

Exploring consumer intentions to adopt telepharmacy services and development strategic recommendations: three theoretical approaches

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Abstract

In the new normal era, telepharmacy represents an online platform for pharmaceutical services that offer various options and opportunities for pharmacists and pharmacies. This study aims to determine the factors that influence the intention to adopt telepharmacy services using 3 theoretical approaches, namely DeLone and McLean, Technology Acceptance Model (TAM), Theory of Acceptance and Use of Technology (UTAUT). The method used in this study was a cross-sectional survey; the sample used was 560 respondents. The primary data used in this study was through questionnaire. Data processing and analysis techniques were carried out using a statistical approach using the SmartPLS 3.0 software. The empirical model was analyzed and interpreted in two stages. First, evaluate the measurement model. Second, analysis the structural model, path coefficients, and determining the fit model. The results show that Facilitating condition, easy skillful; Efficacy response, social influence, and support; Promised time, system quality; Understanding, proficient, confident, and information quality are significantly influence the intention to adopt telepharmacy services.

Keywords

Intention to adopt, telepharmacy, consumer, DeLone and McLean, Technology Acceptance Model (TAM), Theory of Acceptance and Use of Technology (UTAUT)

Introduction

The healthcare sector faces numerous challenges, including managing chronic illnesses, controlling rising costs, and ensuring equitable access to high-quality medical care (Kifle et al. 2010). The growing demand for technology-based services in developing countries, driven by changes in the epidemiological landscape, user awareness, and adoption trends, has further exacerbated the situation. In Ethiopia

and other developing countries, there is a growing shortage of healthcare professionals, with many doctors and healthcare workers leaving for industrialized nations and a shift toward enrollment in Master of Public Health programs (Kifle et al. 2010). In response to these challenges, healthcare professionals are exploring telemedicine as a viable alternative. Telemedicine uses Information and Communications Technology (ICT) to deliver medical treatments remotely. It is particularly compelling in regions

with inadequate medical infrastructure, including a shortage of personnel, centers and institutions, equipment, and medications (Kifle et al. 2010). Furthermore, the ongoing COVID-19 pandemic has provided pharmacists with numerous opportunities and challenges to expand the scope of pharmaceutical services (Killeen et al. 2020). One of these opportunities is providing telepharmacy services using phone or video conferencing technology (Killeen et al. 2020). The implementation of telepharmacy in hospitals and community pharmacy presents a significant challenge, particularly regarding the provision of pharmaceutical care to outpatients (Goitia et al. 2020). Telepharmacy enables experienced pharmacists to provide healthcare services, including drug evaluation, patient counseling, and prescription verification, it addresses the shortage of healthcare resources and improves access to care in underserved communities by leveraging technology (Poudel and Nissen 2016).

Several models have been developed to predict and evaluate the adoption of telemedicine, including the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Rouidi et al. 2022). A recent study combined elements of the Protection Motivation Theory (PMT) to create an integrative model with perceived vulnerability and severity (Guo et al. 2015). The result showed that effort expectations significantly impacted older participants' intention to engage in telehealth, while gender had no effect. Furthermore, it confirmed the importance of UTAUT as a crucial framework for empowering older individuals in telehealth (Diño and de Guzman 2015). The Delone and McLean model, which includes system quality, information quality, service quality, net benefit, and user satisfaction, was found to positively impact the intention to use telehealth (Al-Fadhli et al. 2018). However, this study used only one or two telemedicine application scenarios and theoretical perspectives. The study gap is filled by examining the variables affecting people's decisions to use telepharmacy services during the COVID-19 pandemic. The model includes variables from the UTAUT, task technology fit, awareness, and self-efficacy. The result provided unique guidelines to healthcare providers and software developers in creating a user-friendly telepharmacy application, increasing patient understanding to adopt telepharmacy for health care. Therefore, it is essential to understand the factors influencing user behavior in adopting the applications. This study has been undertaken to promote the adoption of telepharmacy services by identifying the key determinants and devising a plan for its development. Previous analysis has investigated the variables affecting the intention to utilize telemedicine based on technology acceptance (Zailani et al. 2014), use of technology (Dwivedi et al. 2019), and theory of planned behavior (Ramírez-Correa et al. 2020). However, these studies have only considered human factors, such as attitude and health literacy, or environmental factors, such as subjective norms and atmosphere.

Limited research on information technology adoption behavior in developing countries such as Indonesia and

differences in research results in various countries. This research gap need to reduce through a critical examination of the driving forces that influence users' decisions to adopt information technology. Moreover, the contextualization of the pertinent variables and the incorporation of the current model are novelty from a theoretical standpoint. Furthermore, due of the findings' generic nature, might be easily changed to help other developing nations plan for and adopt telepharmacy. Therefore, referring to social cognitive theory which views behavior as the result of interactions between human factors and environmental conditions to provide a comprehensive understanding of individual behavior. It offers a complete experience of the factors influencing the adoption of telepharmaceutical services. This study aims to determine the factors that influence the intention to adopt telepharmacy services using three theoretical approaches, namely DeLone and McLean, Technology Acceptance Model (TAM), Theory of Acceptance and Use of Technology (UTAUT).

Method

Study design

The type of research uses quantitative research, survey method with cross sectional design. The research was conducted in Central Java and was conducted in April until September 2022. A total of 800 respondents were contacted, 560 valid responses were obtained. The survey was distributed using a Google form (online questionnaire) which was given to respondents via WhatsApp chain messages. The participants were selected using convenience sampling (snowball) from a variety of population groupings to achieve the greatest possible diversity. Inclusion criteria of respondents who were at least 18 years old filled the questionnaire, experience using telepharmacy services at least 1 time. This study was approved by the Faculty of Medicine Ethics Committee of Universitas Islam Sultan Agung, with reference number 201/VI/2022/Bioethics Commission.

Study instrument

The first section of the questionnaire contained demographic information about the respondents, while the second section included structured questions about endogenous and exogenous variables. Endogenous variable is intention to adopt telepharmacy. Exogenous variables include: Attitude; Facilitating condition, easy skillful; Efficacy response, social influence, and support; Perceived vulnerability; Severity and suffer; Promised time, system quality; Understanding, proficient, confident, and information quality.

The development of the questionnaire was carried out using a methodological process consisting of four basic steps, namely literature review, focus group discussions, expert evaluation, and pilot testing (Arora et al. 2017).

Furthermore, a thorough literature review was performed as the initial phase to generate items. A total of 13 factors and 44 items were identified based on previous studies (Seethamraju et al. 2018) dan (Bossen et al. 2013; Sun et al. 2013; Gao et al. 2015; Cheung et al. 2019; Li et al. 2020). One expert from linguistics and five experts from academia (pharmacy and information technology) were involved to evaluate the developed questionnaire including content validity, language translation, level of relevance, and critical input. All variable measurements in the study were subjective assessments by the respondents using a four-point Likert scale (1 = strongly disagree to 4 = strongly agree).

Data analysis

The data obtained from the results of the questionnaire were recapitulated using the Microsoft Excel program and then processed using the Smart-PLS 3 software. Data analysis uses the Partial Least Square (PLS) approach. PLS is a structural equation model (SEM) based on components or variance. Test the validity and reliability (measurement model) of indicators from endogenous and exogenous variables. Indicator items are declared valid if they have an outer loading and an average extracted variance (AVE) values above 0.50. Meanwhile, the variable is declared reliable if it has a composite reliability (CR) value of more than 0.70 (Hair et al. 2014). Evaluation of the structural model in PLS-SEM includes the R-squared (R^2) test and significance test through path coefficient estimation.

Results and discussion

The demographic profile of the 424 respondents shows that the majority are aged between 18–23, followed by 117 aged 24–39 and 19 over 40–55. Therefore, the data set covers a diverse age range, and by sex, consists of 85 males and 475 females. According to education (63.6%) most of the respondents were high school students (81.3%) and most of the respondents (72%) had income < Rp. 1,000,000. Most of the respondents used the HaloDoc application (66.3%) (Table 1).

The evaluation of the reflective indicators involved checking for convergent and discriminant validity. The first step was to evaluate convergent validity by ensuring that each item's outer loadings and the AVE were greater than 0.50 (Hair et al. 2014; Shuhaiber 2018). The results showed that most items met these criteria, and all constructs had high composite reliability scores. Additionally, internal consistency was measured using composite reliability (CR), and all estimates exceeded the 0.70 threshold (Table 2). Discriminant validity was evaluated using the Fornell and Larcker criterion, where the construct's indicators and others share more variation (Table 3). Therefore, all constructs in the study model satisfied this condition since none of the off-diagonal elements was greater than the corresponding diagonal element.

Table 1. The respondents' characteristics.

Characteristics	Frequency	Percentage (%)
Age		
• 18–23 years.	424	75.7
• 24–39 years.	117	20.9
• 40–55 years.	19	3.4
Gender		
• Male	85	15.5
• Female	475	84.8
Education		
• Senior High School	356	63.6
• Diploma	170	30.4
• Bachelor	19	3.4
• Master	14	2.5
• Doctoral	1	0.2
Occupation		
• Private employee	17	3
• Student	455	81.3
• Government Officer	18	3.2
• Entrepreneur	70	12.5
Income (IDR)		
• <IDR 1.000.000	403	72
• IDR 1.000.000 - IDR 2.500.000	68	12.1
• IDR 2.500.000 - IDR 3.500.000	32	5.7
• >IDR 3.500.000 - IDR 5.000.000	32	5.7
• >IDR 5.000.000 - IDR 10.000.000	16	2.9
• >IDR 10.000.000	9	1.6
Types of Application		
• AloDokter	72	12.9
• Pharmacies	2	0.4
• Grab Health	15	2.7
• HaloDoc	371	66.3
• K24 online	47	8.4
• KlikDokter	5	0.9
• Shopee	43	7.7
• Tokopedia	4	0.7
• Medscape	4	0.4

The multiple squared correlation R Square (R^2) values show that the current structural model explains 47.2% of the variance in consumers' intention to adopt telepharmacy services. According to another study (Rahi 2021), the factors of performance expectancy, social influence, effort expectancy, facilitating conditions, habit, hedonic incentive, price values, information quality, system quality, and service quality explained 77.9% of the variance in user behavior towards adopting telemedicine applications.

Table 4 show that Facilitating condition, easy skillful; Efficacy response, social influence, and support; Promised time, system quality; Understanding, proficient, confident, and information quality are significantly influence the intention to adopt telepharmacy services. However, Attitude; Perceived vulnerabilities; Severity and suffer have no significant effect on intention to adopt telepharmacy services. The intention to adopt telepharmaceuticals is impacted by response efficacy, social influence, and facility settings. Furthermore, perceived ease of use influences benefits and intention to use. The usefulness of telepharmaceuticals is affected by accessibility assistance, timeliness, and system quality. Understanding, skill, confidence, and information quality positively affect the in-

Table 2. The result of outer model analysis.

Construct	Item Code	Outer Loading	CR	AVE
Attitude	ATTI1	0.813	0.878	0.706
	ATTI2	0.853		
	ATTI3	0.854		
Facilitating condition, easy skillful	EFEX3	0.786	0.905	0.657
	FACO1	0.790		
	FACO2	0.829		
	FACO3	0.836		
Understanding, proficient, confident, and information quality	FACO4	0.810	0.913	0.601
	CSEF2	0.725		
	CSEF3	0.773		
	EFEX1	0.783		
	INFQ1	0.758		
	INFQ2	0.813		
	INFQ3	0.835		
Intention to adopt telepharmacy	INHS1	0.895	0.929	0.814
	INHS2	0.890		
	INHS3	0.920		
Severity and suffer	PESE1	0.879	0.910	0.718
	PESE2	0.911		
	PESE3	0.875		
	PEVU4	0.710		
Perceived vulnerability	PEVU1	0.942	0.951	0.867
	PEVU2	0.926		
	PEVU3	0.925		
Efficacy response, social influence, and support	RESE1	0.767	0.932	0.606
	RESE2	0.801		
	RESE3	0.686		
	RESE4	0.806		
	SOIN1	0.777		
	SOIN2	0.824		
	SOIN3	0.800		
	SOIN4	0.762		
	SRRQ1	0.774		
	Support, promised time, system quality	SRRQ2		
SRRQ3		0.843		
SYTQ1		0.880		
SYTQ2		0.811		
SYTQ3		0.831		

Intention to use telepharmaceuticals. These results align with the study by (Rho et al. 2014), where telemedicine's ease of use and benefits directly impacted the intention and behavior to use. Additionally, they found that medical records, patient accessibility, self-efficacy, and perceived incentives directly impacted the perceived usefulness and ease of use of telemedicine and affected the intention to use the technology. Telepharmacy adoption intention was influenced by efficacy response, social influence, and support. These findings were supported by (Upadhyay et al. 2023), where anti-spyware software acceptance was impacted by response efficacy. While these factors had a smaller effect on maladaptive coping, they greatly influenced adoption intention. The study showed that self-efficacy and response-efficacy play a significant role in people's acceptance of mHealth services, impacting the ease of use and perceived usefulness (Zhang et al. 2017). Social influence refers to the extent to which individuals consider others' recommendations and usage of telemedicine applications (Mannan Khan and Siddiqui 2014). Furthermore, the literature on information systems highlights the importance of social influence (Cho 2016; Rahi and Abd. Ghani 2018; Pandey and Zheng 2023). Enjoyment impacts perceived usefulness and ease of use but do not directly influence adoption intention. The results suggest that social influence and enjoyment reduce perceived risk (Koenig-Lewis et al. 2015). Social influence has also significantly impacted human behavior and Technology Adoption (TA) (Graf-Vlachy and Buhtz 2017). A strong relationship between social factors, individual creativity, and the usefulness and usability of something has been shown by structural equation analysis, affecting adoption intentions (Salloum et al. 2018). However, this contradicts the findings of Ekwegh et al. (2023), where the impact of social variables on telemedicine was not substantial. The medical profession is known for its relative autonomy and independent decision-making (K. Y. Lin 2014). Moreover, technology that disrupts traditional medical practices may impact professionals' perceptions of their roles. Doctors are dedicated to their careers and aim to meet perfor-

Table 3. The result of discriminant validity.

X	Attitude	Efficacy response, social influence, and support	Facilitating condition, easy skillful	Intention to adopt telepharmacy	Perceived vulnerability	Severity and suffer	Support, promised time, system quality	Understanding, proficient, confident, and information quality
Attitude	0.840							
Efficacy response, social influence, and support	0.557	0.778						
Facilitating condition, easy skillful	0.517	0.531	0.811					
Intention to adopt telepharmacy	0.477	0.567	0.573	0.902				
Perceived vulnerability	0.036	0.154	0.178	0.116	0.931			
Severity and suffer	0.210	0.303	0.254	0.257	0.302	0.847		
Support, promised time, system quality	0.561	0.769	0.617	0.618	0.100	0.297	0.834	
Understanding, proficient, confident, and information quality	0.637	0.649	0.722	0.612	0.073	0.232	0.722	0.775

mance standards (Moran et al. 2023). Physician adoption of telemedicine should consider including specific factors in the psychological model, such as the perceived impact of technology on professional status as suggested by Succi and Walter (Kesse-Tachi et al. 2019) (Table 4; Fig. 1).

Conditions that make telepharmacy simple and effective include the perception of the necessary infrastructure for telemedicine health applications and the ease of interaction with the technology. Previous study has emphasized

the significance of social impact and facilitating factors in e-health (Zhou and Li 2014; Cho 2016; Nysveen and Pedersen 2016; Kaium et al. 2020). Patients are more inclined to participate in telemedicine consultations when the technology is simple to comprehend and utilize (Kohnke et al. 2014). However, some may not have access to the necessary technology or may feel uneasy or prefer in-person treatment (Blue et al. 2020). This study also shows the impact of assistance, promised delivery time, and system quality on

Tabel 4. Hypothesis testing.

Relationship	Original Sample	T Statistics	P Values	Conclusion	R-Square (R ²)
Attitude → Intention to adopt telepharmacy	0.054	1.404	0.161	Rejected	0.472
Efficacy response, social influence, and support → Intention to adopt telepharmacy	0.130	2.004	0.046	Accepted	
Facilitating condition, easy skillful → Intention to adopt telepharmacy	0.197	3.357	0.001	Accepted	
Perceived vulnerability → Intention to adopt telepharmacy	0.010	0.346	0.730	Rejected	
Severity and suffer → Intention to adopt telepharmacy	0.045	1.244	0.214	Rejected	
Promised time, system quality → Intention to adopt telepharmacy	0.222	3.438	0.001	Accepted	
Understanding, proficient, confident, and information quality → Intention to adopt telepharmacy	0.179	2.949	0.003	Accepted	

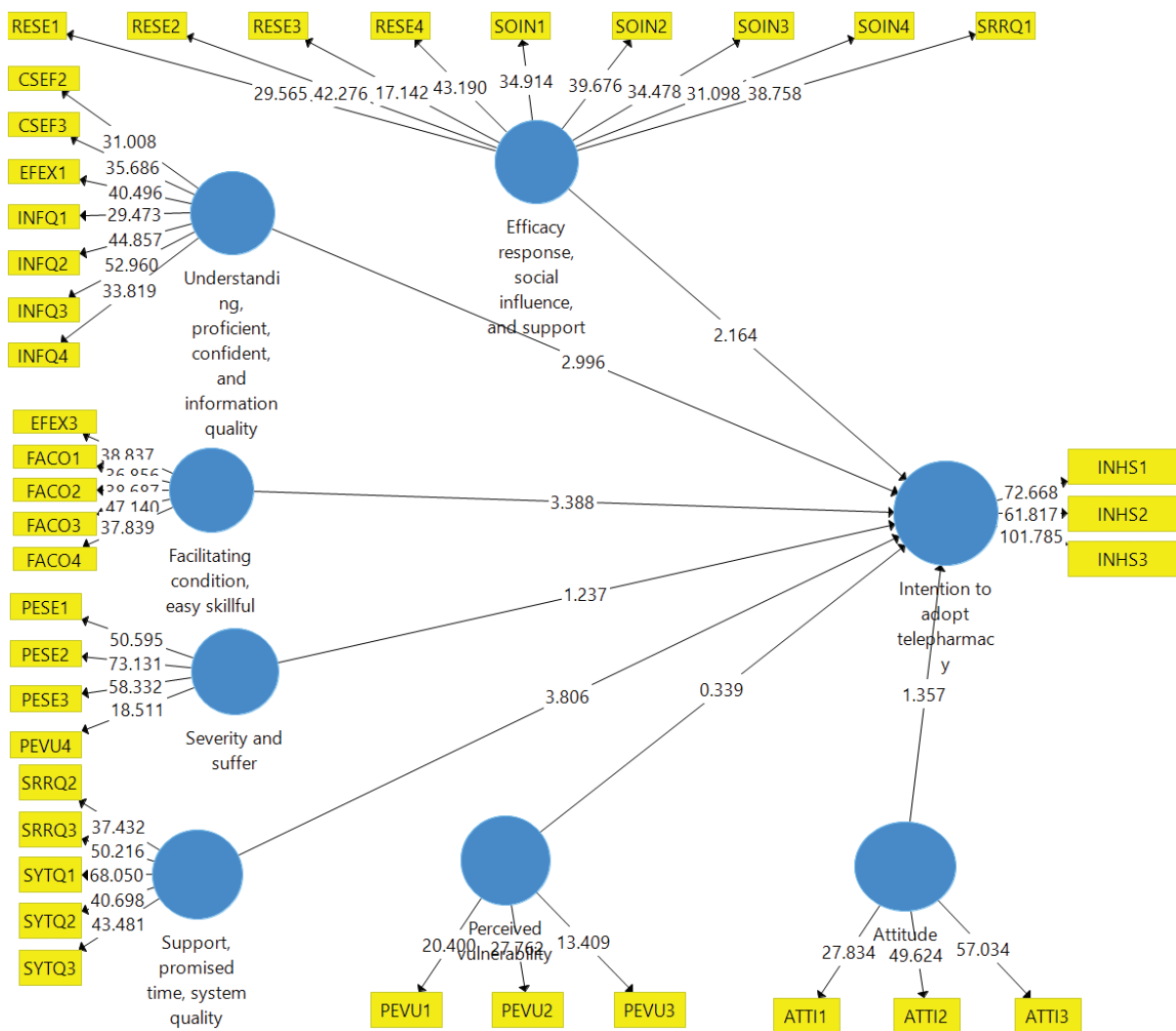


Figure 1. Path analysis.

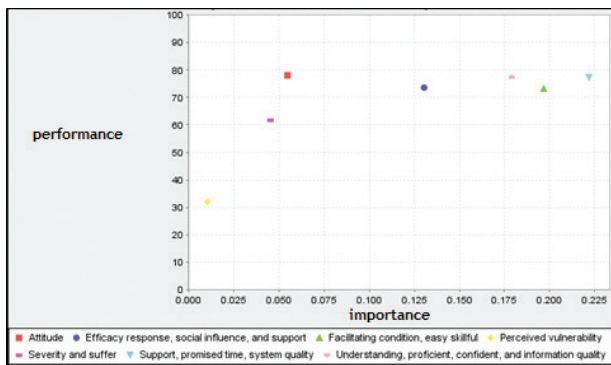


Figure 2. Importance-performance map.

telepharmacy adoption intentions. Study Lu et al. (2023) has indicated that system quality is a significant factor in consumer intention and use, supporting these conclusions. Adoption intentions of users for online purchasing are significantly predicted by system quality (Tarhini et al. 2019).

This study highlights the impact of information quality, proficiency, and confidence on telepharmacy adoption intentions. Study supports the conclusion that information quality is key in determining customer intention and usage (Kaium et al. 2020). Furthermore, the behavioral intentions of users to engage in online buying are significantly influenced by the information quality of the consumed sources (Tarhini et al. 2019). Ease of use is a critical factor in adopting technology, affecting the simplicity of perceived usefulness. The simplicity of telemedicine technology can improve doctors' opinions of its utility and effectiveness (Kifle et al. 2010). Rho et al. (2014) found that perceived utility and ease of use are significant factors in the acceptability of telemedicine services. Technology factors, such as perceived usefulness and ease of use, are crucial in the South Korean healthcare system. Additionally, the telemedicine service must be designed to align with doctors' technological adoption and treatment procedures (Rho et al. 2014). The regular use of mobile applications enhances the user experience of the devices. Users gain proficiency with mHealth applications and rely more on their mobile devices. Meanwhile, dependency is a dimension of IT identity defined by the functional features of the device, such as email, alarm clock, group messaging system, social media, and mHealth applications (Carter and Grover 2015). These functionalities improve user interaction with the device to update health status, communicate with doctors, schedule appointments, receive meal recommendations, and reminders to take medication. Therefore, dependence on smartphones and mobile apps increases with increasing user understanding (Park et al. 2013; T. T.-C. Lin et al. 2015). Mobile applications also provide users with new-found capabilities, such as reducing clinic visits and saving time (Balapour et al. 2019). However, there are concerns about adapting to a new method of dealing with healthcare professionals, security, confidentiality, and privacy. Administrators are concerned about cost-effectiveness, reimbursement, and legal matters. Meanwhile, payers must be confident that supporting telemedicine can decrease

healthcare expenditures (Xiong et al. 2023). Telemedicine solutions are delivered by the existing telecommunications infrastructure, including home computers, telephone lines, and cable lines (Alenoghena et al. 2023). This reduces the technological barrier for patients since the infrastructure can be used for other purposes (Chen et al. 2023).

Several limitations in this study include that the sample was taken from the Province of Central Java, therefore it may not accurately reflect all Indonesian citizens. Convenience sampling technique (snowball) causes bias in the sampling process. This study used a cross-sectional design, future studies should consider using longitudinal techniques, which may be more suitable for assessing behavior change. Furthermore, it is based on consumer self-reports of past behaviors or forecasting of future actions, which may be affected by over or under reporting.

Conclusion

The Facilitating condition, easy skillful; Efficacy response, social influence, and support; Promised time, system quality; Understanding, proficient, confident, and information quality are significantly influence the intention to adopt telepharmacy services. However, Attitude; Perceived vulnerabilities; Severity and suffer have no significant effect on intention to adopt telepharmacy services. The practical implication of this research is that the adoption of telepharmaceutical services needs to be strengthened by trust, economic benefits, and convenience. It focuses on addressing security, privacy, financial risk and legal risks to ensure consumer protection. Regulators and product managers in developing policies and improving services to promote telepharmaceutical adoption. The millennials as the main target group.

Conflict of interest

The authors declare no conflict of interest.

Author Contribution

The authors confirm contribution to the paper as follows: study conception and design: PP, IHS, SS, data collection: PP, IHS; analysis and interpretation of results: PP, IHS; draft manuscript preparation: PP, IHS, SS All authors reviewed the results and approved the final version of the manuscript.

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