

**Original Article****BRIDGING THE GAP: EXPLORING THE ACCEPTANCE OF ARTIFICIAL INTELLIGENCE PREDICTIONS IN FERTILITY TREATMENT BY PATIENTS**

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**Abstract**

**Background:** As Artificial Intelligence (AI) becomes increasingly integrated into healthcare, it becomes important to understand the viewpoint of the patients, as they are the main stakeholders in healthcare management. In reproductive medicine, predictive AI is demonstrating its role in the management of subfertility treatment. However, the viewpoint of the patients remains unexplored. The Objective of this study was to explore the acceptance of using AI predictions in the treatment of subfertility among female patients seeking consultations.

**Material and methods:** An exploratory qualitative study was conducted with individual semi-structured interviews of sixteen female patients undergoing subfertility treatment at Dr. Rehmatullah's Hospital, Gojra. After taking informed consent, data were collected upon data saturation from June 2024 to August 2024. Interview transcripts were transcribed, translated with validation, and analysed for emerging themes using Braun and Clarke's steps of thematic analysis.

**Results:** Data analysis revealed 6 themes and 15 codes, including AI accuracy, need for clinician presence, transparency and clarity of process, data privacy concerns, and patient education. The study participants highlighted both hope as well as concerns for using AI for predictive analysis in subfertility treatment.

**Conclusion:** This study highlights that patient acceptance of Artificial Intelligence in fertility care is deeply linked to trust, transparency, clinician involvement, and ethical reassurance.

**Key words:**

Artificial Intelligence; Patient Acceptance of Health Care; Decision Making, Computer-Assisted; Reproductive Techniques, Assisted; Trust.

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**INTRODUCTION**

Artificial Intelligence (AI) has demonstrated significant potential to enhance diagnostic accuracy, predict treatment outcomes, and improve the overall efficiency of clinical decision-making.<sup>1,2</sup> The multi-faceted role of AI in multiple disciplines has already begun to transform clinical workflows and patient management. On the other hand, subfertility

diagnostic accuracy, predict treatment outcomes, and improve the overall efficiency of clinical decision-making.<sup>1,2</sup> The multi-faceted role of AI in multiple disciplines has already begun to transform clinical workflows and patient management. On the other hand, treatments are often complex, costly, and stressful for couples. The decision-seeking couples are often exhausted and seek solutions with a positive outcome that they can trust. AI has an emerging role in supporting decision-making for such patients by analyzing patient presentations, clinical and hormonal markers to predict treatment success.<sup>2</sup> This predictive ability of AI can aid clinicians in counselling patients with evidence-based data, providing optimal treatment suitable for individual

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couples. In its long-term impact, it can hence reduce the psychological and financial burden on patients by providing accurate predictions about what can work and what cannot.<sup>3</sup> Although AI holds promise for patient management, its acceptance remains uncertain. In sensitive areas such as conception and reproduction, where personal data and intimate decisions are involved, patient trust is less frequently addressed. Existing studies point to a lack of awareness about how AI functions, along with skepticism regarding data privacy, both of which can hinder patient acceptance.<sup>4,5</sup> In addition, important ethical issues including informed consent, transparency, and accountability in AI-assisted clinical care have yet to be fully explored in reproductive health settings.<sup>6</sup> Globally, much of the research on AI in healthcare has focused on technical dimensions such as performance, accuracy, and system-level integration.<sup>7</sup>

Far less attention has been paid to how patients themselves view AI, and in the area of fertility treatment, this neglect is particularly evident. In order to understand the context of the patients and how “ready” they are to accept AI tools for healthcare predictive analysis and disease management; it will be difficult to integrate AI into healthcare management.<sup>4</sup> Hence the successful use of AI in healthcare relies heavily on the perceived trust, awareness, and willingness to accept AI in clinical decision-making.

The lack of this evidence in reproductive medicine leaves a critical gap in achieving safe and ethical AI Integration into management. This study aimed to explore how female patients undergoing subfertility treatment perceive and accept the use of Artificial Intelligence in clinical decision-making. Specifically, it sought to identify the factors that influence their trust, awareness, privacy concerns, and willingness to engage with AI-based predictive tools.

## MATERIAL AND METHODS

This study adopted a qualitative exploratory design, well-suited for gaining an in-depth

understanding of participants’ perceptions and experiences without the constraints of pre-defined theoretical models. Semi-structured interviews allowed participants to freely express their views while ensuring coverage of the key study objectives. The study was conducted at the infertility clinic of Dr. Rahmatullah’s Hospital, Gojra, Pakistan, from June 2024 to November 2024. IRB number is AWBA/DME/MC/539/24 dated 17<sup>th</sup> May 2024. The clinic provides diagnostic and therapeutic services for couples undergoing fertility treatment and serves as a trusted site for patients from both urban and rural catchments. The target population included patients currently undergoing fertility treatment at the clinic. Purposive sampling was used to ensure diversity in terms of age, type (primary or secondary), and duration of infertility. Participants were eligible if they were receiving fertility treatment during the study period were able to provide informed consent; and were willing to share their perceptions and experiences regarding AI. Patients unwilling to participate or those experiencing acute psychological distress were excluded. A total of 16 female participants were recruited after explaining the nature of the study and obtaining informed consent. Recruitment continued until data saturation was reached, defined as the point when no new codes or themes emerged from subsequent interviews. Individual semi-structured interviews were conducted in a private consultation room to ensure confidentiality and comfort. Each interview lasted approximately 30–45 minutes and was guided by an interview schedule with open-ended questions. An interview protocol was developed via a literature review followed by pilot testing on 2 patients to check for understanding of the interview questions. Interviews were conducted in the Urdu language and were audio-recorded with permission. Verbatim transcripts, after translation to English, were prepared, and non-verbal observations were noted in field diaries. Table 1 presents key questions and probes guiding the interviews.<sup>8</sup>

**Table 1: Interview Protocol guiding individual semi-structured interviews.**

Guiding Questions	Probes
What do you know about Artificial Intelligence in healthcare or fertility treatment?	Where have you heard about AI? How do you think it works?
Do you think AI could be helpful in predicting the success of your fertility treatment?	In what ways could it be useful or not useful for you?
Would you be comfortable trusting AI predictions about your chances of conception?	What would make you feel more confident about such predictions?
How do you think AI should be used alongside your doctor's advice?	Should AI replace or support doctors? Why?
What concerns or worries would you have if AI were used in your treatment?	Do you worry about your personal data or decision-making?
Under what conditions would you accept AI as part of your fertility treatment?	What would make you reject it?

Data were analyzed using Braun and Clarke's (Braun & Clarke, 2006) six-phase thematic analysis, facilitated by Atlas.ti software (version X).<sup>9</sup> The process was iterative and reflective, ensuring deep engagement with participant narratives. First, transcripts were read repeatedly for familiarization, and memos were recorded in Atlasti. Second, initial codes were generated inductively, capturing both explicit statements and underlying meanings. Third, codes were clustered into categories using Atlas.ti's network view, creating broader themes. Fourth, themes were reviewed for internal consistency and alignment with the dataset. Fifth, themes were refined, defined, and named to capture their essence. Finally, a report was produced, integrating illustrative quotations from participants. To enhance rigor, coding was cross-checked by a second reviewer in Atlas.ti, and discrepancies were resolved through discussion. A reflexive journal-maintained transparency of analytic decisions. Ethical approval was obtained from the Institutional Review Board (IRB) as well as

permission to collect data from the data collection site prior to data collection. All participants provided written informed consent. Anonymity was maintained by assigning participant codes (e.g., P1, P2). Sensitive data were securely stored, and participants retained the right to withdraw at any stage without consequences to their treatment. The study adhered to Lincoln and Guba's criteria for trustworthiness.<sup>10</sup> Credibility was ensured through prolonged engagement, peer debriefing, and the use of verbatim quotations. Transferability was enhanced by detailed contextual descriptions. Dependability was supported through audit trails and documentation of analytic decisions. Confirmability was maintained by reflexive journaling and triangulation of interpretations.

## RESULTS

A total of six overarching themes and fifteen codes emerged from data analysis. These themes capture the perceptions, expectations, and concerns of patients regarding the use of artificial intelligence in fertility treatment.

**Table 2. Themes, Subthemes, and Codes Identified in Patient Perspectives on AI in Fertility Treatment**

Theme	Representative Codes
Trust in AI Systems	Consistency, prediction accuracy, confidence
Knowledge & Awareness	Understanding, curiosity, lack of awareness
Complementing Clinical Practice	Human oversight, AI as support, not replacement
Data Privacy	Confidentiality, data security, autonomy
Explanation & Guidance	Clear communication, patient education
Clarity of Processes	Transparency, accountability, process understanding

Most patients talked about concerns regarding trusting AI. Participants highlighted that for AI to be accepted in clinical management, it should be reliable and provide accurate answers. Further patients discussed the importance of having a transparent system for using AI. They wanted clarity on how AI-generated insights

would be incorporated into treatment plans. Participant P10 said, “If I understand clearly how my data is used, I would feel more comfortable.” This calls for a need to disseminate information about AI and its accountability. Participant P3 remarked, “*I need to be sure the AI system is reliable before I can trust its predictions about my treatment.*” Another participant, P7 said, “*If the AI tool shows high accuracy, it would give me more confidence in following its recommendations.*” The participants revealed varying levels of awareness about AI. Many of the participants reported limited exposure to AI and how it functions. One participant, P5, acknowledged, “*I don’t fully understand how AI works or how it applies to my case.*” While most of the patients felt unrelated to knowing about AI, some participants were curious and willing to learn more, noting that they were open to discovering possible benefits. This variation in understanding of AI Represents a clear knowledge gap, emphasizing a need for structured patient education on AI during subfertility consultations. Most of the study participants discussed that instead of using AI as a standalone tool, it can be used as a supportive tool and cannot be a substitute for the clinical expertise provided by the doctor herself. Participant P11 noted, “*I hope AI doesn’t replace the person, but only supports the doctor in making decisions.*” Similarly, another participant, P8, explained, “*AI can help, but I still want my doctor to explain things and guide me.*” These perspectives highlight a clear preference for collaborative human–AI integration, with clinicians remaining central to patient care. Participants were inquiring about the use of data while using AI and showed concerns about the confidentiality of personal and medical information. Participant P2 shared, “*I worry about the privacy of my data and how it is being used by the AI.*” Some participants expressed concern that their personal data might be misused or that confidential clinical information could be leaked. These entities point to the broader ethical implications of introducing AI into subfertility care. Patients

emphasized the need for clarity in how AI-generated predictions about their treatment outcomes. They felt that transparency in this process was essential for building confidence and trust. Participant P13 said, “*It is important for me to know how the AI comes to its results, not just what it says.*” Such expectations highlight the important role of clinicians in explaining AI outputs, offering reassurance, and ensuring that the patients remain active partners in the decision-making process. Finally, participants emphasized the importance of having a transparent process in the implementation of AI. They expressed the need to be informed about when and where AI would be applied in their treatment and how their personal data would be utilized. Participant P1 said, “*If I understand clearly how my data is used, I would feel more comfortable*”

## DISCUSSION

This study aimed to explore how patients viewed the use of artificial intelligence in subfertility care. The findings demonstrated that although patients acknowledged the potential benefits of AI, their acceptance is dependent on multiple factors. This study revealed those factors as trust, awareness, clinician involvement, privacy, and process transparency. Another factor adding to the complexity of patients' acceptance was the limited knowledge and awareness that patients demonstrated regarding AI. Although a few experts expressed curiosity, many admitted confusion and uncertainty about how AI related to their treatment and were openly skeptical about its use. This reflects the study findings of Saatci et al., who emphasized that the effective implementation of AI must be accompanied by efforts to strengthen AI awareness among the patients.<sup>7</sup> In the context of subfertility care, where decisions carry significant emotional and social burdens, the need for education and reassurance becomes even more pressing. The patients also highlighted the strong resistance to the notion of AI replacing clinicians. The patient emphasized the irreplaceable quality of

empathy, contextual judgment, and personal care provided by the clinicians, which cannot be replaced by AI. A study from consumer psychology indicated patient reluctance when AI appears to undermine human agency.<sup>11</sup> In contrast, our present study revealed that patients do not reject AI outright. Instead, they view it as a valuable tool only when embedded within human-led care. In other words, AI is acceptable when it operates as a supportive tool under the guidance of clinicians, rather than as an autonomous decision-maker. These insights resonate with the call for a human in the-loop system in medical AI, which reinforces that technology should serve to enhance, not replace, doctor-patient relationships.<sup>12</sup> In our study, patients expressed anxiety about sharing their sensitive reproductive information, which highlights that current ethical frameworks are not sufficient to ensure responsibility.<sup>13,14</sup> These concerns are consistent with Lupton's view that digital health data is never neutral but carries deep social and emotional significance to those it represents.<sup>15</sup> In reproductive care, these sensitivities are heightened by family aspirations and cultural expectations, making privacy and security particularly critical. This hence calls for a need of a robust governance system that can ensure accountability, confidentiality, and responsible data management. Another key factor influencing patient acceptance was the need for clear explanations of how predictions were generated. Patients indicated that outcomes alone were not sufficient. They also wanted to understand the reasoning and processes that produce those results. This finding aligns with the growing literature on explainable AI, which cautions that reliance on black box algorithms risks distancing the very individuals technology is intended to support.<sup>16</sup> In the context of subfertility care, transparent communication combined with clinical lead interpretation of AI output can provide reassurance, enhance trust, and enable patients to participate more confidently in the shared decision-making process.<sup>17</sup> This study showed that patient acceptance of AI in subfertility care cannot be

reduced to a simple choice of acceptance or rejection. Instead, it is a negotiated process in which patients carefully balance the potential benefits against the possible risks. Their willingness to engage is shaped not only by the accuracy and performance of the technology but also by wider expectations of trust, transparency, accountability, and ethical responsibility. These findings highlight that the adoption of AI is socially constructed and shaped by context. For developers and policymakers, the challenge is therefore to move beyond technical optimization and respond to the lived realities, concerns, and values of patients if AI is to be meaningfully integrated into reproductive healthcare. This study had various strengths. The use of qualitative methods provided rich contextualized insights that could not be captured by quantitative surveys. Additionally, adopting Braun and Clark's thematic analysis ensured of systematic yet flexible approach to coding and theme analysis. However, limitations must also be acknowledged. The study was conducted in a single center in Pakistan, which may limit transferability. Also, cultural factors including patient's prior exposure may shape perceptions in ways that differ from other contexts, suggesting the need for research across diverse populations and geographical locations.

## CONCLUSION

This study highlights the importance of building trust, transparency, and ethical safeguards when integrating Artificial Intelligence into fertility care.

## CONFLICT OF INTEREST

None

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## AUTHORS'S CONTRIBUTIONS

**NIK:** Idea Conception, Data Collection, Analysis, Manuscript Writing

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