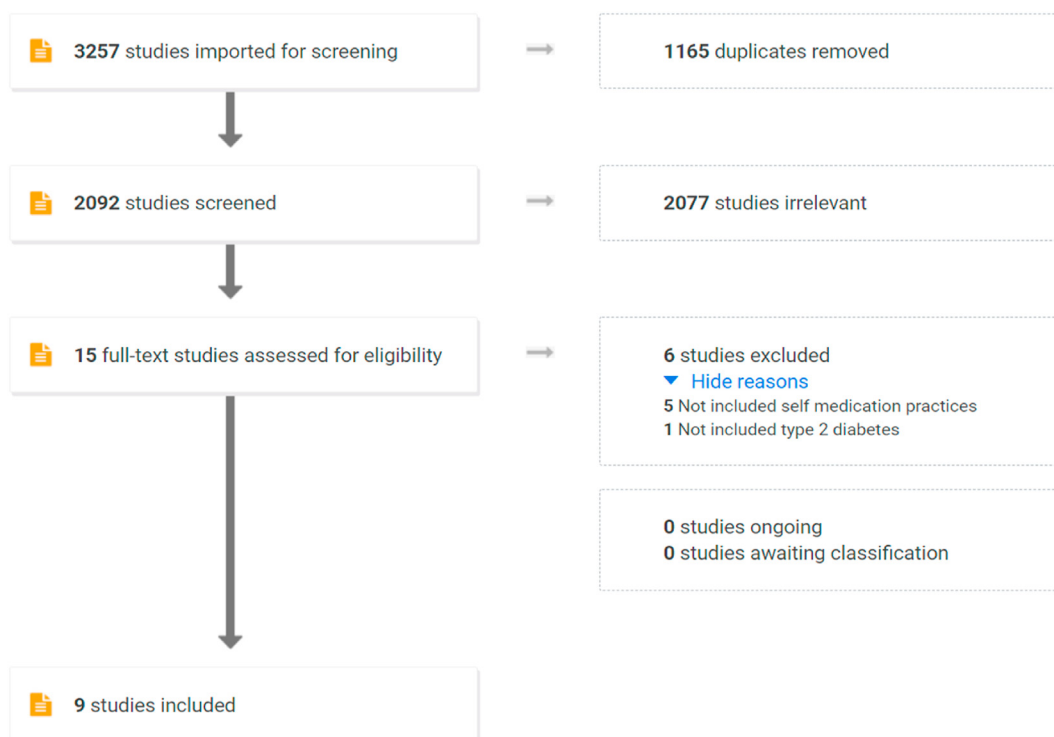


Figure 1. Flow chart of studies screening process.

Table: 2
Summary characteristics of quantitative studies.

First Author, Pub. Year, (Ref)	Settings	Aim of the Study	Methodology	Outcomes
Abraham, 2015 [21],	Endocrinology Department of General hospital-Bangalore, Karnataka, India	To identify perceived barriers to self-care, illness perceptions in relation to self-care, metabolic control and Quality of Life (QoL)	Total participants: 60 The study was cross-sectional. Patients with type 2 diabetes mellitus, attending outpatient services of the department of endocrinology of a medical college in Bangalore, India.	<ol style="list-style-type: none"> 1. Cost was a barrier to medication use. Dose omissions were frequent among participants from lower socioeconomic backgrounds, especially when they were unable to present for follow-ups. 2. Unavailability of medication in smaller towns and Side effects of medication/insulin were reasons behind self-medication. 3. Participants believe that consumption of food such as garlic or bitter gourd would improve sugar levels. 4. Male participants said that their spouses should make extra efforts to prepare the recommended diabetic diet and women reported that they needed a male family member to assist with visits to the hospital for follow-up.
Bhalerao, 2013 [3],	Tertiary care, teaching hospital in Mumbai, Maharashtra, India	To assess the extent of use of complimentary alternative medication (CAM) and satisfaction with its use in four chronic diseases—epilepsy, HIV, rheumatoid arthritis (RA) and diabetes mellitus (DM).	Total participants: 650 A cross-sectional, observational study. The study participants were given with 'Treatment Satisfaction Questionnaire for Medication' to assess the patients' satisfaction through four domains, such as effectiveness, no side-effect, convenience and global satisfaction	<ol style="list-style-type: none"> 1. Effectiveness, no side effects, and convenience of traditional medications were reasons behind self-medication practices. 2. Participants did not want to disclose the use of traditional medications to their doctors. 3. Participants use home remedies and did not consider them as CAM.
Ravi, 2004 [5],	Patients attending an outpatient clinic in Uttar Pradesh, India	Assess the awareness and pattern of use of CAM among patients with diabetes taking allopathic treatment.	Total participants: 493 A prospective observational study. The selected participants were interviewed on knowledge, awareness and practice of alternative treatment.	<ol style="list-style-type: none"> 1. The desire for early and maximum benefit and no side effects of CAM was the reason for self-medication. 2. Friends and family members were important information sources for CAM. 3. Participants preferred to take advice regarding CAM from family and friends. This is because western medicine practitioners discourage the use of CAM or may not have knowledge of the benefits of CAM. 4. Inability to communicate in participants language by the doctor made participants take advice from friends and family members. 5. Lack of regulatory body for CAM drugs.
Shah, 2009 [23],	This study was conducted in G.G. Hospital, Jamnagar, Sir Takhatsinhji Hospital, Bhavnagar, S. J. Eye Hospital, Gondal, Rajkot, Gujarat, India.	Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat	Total participants: 238 A prospective observational study. A predesigned questionnaire was administered to the included participants.	<ol style="list-style-type: none"> 1. Herbs are better in treating DM. 2. Diabetes can be cured by eating bitter substances. 3. Drugs can be stopped once the blood glucose levels are in normal. 4. Western medications are harmful to the body.
Krishnan, 2016 [22],	Department of Pharmacology, Saveetha Medical College across diabetes population of Chennai, Tamil Nadu, India	To assess the patient's knowledge and practice SBGM and their tendency to self-titrate antidiabetic medications based on self-monitoring.	Total participants: 153 Pilot, cross-sectional observational study. A structured questionnaire was administered to included participants.	<ol style="list-style-type: none"> 1. Inaccessibility and hard timings to consult doctor are common reasons for self-medication practices. 2. Participants were aware of the possible side effects of self-medication practices. 3. Participants tend to skip or take more medications or adjust the dose of insulin/tablets after self-monitoring of sugar before consulting your doctor.
Kumar, 2006 [4],	Outpatient endocrine clinic of Swaroop Rani Nehru Hospital, Allahabad, India	Investigate the knowledge, attitude and practices of CAM, along with some associated factors and perceptions relating to CAM among patients with diabetes in an Indian community.	Total participants: 493 A hospital-based cross-sectional study was conducted during 1999–2001.	<ol style="list-style-type: none"> 1. Additional relief, no side-effect, low cost and easy availability of traditional medications were reasons for self-medication practices. 2. Participants get the information from friends, neighbours relatives and family members and registered medical practitioners

medication practice. Two [4,5] studies discussed sources of information on the use of traditional medications. It appears that the majority of participants obtained sources of information through word of mouth. Out of 986 participants from two studies [4,5], 668 (67.7%) participants revealed details on sources of information on use of traditional medications. It was found that friends (46.7%) and doctors (26.6%) were the most common sources of information on the use of traditional medications among participants of these two studies. Other sources of information include neighbours (13.2%) and relatives (9.6%) and a very small percentage of participants (3.9%) sought information from additional undisclosed sources [4].

3.2.1.3. Perceived benefits of the use of traditional medication. It is well known that a proportion of primary care doctors treating chronic health illnesses are aware that patients use complementary and alternative medications [3]. This study found that patients who take home remedies to manage their diabetes along with western medications do not necessarily consider these home remedies as traditional medications [3]. Around forty percent of participants in another study (n = 238) from three hospitals in Gujarat in western India, believed that herbs are better than western medications in treating diabetes with almost one-quarter (23%) stating that western medications can be stopped once blood glucose levels are controlled [23].

3.2.1.4. Perception of side effects related to medications. Three of the six studies reported on participants perception of side effects [3,4,21]. All three studies found that many of the participants had the perception that traditional medications do not have side effects. Kumar et al. [4] found that 87 participants reported the use of traditional medications as they perceived no side effects of traditional medications. According to the Treatment Satisfaction Questionnaire by Bhalerao et al. [3] the “no side effects” domain scored highest (99.1%) in the satisfaction scale towards the use of traditional medications. However, another study [21] reported that 14 participants perceived side effects when taking western medications. 107 (70%) out of 153 participants in a study by Krishnan et al. [22] were found to be aware of common adverse effects of western medications. However, this study did not explore people's perception on side effects of traditional medications.

3.2.1.5. Accessibility to health facilities. Two out of six studies reported that lack of accessibility to health facilities was the reason why people chose to adopt self-medication practices [21,22]. Sixteen participants from a study conducted by Abraham et al. [21] stated that there was a lack of availability of western medications in smaller towns. Furthermore, in the study conducted by Krishnan and colleagues [22], it was found that 98 out of the 153 participants self-titrated the dose of insulin and/or medications despite knowing the adverse effects of western medications due to the lack of time and access to health facilities.

3.3. Synthesis of qualitative studies

3.3.1. Design and setting

Three studies [18–20] were included in the synthesis. The data for all three studies were collected by in-depth interviews. Common themes from the studies included perceived benefits of the use of traditional medications, perception on side effects of medications, sources of information on self-medication and cost of health care. Two studies [19,20] were conducted in the south of India and one [18] in northern India. All studies included participants with type 2 diabetes. Of the two studies conducted in the south, Chacko [19] included participants aged over 30 years whilst Jansiraninatarajan [20] included participants aged over 35 years.

The study in northern India [18] included participants who were above 20 years. Participants from all socioeconomic and educational backgrounds were included in these studies [18–20]. The characteristics of participants in these studies are presented in Table 3.

3.3.1.1. Self-medication practices. Participants adopted diverse types of self-medication practices. For instance, participants from a study [20] stated that if they forgot to take their medication in the morning, then they would compensate by taking two doses at night.

3.3.1.2. Perceived benefits of the use of traditional medications. Trust in traditional medications was the most commonly reported reason stated by people living with diabetes in India for the management and treatment of diabetes [18,19]. In their in-depth interview study of 59 people living with type 2 diabetes, Mendenhall and colleagues [18] found that participants were taking traditional medications because they believed they could cure type 2 diabetes, thus suggesting greater trust. For example, a male participant stated [18].

“I haven't taken any other treatment except the English medicine. [...] I took the powder of the seeds of java plum [pause] from the market it comes in a packet and costs 25 rupees. [...] I believe that the herbs are the most successful thing in this to bring bitterness in the blood. The seed of java plum is the best one. That totally cures it.” [18].

Participants perceived that traditional medications would help in lowering the blood glucose levels by purifying the blood which may in turn help them lower the dose of western medications if taken together [19]. Jansiraninatarajan [20] found in her study that participants perception of using western medications was not very important in the management of diabetes however, the reasons behind this were not explored.

3.3.1.3. Perception on side effects of medications. Two [19,20] of the three studies reported the participants' perceptions of the side effects of both traditional [19] and western [20] medications. Participants from the study conducted by Chacko et al. [19] perceived less side effects from taking traditional medications. In addition, Jansiraninatarajan [20] found that participants stop taking western medications without informing the doctor due to the fear of adverse effects from western medications.

3.3.1.4. Sources of information on self-medication. Two [19,20] out of three studies discussed in detail the sources of information on self-medication. The primary sources of information for how to self-medicate were from communities, neighbours, friends, family members [19] and social networks [20]. However, none of the studies stated why participants did not convey this information to their doctors [19,20]. In addition, the credibility of information obtained from these non-medical sources was not validated.

3.3.1.5. Cost of health care. Two [19,20] out of three studies reported the cost of health care as a reason for self-medication practices. Chacko et al. [19] suggested that the low cost of traditional medications allowed them to self-medicate with traditional medications. Jansiraninatarajan [20] found that participants indulged in self-medication practices as they were unable to go for regular follow-up visits to the doctor and buy western medications for managing diabetes due to their financial constraints.

Table: 3
Summary characteristics of qualitative studies.

First Author, Pub. Year, (Ref)	Study Settings	Aim of the Study	Methodology	Outcomes
Mendenhall, 2016 [18],	Not Disclosed	Explain how individuals navigate between and draw from allopathic and non-allopathic discourses around sickness and healing	Total participants: 53 Qualitative study. Conducted in-depth interviews. (Around 1 h each). The questions were related to five domains 1) Routine daily activities 2) General questions about stress 3) Social relationships 4) Beliefs and experiences regarding diabetes 5) Experiences within the formal healthcare sector	<ol style="list-style-type: none"> 1. Participants believe that they can get cured of diabetes by using traditional medications. 2. Java plum, fenugreek seeds, sadabahar and neem leaves are commonly used home remedies for diabetes. 3. Most of the participants were not willing to express the use of traditional practices due to social conventions.
Chacko, 2003 [19],	Three hospitals with diabetes treatment facilities in the cities of Cochin and Thrissur, India.	1. The subjects' health care knowledge with regard to biomedical and other therapies for diabetes management. 2. Their use of auxiliary remedies in response to their illness. 3. How this information is acquired and circulated	Total participants: 50 Qualitative methods such as participant observation and in-depth personal interviews (20–35 min) were used to develop an understanding of complementary strategies used to treat Type 2 diabetes in urban Kerala. The Open-ended questions were on 1. Information on self-reported care-seeking behaviours 2. The knowledge and use of conventional and complementary treatments for Type 2 diabetes	<ol style="list-style-type: none"> 1. Fewer perceived disadvantages and side effects, permitting to lower the doses of Western biomedicine, which have known side effects and easy availability of hypoglycemic herbs and low cost are reasons said by participants for self-medication practices. 2. Family members, neighbours and friends are common information sources of self-medication practices. This passing of information was from generations to generation. 3. Also, participants reported that the actual dose of western medications can be reduced if used along with traditional medications. 4. Urban Malayalis retain their distinctiveness is through local therapies and diets (such as that for diabetes), that are coded into the domestic culture. This lay medical knowledge cannot be dismissed as a myth that has persisted because of cultural inertia. Rather, local knowledge of the medicinal qualities of various herbs and plants constitutes a source of cultural capital.
Jansiraninatarajan, 2014 [20],	Multi-speciality tertiary hospital in Chennai, India.	To explore the factors influencing compliance with the therapeutic regimen, with the aim to understand the motivating factors and barriers and thereby formulate strategies to build up compliance among T2DM patients.	Total participants: 75 This is a qualitative, descriptive, exploratory study consisted of open-ended questions. Themes 1. Level of knowledge (Sub Themes-Causes, Complications, Treatment of diabetes) 2. Impact of diabetes (Sub Themes-Psychological impact, Social impact) 3. Compliance to treatment (Sub Themes-Diet and nutrition, Exercise, Medication, Diabetes self-monitoring and follow-up visits)	<ol style="list-style-type: none"> 1. Participants said that it is difficult to meet the doctor regularly because of financial constraints, lack of medical facilities at nearby places, need for dependency on others and lack of time due to work schedule. 2. Several of them took alternative remedies as recommended by their social networks and without the knowledge of the diabetes care team. 3. Few informants felt that taking medications is not very important in the management of diabetes. 4. Also, participants said that take an extra dose of medication at night if they missed to take it and few stop taking medications whenever they experience side effects. 5. Many informants felt that it is costly to get medications regularly. Some informant said that "sometimes I forget to take medication in my busy work schedule".

4. Discussion

This review included nine studies (six quantitative [3–5,21–23] and three qualitative [18–20]) and has established that self-medication practices are common for people living with type 2 diabetes in India. It appears that people with type 2 diabetes in India trust traditional medications more than western medications [18,19]. The main reasons identified for self-medication practices

were positive benefits of traditional medications, including lack of side effects as well as the perception that diabetes could be cured [3–5,18,19,23]. The perceived high treatment cost of western medications, lack of availability of medical services and medications at nearby places, easy availability of traditional medications and/or dietary supplements were other factors influencing self-medication practices [3,21,22]. It also appears that baseline characteristics such as socioeconomic and educational status of

participants did not influence the report of self-medication practices among participants.

Socioeconomic status of participants was discussed in four studies [4,5,21,23] and educational background was discussed in six studies [4,5,19–21,23]. However, none of the studies concluded that socioeconomic status or education background were independent factors that influenced self-medication practices of people living with diabetes in India, suggesting that the use of self-medication practices is common regardless of socioeconomic status.

For many participants, the results of the review indicated that participants believed that traditional medications were beneficial to their management of diabetes as they often reported improved blood glucose levels after taking traditional medications. However, many of these participants were also simultaneously taking western medications prescribed by their doctor. Given the lack of studies investigating the effectiveness of traditional medications over western medications, we are unable to conclude that traditional medications alone are sufficient to manage blood glucose levels in people living with type 2 diabetes in India.

The perception among many participants that accessibility to western medications is limited and expensive contrast with reality. Many of the western medications can be obtained from local pharmacies at subsidized costs (Jan Aushadhi Scheme) which may address the issue about the cost of western medications [24,25]. Furthermore, the lack of knowledge among local pharmacists on the scheduling of certain medications (schedule H medications can only be dispensed following prescription) [26] meant that a pharmacist could dispense western medications without prescriptions [27,28]. Strengthening the policy and regulatory environment around traditional and western medications and implementing strategies to track the use of medications is required.

Adopting self-medication practices without medical advice may put the patient at risk due to unmanaged blood glucose levels which could lead to related complications such as nephropathy, neuropathy, retinopathy, and cardiovascular diseases [29]. Healthcare professionals, including primary care doctors, should prioritise education of their patients about the natural disease progression for people living with type 2 diabetes such as explaining that the need for insulin does not mean failure or non-adherence to oral antidiabetic medications. Consultations with patients should focus on understanding the individual beliefs about the use of western medications such as insulin, justification of medications prescribed and appropriate information regarding the use of western medications [30]. Future research should explore the barriers and enablers faced by people living with diabetes in terms of managing their medications. The findings of this review indicate that healthcare professionals need to have a conversation with their patients about the potentially harmful effects of self-medication practices as well as the importance of adherence to prescribed western medications.

Findings from this study are pertinent to the large global Indian diaspora. It is well known that there is a sizeable Indian population settled in western countries like USA, UK, Australia and Canada [31–33] who continue to maintain connections with family and friends in India and may have similar diabetes management practices such as taking traditional medications [34,35].

5. Strengths and limitations

This is the first systematic review conducted to identify the factors associated with self-medication practices amongst people living with type 2 diabetes in India. The inclusion of qualitative and quantitative studies has provided a comprehensive analysis of studies in this area. One of the limitations to the review was the inability to perform meta-analysis due to the heterogeneity of

outcome measures. A majority of studies included participants visiting hospitals and/or large clinics and not being treated in community settings which may affect the generalisability of the study.

6. Conclusion

Despite the lack of evidence supporting benefits of self-medication practices, people living with type 2 diabetes in India have high trust in the benefits of self-medication practice and the use of traditional medications regardless of their socioeconomic status or educational background. Patient education about the complications of uncontrolled diabetes due to poor medication adherence and self-medication practices is recommended. Whilst we suggest increasing the regulatory environment over the production and dispensing of traditional medications in India, it is also important to explore the feasibility of co-utilization of traditional and western medications (integrative medicine) in the management and treatment of type 2 diabetes.

Disclaimer

All authors have read, and approved submission of the manuscript and the manuscript has not been published and is not being considered for publication elsewhere in whole or part in any language except as an abstract.

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Conflicting interest

None of the authors have any conflicts of interest that are directly relevant to the content of this article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.metop.2020.100073>.

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