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Self-management interventions for gestational diabetes in Africa: a scoping review

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Abstract

Background Gestational diabetes (GD) can threaten the health of both the mother and the foetus if it is not effectively managed. While there exists a growing body of research on self-management interventions for GD, there is a lack of reviewed studies regarding the various self-management interventions in Africa. The purpose of this review is to map the evidence of self-management interventions for GD in Africa.

Methods Searches for records were conducted in four major databases, including PubMed, PubMed Central, Science Direct and Journal Storage. Additional documents from Google and Google Scholar were also added. The guidelines for conducting scoping reviews by Arksey and O'Malley were followed.

Results The results revealed that intermittent fasting, education on diet, insulin injection, blood glucose monitoring, physical activities, lifestyle modification and foot care were the available self-management interventions for GD in Africa. Most of the reviewed studies reported intermittent fasting and patient education as effective self-management interventions for GD in Africa. The barriers identified in the reviewed studies were either patient-related or facility-related. Patient-related barriers included lack of awareness, and negative attitude, while facility-related barriers included lack of access to education on GD, especially, face-to-face educational interventions.

Conclusion It is crucial to consider the cultural and personal needs, as well as the educational level of women with gestational diabetes when creating an effective self-management intervention. Optimal results can be achieved for self-management of gestational diabetes by integrating multidisciplinary approaches.

Keywords Self-management, Gestational diabetes, Intervention, Effectiveness, Barriers, Africa

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Introduction

Pregnancy is associated with several structural and functional changes in the body, most of which are temporary [1]. One of these changes is the development of glucose intolerance resulting in gestational diabetes [2, 3]. Gestational diabetes (GD) is characterised by elevated levels of blood glucose concentrations during pregnancy, usually resolving after childbirth [4].

Evidence shows that GD affects approximately 17% of pregnant women who are diagnosed with GD annually [5]. The highest prevalence is observed in the Middle East and North Africa (27.6%) and Southeast Asia (20.8%) while the lowest is recorded in Europe (7.8%) and North America and the Caribbean (7.1%) [6, 7]. The prevalence of GD ranged from 8.4 to 24.5% in the Middle East and North Africa and 14% in sub-Saharan Africa [8, 9]. Despite affecting both high and low-income countries, it is estimated that nearly 90% of global GD occurs in low-income countries [10].

The presence of GD poses a significant risk to the well-being of both the mother and the foetus. According to recent research, 5.7% of pregnant women develop type 1 diabetes within 5 to 7 years [5, 6] and 50.4% develop type 2 diabetes within 23 years following the initial diagnosis of GD [6]. Maternal complications may include pregnancy-induced hypertension and infections, abortion, preterm labour, hydramnios, and unexplained foetal deaths [11]. Furthermore, foetal complications can manifest in the form of macrosomia, foetal malnutrition, neural tube defects, and cardiac anomalies [12–15].

To prevent such complications, it is recommended that women with GD attain optimal glycaemic control during pregnancy. This can be achieved by means of effective self-management interventions, comprising dietary modification, exercise, self-monitoring of blood glucose, and appropriate medication usage [16]. The use of technology in delivering some of these interventions has been recommended ([17, 18]. Self-management programmes in patients with GD are also increasingly gaining popularity [19]. However, for some mothers who experience GD, the process of self-management can present a challenge as it necessitates the acquisition and application of self-management skills within a limited timeframe [20].

Gestational diabetes has a serious impact on maternal and neonatal morbidity in the short and long term [21]. It is therefore important for women with GD to get attention through effective intervention and policies in performing optimal self-management. While there exists a growing body of research on self-management interventions for GD [22–26], there is a lack of reviewed studies regarding the various self-management interventions, the effectiveness of these interventions and the barriers to them in Africa. Consequently, this review seeks

to map existing evidence on self-management interventions for GD in Africa. The results of this review will benefit healthcare providers and policymakers by providing insights into effective self-management interventions. This information can inform clinical guidelines and recommendations for managing gestational diabetes in African settings, ultimately leading to improved patient care and outcomes.

Methods

The five-stage framework of Arksey and O'Malley [27] was adopted for this scoping review. The steps of the framework are: identification of research question, search for relevant studies, selection of studies, data collection, data collating, summary and reporting. The guiding questions for this review were:

- 1) what are the existing self-management interventions for GD in Africa?
- 2) what is the effectiveness of the self-management interventions for GD in Africa? and
- 3) what are the barriers to the use of self-management interventions for GD in Africa?

To address these questions and map relevant literature, the authors developed a search strategy that utilized a combination of controlled vocabularies like Medical Subject Headings (MeSH) and keywords for each of the four major electronic databases (PubMed, PubMed Central, Science Direct and Journal Storage). An initial search was conducted in PubMed (Table 1 illustrates the search strategy for PubMed) and the search terms were modified for search in other databases. Five keywords were used by the authors in their search for the relevant literature: self-management intervention, effectiveness, barriers, gestational diabetes, Africa.

Additional search was conducted in other databases such as Dimensions AI, Google, Google Scholar, Cochrane Library and Open Science Framework Library to identify other relevant studies. Furthermore, the reference lists of selected articles were manually searched to identify other relevant articles. A librarian at the Sam Jonah Library was consulted throughout the search for relevant studies and screening of identified articles. The search for articles started on the 14th of May 2023 and ended on the 16th of August 2023. To retrieve relevant studies on the review topic, the authors developed eligibility criteria for the review topic for data screening (Table 2).

Relevant articles retrieved from the database search were uploaded into the Mendeley software version 1.19.8 and all duplicates were removed. Titles and abstracts of the retrieved studies were then screened by all authors

Table 1 Search strategy used in PubMed to retrieve scientific data

Search (#)	Search terms
#1 Search to identify self-management intervention	Self-management intervention* [MeSH Term] OR Self-care treatment* OR Self-directed intervention* OR Self-regulation strategies* OR Self-management strategies* OR Self-management approaches OR Self-management support* OR Self-care management support* OR Self-management*
#2 Search to identify gestational diabetes	Gestational diabetes* [MeSH Term] OR Pregnancy-induced diabetes* OR Pregnancy-related diabetes* OR Maternal diabetes* OR maternal hyperglycemia* OR Pregnancy-onset diabetes* OR Pregnancy-associated diabetes*
#3 Search to identify effectiveness	Effectiveness* [MeSH Term] OR Efficacy* OR Impact* OR Effect*
#4 Search to identify barriers	Barriers* [MeSH Term] OR Hindrances* OR Obstacles* OR Limitation* OR Challenges*
#5 Search to identify Africa	Africa* [MeSH Terms] OR Sub-Saharan Africa* OR Algeria* OR Angola* OR Benin* OR Botswana* OR Burkina Faso* OR Burundi* OR Cabo Verde* OR Cameroon* OR Central African Republic* OR Chad* OR Comoros* OR DR Congo* OR Congo* OR Cote d'Ivoire* OR Ivory Coast* OR Djibouti* OR Egypt* OR Equatorial Guinea* OR Eritrea* OR Eswatini* OR Swaziland* OR Ethiopia* OR Gabon* OR Gambia* OR Ghana* OR Guinea* OR Guinea-Bissau* OR Kenya* OR Lesotho* OR Liberia* OR Libya* OR Madagascar* OR Malawi* OR Mali* OR Mauritania* OR Mauritius* OR Morocco* OR Mozambique* OR Namibia* OR Niger* OR Nigeria* OR Rwanda* OR Sao Tome and Principe* OR Senegal* OR Seychelles* OR Sierra Leone* OR Somalia* OR South Africa* OR South Sudan* OR Sudan* OR Tanzania* OR Togo* OR Tunisia* OR Uganda* OR Zambia* OR Zimbabwe*
Overall Search Strategy	1. #1 AND #2 AND #5 NOT ANIMAL*
Activate filter	2. #1 AND #2 AND #3 AND #5 NOT ANIMAL*
	3. #1 AND #2 AND #4 AND #5 NOT ANIMAL*
	English Language
	01/01/2010 – 14/08/2023

Table 2 Eligibility criteria for screening search results and full text

Inclusion criteria	Exclusion criteria
1. Studies (quantitative, qualitative and mixed method designs) conducted on self-management intervention on gestational diabetes	1. Studies that were not conducted on self-management interventions on gestational diabetes
2. Papers published in English Language	2. Studies that were not written or published in the English Language
3. Papers that have been peer-reviewed	3. Papers that are not conducted in Africa
4. Papers that were conducted with participants in Africa	4. Papers that were published online before 2010
5. Studies published in 2010 or later	5. Papers that were preprint and grey literature

against the inclusion and exclusion criteria. Articles that met the inclusion criteria were retrieved in full and further screened against the inclusion and exclusion criteria. Full test studies that met the inclusion criteria were then selected for this review. After the screening process, the authors divided themselves into two groups (AAD, CO, TDA, GO and GOB, NKY, GOO, BN, JEK) who extracted data from the selected papers independently. This was further reviewed by all the authors. The extracted data is presented in Table 3. The authors read through the final extracted data and the findings from the selected articles were organised thematically. A thematic analysis was conducted to identify and categorize key themes emerging from the extracted data. This method involved systematically coding the data to uncover patterns and insights related to the research question, allowing for a comprehensive understanding of the relevant themes. Finally, the results were presented and discussed according to the research questions.

Results

Search results

A total of 5,339 records were identified from the initial database search and 11 additional records were identified from other sources. After removing 1,200 duplicates, 4,150 records were screened for full-text articles. Forty-nine full-text records were assessed for eligibility. Twenty-seven full-text records were removed because some did not include the variable of interest, some were from outside Africa and others were duplicates. Twenty-two records were included in this review (Fig. 1). Out of the 22 records, one was an abstract and the rest were journal articles. The search results and screening process are presented in Fig. 1. In all, 1,707 participants were sampled by the 22 studies.

Table 3 Extracted data

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[28] Egypt	To evaluate the nursing intervention effectiveness on health locus of control and self-efficacy in women with gestational diabetes	Quasi-experimental design	Pregnant women at Outpatient Clinic	120	Education on self-care (Insulin injection and blood glucose checking) as well as education on diet, foot care etc	Face-to-face	Group	4 h	Women who were exposed to self-care interventions had higher levels of self-efficacy and internal locus of control to adapt to self-care interventions	Access to nursing intervention
[29] Egypt	To review the effectiveness of intermittent fasting, dietary modifications, and exercise in controlling gestational diabetes and maternal mood dysregulation	Case report	Pregnant woman diagnosed with gestational diabetes	1	Intermittent fasting, caloric restrictions and exercise	Face-to-face	Individual	14 weeks	The intervention helped to maintain the 2-h post-prandial blood glucose level within the reference range, reduced body weight and abdominal circumference, and corrected abnormalities of foetal growth associated with hyperglycaemia	
[30] Egypt	To investigate the effect of health education on maternal and neonatal outcomes among gestational diabetes women	Quasi-experimental design	Pregnant women diagnosed with gestational diabetes	150	Health education designed to provide information, advice and support to women with gestational diabetes	Face-to-face	Individual	24 weeks	Pregnant women with gestational diabetes who received health education on gestational diabetes had better maternal & neonatal outcomes	Lack of access to education on gestational diabetes

Table 3 (continued)

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[31] Morocco	To test the hypothesis that detection and initial management of gestational diabetes at the primary level of care would reduce the incidence of macrosomia and result in lower birthweights of new-borns	Randomised-controlled trial	Pregnant women	120	Dietary advice, physical activity, and glucose monitoring	Face-to-face	Individual	8 weeks	Pregnant women with gestational diabetes who received counseling on nutrition and exercise had infants with lower incidence of increased birth weight and large-for-gestational-age	Lack of access to education on nutrition and exercise
[32] Zimbabwe	To examine the knowledge of gestational diabetes and self-care practices to prevent among pregnant women	Cross-sectional survey	Pregnant women	200	Education on life-style modification including diet, exercise, avoidance of smoking and drinking alcohol				Poor eating habits with many eating fast foods Majority engaged in physical activities, walking and performing household chores	-
[33] South Africa,	To explore the lived experiences of women with gestational diabetes and the impact of gestational diabetes on their experience of pregnancy and sense of well-being	Qualitative study	Women who had been diagnosed with gestational diabetes in their previous pregnancy	35	Education on Self-monitoring of blood glucose and dietary modification				The level of education was not adequate	-

Table 3 (continued)

Author(s) Year/Country study	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[34] South Africa	To explore women's lived experiences of gestational diabetes and the feasibility of sustained lifestyle modification after gestational diabetes in a low-income setting	Qualitative study	Women with gestational diabetes	35	Education both self-education through the internet and education on to monitor blood glucose level and on physical activities like walking. Educational material (diet sheet) on exercise was also provided as part of routine care				The patients were not satisfied with the information they were given resulting in the low practice of self-management	-
[35] South Africa	To explore current policies and clinical practices relating to antenatal and post-natal care for women with GD in South Africa, as well as health sector stakeholders' perspectives on the barriers to – and opportunities for – delivering an integrated mother–baby health service that extends beyond the first week post-partum, to the infant's first year of life	Qualitative study	Key informants	11	Counselling on dietary and lifestyle change during pregnancy				Insufficient information was provided by the health professionals	

Table 3 (continued)

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[36] Egypt	To evaluate the effect of Tele-nursing guidelines on knowledge among gestational diabetic women during covid-19 pandemic	Quasi-experimental design	Pregnant women with gestational diabetes	50	Educational program on the basic knowledge about gestational diabetes, blood glucose measurement procedure and insulin injection technique	Tele-health	Individual	8 weeks	The women's knowledge regarding gestational diabetes and self-managements significantly improved	
[37] Egypt	To evaluate the effect of Tele-nursing guidelines on health lifestyle and self-efficacy among women with gestational diabetes during COVID-19 pandemic	Quasi-experimental design	Pregnant women with gestational diabetes	50	Educational on the basic knowledge about gestational diabetes, blood glucose measurement procedure and insulin injection technique, dietary modifications	Tele health	Individual	8 weeks	Health lifestyle and self-efficacy among women with gestational diabetes significantly improved. This was measured with the Health Promotion Lifestyle Profile scale (HPLP), and the Self-efficacy scale in gestational diabetes	
[38] Egypt	To evaluate the effect of tele-nursing application on self-management of pregnant women regarding minor discomforts	Quasi-experimental design	Pregnant women with gestational diabetes age of 8–30 weeks	120	Educational booklet was distributed to the pregnant women in the study group There was also health education mobile messaging and illustrative videos through WhatsApp by which minor discomforts and self-management practices to eliminate them were taught	Face-to-face and mHealth	Groups	24 weeks	Pregnant women who were exposed to the intervention demonstrated significant improvement in the knowledge of gestational diabetes and in all aspects of self-management The pregnant women in the study group also reported a decrease in the experience of minor discomforts	

Table 3 (continued)

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[39] Egypt	To assess the effect of educational programmes for health literacy knowledge level of pregnant women with gestational diabetes on maternal & foetal outcomes	Quasi-experimental design	Pregnant women with gestational diabetes between 28–36 gestational diabetes weeks	50	An on-site training programme was conducted for the pregnant women to educate them on the basics of gestational diabetes including the risk factors, and management, complications and the need for follow up	Face-to-face	groups	4 weeks	Women who attended the training session showed an improved level of knowledge of gestational diabetes	
[40] Egypt	To assess the effect of nursing intervention on knowledge, attitude and self-care activities among gestational diabetic women	Quasi-experimental design	Pregnant women	60	Self-care education on diabetes in the form of lectures and question and answer was given along with a booklet. The education covered the basics of gestational diabetes with an emphasis on self-care management	Face-to-face	Group	4 weeks	The women improved significantly in their knowledge on self-care activities after the training	
[41] South Africa	To identify the personal experiences, challenges, coping strategies and health decisions made by urban indigenous women affected by gestational diabetes	Qualitative study	African women affected by gestational diabetes	10	Dietary advice, exercise, diabetes education and self-monitoring of blood glucose					

Table 3 (continued)

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[42] Egypt	To evaluate the effect of health belief model based educational package on lifestyle among gestational diabetes women	Quasi-experimental design	Women with gestational diabetes	62	Educational package on exercise, self-monitoring blood glucose (SMBG), insulin use, and taking care of one's feet	Face-to-face	Group	8 weeks	The study showed a positive statistically significant correlation between total knowledge score, total lifestyle score and total health belief model score before and after gestational diabetes educational package	
[43] Nigeria	To investigate the effect of structured aerobic dance exercise on the blood glucose level in pregnant diagnosed with gestational diabetes	Quasi-experimental design	Pregnant women diagnosed of gestational diabetes	34	Aerobic exercise	Face-to-face	Group	8 weeks	The study showed significant improvement in the fasting blood sugar of the exercise group	Lack of exposure to aerobic exercise
[22] Egypt	To assess the effect of educational sessions on knowledge, attitude and self-care practices among pregnant women with gestational diabetes	Quasi-experimental design	Pregnant women with gestational diabetes	97	Educational sessions on exercise, diet regimen, treatment during pregnancy period	Face-to-face	Group	24 weeks	Women who were provided with educational sessions had knowledge, attitude and self-care practices regarding gestational diabetes	Lack of access to educational sessions
[25] Egypt	To investigate the relationship between self-efficacy and self-management among diabetic pregnant women	A descriptive correlational study	Pregnant women with gestational diabetes	125	Dietary change, weight loss, and physical activity				A highly positive correlation was found between self-efficacy and self-management among diabetic pregnant women	Reliance on coping mechanisms and pertinent knowledge

Table 3 (continued)

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[44] Egypt	To assess the effect of aerobic exercises on insulin sensitivity and fasting plasma glucose level in pregnant women with risk for gestational diabetes	A randomized clinical trial study design	Pregnant women at increased risk for gestational diabetes	40	Aerobic exercise	Face-to-face	Group	16 weeks	There was a highly statistically significance decrease in fasting blood glucose level, fasting insulin level	Lack of access to education and exercise programmes
[24] Egypt	To examine the effect of tele-nursing services on healthy lifestyle and self-efficacy among gestational diabetes women	A quasi-experimental study	Women with gestational diabetes	112	Tele-nursing on dietary advice, self-monitoring of blood glucose, regular physical activity and insulin therapy	Tele-health	Individual	12 weeks	Improvement of self-efficacy, lowering of blood glucose and increasing the adherence for antenatal visit	Lack of phone and inability to answerphone calls
[45] Egypt	To evaluate the effect of an empowerment educational intervention using the Beliefs, Attitudes, Subjective Norms, and Enabling Factors BASNEF model; personal Beliefs (PB), attitudes (A), Subjective Norms (SN), Behavioural Intention (BI), and enabling factors (ef), on gestational diabetes self-care behaviours.(GD-SCB) among gestational diabetic woman	A randomized-controlled trial	Women with gestational diabetes	220	Educational intervention on appropriate diet, insulin regimen, and physical activity	Face-to-face	Individual	8 weeks	Empowerment educational intervention grounded on the basnef model for gestational diabetes women could significantly increase their knowledge, create positive beliefs and attitudes, and improve their enabling factors and subjective norms, leading to improvement	Lack of awareness, negative attitude, low subjective norms, and enabling factors towards gestational diabetes self-care behaviour (GD-SCB)

Table 3 (continued)

Author(s) Year/Country	Purpose of the study	Study Design	Population	Sample size	Self- management intervention	Mode of delivery	Strategy	Duration	Effectiveness	Barriers
[46] Egypt	To evaluate the effect of self- care program for gestational diabetes women in pregnancy outcomes	Quasi-experi- mental	Pregnant women with gestational diabetes	80	Education on self- management	Face-to-face	Group	2 h	Self-care was high among women in the study group. They also show positive attitude about self-care than those in the con- trol group after the interven- tion	Lack of health education on gesta- tional diabetes

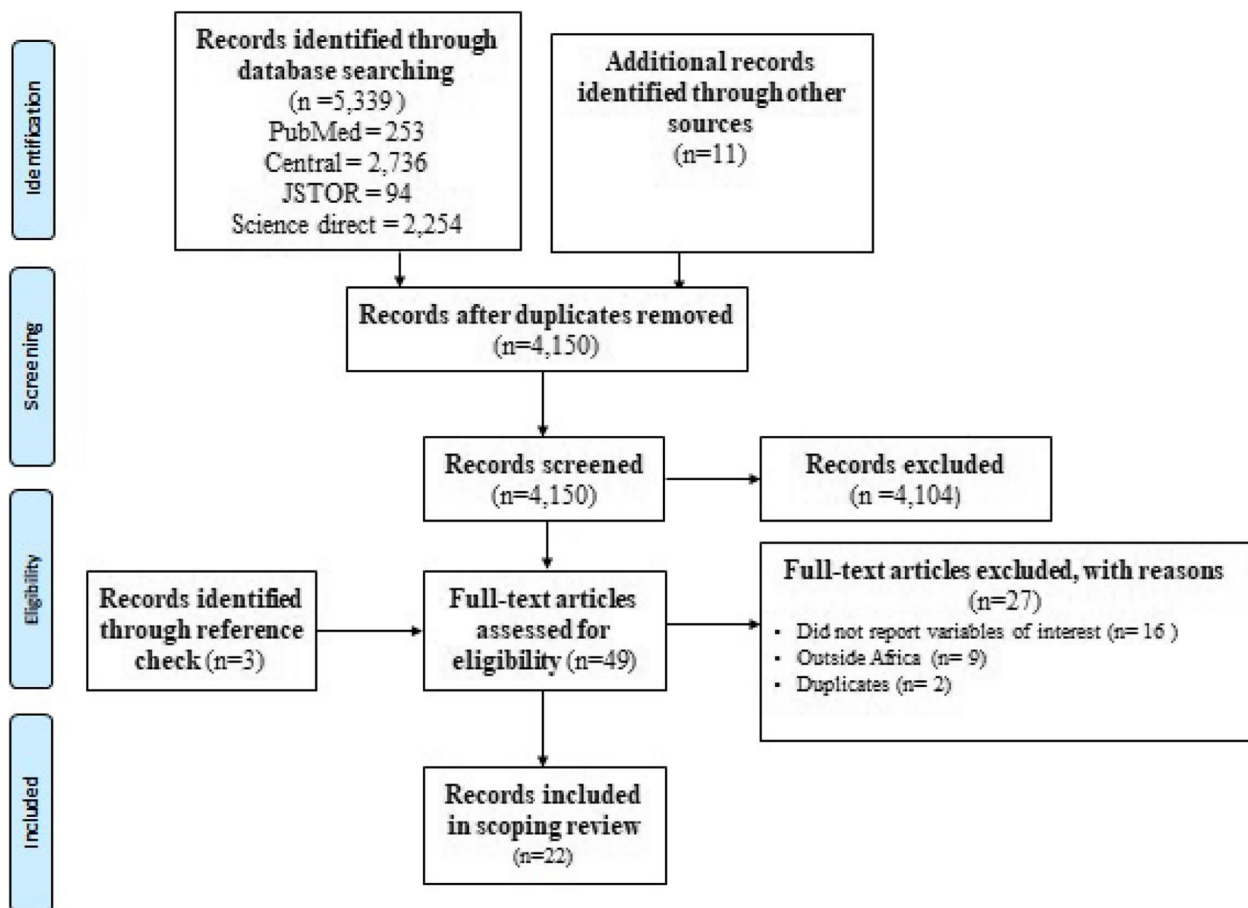


Fig. 1 PRISMA Flow chart showing search results and screening process here

Characteristics of included studies

Most of the included studies were conducted in Egypt (n=15), followed by South Africa (n=4), Morocco (n=1), Zimbabwe (n=1) and Nigeria (n=1) (Fig. 2). Majority of the reviewed studies used a quasi-experimental design (n=12) (Fig. 3). Again, most of the reviewed studies (n=13) were published between 2018 and 2020 (Fig. 4).

Findings

Findings from this review were reported based on the three research questions: (1) Self-management interventions (2) Effectiveness of self-management interventions and (3) Barriers to self-management interventions.

Self-management interventions

Three major themes which included Education/Content of Education, Mode of Education and Intermittent

Fasting emerged under self-management interventions for GD in Africa. The thematic table is presented in Table 4.

Content of self-management education

A number of the reviewed studies reported education on diet [22, 24, 25, 28, 33, 35, 37, 41, 45]. Five studies also reported insulin injections [24, 28, 36, 37, 42]. Ten studies documented education on physical activities such as aerobic exercise and walking [22, 24, 25, 31, 32, 34, 41–43, 45]. Lifestyle modifications which included avoidance of smoking and drinking alcohol were reported by two studies [32, 34] and three studies on foot care [28, 37, 42].

Mode of education interventions

On the mode of education, three studies [24, 38, 39] reported the use of mobile messaging and illustrative videos through WhatsApp. One study stated self-education through the Internet [34]. Saboula et al., (2018) also reported the usage of lectures with the opportunity to ask questions and receive answers on GD as a mode of

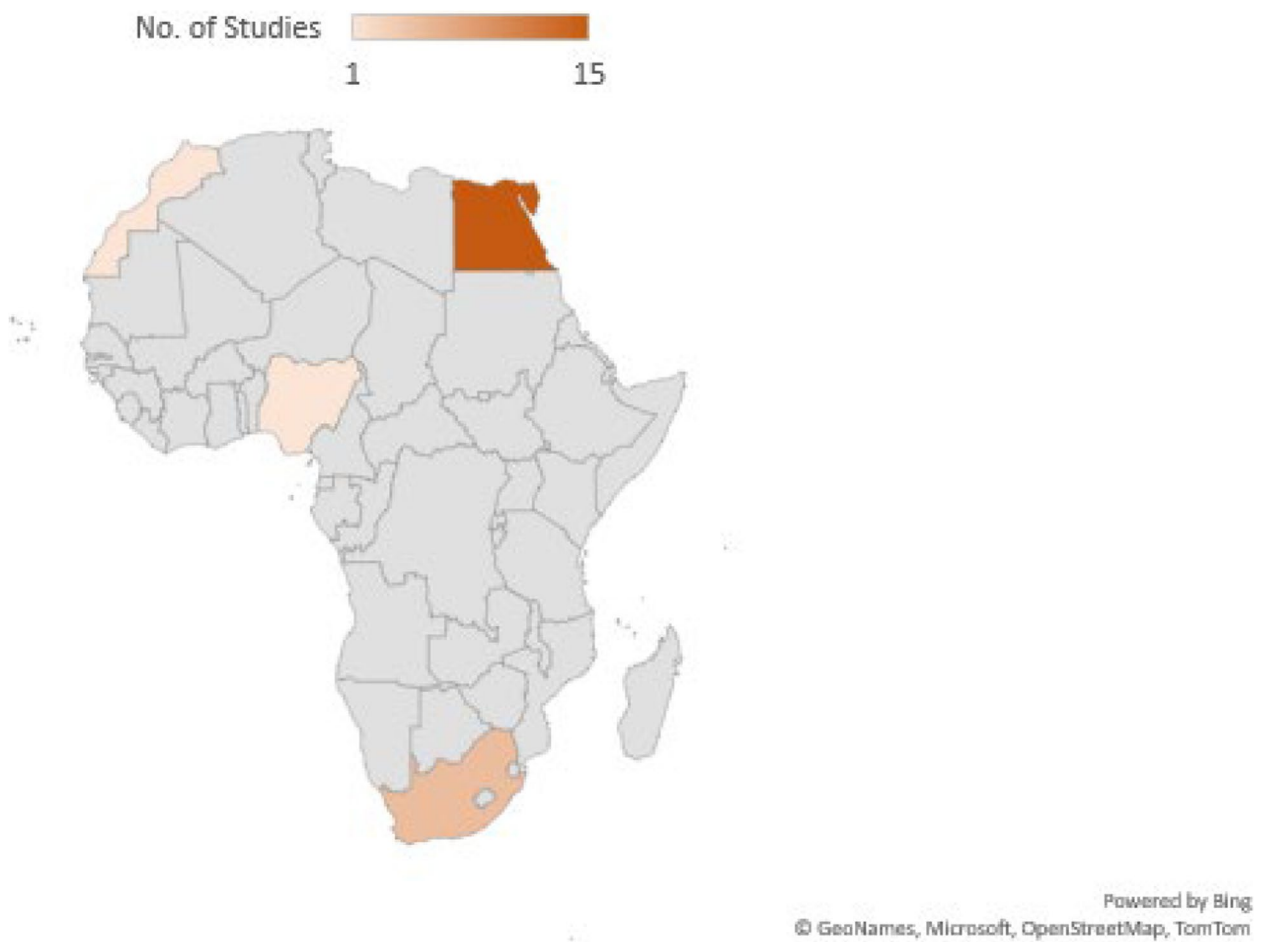


Fig. 2 Map showing where reviewed studies were conducted

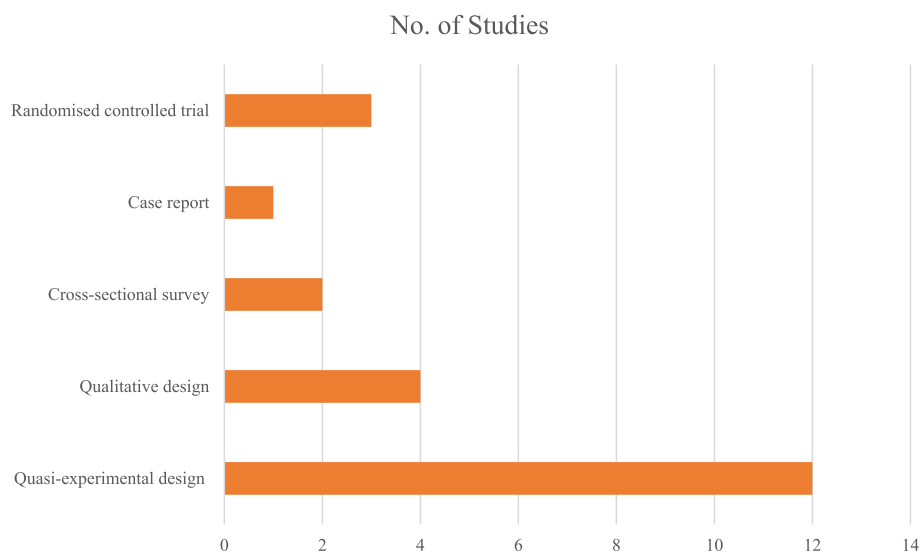


Fig. 3 Designs employed by the reviewed studies

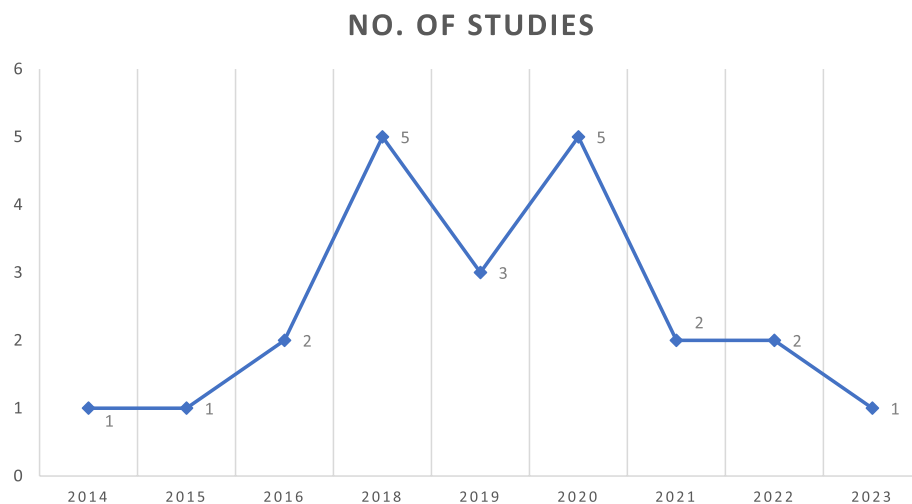


Fig. 4 Number of studies based on the year of publication

Table 4 Thematic analysis for self-management intervention

Themes	Specific intervention	Authors
Education/ Content of Education	Diet	[22, 24, 25, 28, 33, 35, 37, 41]
	Insulin injection	[24, 28, 36, 37, 42]
	Blood glucose monitoring	[24, 28, 31, 33, 34, 37, 41, 42]
	Foot care	[28, 37, 42]
	Physical activity (aerobic exercise, walking)	[22, 24, 25, 31, 32, 34, 41–44]
	lifestyle modification (avoidance of smoking, drinking alcohol)	[32, 35]
	Basic knowledge about gestational diabetes	[36, 37, 39, 41]
Mode of Education	Mobile messaging and illustrative videos through WhatsApp	[38, 39]
	Self-education through the internet	[34]
	Lectures and question and answer	[40]
	Booklet containing proper nutrition, physical activity, medication regimen, follow up schedule, domestic blood glucose level control and usage of insulin pens	[40]
	Tele-health	[24, 36, 37]
Intermittent fasting	Intermittent fasting	[29]

education for self-management. Additionally, one study [40] mentioned the utilisation of booklets on GD by patients.

Effectiveness and non-effectiveness of self-management interventions

In this review, the effectiveness of the interventions was defined as improvement in the outcomes such as knowledge levels, lifestyle modifications and self-care skills acquisition as reported by the included studies. On the other hand, non-effectiveness of the interventions was defined as non-improvement in the outcomes as reported by the included studies. Most of the studies reviewed found educational sessions on basic knowledge of GD and nutrition [22, 28, 30, 36–38, 42, 46],

tele-nursing [24, 38] exercise [22, 25, 29, 31, 34, 43], intermitted fasting [29], self-monitoring of blood glucose [22, 24, 36, 42] and dietary modification as effective interventions [24, 25, 31, 41, 45]. On the contrary, a few studies also reported that education [32], glucose monitoring and dietary modification [33, 34] were not effective self-management interventions (Table 5).

Barriers to self-management interventions of GD

Some pregnant women experienced impediments to self-management interventions of GD. These barriers were grouped under facility-related, patient-related factors and mode (face-to-face and technology) of intervention as depicted in Table 6.

Table 5 Thematic analysis for effectiveness and non-effectiveness

Themes	Intervention	Authors
Effective	Patient education	[22, 28, 30, 36–40, 42, 45, 46]
	Tele nursing	[24, 38]
	Exercise	[22, 25, 29, 31, 34, 43]
	Intermittent Fasting	[29]
	Self-monitoring of blood glucose	[24, 36, 42]
	Dietary modification	[22, 24, 25, 31, 41, 45]
Non-effective	Education	[32–35]
	Self-glucose monitoring	[33]
	Dietary modification	[35]

Effectiveness/ non-effectiveness of interventions

Facility-related

With regards to facility related barriers, five studies mentioned lack of access to education on GD [22, 25, 28, 30, 46] and nutrition [31]. Two studies also reported lack of knowledge on exercise such as aerobics and walking [31, 43].

Patient-related factors

The barriers that were reported were lack of phone and inability to answer phone calls [24]. Others were lack of awareness, negative attitude, low subjective norms and enabling factors towards GD and self-care behaviours [45].

Mode of intervention

Included studies reported that participants had difficulty accessing face-to-face interventions [22, 28, 30, 31, 43–46]. A study reported that lack of phones was a barrier to accessing technology interventions such as mHealth and telehealth [24].

Discussion

This scoping review revealed that intermittent fasting, education on diet, insulin injection, blood glucose monitoring, foot care, physical activity and lifestyle modification through in-person meetings, illustrative videos, WhatsApp messaging, and self-education were the self-care management interventions that exist. These interventions were effective in most of the reviewed studies, but ineffective in others. Barriers to the self-management interventions included those that are facility-related, patient-related factors and the mode of delivery of interventions. The facility-related factors included lack of access to education on GD and nutrition, reliance on coping mechanisms and lack of exposure to exercise. Patient-related barriers included lack of phone and inability to answer phone calls, lack of awareness, negative attitude, and low subjective norms. Also, there was an access barrier to face-to-face interventions.

Self-management interventions

Proper education empowers pregnant women with the knowledge and skills needed to manage their blood sugar levels effectively. Comprehensive education on diet and lifestyle modifications leads to better glycaemic control and reduces the risk of complications for both the mother and the baby [47]. While the identified interventions such as education on diet, insulin injection, physical activities, lifestyle modifications, and foot care offer a comprehensive approach to GD self-management, its sufficiency can vary depending on individual patient’s needs and circumstances. GD is a complex condition influenced by hormonal and lifestyle factors. Therefore, a multifaceted and multidisciplinary approach to education and intervention is recommended to meet the diverse needs of pregnant women with GD [48]. Some individuals may require more personalised guidance, especially if they have pre-existing health conditions or challenges in adhering to recommended practices. Tailoring interventions to each

Table 6 Thematic analysis for barriers to self-management of gestational diabetes

Main theme	Specific barrier	Author
Facility-related	Lack of access to education on gestational diabetes	[22, 25, 28, 30, 46]
	Reliance on coping mechanisms and pertinent knowledge (lack of knowledge)	
	Lack of access to education on nutrition	[31]
Patient-related	Lack of exposure to exercise	[31, 43]
	Lack of phone and inability to answer phone calls	[24]
	Lack of awareness, negative attitude, low subjective norms, and enabling factors towards GD-SCB	[45]
Mode of intervention	Difficult access to face-to-face interventions	[22, 28, 30, 31, 43–46]
	Lack of phones to access tele-health interventions	[24]

patient's specific needs, possibly through individualised plans, could enhance the efficacy of the interventions.

Effectiveness of self-management interventions

Most of the studies reported that the educational self-care interventions were effective. The efficacy of these interventions can be attributed to the fact that most pregnant women will make decisions that will be beneficial to the foetus. Also, another factor could be how engaging and interactive the intervention was. For instance, Farrag et al. [24] and Mohamed et al. [38] demonstrated the effectiveness of using mobile messaging and illustrative videos to educate pregnant women about GD self-management. These interventions not only improve knowledge retention but also promote active engagement and adherence to recommended practices. The studies reporting education as ineffective interventions for self-management of GD point to a crucial aspect relating to the quality and comprehensiveness of the education provided. Muhwava et al. [33] and Muhwava [34] identified self-glucose monitoring and dietary modification as ineffective self-management interventions. This was attributed to patients' dissatisfaction with the education they received about these interventions.

Healthcare providers who deliver insufficient or inaccurate information during educational sessions may impede pregnant women's ability to acquire a comprehensive understanding on how to effectively manage their condition. The method used to deliver the education could be a contributing factor to its efficacy. If the educational material is not presented in an engaging, interactive, or customised manner to meet individual needs, clients may struggle with comprehension and application of the information. The study designs employed in the studies could have also accounted for the ineffectiveness of some of the self-management interventions. Most of the studies ($n=12$) used quasi-experimental design. Quasi-experimental designs often lack random assignment of participants to intervention and control groups [49]. Without randomization, it is difficult to ensure that the intervention and control groups are equivalent in terms of characteristics that could influence outcomes [50]. Hence, confounding variables were not controlled.

Barriers to self-management interventions of GD

The studies pointed to the fact that some pregnant women lacked access to education on GD [25, 28, 30]. This barrier could be attributed to inadequate healthcare infrastructure, limited resources, and insufficient awareness campaigns. When healthcare facilities fail to provide resources for proper education about GD, women may not fully understand the condition, its implications, and the necessary self-care measures. The lack of education

on proper nutrition could have arisen from healthcare facilities not offering comprehensive dietary guidance. Proper nutrition is crucial for managing GD, and when pregnant women are not adequately educated on this aspect, they may struggle with making appropriate food choices [51]. In cases where pregnant women had to engage in a face-to-face intervention, lack of geographical access was a barrier. Many regions in sub-Saharan Africa have rural areas where healthcare facilities are sparse and far apart [52]. The long distances and poor transportation infrastructure make it challenging for pregnant women to travel to healthcare centres regularly [53]. Also, the cost of travel, coupled with the potential loss of income due to time taken off work to attend medical appointments, can be prohibitive for many women [54, 55].

Also, lack of access to phones or difficulties in answering phone calls make communication with healthcare providers challenging for some pregnant women, especially with technology-mediated interventions [24]. This could have been because a significant portion of the population in sub-Saharan Africa does not have access to mobile phones or reliable internet connections [56, 57]. This digital divide limits the reach of mHealth and telehealth interventions, which rely on these technologies to deliver care and support. Even when phones are available, there may be a lack of knowledge and familiarity with using these devices, especially among women with limited education [58]. In addition to issues with personal access, there are broader infrastructural problems such as unreliable electricity and internet services [59, 60]. Frequent power outages and weak internet connectivity can disrupt the consistent use of digital health tools. This could prevent timely guidance, monitoring, and support, which are essential for effective self-care.

Implication for practice and policy

By empowering pregnant individuals to actively manage their condition through education, lifestyle changes, and monitoring, these interventions can lead to improved health outcomes. However, successful implementation requires considering cultural contexts, literacy levels, and healthcare infrastructure. Midwives and obstetricians/gynaecologists should adapt their roles to provide guidance, education, and support, rather than solely directing the care process. Collaboration between healthcare professionals and patients becomes crucial to ensure safe and effective management of GD. Self-management interventions for GD in Africa can positively impact Sustainable Development Goal 3 by reducing maternal, child and infant mortalities with their attendant improvement in health and wellbeing. Regarding the effectiveness of self-management interventions, employing a dual mode of delivery that combines face-to-face and online modes is

crucial. Also, interventions that can be delivered through outreach programmes may help eliminate the access barrier created when face-to-face interventions are delivered in healthcare facilities.

Limitations of this review

Most of the studies reviewed utilised quasi-experimental designs. These studies lack random assignment of the participants. As a result, confounding variables may have affected the results of those studies. Also, the studies included in this review were conducted in only four out of the 54 countries in Africa. Hence, the results cannot be generalised. The ability to generalise the results is again affected because most of the studies ($n=21$) were conducted in public facilities neglecting the private facilities. Despite these limitations, this review used a robust method in extracting, screening and reviewing the data. Furthermore, the authors engaged people who had experts (Librarian, obstetrician and review experts) relevant to this review to provide comprehensive evidence of self-management interventions for GD in Africa.

Suggestions for future research

Future studies should prioritise more robust quantitative studies that control for confounding and extraneous variables such as randomised controlled trials and longitudinal studies. Also, more qualitative studies should be conducted on the continent on the subject to understand factors that affect the effectiveness of interventions directed towards reducing GDM and its impact on mothers and children. This will help understand the challenges and facilitators associated with modes of delivery of these interventions.

Conclusion

This scoping review provides insight into the various existing self-management interventions for gestational diabetes which include intermittent fasting, education on dietary modification, blood glucose monitoring, physical activity, insulin injection, avoidance of smoking and drinking of alcohol. While most of the interventions were effective, some were not. The differences observed in the reviewed studies were related to infrastructural, knowledge, attitude and how engaging the mode of education was. Designing effective self-management interventions therefore requires that the cultural and personal needs as well as the level of literacy of people with gestational diabetes are considered. Again, a multidisciplinary approach to implementing self-management interventions for gestational diabetes will produce desirable effects.

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Authors' contributions

AAD, GO, NKY, TDA, GOB, BN, JEK, SAA, FN, DFA, JA, RO, PO, MA, CO, GOO and CMB conceptualized and designed the study, collected and analyzed the data, and wrote the initial draft. MA is the independent researcher who guided the team throughout the review process. All authors critically reviewed the manuscript and approved the final version of the manuscript for publication.

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Availability of data and materials

The datasets generated and/or analysed during the current study are included in this manuscript.

Declarations

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Competing interests

The authors declare no competing interests.

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