



Evaluating the Knowledge Attitudes Practices of Specialist Healthcare Providers [OB/GYN] on Femtech: A Cross-Sectional Study

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Abstract

Background: Obstetricians and Gynecologists (OB/GYN) play a pivotal role in shaping the landscape of women's healthcare, encompassing crucial areas such as prenatal care, childbirth assistance, gynecological exams, and reproductive health management. Understanding their Knowledge, Attitudes, and Practices (KAP) regarding Femtech remains a critical aspect, ensuring its effective integration into clinical care. In this regard, this study aimed to evaluate the KAP of OB/GYNs in Karnataka, towards fem-tech.

Method: A cross-sectional descriptive study investigates the KAP of OB/GYNs in Karnataka. Information was gathered via a self-conducted survey entailing 12 questions, using a convenient sampling method.

Result: A total cohort of 94 OB/GYNs from Karnataka participated in the survey with mean 10 years of experience. Among the participants, 80% (n = 75) were actively involved in private healthcare facilities, while the remaining 20% (n = 19) were associated with public healthcare facilities. Within this cohort, 66% (n = 62) demonstrated good knowledge, 75.7% (n = 71) displayed a positive attitude, and 37.2% (n = 35) exhibited good practice towards Femtech.

Conclusion: Though more than half of the participants exhibited positive knowledge and attitude, the practice scores is pronouncedly lower among participants underscoring the urgency of targeted interventions and educational initiatives within the OB/GYNs of Karnataka.

Keywords: Attitude; Femtech; Knowledge; Practice; Healthcare

Introduction

Women in developing nations frequently experience poor health and are burdened with heavy workloads. A significant

number suffer from anemia, malnutrition, and parasitic infections, particularly during pregnancy and childbirth. Approximately 37% of pregnant women suffer from anemia worldwide [1,2]. Nearly 300,000 women succumb to complications during pregnancy and

childbirth each year [3]. The psychological factor in women (fear of painful diagnosis), lack of trained OB/GYNs, medical facilities and digital literacy play a considerable role in discouraging them for a routine check [4].

To enhance health outcomes and align with national targets outlined in the Long-Term Plan, the NHS has shifted its focus to leverage digital technology in the last thirty years [4,5]. This encompasses a variety of components in Health Information and Communications Technology (ICT), such as multiplatform features (web-based, native computer and smartphone-based and basic mobile phones), wellness apps, gamification, metadata, sensors and wearable devices, electronic health records, medical imaging, telemedicine, and personal genomics. These applications are accessible at any time, allowing individuals to access online information, create and share their health data, as well as share their experiences related to healthcare and illness [6].

Danish entrepreneur Ida Tin coined the term “Femtech” for the first time in 2016 [7]. A hybrid tool comprises the combination of in-person care and telehealth offers cost-effectiveness, convenience, proactive treatment, and time efficiency [8]. Businesses within this sector create and provide software, products, and services aimed at addressing health issues exclusive to women or those that affect them differently or disproportionately, such as pregnancy [9]. There are 12 FemTech app present helping women take control of their health including Know Your Lemons, Keep a Breast, mySystems, Balance, Health & Her, Baby Breastfeeding Tracker, Easy Kegel, Pregnancy+, BabyCentre, Ava, Clue and Flo [10]. As per a Statista report, the worldwide market size for the femtech products and services reached around 45.5 billion U.S. dollars in 2021, with expectations to exceed 75 billion U.S. dollars by 2025 [11].

OB/GYNs (Obstetricians and Gynecologists) play a crucial role in providing awareness on FemTech due to their unique position as healthcare professionals specializes in the care of diseases and disorders of the female reproductive system [12]. Patients often have a longstanding relationship of trust with their OB/GYN, making them credible sources of information, recommendations and guidance, fostering confidence in the adoption of Femtech solutions. Approximately 60% of women aged 16 to 77 visited an OB/GYN annually [13], where in numerous cases, individuals consider their OB-GYN as their primary care physicians. The awareness of fem-

tech solutions by OB/GYNs is essential for embracing the potential benefits of Femtech, improving patient outcomes, and ensuring that women receive holistic and personalized care aligned with advancements in reproductive health technology.

Over the past seven years (2015-2021), the proportion of livebirths in India decreased from 90.2% to 88.9%. Nearly half of the Indian states and union territories had livebirth rates lower than the national average. Stillbirths increased by 28.6% (from 0.7% to 0.9%) among Indian women [14]. In Karnataka, the District Level Household and Facility Survey (DLHS-4) indicated that 36.1% of women reported pregnancy complications, 26.1% reported delivery complications, and 13.1% reported postdelivery complications [15]. To improve these outcomes, current cross-sectional study seeks to evaluate the Knowledge, Attitudes, and Practices (KAP) of OB/GYNs concerning Femtech in Karnataka.

Methodology

Study design

A cross-sectional descriptive study was conducted to assess KAP scores related to FemTech among OB/GYNs in Karnataka. The study employed a convenient sampling technique. Inclusion criteria involved OB/GYN practitioners providing healthcare services in Karnataka during the study period. The questionnaire were distributed through various channels, involving the distribution of online surveys to hospitals, private clinics, and direct messaging to healthcare professionals specializing in Obstetrics and Gynecology. The sample size calculation was based on established parameters: Z = standard normal distribution value at a 95% confidence level (1.96), and margin of error (d) set at 5%.

Study instruments

A comprehensive questionnaire comprises 12 questions (Qs) aimed at acquiring demographic details and sample characteristics, including years of experience (1Q), and nature of practice (1Q). The multiple questionnaires also covers aspects related to Knowledge (4Qs), Attitude (3Qs), and Practice (3Qs). The surveyed healthcare professionals' were assessed on their familiarity with femtech, participation in video consultations, adoption of nutrition applications, endorsement of wearable devices such as Fitbit, perspectives on the integration of technology in patient care, the importance attributed to in-person visits, awareness of remote

fetal monitoring devices like Fetosense, utilization trends of mental health apps for maintaining confidentiality, and their expectations regarding the future reliance of the next generation on femtech. Additionally, healthcare professionals were inquired about their awareness of girls or women using menstrual apps. Participants were given the opportunity to mark their responses as ‘Yes,’ ‘No,’ ‘Not sure,’ ‘True,’ ‘False,’ ‘Maybe,’ ‘Sometimes,’ ‘Strongly believe,’ ‘Likely,’ ‘Depends,’ and ‘Doubtful’. Participants were deemed to have achieved favorable KAP scores when they provided correct answers to 80%–100% of the questions.

Statistical analysis

The entire dataset underwent thorough scrutiny for completeness and consistency before being compiled, coded, and subsequently entered into the Microsoft Excel Sheet. The summary statistics, including frequencies and percentages, were employed to succinctly present the dataset, with the findings visually depicted through tables and graphs.

Ethical approval

The Institutional Ethics Committee (IEC) granted the study ethical permission. All pertinent and required documents was sent to the Ethics Committee. After stating that participation in the study would be completely voluntary and that confidentiality and anonymity would be rigorously preserved, verbal consent was obtained.

Results

A total cohort of 94 individuals actively participated in the study, with an average of 10 years of professional experience. The demographic data indicate that 80% (n = 75) of the participants were involved in private practice, with the remaining 20% (n = 19) affiliated with public healthcare settings (Table 1).

Category	OB/GYNs N = 94
Years of experience (mean)	10
Nature of practice	
Private	75 (80)
Public	19 (20)

Table 1: Socio-demographic details of OB/GYN Specialists.

Knowledge of OB/GYNs on femtech

In our research, a substantial level of knowledge was observed among 66% (n = 62) of participants (Fig 1.). About 47.8% (45/94) demonstrated awareness of femtech, while 54.2% (51/94) exhibited familiarity with fetal monitoring devices. Furthermore, 76.5% (72/94) and 86.1% (81/94) responses indicated the popularity of menstrual and mental health apps, respectively (Table 2).

Questions	Responses	N (%)
Have you heard of femtech?	Yes	45 (47.8)
	No	49 (52.1)
Have you heard of remote fetal monitoring devices like Fetosense?	Yes	51 (54.2)
	No	32 (34)
	Not Sure	11 (11.7)
Is the popularity of mental health apps primarily attribute to the assurance of confidentiality and anonymity?	True	81 (86.1)
	False	13 (13.8)
Do you know some of the girls/women who use menstrual app?	Yes	72 (76.5)
	No	22 (23.4)

Table 2: Knowledge of OB/GYNs on Fem-tech.

Attitudes of OB/GYNs on femtech

In our cohort, a positive attitude was observed in 75.5% (n = 71) of participants (Figure 1). About 85.1% (80/94) emphasized the importance of tech-health in patient care, another 85.1% (80/94) indicated a higher likelihood of future generations embracing Femtech, and 55.3% (52/94) responses highlighted the significant and irreplaceable importance of personal visits (Table 3).

Questions	Responses	N (%)
Do you think tech health adds value to patient care?	Yes	80 (85.1)
	No	14 (14.8)
Do you believe that nothing can replace personal visits because touch and feel is important?	Strongly believes	52 (55.3)
	Likely believes	9 (9.5)
	Depends	33 (31.9)
	Doubtful	3 (3.1)
Next generation will largely rely on femtech.	True	80 (85)
	False	7 (7.4)
	Maybe	7 (7.4)

Table 3: Attitude of OB/GYNs on Fem-tech.

Practice of OB/GYNs on femtech

In the study conducted among OB/GYNs, the practice score was 37.2% (n = 35) (Figure 1). Among the surveyed participants: 17% (16/94) reported practicing video consultation, 42.5% (40/94) provided recommendations for nutritional apps., and 52.1% (49/94) demonstrated support for wearable devices (Table 4).

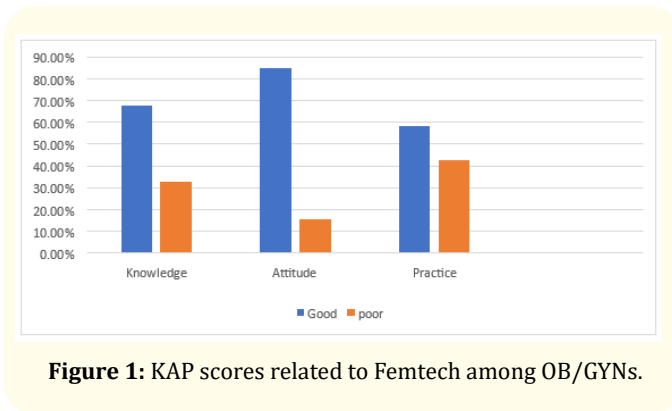


Figure 1: KAP scores related to Femtech among OB/GYNs.

Questions	Responses	N (%)
Do you offer video consultations?	Yes	16 (17)
	No	50 (53.1)
	Sometimes	28 (29.7)
Do you direct any of your patients to nutrition apps?	Yes	40 (42.5)
	No	54 (57.4)
Do you encourage wearable devices like Fitbit?	Yes	49 (52.1)
	No	55 (47.8)

Table 4: Practice of OB/GYNs on Fem-tech.

Discussion

In the current era of digital health, it is crucial to assess the readiness and viewpoints of OB/GYNs regarding Femtech, given their pivotal role as primary stakeholders in women’s reproductive health. Femtech offers a myriad of advantages, including the augmentation of users’ capacity for self-insights, the expansion of virtual connections, promotion of equitable access, enhancement of patient empowerment, cost-effectiveness, facilitation of point-of-care interactions, and fostering self-care in collaboration with healthcare professionals such as doctors, nurses, and communitybased providers [8].

Telemedicine applications offer a versatile solution that has the potential to enhance the autonomy of healthcare professionals,

elevate their individual expertise, and ultimately contribute to the selfmanagement of patients in the long run [24]. The current study’s findings reveal that, although the term “fem-tech” may not have widespread recognition, a substantial number (67.6%) of participants displayed awareness of its underlying concept. However, literature surveying various studies illustrates considerable disparities in the knowledge levels of healthcare professionals, including obstetricians and gynecologists, with percentages reported as follows: 80.7% (Pakistan) [16], 65.8% (Ethiopia) [17], 31.7% (Syria) [18], 23.6% (Germany) [19], and 25% (Saudi Arabia) [20]. These variations in awareness underscore the need for targeted education and awareness initiatives within the healthcare community to ensure a more comprehensive understanding of fem-tech, fostering its integration into medical practices for enhanced patient care and outcomes.

Emphasizing attitude as another factor underscores its potential to impede or hinder the adoption of digital health initiatives [21]. Regarding the attitude of OB/GYNs, 75.5% positive scores has been noted in our study, indicating significant and irreplaceable importance of personal visits, as well as signifying the growing importance of Femtech in patient care, both in the current and future contexts. Other studies manifested 67-80% mean preparedness to embrace mobile medical technology: 80% (Jordan) [22], 70% (Iran) [23], 67.3% (Germany) [23].

These positive attitudes toward Femtech among OB/GYNs not only highlight the current importance placed on traditional in-person visits but also signify a growing recognition of Femtech’s role in advancing patient care.

Practicing digital health can contribute to cost savings by streamlining processes, reducing administrative overhead, and minimizing unnecessary tests through more targeted and efficient healthcare delivery [24]. It can empower patients by providing access to health information, enabling self-monitoring, and fostering active participation in their healthcare journey. In gynecology, telemedicine is less prevalent compared to other medical disciplines like anesthesia, and intensive care and internal medicine [23]. In our study only about 37.2% respondents offered video consultations and provide recommendation on using health-tech for remote management. Similarly, in other studies the practice score among gynecologists remain poor: 8.1% (Germany) [24],

33.3% (Australia) [25], 45.4% (Multinational) [26]. Factors that may contribute to disparities observed in KAP scores is attributed to data collection occurring in the pre-and during Covid period [27], mixed healthcare professions [23], and diverse resource settings [21].

In addition, the slow adoption of femtech might be influenced by limited awareness and education [21], doctors' age, years of experience, privacy and security concerns [23], cost and affordability [30], disparities in access to digital technologies [20], global variations in healthcare practices [28], insufficient computer training [29], limited Internet availability in the workplace [30], access to private laptops [21], inadequate infrastructure, absence of appropriate policies [30], varying levels of experience and knowledge among health professionals, organizational factors [22], and due to concerns about reliability and real-world advantages [30].

According to current stats, pregnant women suffers numerous complications, such as 41.8% experiencing anemia [31], 2-10% gestational diabetes [32], 6-8% gestational hypertension [33], 2-8% preeclampsia [34], 10-20% depression [35], 15-23% anxiety [36], 15.3% miscarriages [37], 1 in 160 stillbirths [38], and 3-8% postpartum hemorrhage [39]. To reduce these complexities, Femtech offers a range of solutions. Applications play a pivotal role by providing personalized guidance for health concerns in pre-pregnancy, during and post pregnancy period. For e.g. Creating a specialized nutrition checklist for conditions like Gestational Diabetes Mellitus or nutrient hypersensitivity. Integrated into digital platforms through femtech, this checklist ensures easy access to personalized nutritional guidance, improving both immediate health outcomes and long-term well-being. It help quantifying reproductive processes such as periods, conception, pregnancy and hormonal health and promise their users greater 'self-awareness' and 'control' through 'self-management' [40].

The introduction of remote counseling not only increases accessibility for individuals but also facilitates a more convenient and widespread dissemination of essential information. Online support groups and forums create safe spaces for sharing experiences, seeking advice, and fostering a sense of community among women facing similar challenges. Furthermore, the

utilization of remote monitoring devices has the potential to significantly reduce costs, time, and complications related to maternal and neonatal health [7].

Lack of practice scores in current study substantiate the need to increase awareness and accessibility of Femtech among OB/GYNs. Strategic steps that can be taken include implementing specialized education and training programs that focus on Femtech advancements, applications, and potential benefits, as well as organizing workshops, webinars, continuing medical education (CME) courses, and creating dedicated spaces for conversations and information-sharing [41]. Increasing FemTech practices in OB/GYN involves strategic collaboration with medical associations like FIGO, promoting adoption through guidelines and research-backed evidence [7]. Seamless integration into electronic health records and practice management systems enhances accessibility during patient visits. Patient involvement in discussions and advocacy for reimbursement incentivize OB/GYNs to recommend FemTech services, fostering widespread adoption. Continuous feedback from practitioners ensures ongoing improvement and addresses challenges in integrating these technologies into routine clinical practices [42].

To the best of our knowledge, this is the first study representing the KAP of OB/GYNs on Femtech in Karnataka. The implications of these findings extend to the healthcare landscape, influencing the ongoing discourse on the integration of technology in women's reproductive health. The identified gaps and trends in KAP can guide targeted interventions, educational programs, and policy initiatives aimed at enhancing the incorporation of FemTech in obstetric and gynecological care. Ultimately, the study contributes to the advancement of FemTech adoption, potentially leading to improved patient outcomes, increased efficiency, and a more informed and engaged healthcare community.

Conclusion

The study reveals a descending pattern of attitude, knowledge and practices among OB/GYNs. While a majority of participants demonstrated favorable knowledge and attitudes, there is a notable disparity in practice scores among the participants. This emphasizes the critical need for targeted interventions and educational initiatives within the OB/GYNs community in

Karnataka. Conducting a thorough analysis of their practices will, in turn, enable the identification of optimal interventions for this cohort.

Conflict of interest

All authors declare no conflict of interest.

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