



Role of Artificial Intelligence in Infertility Screening and Treatment: A Systematic Review

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ABSTRACT

Introduction: Infertility and pregnancy complications are among the unpleasant experiences observed in societies, and their prevalence is not the same in different societies. According to the WHO 2023 report, about 17.5% of the adult population, approximately 1 in 6 worldwide, experience infertility. Screening programs aimed at reducing infertility rates have been implemented, and their effects have been observed in various communities. However, due to existing challenges, not everyone has sufficient access to necessary treatments and screenings. Given the widespread role of artificial intelligence (AI) in modern societies, this study was undertaken to collate and review previous articles on infertility, focusing on screening, diagnosis, and treatment.

Search Strategy: A review was conducted independently by two individuals based on PICO criteria and aligned with the research aim using Google Scholar, PubMed, Web of Science, SID, and Magiran search engines. The time limitation was set between 2018 and 2024, using the MESH keywords "Screening", "Treatment", "Infertility", and "Artificial Intelligence." According to the entry and exit criteria in the Prisma checklist, eight articles were selected from 43 primary articles.

Results: Studies have demonstrated that AI can provide personalized risk assessment, enable access to infertility specialists through telemedicine, and accurately distinguish viable blastocysts. AI algorithms can predict risks such as preeclampsia, premature birth, mortality, birth weight, miscarriage, and postpartum depression before pregnancy. Additionally, AI algorithms can non-invasively determine sperm chromosomal abnormalities with 70% accuracy, enhancing the quality of medical services and reducing human errors. AI can improve infertility care by detecting fetal defects, assisting in procedures like accurately tracking ovulation cycles, predicting treatment outcomes, and optimizing treatment processes through data analysis.

Conclusion and Discussion: AI holds significant potential in addressing infertility. Ethical considerations, infrastructure development, data security, and interdisciplinary cooperation are important for the ethical use of AI in infertility treatment. Considering the vast dimensions of AI, more research is recommended for its greater use in medicine and infertility.

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