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Systematic Review

Tele-obstetric Applications: Revolutionizing Prenatal Care and Maternal Health

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ABSTRACT

Pregnancy often accompanied by a multitude of questions and concerns for expectant mothers. Due to possible complications during pregnancy and limited access to healthcare in different geographical areas, this study aimed to evaluate the use of tele-obstetrics services for pregnant women. The Scopus, Google Scholar, PubMed and Science Direct were investigated with the keywords of Telemedicine, Obstetrics, Tele- Obstetrics. The articles over the past 10 years (2014- 2024) were analyzed. 46 articles including 44 in English and 2 in Persian were obtained. Tele-obstetric applications have emerged as a transformative force in the realm of prenatal care and maternal health. By leveraging technology, these innovative tools empower healthcare professionals to remotely monitor and support expectant mothers throughout their pregnancy period. these applications provide invaluable educational resources for pregnant women, offering personalized information on nutrition, exercise, and self-care. Tele-obstetric applications will become even more sophisticated by Integration of artificial intelligence and machine learning, as well wearable technology can provide even more comprehensive and real-time monitoring of maternal and fetal health. By embracing this technology while addressing its challenges, we can create a future where every pregnant woman receives the support and care regardless of location or circumstance.

Keywords: Telemedicine, Obstetrics, Tele- obstetrics

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INTRODUCTION

Pregnancy is a joyous yet transformative journey, often accompanied by a multitude of questions and concerns for expectant mothers (1). Traditional prenatal care, while invaluable, can sometimes involve inconvenient scheduling, travel time, and limited interaction with healthcare providers. Fortunately, the digital age presents an exciting solution: tele-obstetric applications (2).

The use of telemedicine for pregnant women can be considered as a suitable and cost-effective method with reducing the risks and adverse consequences of pregnancy. Healthcare services and medical activities such as remote evaluation, diagnosis and treatment of pregnancy diseases by healthcare providers using remote communication technologies can overcome geographical and physical limitations and potentially improve the prenatal care (3, 4).

Tele-obstetrics refers to the use of telecommunication technologies to deliver obstetric care remotely. This can include a variety of services, such as:

Virtual consultations: Pregnant women can meet with their healthcare provider via video conferencing for prenatal checkups, postpartum appointments, and consultations about concerns (5).

Remote monitoring: Women can use home-based devices to track their vitals, fetal heart rate, and other health indicators, which can then be reviewed by their provider remotely.

Ultrasound exams: In some cases, specially trained healthcare providers can perform ultrasounds remotely using portable ultrasound machines and telecommunication technology.

Education and support: Tele-obstetrics can also be used to provide educational resources and support groups for pregnant women and new mothers (6).

Due to the vulnerability and possible complications during pregnancy and pregnant mothers need to receive services and check the status of pregnancy frequently, as well as limited access to medical advice and self-care programs in different geographical areas, this review study aimed to evaluate the use of tele-obstetrics services for pregnant women.

METHODS

In this study, the initial search with keywords Telemedicine, Obstetrics, Tele-Obstetrics, gestational diabetes, in combination with the operator And the English equivalent of these words in Scopus, Google Scholar, PubMed, Science direct. A total of 46 articles were obtained. from this the articles were 44 in English and 2 in Persian. Access to the full text Articles, online access to the articles available in the years 2014 to 2024 and the full text of the articles in English or Persian were among the criteria for inclusion in the study. So, Old and repetitive articles were removed and studies related to the years 2014 to February 2024 were reviewed.

RESULTS

The landscape of prenatal care is experiencing a seismic shift with the rise of tele-obstetric applications (7). These innovative tools leverage technology to bridge the gap

between pregnant women and healthcare professionals, offering convenient, personalized, and accessible care during one of life's most critical journeys (8).

Tele-obstetric applications have emerged as a transformative force in the realm of prenatal care and maternal health. By leveraging technology, these innovative tools empower healthcare professionals to remotely monitor and support expectant mothers throughout their pregnancy journey (9).

Through telemedicine platforms, doctors can conduct virtual consultations, enabling timely interventions and reducing the need for in-person visits. This not only enhances access to quality care but also minimizes the burden on healthcare facilities, especially in underserved areas (10).

Moreover, tele-obstetric applications enable remote fetal monitoring, allowing healthcare providers to track vital signs and detect any abnormalities in real-time (11). This early detection of potential complications ensures prompt intervention and improves outcomes for both mother and baby (12).

Additionally, these applications provide invaluable educational resources for pregnant women, offering personalized information on nutrition, exercise, and self-care (13). This empowers expectant mothers to make informed decisions about their well-being, leading to healthier pregnancies (13).

In summary Tele-obstetric applications leverage technology to deliver remote prenatal care contain:

- Connect with their healthcare providers virtually: Schedule video consultations, discuss concerns, and receive real-time guidance from doctors or midwives.
- Monitor their health remotely: Track vital signs like blood pressure and weight, and use wearable devices to monitor fetal heart rate and movement.
- Access educational resources: Gain personalized information on various aspects of pregnancy, childbirth, and postpartum care through integrated educational modules.
- Join online support groups: Connect with other pregnant women, share experiences, and build a sense of community (14).

Benefits of Tele-Obstetric Applications:

- Enhanced Accessibility: Tele-obstetric applications overcome geographical barriers, providing vital prenatal care to women in remote areas or with limited mobility. This democratizes access to quality care, fostering inclusivity and equity in healthcare.
- Improved Convenience: Virtual consultations eliminate the need for time-consuming travel to appointments, reducing stress and allowing for more flexible scheduling. This is particularly beneficial for working women or those facing childcare challenges.
- Personalized Care: Tele-obstetric applications can deliver personalized care plans through remote monitoring of vitals, weight gain, and fetal movement. This empowers women to actively participate in their healthcare journey, leading to informed decision-making.
- Reduced Costs: By minimizing in-person visits and hospital stays, tele-obstetrics can significantly reduce healthcare costs for both patients and providers. This is especially crucial in regions with limited resources.
- Enhanced Education and Support: Tele-obstetric applications can provide readily accessible educational resources and support groups, fostering informed decision-making and reducing anxiety throughout the pregnancy (15).

Tele-obstetric for Gestational Diabetes Mellitus Patients

Tele-obstetrics, also known as telehealth in the context of pregnancy care, has emerged as a promising tool for managing gestational diabetes mellitus (16). It involves using remote technologies like video conferencing, phone calls, and mobile apps to deliver prenatal care and support to pregnant women with GDM (17). Some specific examples of how tele-obstetrics can be used for GDM management:

- Remote blood sugar monitoring: Patients can use home blood glucose meters that transmit data wirelessly to their healthcare providers.
- Video consultations: Patients can have scheduled video appointments with their doctors or nurses to discuss their blood sugar levels, diet, exercise, and any concerns they may have.
- Educational webinars and support groups: GDM patients can participate in online webinars or support groups to learn more about managing their condition and connect with other women who are going through the same experience (18).

Tele-obstetric for perclamsy Patients

Tele-obstetrics can be a beneficial option for perclamsy patients, as it can allow them to receive care from a specialist without having to travel long distances. There are a number of benefits to using tele-obstetrics for perclamsy patients (5). First, it can help to improve access to care. Perclamsy is a relatively rare condition, and there may not be many specialists available in all areas. Tele-obstetrics can allow patients to connect with a specialist regardless of where they live. Second, tele-obstetrics can be more convenient for patients (19). Perclamsy patients may have difficulty traveling long distances, due to the physical challenges of the condition. Tele-obstetrics can allow them to receive care from the comfort of their own homes. Third, tele-obstetrics can be more cost-effective for patients (19). Traveling for care can be expensive, and tele-obstetrics can help to reduce these costs (14).

Challenges and Considerations:

- Technology access: Ensuring equitable access to technology and digital literacy is crucial to bridge the digital divide.
- Data security and privacy: Robust measures are needed to protect sensitive medical information and ensure patient confidentiality.
- Limited physical examinations: While teleconsultations are valuable, certain aspects of prenatal care may still require in-person visits.
- Integration with existing healthcare systems: Seamless integration with existing medical records and communication channels is essential for efficient care coordination (20).

DISCUSSION

Key Features of Tele-Obstetric Applications include Secure Video Conferencing: Enables face-to-face consultations for diagnosis, symptom assessment, and emotional support. Remote Monitoring: Tracks vital signs, weight, fetal movement, and other health parameters through wearable devices or home-based equipment. Educational Resources: Provides access to evidence-based information on pregnancy, childbirth, and postpartum care. Messaging and Communication: Facilitates secure communication between patients and healthcare providers for questions and concerns. Medication Management: Enables remote prescription and delivery of essential medications (21).

As technology continues to evolve, tele-obstetric applications will become even more sophisticated. Integration of artificial intelligence and machine learning can offer personalized risk assessments and early detection of potential complications. Integration with wearable technology can provide even more comprehensive and real-time monitoring of maternal and fetal health (22).

CONCLUSION

Tele-obstetric applications hold immense promise for revolutionizing prenatal care, improving maternal health, and ensuring equitable access to quality healthcare. By embracing this technology while addressing its challenges, we can create a future where every pregnant woman receives the support and care they deserve, regardless of location or circumstance.

CONTRIBUTORSHIP STATEMENT

M.K. conceived of the idea. L.M. and M.K. developed and designed the study. E.J. and L.M. performed the experiments and collected data. M.K. and. L.M. analyzed the data. E.J. verified the results. All authors discussed the results. M.K. and L.M. wrote the first draft with contributions from E.J., and All authors reviewed and commented on the manuscript, as well as all are responsible for the content of the manuscript.

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DECLARATION OF CONFLICTING INTERESTS

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DATA AVAILABILITY STATEMENTS

The data will be made available from the corresponding author on reasonable request.

REFERENCES

1. Lothian JA. The journey of becoming a mother. J Perinat Educ. 2008;17(4):43-7.
2. Shmerling A, Hoss M, Malam N, Staton EW, Lyon C. Prenatal Care via Telehealth. Prim Care. 2022;49(4):609-19.
3. MORADI FATEMEH, GHADIRI ANARI AKRAM, ENJEZAB BEHNAZ. Telemedicine services for women with gestational diabetes mellitus during the COVID-19 pandemic: A review study. JOURNAL OF PREVENTIVE MEDICINE[Internet]. 2020;7(3):20-30. Available from: https://sid.ir/paper/365931/en.
4. Yasrebinia S, Zeynalzade M, Rezaei M. The effectiveness of using telemedicine on blood sugar control and maternal complications and neonatal outcomes of women with gestational diabetes during covid-19: a quasi-experimental study. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2023;26(5):22-30.
5. Kern-Goldberger AR, Srinivas SK. Obstetrical Telehealth and Virtual Care Practices During the COVID-19 Pandemic. Clin Obstet Gynecol. 2022;65(1):148-60.
6. Li S, Yang Q, Niu S, Liu Y. Effectiveness of Remote Fetal Monitoring on Maternal-Fetal Outcomes: Systematic Review and Meta-Analysis. JMIR Mhealth Uhealth. 2023;11:e41508.
7. Peahl AF, Howell JD. The evolution of prenatal care delivery guidelines in the United States. Am J Obstet Gynecol. 2021;224(4):339-47.
8. Magriples U, Kershaw TS, Rising SS, Massey Z, Ickovics JR. Prenatal health care beyond the obstetrics service: utilization and predictors of unscheduled care. Am J Obstet Gynecol. 2008;198(1):75.e1-7.
9. Fryer K, Delgado A, Foti T, Reid CN, Marshall J. Implementation of Obstetric Telehealth During COVID-19 and Beyond. Matern Child Health J. 2020;24(9):1104-10.
10. Haleem A, Javaid M, Singh RP, Suman R. Telemedicine for healthcare: Capabilities, features, barriers, and applications. Sens Int. 2021;2:100117.
11. Alves DS, Times VC, da Silva ÉMA, Melo PSA, Novaes MdA. Advances in obstetric telemonitoring: a systematic review. International Journal of Medical Informatics. 2020;134:104004.
12. Saharoy R, Potdukhe A, Wanjari M, Taksande AB. Postpartum Depression and Maternal Care: Exploring the Complex Effects on Mothers and Infants. Cureus. 2023;15(7):e41381.
13. Choudhury A, Shahsavar Y, Sarkar K, Choudhury MM, Nimbarte AD. Exploring Perceptions and Needs of Mobile Health Interventions for Nutrition, Anemia, and Preeclampsia among Pregnant Women in Underprivileged Indian Communities: A Cross-Sectional Survey. Nutrients. 2023;15(17).
14. Atkinson J, Hastie R, Walker S, Lindquist A, Tong S. Telehealth in antenatal care: recent insights and advances. BMC Med. 2023;21(1):332.
15. Kuziemsky C, Hunter I, Udayasankaran JG, Ranatunga P, Kulatunga G, John S, et al. Telehealth as a Means of Enabling Health Equity. Yearb Med Inform. 2022;31(1):60-6.
16. Rasekaba TM, Lim K, Blackberry I, Gray K, Furler J. Telemedicine for Gestational Diabetes Mellitus (TeleGDM): A Mixed-Method Study Protocol of Effects of a Web-Based GDM Support System on Health Service Utilization, Maternal and Fetal Outcomes, Costs, and User Experience. JMIR Res Protoc. 2016;5(3):e163.
17. Leblalta B, Kebaili H, Sim R, Lee SWH. Digital health interventions for gestational diabetes mellitus: A systematic review and meta-analysis of randomised controlled trials. PLOS Digit Health. 2022;1(2):e0000015.
18. Zork NM. Telehealth for the Management of Diabetes in Pregnancy. Curr Diab Rep. 2022;22(8):365-9.
19. Alkawaldeh M, Alkhawaldeh A, Yeboah T. Exploring patients' experiences with telehealth in obstetrics care during the COVID-19 pandemic: A qualitative study. PLoS One. 2023;18(12):e0292799.
20. Shaw RJ. Access to Technology and Digital Literacy as Determinants of Health and Health Care. Creat Nurs. 2023;29(3):258-63.
21. Janjua S, Carter D, Threapleton CJ, Prigmore S, Disler RT. Telehealth interventions: remote monitoring and consultations for people with chronic obstructive pulmonary disease (COPD). Cochrane Database Syst Rev. 2021;7(7):Cd013196.
22. Senbekov M, Saliev T, Bukeyeva Z, Almabayeva A, Zhanaliyeva M, Aitenova N, et al. The Recent Progress and Applications of Digital Technologies in Healthcare: A Review. Int J Telemed Appl. 2020;2020:8830200.