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REVIEW

Technologies related to sleep in women with gestational diabetes mellitus: a scoping review

Tecnologías relacionadas con el sueño en mujeres con diabetes mellitus gestacional: una revisión del alcance

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Abstract:

Objectives: To map the health technologies related to sleep that are used in pregnant women with Gestational Diabetes Mellitus (GDM) in healthcare institutions, as reported in the scientific literature.
Material and Method: This scoping review was structured according to the recommendations of the Joanna Briggs Institute (JBI) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) protocol. The research was guided by the following question: "What health technologies related to sleep are used in pregnant women with GDM in healthcare institutions?" The search was conducted from June to August 2023 in the following databases: SCOPUS, PubMed, LILACS, Web of Science, and Cochrane, without language or time frame restrictions.
Results: Initially, 2,452 studies were identified. After screening, two studies remained, and two additional studies from the grey literature were included, resulting in a final sample of four studies. The identified technologies included Continuous Positive Airway Pressure (CPAP), pulse monitor, Pittsburgh Sleep Quality Index (PSQI) questionnaire, Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), Horne-Ostberg Morningness-Eveningness Questionnaire (MEQ), and educational booklet with self-care instructions.

Conclusions: There are technologies that aid in the treatment of sleep disorders and promote sleep quality. The implementation of health promotion strategies related to sleep quality and hygiene in prenatal care routines is suggested.

Keywords: Diabetes Gestational; Diabetes Mellitus; Sleep Quality; Biomedical Technology; Sleep-Wake Disorders.

Resumen:

Objetivos: Mapear las tecnologías de la salud relacionadas con el sueño que se utilizan en mujeres embarazadas con Diabetes Mellitus Gestacional (DMG) en instituciones de atención médica, según lo reportado en la literatura científica.

Material y Método: Esta revisión de alcance el era investigación se guio por la siguiente pregunta: "¿Qué tecnologías de la salud relacionadas con el sueño se utilizan en mujeres embarazadas con DMG en instituciones de atención médica?". La búsqueda se realizó de junio a agosto de 2023 en las siguientes bases de datos: SCOPUS, PubMed, LILACS, Web of Science y Cochrane, sin restricciones de idioma o marco de tiempo.

Resultados: Inicialmente, se identificaron 2452 estudios. Después de la selección, quedaron dos estudios y se incluyeron dos estudios adicionales de la literatura gris, lo que resultó en una muestra final de cuatro estudios. Las tecnologías identificadas incluyeron Presión Positiva Continua en las Vías Respiratorias (CPAP), monitor de pulso, cuestionario del Índice de Calidad del Sueño de Pittsburgh (PSQI), Índice de Severidad del Insomnio (ISI), Escala de Somnolencia de Epworth (ESS), Cuestionario de Matutino-Vespertino de Horne-Ostberg (MEQ) y folleto educativo con instrucciones de autocuidado.

Conclusiones: Existen tecnologías que ayudan en el tratamiento de los trastornos del sueño y promueven la calidad del sueño. Se sugiere la implementación de estrategias de promoción de la salud relacionadas con la calidad y la higiene del sueño en las rutinas de atención prenatal.

Palabras clave: Diabetes Gestacional; Diabetes Mellitus; Calidad del Sueño; Tecnología Biomédica; Trastornos del Sueño-Vigilia.

INTRODUCTION

Sleep is crucial for the proper functioning of the body and maintaining health, playing an essential role in restoring physical and mental energy, the ability to think and comprehend, and memory consolidation. Decreased sleep quality can lead to changes in physical, cognitive, social, occupational, and mental functioning. Thus, it has been reported that sleep impairment is a risk factor for several disorders.[1]

Women, due to various hormonal changes, are more vulnerable to developing sleep-related problems, including sleep quantity and quality. In the context of pregnant women, there is a susceptibility to sleep problems due to significant physiological and anatomical changes throughout the gestational trimesters.[2, 3]

In the first trimester, pregnant women have a longer total sleep time, but it is less deep sleep, and this phase is characterized by excessive tiredness and drowsiness. Episodes of vomiting, nausea, increased urinary frequency, and general discomfort are present, which can interfere with sleep quality, but these episodes tend to decrease as the pregnancy progresses.[4]

Long sleep decreases in the second trimester due to increased estrogen and progesterone levels, causing edema of the upper airway mucosa, especially in pregnant women with elevated body mass, thus favoring the appearance of snoring and Obstructive Sleep Apnea (OSA).[5] In the third trimester, there is some difficulty for women to find a comfortable sleeping position due to low back pain, increased urination, respiratory discomfort caused by increased pressure on the lungs, and fetal activity.[3]

Furthermore, sleep duration and quality play an important role in glucose metabolism and insulin resistance.[6] Research conducted in Shanghai with 382 pregnant women who underwent sleep assessment using the Chinese version of the Pittsburgh Sleep Quality Index (PSQI) showed that sleep patterns during pregnancy affect the occurrence of Gestational Diabetes Mellitus (GDM).[7]

GDM is a metabolic condition characterized by glucose intolerance leading to hyperglycemia of varying intensity, causing serious harm to maternal and child health. In addition to predisposing to the occurrence of GDM, poor sleep quality can cause adverse effects in patients who already have the condition, and the association of poor sleep with GDM increases the risks of miscarriage, macrosomia, and pre-eclampsia.[8]

The healthcare team, especially nurses, should be aware of the factors associated with sleep problems and have as one of their tasks the elaboration of alternatives that can be used to alleviate them and inform pregnant women about the possible sleep changes that may occur.[3] In this perspective, aiming to improve and enhance patient care, healthcare professionals have been adopting the use of health technologies, which relate to the purpose of generating and applying knowledge, becoming an effective player in the care process.[9]Thus, technologies are something developed to facilitate the performance of activities, as well as to enable the understanding and application of a certain action, with technical and scientific knowledge, through its transformation into the use of tools, processes, and instruments created and/or used from this knowledge. In healthcare, knowledge is applied in the prevention, diagnosis, and treatment of diseases, as well as in the rehabilitation of their consequences.[10]

The technological debate in healthcare is an expanding field with promising possibilities because current and future technologies can be applied in daily life in different healthcare fields, such as clinics, offices, and hospitals. In this perspective, technologies have a set of devices aimed at promoting health, preventing and treating diseases, and rehabilitating people incorporated into care, based on their correct handling, communicating important information for decision-making.[11]

Given this context, the need arose to know the health technologies available for women with GDM. This outcome will allow the socialization of information that enables the promotion of a healthy pregnancy, reducing the development of sleep disturbances and worsening of GDM, in addition to its possible maternal-fetal outcomes. Thus, this research aimed to map the health technologies related to sleep that are used in women with GDM in healthcare institutions, as reported in the scientific literature.

MATERIAL AND METHOD

This is a scoping review, conducted based on the methodological framework developed by the JBI[12] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA extension for Scoping Reviews) checklist[13]. The scoping review has a research protocol registered with the Open Science Framework (https://osf.io/8pe2s/), with DOI 10.17605/OSF.IO/8PE2.

The research was developed in five stages: 1) identification of the research question; 2) identification of relevant studies; 3) study selection; 4) data categorization; 5) data collection, summary, and mapping of results.[14]

To structure the research question, the PCC mnemonic (Population, Concept, Context) was used: P consisted of Pregnant women with GDM; C Health technologies related to sleep; and C healthcare institutions. Thus, the guiding question was: What health technologies related to sleep are used in pregnant women with GDM in healthcare institutions?

The searches were carried out between June and July 2023 in the following databases: SCOPUS, Science Direct, Latin American and Caribbean Health Sciences Literature (LILACS), Cochrane, Web of Science, Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed.

Grey literature was retrieved from the following sources: Google Scholar, Brazilian Digital Library of Theses and Dissertations (BDTD), Thesis and Dissertation Catalog (CTD) of the Coordination for the Improvement of Higher Education Personnel (CAPES), OpenGrey, and Open Access Theses and Dissertations (OATD). Document retrieval in Google Scholar was based on the first 16 pages, without filters.

For the search strategy in identifying studies, Medical Subject Headings (MeSH)/Descriptors in Health Sciences (DeCS) and keywords were used, together with the Boolean operators AND and OR, to obtain a broad spectrum of results in the different databases. In the databases that were searched, the structure presented in Table 1 was used.

Table 1. Search strategy for document retrieval.

DATABASE	STRATEGY
SCOPUS	(“Diabetes Gestational”) OR (Hyperglycemia) AND (Pregnancy) OR (“Pregnancy, High-Risk”) AND (“Biomedical Technology”) (“Educational Technology”) OR (“Technology Assessment, Biomedical”) OR (“Instructional Film and Video”) OR (Multimedia) OR (“Video-Audio Media”) OR (“Teaching Materials”) OR (“Video Games”) OR (“Mobile Applications”) OR (“Online Social Networking”) OR (“Social Media”) OR (Teaching) OR (“Electronic Supplementary Materials”) OR (“Health Education”) AND (“Sleep”) OR (Sleep quality) OR (Sleep-Wake Transition Disorders) AND (“Health Facility Environment”) OR (Maternal-Child Health Services) OR (Health Facilities) OR (Voluntary Health Agencies) OR (Ambulatory Care Facilities)
SCIENCE DIRECT	(Diabetes Gestational) AND (Educational Technology) AND (Sleep) AND (Health Facility Environment)
LILACS	(Diabetes Gestacional) OR (Hiperglicemia) AND (Gravidez) OR (Gravidez de Alto Risco AND (Tecnologia Biomédica) OR (Tecnologia educacional) OR (Avaliação da Tecnologia Biomédica) OR (Filme e Vídeo Educativo) OR (Multimídia) OR (Mídia Audiovisual) OR (Materiais de Ensino) OR (Jogos de Vídeo) OR (Aplicativos Móveis) OR (Grupos de Treinamento de Sensibilização) OR (Redes Sociais Online) OR (Mídias Sociais) OR (Ensino) OR (Materiais Suplementares Eletrônicos) OR (Educação em Saúde) AND (Sono) OR (Qualidade do Sono) OR (Transtornos da Transição Sono-Vigília) AND (Ambiente de Instituições de Saúde) OR (Serviços de Saúde Materno-Infantil) OR (Instalações de Saúde) OR (Instituições Filantrópicas de Saúde) OR (Instituições de Assistência Ambulatorial)

DATABASE	STRATEGY
COCHRANE	(Diabetes Gestational) AND (Educational Technology) AND (Sleep) AND (Health Facility Environment)
MEDLINE	(Diabetes Gestational) OR (Hyperglycemia) AND (Biomedical Technology) OR (Educational Technology) OR (Technology) OR (Technology Assessment, Biomedical) OR (Instructional Film and Video) OR (Multimedia) OR (Video-Audio Media) OR (Teaching Materials) OR (Video Games) OR (Mobile Applications) OR (Online Social Networking) OR (Social Media) OR (Teaching) OR (Electronic Supplementary Materials) OR (Health Education) AND (Sleep) OR (Sleep quality) OR (Sleep-Wake Transition Disorders) AND (Health Facility Environment) OR (Maternal-Child Health Services) OR (Health Facilities) OR (Voluntary Health Agencies) OR (Ambulatory Care Facilities)
WEB OF SCIENCE	“Diabetes Gestational” OR “Hyperglycemia” AND “Educational Technology” OR Technology OR “Biomedical Technology” AND “Sleep” OR AND (Health Facility Environment)

Source: own elaboration.

The eligibility criteria for this scoping review were publications on technologies used in healthcare institutions regarding sleep in pregnant women with GDM, without language or time frame restrictions. Studies developed at any level of healthcare institution were included, ranging from basic health units to tertiary hospitals and specialized centers. The essential strategy for inclusion was the presence of data that addressed the use of health technologies focused on sleep in pregnant women with GDM. Studies that used internationally recognized diagnostic criteria for GDM were included, including the American Diabetes Association (ADA), World Health Organization (WHO), and International Association of Diabetes and Pregnancy Study Groups (IADPSG). The inclusion of different diagnostic criteria allowed a broad view of the application of technologies in different clinical contexts.

Regarding the type of study, primary and secondary, empirical, quantitative, and qualitative research of any design or methodology were chosen. Event proceedings abstracts, incomplete and duplicate articles, studies in the project phase or without results, as well as editorials and letters to the editor were excluded.

According to the strategy presented for carrying out the search, the studies were selected. The results obtained in the databases were exported to the Rayyan® reference manager, developed by the Qatar Computing Research Institute, for the removal of duplicates, selection, and screening of studies, which was carried out by two researchers independently, with disagreements resolved with the participation of a third examiner. The first phase comprised reading titles and abstracts. Studies that met the inclusion criteria were analyzed in the second phase, via full-text reading of the manuscripts. Finally, manual searches were carried out in the references of the included studies.

The selected studies were analyzed at different times for mapping. First, data were extracted by two reviewers independently, using Microsoft Excel® spreadsheets. The information was confirmed by the third reviewer, and disagreements and doubts were resolved in discussions until consensus was reached among the authors. The extraction table included author, year, title, objective, type of study, level of evidence,

type of technologies used, level of healthcare institution, and main findings. The description of the characterization of the studies is presented in tables, ending in a narrative summary.

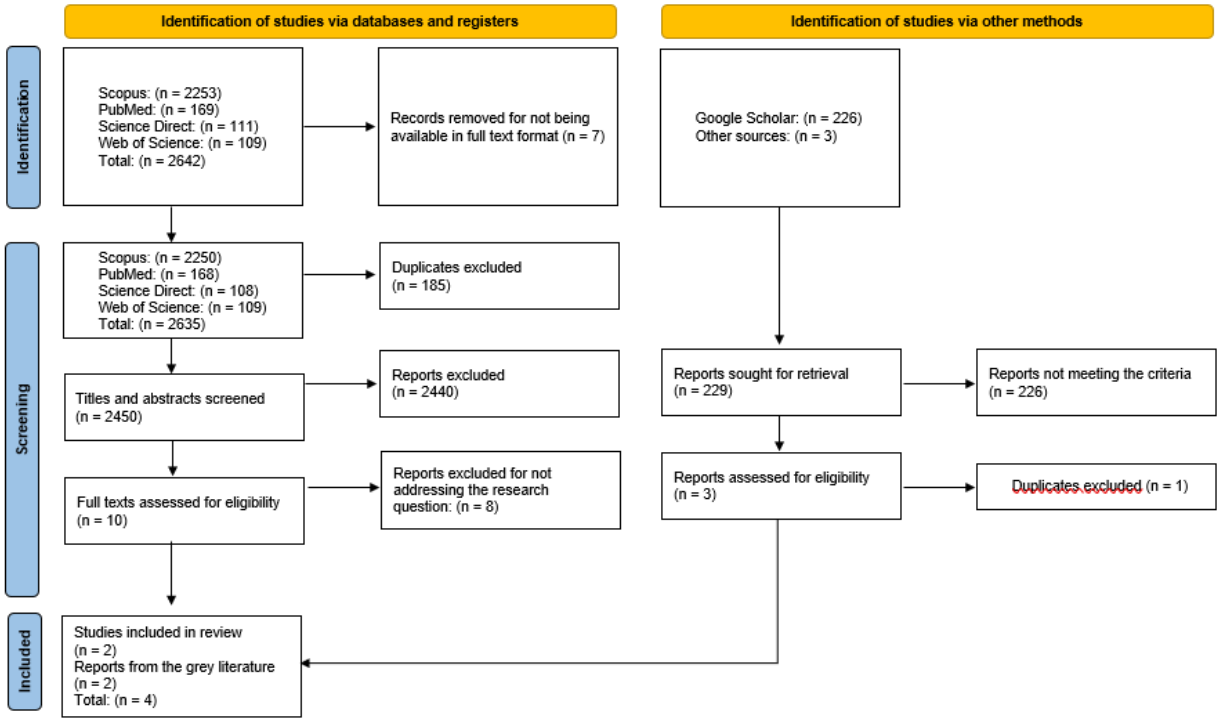
The hierarchy of evidence is often represented as a pyramid, with the highest level of evidence at the top and the lowest at the base. Level I, the top of the pyramid, consists of meta-analyses. This is followed by Level II, systematic reviews; Level III, randomized clinical trials; and Level IV, cohort and case-control studies. Cross-sectional studies and case reports occupy the base of the pyramid at Level V.[15]

RESULTS

The initial search in the four databases resulted in 2,642 potentially relevant studies. After evaluation, 185 duplicates were removed, followed by reading the titles and abstracts of 2,457 articles, where 2,447 were excluded for not answering the research question. Thus, 10 articles were evaluated in full for eligibility, and only two were included in the research. In the end, no publications were added from the reference list, but two studies from the grey literature were included, adding up to four documents to compose the sample.

Initially, the PRISMA-ScR (PRISMA extension for scoping reviews) flowchart was used to present the selection of studies, as illustrated in Figure 1.

Figure 1. Flowchart of the process of searching and selecting studies.



Source: Translated and adapted from PRISMA 2020.

Regarding the countries of origin of the studies, they were developed in Brazil (n = 3) and Thailand (N = 1). The publication year ranged from 2018 to 2023. Regarding the journals, the studies are found in the Journal of Clinical Sleep Medicine (N = 1), the official journal of the Brazilian Society of Endocrinology and Metabolism (N = 1), and Endocrinology of Bahia (N = 1), and one study was selected from a course conclusion

work repository. The studies were prospective cohort (N = 2), randomized clinical trial (N = 1), and qualitative study (N = 1).

Table 2 characterizes the analyzed studies, according to article/author/year, objective or research question, sample, type of study/level of evidence.

Table 2. Summary table of analyzed articles, according to author, year, objective/research question, sample, and study design/level of evidence.

Article / Author / Year	Objective or research question	Sample	Study design / Level of evidence
A1 Chirakalwason et al., 2018.	To evaluate the impact of continuous positive airway pressure (CPAP) therapy in obese pregnant women with gestational diabetes mellitus (GDM) and obstructive sleep apnea (OSA).	36 women with GDM and OSA	Randomized clinical trial / Level III
A2 Façanha 2021.	To investigate the characteristics of sleep and circadian rhythm in patients with Gestational Diabetes Mellitus (GDM), as well as the associations with maternal and fetal stages..	448 pregnant women	Prospective Cohort Study / Level IV
A3 BRASIL, 2013.	Guidance booklet for pregnant women with GDM.	-	-
A4 Façanha et al., 2023.	To evaluate the relationship between chronotype (morning/evening preference) and clinical stages in pregnant women with gestational diabetes mellitus (GDM).	305 patients with GDM	Prospective Cohort Study / Level IV

Source: own elaboration

The types of technology, level of healthcare institution, main results, and care for sleep in GDM are presented below (Table 3).

Table 3. Synthesis of mapped articles, type of technology, level of healthcare institution, and main findings.

Article	Type of technology	Level of healthcare institution	Main findings
A1	Self-adjusting CPAP machine	Tertiary specialized center (university hospital)	The study identified CPAP as an effective technology for pregnant women with GDM and OSA, promoting significant improvements in pancreatic beta cell function and potentially reducing rates of preterm birth, unplanned cesarean sections, and neonatal admissions to the ICU. Despite this, no changes were observed in glucose levels in the short term (2 weeks), and adherence to treatment was limited. These findings highlight the role of CPAP in sleep management and its metabolic and obstetric implications in pregnant women with GDM.

Article	Type of technology	Level of healthcare institution	Main findings
A2	Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS), actigraphy, and 6-sulfametoxymelatonin (MT6s) determination in overnight urine.	Integrated Center for Diabetes and Hypertension Care in Ceará.	Poor sleep quality (PSQI ≥ 6) was more prevalent in pregnant women with GDM (64.5%) compared to pregnant women with normal risk (45.7%). Total sleep time was lower in patients with GDM (6.68h) compared to those with normal risk (7h). Actigraphy revealed that the time spent awake after sleep onset (WASO) was associated with higher levels of HbA1c and fasting glucose. The evening chronotype was associated with pre-eclampsia, poor sleep quality, greater severity of insomnia, and the need for neonatal hospitalization. The risk of obstructive sleep apnea (OSA) and fatigue were associated with gestational hypertension and more negative episodes, respectively.
A3	Self-care guidance.	Conducted outside of a healthcare setting.	Guidance on healthy eating, physical exercise, leisure, and sleep with a focus on reducing complications in future pregnancies or even developing type 2 diabetes.
A4	Monitoring of circadian rhythm using actigraphy and validated questionnaires, such as the Horne-Östberg Morningness-Eveningness Questionnaire (MEQ).	Integrated Center for Diabetes and Hypertension Care in Ceará.	Among 305 patients with GDM, the evening preference was found in 21 (6.9%), who had worse sleep quality, greater severity of insomnia, fatigue, and depressive symptoms. The evening chronotype was associated with pre-eclampsia and a greater need for hospitalization in the neonatal intensive care unit. A lower score on the MEQ confirmed an association with pre-eclampsia and remained after controlling for age, hypertension, sleep quality, fatigue, and depressive symptoms. In addition, the wrist monitor allowed the recording of activities to calculate sleep onset time, sleep offset time, total sleep time, sleep midpoint, and sleep efficiency.

Source: own elaboration.

DISCUSSION

Sleep should be one of the most addressed topics with pregnant women, given the high rate of sleep disorders or difficulties during this period. Data show that sleep in patients with GDM is more compromised than in pregnant women with normal risk, with worse subjective sleep quality, more insomnia, greater risk of sleep apnea, and more daytime sleepiness.[16]

In this perspective, the use of technologies in healthcare settings becomes a tool for improving care, providing opportunities to apply knowledge in health promotion,

prevention, treatment, and rehabilitation.[9] Despite this need, there was a predominance of studies with weak levels of evidence, with only one randomized clinical trial cited, which highlights the importance of new studies with this methodological rigor, given their impact on health services and clinical nursing practice, based on the potential to explain cause and effect of different interventions using technologies.[17]

Among the technologies found in this review, soft-hard technologies stand out for their educational potential, promoting continuous and accessible learning for pregnant women in health services. This review identified an educational booklet entitled "Pregnancy and diabetes: taking care of myself and the baby", which was created by the Center for Diabetes and Endocrinology of Bahia and presented in an illustrative and didactic way forms of prevention and treatment of GDM, bringing self-care guidelines, including sleep care. However, one limitation of the research involving the booklet is the lack of description of the theoretical basis for its construction and validation.[18]

The elaboration and application of educational booklets with simple and objective approaches, with important information, are of great relevance so that patients and family members can understand the health and disease process and thus participate effectively in treatment.[19] An example is a booklet entitled 'Pregnant Woman's Guide,' which was accepted and recommended by pregnant women and expert nurses for being a user-friendly material, as an additional resource in prenatal consultations and for daily use by pregnant women.[20]

Sleep quality is an important dimension considered in the assessment of healthy sleep, and it is known that poor sleep predisposes to the emergence of GDM and intensifies adverse effects for those who have the condition.[7,8] According to the articles found, sleep quality and its pattern can be identified using soft-hard and hard technologies.

In the field of healthcare, there is an increase in the creation and use of scales, instruments, and questionnaires, considered soft-hard technologies, which encompass knowledge in a more structured way, representing a great contribution to the areas of research, teaching, and practice. The development of these technologies depends on the constant search for evidence that helps professionals in decision-making, thus being a current topic that sparks discussion among researchers who use Evidence-Based Practice (EBP).[21]

These technologies bring contributions to the clinical environment, improve assessment, promote risk stratification, prioritize and guide interventions, as well as the evolution of care provided, favoring the quality of care and optimizing the time of healthcare professionals, generating a positive impact on patient safety and institutions.[21] The soft-hard technologies used with GDM related to sleep evidenced in this review were: Pittsburgh Sleep Quality Index (PSQI) questionnaire, Insomnia Severity Index (ISI) instrument, Epworth Sleepiness Scale (ESS) scale, and Horne-Ostberg Morningness-Eveningness Questionnaire (MEQ).

These validated instruments have been shown to be effective in assessing sleep quality. Research involving 38 pregnant women with a mean age of 29 years identified that 55.3% of pregnant women reported poor sleep quality in the first trimester, 39.5%

in the second trimester, and 65.8% in the third trimester, being considered an easy-to-use, low-cost, and effective strategy to be used by nurses during prenatal care.[3]

Regarding hard technologies, two pieces of equipment were identified that aimed to improve sleep in women with GDM: the wrist monitor and CPAP. The wrist monitor allowed the recording of activities to calculate sleep onset time, sleep offset time, total sleep time, sleep midpoint, and sleep efficiency.[22] The aspects that improve patient adherence to the use of hard technologies involve education about the possible risks of OSA, expected benefits with the use of therapy, monitoring of use, and the promotion of behavioral strategies, such as cognitive behavioral therapy and motivational therapy.[23]

The use of CPAP was cited in the treatment of OSA, the most prevalent disorder in GDM, as observed in other studies, where it was observed that 75% of pregnant women suffer from OSA.[24] It is noted that there are still controversies about its use in improving sleep and glycemic control. When analyzing its effect in the treatment of OSA in women with GDM, it was found that two weeks of continuous positive airway pressure treatment improves sleep but did not result in significant changes in glucose levels, although it improves pancreatic function.[25]

The results found in this review demonstrate that there are technologies available to assess and improve sleep in relation to pattern (wrist monitor and Horne-Ostberg Morningness-Eveningness Questionnaire) and quality (instruments, scales, CPAP), as well as technologies that favor guidance and support (booklet and counseling). However, it is noticeable that sleep-wake disorders are treated as something natural during the gestational period, although they represent potential risks.[3] An important aspect to be highlighted is that pregnant women with sleep disorders are more likely to have depressive symptoms in the postpartum period and a lower quality of life.[23, 26]

Given this gap in consultations, it is important that healthcare professionals, especially nurses, implement actions related to sleep assessment practices, guidance on sleep hygiene, and interventions to improve sleep quality, and it is necessary to increase the approach to this topic in the prenatal care routine.

Professionals who care for pregnant women should be aware that some reduction in sleep quality is expected during pregnancy; however, pregnant women with several complaints should be investigated for any disorder and assessed for the possibility of referral for sleep studies.[3, 5] Thus, it is essential that prenatal consultations promote qualified reception, address sleep-related issues systematically, and adopt a holistic perspective. This includes comprehensive care, health education that empowers pregnant women, and strengthening the bond with support groups, ensuring more humanized and effective care for maternal-fetal health.[26]

Some limitations should be considered in the study. Most of the included studies have a predominantly low to moderate level of evidence, with few randomized clinical trials, which makes it difficult to establish cause-and-effect relationships between technologies and clinical outcomes. In addition, two studies were excluded for not specifying the application of technologies in healthcare institutions, reducing the number of available evidence but ensuring methodological consistency. Differences in GDM diagnostic criteria between studies may also influence the interpretation of the findings.

Review has limitations, as it does not allow evaluating the effectiveness of the use of technologies, so the development of experimental studies is essential. It is recommended to conduct randomized clinical trials and longitudinal studies to assess with greater precision the impact of technologies on the sleep quality of these pregnant women. As sleep disorders can negatively affect a woman's quality of life, prenatal care should include health promotion strategies that address sleep quality and hygiene.

CONCLUSIONS

Despite limitations in the available scientific evidence, health technologies such as validated questionnaires (PSQI, MEQ), actigraphy, and CPAP have demonstrated potential for assessing and improving sleep, and educational strategies, such as booklets, promote self-care and are valuable tools in clinical practice in healthcare institutions.

The findings allowed the generation of guidance and support for both health professionals, to improve on the topic, and for women with GDM who seek alternatives to improve sleep during pregnancy.

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