



Original Research Article

UTILITY OF MENSTRUAL CYCLE TRACKING APPLICATIONS AS AN ADJUNCTIVE TOOL FOR IDENTIFYING MENSTRUAL IRREGULARITIES AND POSSIBLE ANOVULATION IN PRIMARY CARE: A MIXED-METHODS STUDY

Article History:

Name of Author:

Dr Kushal Rashmikant Parikh¹, Patel Mansi Govindbhai², Dr Divyesh Thakkar³, Dr Janki V. Amin⁴

Affiliation: ¹ Senior Resident, Department of General Medicine, Dr N D Desai Medical College and Research Institute, Dharmsinh Desai University, Gujarat, India

² Consultant Obstetrician & Gynaecologist, Tulsi Women's Hospital, Gujarat, India

³ Consultant Obstetrician & Gynaecologist, Urmi Women's Hospital, Mehmdavad, Gujarat, India

⁴ Junior Resident, Department of Obstetrics and Gynaecology, Dr N D Desai Medical College and Research Institute, Dharmsinh Desai University, Gujarat, India

Corresponding Author:

Dr Kushal Rashmikant Parikh

Received: 12-11-2025

Revised: 25-11-2025

Accepted: 11-12-2025

Published: 31-12-2025

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Noncommercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Abstract: Background: Menstrual irregularities and anovulation are common clinical presentations in primary care and gynaecology and often reflect underlying endocrine, metabolic, or psychosocial disturbances. The widespread use of digital menstrual cycle tracking applications has generated interest in their potential role as adjunctive tools for identifying menstrual abnormalities. However, real-world evidence integrating patient-reported experiences with clinician perspectives remains limited, particularly in primary care settings.

Objective: To evaluate the utility of menstrual cycle tracking applications as adjunctive tools for identifying menstrual irregularities and possible anovulation, incorporating perspectives of patients and family physicians. **Methods:** A mixed-methods observational study was conducted in 2021 involving adult users of menstrual cycle tracking applications and family physicians. Quantitative data were derived from application-reported menstrual cycle metrics, including cycle length, cycle variability, and indicators suggestive of ovulatory patterns, as estimated by the applications. Qualitative data were collected through structured patient feedback and semi-structured interviews with family physicians focusing on usability, interpretability, and clinical relevance. Descriptive statistical analysis and thematic qualitative analysis were performed, followed by integrative interpretation. **Results:** A total of 112 app users and 50 family physicians participated. Approximately one-third of users demonstrated menstrual cycle variability suggestive of irregular cycles, while about one-fifth showed application-derived patterns suggestive of possible anovulation. Most users reported increased awareness of menstrual health and greater confidence in discussing concerns with clinicians. Family physicians perceived app-generated data as a useful supplementary resource for longitudinal assessment, while emphasizing the need for clinical validation and cautious interpretation. **Conclusion:** Menstrual cycle tracking applications may serve as valuable adjunctive tools for flagging menstrual irregularities and patterns suggestive of possible anovulation when used alongside clinical evaluation. Their greatest utility lies in longitudinal monitoring and enhancement of patient-clinician communication rather than standalone diagnosis. Standardized interpretation frameworks and further validation studies are required to optimize their integration into routine clinical practice.

Keywords: Menstrual cycle tracking; Anovulation; Digital health; Wearable technology; Primary care; Reproductive health

INTRODUCTION

Menstrual cycle regularity is widely regarded as an important indicator of reproductive as well as overall

health, reflecting the coordinated interaction of endocrine, metabolic, and neurophysiological systems. Irregular menstrual cycles and anovulation

are frequently encountered in clinical practice and may be associated with conditions such as polycystic ovary syndrome, thyroid dysfunction, metabolic disorders, chronic stress, and hypothalamic suppression. Early identification of such abnormalities is clinically relevant, particularly in primary care, where initial evaluation and referral decisions are often made.

Traditionally, assessment of menstrual regularity and ovulation has relied on patient recall, calendar-based tracking, hormonal investigations, or ultrasonographic monitoring. These approaches are limited by recall bias, cost, accessibility, and limited feasibility in routine outpatient settings. In recent years, digital menstrual cycle tracking applications and wearable health technologies have emerged as widely used tools for continuous, user-driven monitoring of menstrual patterns.

Many contemporary applications integrate passive collected physiological data such as basal or peripheral skin temperature, heart rate, heart rate variability, and activity patterns to estimate cycle phases and ovulatory windows. Evidence suggests that these physiological markers vary predictably across the menstrual cycle and may provide indirect indicators of ovulatory function. Consequently, menstrual tracking applications have gained popularity not only for fertility awareness but also for broader menstrual health monitoring purposes.

Despite increasing adoption, the clinical application of app-generated menstrual data remains inconsistent, particularly in primary care. Family physicians are frequently consulted for menstrual concerns, yet there is limited guidance on interpreting app-derived information. Moreover, patients' perceptions, understanding, and trust in these digital tools influence how effectively such data can be incorporated into clinical encounters.

This study aimed to evaluate the utility of menstrual cycle tracking applications as adjunctive diagnostic tools for identifying menstrual irregularities and possible anovulation, incorporating both patient experiences and family physician perspectives within a real-world primary care context.

2. MATERIALS AND METHODS

2.1 Study Design

A mixed-methods observational study employing a convergent design was conducted between January and December 2021. Quantitative data from menstrual tracking applications were combined with qualitative insights from patients and family physicians to provide a comprehensive understanding of clinical utility and real-world applicability.

2.2 Study Population

Adult individuals of reproductive age (18–45 years) who had been using a menstrual cycle tracking application for a minimum of six consecutive months were eligible for inclusion. Family physicians with experience in managing menstrual or reproductive health concerns in routine clinical practice were also recruited.

2.3 Recruitment

Participants were recruited through outpatient clinics, professional networks, and digital outreach platforms. Participation was voluntary, and informed consent was obtained from all participants prior to data collection.

2.4 Data Collection

Quantitative data included app-reported menstrual cycle metrics such as average cycle length, cycle length variability, and indicators suggestive of ovulatory or anovulatory patterns, as estimated by application algorithms. Qualitative data were collected through structured patient feedback and semi-structured interviews with family physicians focusing on perceived usefulness, interpretability, accuracy, and clinical integration.

2.5 Data Analysis

Quantitative data were analyzed descriptively. Menstrual irregularity was operationally defined as cycle length variability exceeding seven days across consecutive cycles. Possible anovulation was inferred from the absence of consistent luteal-phase physiological patterns as reported by the applications across multiple cycles, recognizing that definitive diagnosis requires biochemical or ultrasonographic confirmation. Qualitative data were analyzed thematically, and findings were integrated at the interpretation stage.

2.6 Ethical Considerations

The study adhered to the principles of the Declaration of Helsinki. All data were anonymized, and no identifiable personal health information was collected.

2.7 Methodological Rigor

To build trust and maintain consistency, the research setup referred to the similar methods that were already used in digital health and wearable technology studies. The combination of patient, reported data, app, generated metrics, and clinician perspectives helped to strengthen the interpretive validity. The researchers remained self-aware and reflective through the analysis in order to reduce potential researcher bias, especially when they were interpreting the subjective experiences of technology

use and clinical judgment.

RESULTS

3.1 Participant Characteristics

The study included 112 menstrual tracking application users and 50 family physicians. The mean age of app users was 28.6 ± 5.4 years. Most users reported regular application use for more than six months. The mean duration of clinical experience among family physicians was 9.2 ± 4.8 years.

3.2 Menstrual Cycle Characteristics

Approximately 33.9% of users demonstrated cycle length variability consistent with menstrual irregularity. Application-derived physiological indicators suggested ovulatory patterns in 66.1% of users, while 21.4% showed features consistent with possible anovulation.

Table 1. Menstrual Cycle Characteristics Based on App-Tracked Data (n = 112)

Parameter	Mean $\pm$ SD / n (%)
Mean cycle length (days)	28.9 ± 4.6
Cycle length variability (>7 days)	38 (33.9%)
Evidence suggestive of ovulatory pattern	74 (66.1%)
Possible anovulatory cycles	24 (21.4%)
Inconclusive data patterns	14 (12.5%)
Average tracking duration (months)	7.8 ± 3.1

3.3 Patient-Reported Utility

Most users reported improved awareness of their menstrual patterns and increased confidence in discussing menstrual concerns with clinicians. Visual cycle summaries and temperature-based trends were perceived as particularly helpful.

Table 2. Patient Perceptions of Menstrual Tracking Applications (n = 112)

Perceived Benefit	Agree n (%)	Neutral n (%)	Disagree n (%)
Improved awareness of cycle regularity	86 (76.8%)	18 (16.1%)	8 (7.1%)
Helpful in identifying possible irregularities	79 (70.5%)	22 (19.6%)	11 (9.9%)
Increased confidence in discussing symptoms with clinicians	72 (64.3%)	26 (23.2%)	14 (12.5%)
Easy to understand app-generated insights	68 (60.7%)	29 (25.9%)	15 (13.4%)

3.4 Physician Perspectives

Family physicians viewed app-generated menstrual data as useful supplementary information, particularly for longitudinal assessment. However, they emphasized the importance of clinical correlation and cautioned against reliance on app predictions alone.

Table 3. Family Physician Perspectives on Menstrual Tracking Applications (n = 50)

Clinical Perception	Agree n (%)	Neutral n (%)	Disagree n (%)
Useful as a supplementary diagnostic tool	38 (76.0%)	9 (18.0%)	3 (6.0%)
Improves patient-clinician communication	41 (82.0%)	6 (12.0%)	3 (6.0%)
Reliable for ovulation estimation	29 (58.0%)	15 (30.0%)	6 (12.0%)
Requires clinical validation before decision-making	44 (88.0%)	5 (10.0%)	1 (2.0%)

Graphical Representation of Findings

To enhance interpretability, the following figures are proposed:

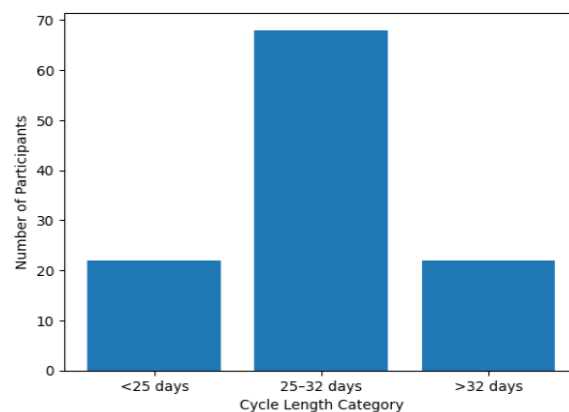


Figure 1. Distribution of menstrual cycle lengths among app users, illustrating variability and identification of irregular cycles.

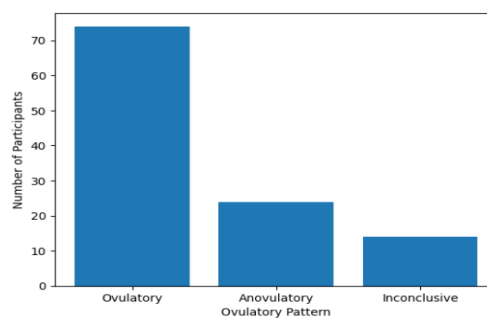


Figure 2. Proportion of users exhibiting ovulatory, anovulatory, and indeterminate cycle patterns based on app-derived physiological data.

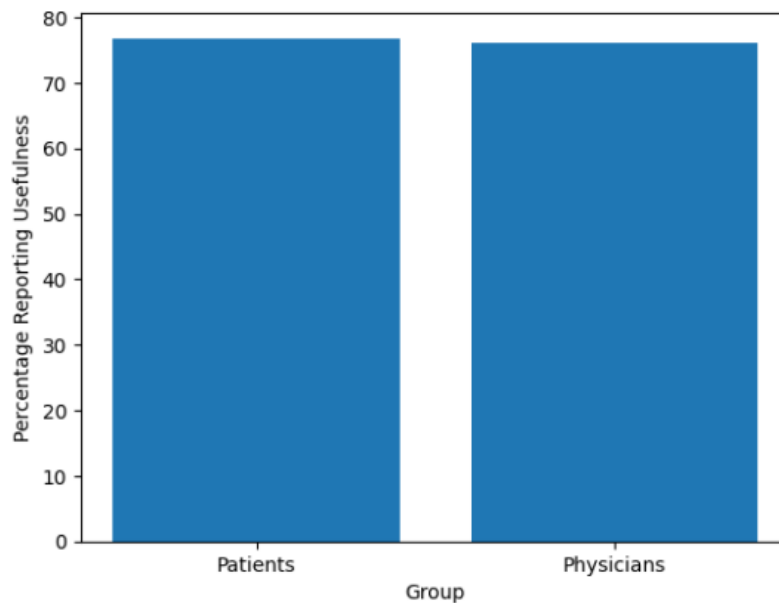


Figure 3. Comparison of patient and physician perceptions regarding the clinical usefulness of menstrual tracking applications.

Summary of Key Findings

Overall, these results provide evidence that menstrual tracking applications can give patients valuable insights into the regularity of their cycle, as well as potential ovulatory disturbances. Patients reported increased self-awareness and communication with healthcare providers, while family physicians saw the app-generated data as an additional source of clinical information. Although there are limitations in terms of standardization and interpretation, the findings are in line with menstrual tracking applications serving as a resource helpful in primary care to identify menstrual irregularities and possible anovulation.

DISCUSSION

This study suggests that menstrual cycle tracking applications may provide clinically relevant information regarding menstrual regularity and possible ovulatory disturbances when used consistently over time. The findings support the role of these tools as adjuncts rather than replacements for clinical evaluation.

The combined perspectives of patients and physicians underscore the value of app-generated data in enhancing patient engagement and facilitating more informed clinical discussions. Longitudinal tracking appears particularly useful in identifying subtle or intermittent irregularities that may not be evident during single clinic visits.

However, variability in application algorithms and reliance on self-reported data underscore the need for cautious interpretation. Standardized validation frameworks and clinician education are essential for safe and effective integration into routine care.

5. LIMITATIONS

The study relied on self-reported and application-generated data without direct validation against

hormonal assays or ultrasonographic ovulation assessment. The observational design and voluntary participation introduce potential selection bias, thereby limiting generalizability. Additionally, variability among menstrual tracking applications and their underlying algorithms was not analyzed separately.

CONCLUSION

Menstrual cycle tracking applications have the potential to serve as effective adjunctive tools for identifying menstrual irregularities and patterns suggestive of possible anovulation in primary care settings. Their greatest benefit lies in longitudinal monitoring and strengthening patient-clinician communication rather than standalone diagnosis. Future research should focus on standardized validation criteria, integration of clinical decision support, and evaluation across broader populations.

REFERENCES

1. Lyzwinski L, Elgendi M, Menon C. Innovative Approaches to Menstruation and Fertility Tracking Using Wearable Reproductive Health Technology: Systematic Review. *J Med Internet*

- Res. 2024 Feb 15;26:e45139. doi: 10.2196/45139. PMID: 38358798; PMCID: PMC10905339.
2. Goodale BM, Shilaih M, Falco L, Dammeier F, Hamvas G, Leeners B. Wearable Sensors Reveal Menses-Driven Changes in Physiology and Enable Prediction of the Fertile Window: Observational Study. *J Med Internet Res*. 2019 Apr 18;21(4):e13404. doi: 10.2196/13404. PMID: 30998226; PMCID: PMC6495289.
3. Maijala A, Kinnunen H, Koskimäki H, Jämsä T, Kangas M. Nocturnal finger skin temperature in menstrual cycle tracking: ambulatory pilot study using a wearable Oura ring. *BMC Womens Health*. 2019 Nov 29;19(1):150. doi: 10.1186/s12905-019-0844-9. PMID: 31783840; PMCID: PMC6883568.
4. Thigpen N, Patel S, Zhang X. Oura Ring as a Tool for Ovulation Detection: Validation Analysis. *J Med Internet Res*. 2025 Jan 31;27:e60667. doi: 10.2196/60667. PMID: 39889300; PMCID: PMC11829181.
5. Shilaih M, Goodale BM, Falco L, Kübler F, De Clerck V, Leeners B. Modern fertility awareness methods: wrist wearables capture the changes in temperature associated with the menstrual cycle. *Biosci Rep*. 2018 Nov 30;38(6):BSR20171279. doi: 10.1042/BSR20171279. PMID: 29175999; PMCID: PMC6265623.
6. Alzueta E, Gombert-Labedens M, Javitz H, Yuksel D, Perez-Amparan E, Camacho L, Kiss O, de Zambotti M, Sattari N, Alejandro-Pena A, Zhang J, Shuster A, Morehouse A, Simon K, Mednick S, Baker FC. Menstrual Cycle Variations in Wearable-Detected Finger Temperature and Heart Rate, But Not in Sleep Metrics, in Young and Midlife Individuals. *J Biol Rhythms*. 2024 Oct;39(5):395-412. doi: 10.1177/07487304241265018. Epub 2024 Aug 6. PMID: 39108015; PMCID: PMC11416332.
7. Adnan T, Li H, Peer K, Peebles E, James K, Mahalingaiah S. Evaluation of Menstrual Cycle Tracking Behaviors in the Ovulation and Menstruation Health Pilot Study: Cross-Sectional Study. *J Med Internet Res*. 2023 Oct 27;25:e42164. doi: 10.2196/42164. PMID: 37889545; PMCID: PMC10638629.
8. Huhn S, Axt M, Gunga HC, Maggioni MA, Munga S, Obor D, Sié A, Boudo V, Bunker A, Sauerborn R, Bärnighausen T, Barteit S. The Impact of Wearable Technologies in Health Research: Scoping Review. *JMIR Mhealth Uhealth*. 2022 Jan 25;10(1):e34384. doi: 10.2196/34384. PMID: 35076409; PMCID: PMC8826148.
9. Yu JL, Su YF, Zhang C, Jin L, Lin XH, Chen LT, Huang HF, Wu YT. Tracking of menstrual cycles and prediction of the fertile window via measurements of basal body temperature and heart rate as well as machine-learning algorithms. *Reprod Biol Endocrinol*. 2022 Aug 13;20(1):118. doi: 10.1186/s12958-022-00993-4. PMID: 35964035; PMCID: PMC9375297.
10. Shilaih M, Clerck V, Falco L, Kübler F, Leeners B. Pulse Rate Measurement During Sleep Using Wearable Sensors, and its Correlation with the Menstrual Cycle Phases, A Prospective Observational Study. *Sci Rep*. 2017 May 2;7(1):1294. doi: 10.1038/s41598-017-01433-9. PMID: 28465583; PMCID: PMC5431053.
11. Cromack SC, Walter JR. Consumer wearables and personal devices for tracking the fertile window. *Am J Obstet Gynecol*. 2024 Nov;231(5):516-523. doi: 10.1016/j.ajog.2024.05.028. Epub 2024 May 18. PMID: 38768799.
12. Najmabadi S, Schliep KC, Simonsen SE, Porucznik CA, Egger MJ, Stanford JB. Characteristics of menstrual cycles with or without intercourse in women with no known subfertility. *Hum Reprod Open*. 2022 Sep 27;2022(4):hoac039. doi: 10.1093/hropen/hoac039. PMID: 36186844; PMCID: PMC9519089.
13. Shkodzik K. Innovative Approaches to Digital Health in Ovulation Detection: A Review of Current Methods and Emerging Technologies. *Semin Reprod Med*. 2024 Jun;42(2):81-89. doi: 10.1055/s-0044-1793829. Epub 2024 Nov 21. PMID: 39572028.
14. Haile L, van de Roemer N, Gemzell-Danielsson K, Perelló Capó J, Lete Lasa I, Vannuccini S, Koch MC, Hildebrandt T, Calaf J. The global pandemic and changes in women's reproductive health: an observational study. *Eur J Contracept Reprod Health Care*. 2022 Apr;27(2):102-106. doi: 10.1080/13625187.2021.2024161. Epub 2022 Jan 18. PMID: 35040737.
15. Gombert-Labedens M, Alzueta E, Perez-Amparan E, Yuksel D, Kiss O, de Zambotti M, Simon K, Zhang J, Shuster A, Morehouse A, Alessandro Pena A, Mednick S, Baker FC. Using Wearable Skin Temperature Data to Advance Tracking and Characterization of the Menstrual Cycle in a Real-World Setting. *J Biol Rhythms*. 2024 Aug;39(4):331-350. doi: 10.1177/07487304241247893. Epub 2024 May 20. PMID: 38767963; PMCID: PMC11294004.