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Exploring the Importance of Health Education during Pregnancy Based on the Health Belief Model

Cuicui Sun

Shijiazhuang Medical College, Shijiazhuang, 050000, Hebei, China

Abstract: Pregnancy health education is of great significance for the health of both mothers and infants, and the Health Belief Model (HBM) provides a key theoretical framework for it. The HBM consists of six constructs: perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy. It can facilitate the transformation from "knowing" to "believing" and then to "acting" for pregnant women. Pregnancy health education based on the HBM can improve maternal and infant health outcomes, enhance specific health knowledge and safe behaviors, and promote the establishment of healthy lifestyles. Its intervention implementation involves assessment, planning, implementation, and re-assessment processes, and the educational content needs to be constructed according to the characteristics of the early, middle, and late stages of pregnancy. However, the application of the HBM faces challenges such as cultural adaptability, digital integration, and the lack of long-term effect evaluation. In the future, targeted optimization is needed to improve the pregnancy health education system and ensure maternal and infant health.

Keywords: Health education; Pregnancy; Health Belief Model (HBM)

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1. Introduction

Pregnancy is a special period in a woman's life, not only accompanied by significant physical and psychological changes, but also directly related to the long-term health of both the mother and the baby. Pregnancy health education aims to help pregnant women master necessary health care knowledge, establish a healthy lifestyle, and prevent complications and comorbidities during pregnancy through systematic information dissemination and behavioral guidance, thereby ensuring the safety of both the mother and the baby and improving the quality of life. However, merely imparting knowledge is not sufficient to guarantee behavioral change. The Health Belief Model, as one of the most widely applied theoretical models in the field of health behaviors, provides us with a profound theoretical perspective and practical framework for understanding and intervening in pregnant women's health-related behaviors [1,2]. This article will take the Health Belief Model (HBM) as the core theoretical basis, deeply exploring the intrinsic importance, implementation strategies, empirical effects, and future development directions of prenatal health education, aiming to provide theoretical basis and practical insights for optimizing prenatal

health services.

2. Analysis of the theoretical framework of the HBM

The Health Belief Model is a theory derived from social psychology, aiming to explain and predict why individuals do or do not engage in health-related behaviors [3,4]. This model posits that an individual's decision regarding health behaviors is primarily driven by their internal beliefs and attitudes [5]. Understanding the core constructs of HBM is the foundation for exploring its application in health education during pregnancy.

2.1. The core construct of HBM

The Health Belief Model mainly consists of six core constructs, which work together to influence an individual's health decision-making process.

2.1.1. Perceived susceptibility

This refers to the individual's subjective assessment of their own likelihood of contracting a certain disease or facing a certain health risk [6]. In the context of pregnancy, this manifests as whether the pregnant woman believes that she and her fetus are prone to adverse pregnancy outcomes (such as gestational diabetes, premature birth, birth defects).

2.1.2. Perceived severity

This refers to an individual's perception of the severity of potential consequences associated with contracting a certain disease or facing health risks, including medical consequences (such as death, disability) and social consequences (such as family relationships, work ability). For example, the awareness level of pregnant women regarding the severe consequences that hypertension during pregnancy may bring, such as eclampsia and intrauterine growth retardation of the fetus.

2.1.3. Perceived benefits

This refers to an individual's belief that engaging in a certain health behavior (such as maintaining a balanced diet, undergoing regular prenatal check-ups) can effectively reduce risks or bring positive outcomes. For instance, a pregnant woman believes that taking folic acid supplements can effectively prevent neural tube defects, which is an example of perceived benefits.

2.1.4. Perceived barriers

This refers to the difficulties, costs, or negative impacts that individuals may encounter when adopting healthy behaviors, including physical, psychological, economic, and time-related obstacles. For instance, pregnant women might struggle to maintain a healthy diet due to "severe morning sickness", or fail to get sufficient rest due to "busy work schedules".

2.1.5. Action cues

These refer to the internal and external factors that prompt individuals to take action. Internal cues include physical discomfort symptoms, while external cues include doctors' advice, family reminders, media publicity, or health

education materials.

2.1.6. Self-efficacy

It refers to an individual's belief in their ability to successfully carry out a certain health behavior. For instance, does a pregnant woman have the confidence to control her weight during pregnancy by adjusting her diet and exercising?

2.2. The mechanism of HBM

According to HBM, when a pregnant woman perceives that she and her fetus are facing a real and serious health threat (high perceived susceptibility and severity), and believes that the benefits of a certain health behavior (such as attending a prenatal class) outweigh the obstacles (high perceived benefits and low perceived obstacles), she is more likely to take action when triggered by appropriate action cues (such as community posters, doctor recommendations). Self-efficacy plays a crucial regulatory role in this process. Pregnant women with high self-efficacy are more inclined to adhere to health behaviors even in the face of obstacles. Therefore, if prenatal health education is designed around these six constructs, it can more effectively tap into the internal motivation of pregnant women, thereby achieving the transformation from "knowledge" to "belief" and then to "action". Studies have shown that using HBM for health intervention of pregnant women effectively improves their knowledge, beliefs, and compliance with disease prevention [7].

3. Empirical research on pregnancy health education based on HBM and its outcomes

Applying the Health Belief Model to prenatal health education is not just a theoretical concept. In recent years, numerous empirical studies have provided strong evidence for its effectiveness. These studies show that intervention measures based on the HBM can significantly improve maternal and infant health outcomes, enhance the health literacy and self-management ability of pregnant women.

3.1. It significantly improves the comprehensive health outcomes of both mothers and infants

A study aimed at improving maternal and infant health outcomes through in-depth prenatal education and analyzing the Health Belief Model found that pregnant women who received systematic prenatal education performed better in multiple indicators [8]. This educational program was based on the HBM framework and not only conveyed knowledge but also focused on shaping the pregnant women's health beliefs. The specific outcomes of the research report include effectively improving the weight management during pregnancy for pregnant women, reducing the level of stress during pregnancy, and directly correlating to better neonatal health indicators, such as higher birth weight, higher Apgar scores, and higher success rates of early breastfeeding. Studies have shown that providing nursing services to pregnant women under the guidance of health beliefs can enhance their understanding of pregnancy and childbirth, thereby reducing the rate of cesarean sections and is worthy of clinical adoption [9]. This fully demonstrates that interventions targeting the construct of the HBM can produce quantifiable and positive clinical health outcomes.

3.2. It effectively enhances specific health knowledge and safe behaviors

In the field of specific risk prevention, HBM also demonstrates strong application value. A health education study targeting mothers of premature infants, based on HBM, aimed to promote safe sleep practices related to SIDS [10]. The study found that after one month of intervention, the mothers who received education showed significant improvements in relevant knowledge, scores of the health belief model items, and reports of safe sleep practices. This indicates that by emphasizing risks (perceived severity), providing solutions (perceived benefits), and building the mothers' confidence (self-efficacy), HBM can effectively transform knowledge into key behaviors that protect the safety of newborns' lives. A study showed that health education can effectively alleviate the anxiety and depression of pregnant women with gestational diabetes, improve glucose and lipid metabolism, enhance their mastery of disease-related knowledge, improve compliance, and ensure the safety of mothers and infants [11].

3.3. It promotes the establishment and maintenance of a healthy lifestyle

The lifestyle during pregnancy, including nutrition and physical activities, is of vital importance for both the mother and the baby's health. An empirical study evaluated the impact of an education intervention based on HBM on pregnant women's physical activity and nutritional behaviors [12]. The results showed that the physical activity levels and nutritional status of the pregnant women in the intervention group were significantly improved. More importantly, from the conceptual level of HBM, after the intervention, the pregnant women's perceived susceptibility, perceived severity, perceived benefits, and self-efficacy all significantly increased, while the perceived barriers significantly decreased. Another study, a randomized controlled trial of HBM-based nutrition education conducted among pregnant women, also reported similar positive results. The intervention significantly enhanced the pregnant women's nutritional knowledge and dietary practices [1]. These studies clearly reveal the mechanism of HBM as an intervention "mediator": health education, by changing the internal beliefs of pregnant women, ultimately leads to the improvement of external health behaviors.

In conclusion, empirical evidence consistently indicates that prenatal health education based on the health belief model is not merely a one-way dissemination of information, but rather an effective intervention strategy that can profoundly influence the cognition, beliefs, and behaviors of pregnant women. Its significance lies in its ability to systematically and specifically address the psychological factors that hinder healthy behaviors, thereby fundamentally improving the quality and effectiveness of self-care during pregnancy.

4. Design and implementation of health education intervention for pregnant women based on HBM

A successful HBM–based health education program for pregnant women requires systematic design and meticulous implementation procedures. This encompasses assessing the initial beliefs of pregnant women, understanding the specific needs at different stages of pregnancy, and formulating personalized intervention strategies accordingly.

4.1. The general process of intervention implementation

Interventions based on HBM typically follow a dynamic cyclic process, consisting of four stages: assessment, planning, implementation, and re-assessment [13].

4.1.1. Evaluation phase

Before the intervention begins, through questionnaires, interviews, or focus groups, assess the levels of each construct of the BM framework among the target pregnant population regarding specific health issues (such as prenatal nutrition), and understand their existing knowledge, beliefs, obstacles, and confidence.

4.1.2. Planning stage

Based on the assessment results, design targeted intervention contents and forms. For instance, if it is found that pregnant women generally have high perceptual barriers (such as not knowing how to prepare healthy meals), then practical demonstrations or recipe sharing sessions should be included in the education.

4.1.3. Implementation phase

A variety of educational methods are employed, such as health lectures, group discussions, video materials, one-on-one counseling, role model sharing, and skills training, to convey the intervention content to pregnant women.

4.1.4. Re-evaluation phase

After the intervention is completed, the same tools used before the intervention are employed again to measure and assess the changes in each component of the HBM and related health behaviors, in order to verify the effectiveness of the intervention [14].

4.2. Comprehensive construction of educational content during different stages of pregnancy

Although existing studies have provided relatively few clear HBM intervention plans divided into early, middle and late pregnancy stages, we can construct a theoretical educational content framework based on the physiological characteristics and health care priorities of different pregnancy stages, combined with the HBM construct. It should be emphasized that this is a model derived from the existing scattered information and the HBM theory, and more empirical research is needed for verification.

4.2.1. Early pregnancy (1-12 weeks): The focus in establishing basic knowledge and eliminating early risks

(1) Enhancing perception of susceptibility/severity

By explaining the incidence and severe consequences of early miscarriage, fetal neural tube defects, etc., pregnant women will realize the necessity of early health care.

(2) Highlighting the benefits of perception

Emphasizing the decisive role of folic acid supplementation in preventing deformities, as well as the advantages of quitting smoking and drinking for fetal development.

(3) Reduce perception barriers

Provide dietary advice to cope with early pregnancy symptoms (such as nausea and vomiting), helping pregnant women maintain basic nutrition even when feeling unwell.

(4) Enhancing self-efficacy

Providing pregnant women with guidance on how to correctly take supplements, and helping them build confidence that they are “capable of providing the best start for their baby”.

4.2.2. Second trimester (13-27 weeks): The focus in preventing complications and monitoring fetal growth

(1) Enhancing perception of susceptibility/severity

Introduce the risk factors, screening methods, and long-term harm to both mother and baby of common complications such as gestational diabetes and gestational hypertension.

(2) Enhancing perception of susceptibility/severity

Introduce gestational diabetes, gestational hypertension, etc. These conditions often highlight perceived benefits: Explain the advantages of reasonable weight control, moderate exercise, and regular prenatal check-ups in preventing these diseases and monitoring fetal health.

(3) Reduce perception barriers

Offer simple and feasible pregnancy exercise plans (such as prenatal yoga), healthy snack options, and guidance on how to interpret prenatal examination reports, thereby reducing the confusion and difficulty in implementation for pregnant women.

(4) Set up action clues

Encourage pregnant women to use the app to record their weight and fetal movements, and the hospital will send reminders via text messages about the due dates for prenatal check-ups [15].

(5) Enhancing self-efficacy

Teaching pregnant women, the method of self-monitoring fetal movements, enabling them to acquire a skill for actively monitoring the health of their babies and enhancing their sense of control.

4.2.3. Late pregnancy (from week 28 until delivery): The focus in preparing for childbirth and welcoming the new baby

(1) Enhance perception of susceptibility/severity

Explain the signs and risks of premature birth, as well as the prevalence and severity of postpartum depression, to enhance the alertness of pregnant women.

(2) Highlighting the perceived benefits

Teaching non-pharmacological pain relief techniques such as Lamaze breathing exercises, explaining the short-term and long-term benefits of breastfeeding for both mothers and infants, and enhancing pregnant women's positive expectations of natural childbirth and breastfeeding.

(3) Reduce perception barriers

Conduct psychological counseling for pregnant women regarding their fear of labor pain, provide a template for the "Birth Plan" to help them communicate effectively with their families and doctors, and reduce anxiety caused by uncertainty.

(4) Enhancing self-efficacy

Conduct simulation exercises for childbirth and practical operations for newborn care (such as bathing and changing diapers), allowing prospective parents to build confidence through practice.

5. Challenges and future directions of applying HBM in pregnancy health education

Although HBM has demonstrated great potential in prenatal health education, it still faces some challenges in its application and research, which also points out the direction for future development.

5.1. Challenges and countermeasures of cultural adaptability

The Health Belief Model was developed within the context of American culture, and its conceptual explanations and weights may vary across different cultures. For instance, in some cultures that emphasize collectivism and family opinions, family support or social norms might have a greater influence on pregnant women's behavioral decisions than the perceived benefits by individuals. Therefore, when applying the HBM to different countries and regions, cultural adaptability adjustments must be made to ensure that the educational content and intervention strategies are in line with the local cultural values, beliefs, and social norms [16,17]. Future research should focus more on cross-cultural comparisons, developing and validating culturally adjusted HBM assessment tools and intervention programs.

5.2. The opportunities and current situation of digital integration

With the rise of mobile health (mHealth) and telemedicine (Telehealth), prenatal health education has ushered in new digital opportunities. Digital platforms can enhance the effectiveness of health behavior modification (HBM) interventions in a highly promising way. Personalized push notifications can serve as a powerful "action cue", sending reminders and knowledge based on the gestational weeks and individual health data. The interactive functions (such as online Q&A, virtual communities) can provide social support and help reduce "perceived barriers". Data tracking and feedback (such as weight and blood sugar curves) can visually demonstrate the "benefits" of behaviors and enhance "self-efficacy" [18].

Previous studies have begun to explore the combination of telemedicine and HBM to promote pregnant women's exercise behaviors, and it has been found that HBM is an appropriate theoretical framework for education in this model [19]. However, the current research evidence shows that studies that combine HBM, mobile applications, and comprehensive prenatal health education, and conduct rigorous randomized controlled trials (RCTs) to verify their quantitative effects are still very scarce. This constitutes an important research gap, and future research should focus on developing and evaluating digital prenatal health education tools that integrate the HBM theory to verify their effectiveness and cost-effectiveness in the real world.

5.3. The absence of long-term effect assessment

Most current studies on HBM-based pregnancy education focus on short-term effect evaluations, such as changes in behaviors and health indicators during pregnancy or shortly after childbirth. However, many of the goals of pregnancy health education, such as establishing healthy family lifestyles, preventing long-term diseases in children, and promoting long-term mental health of mothers, take much longer to manifest. Search results indicate that there is an extreme lack of longitudinal studies that conduct follow-ups on HBM-based pregnancy education programs over a long period (e.g., two years or longer after childbirth). Although one study conducted a two-year follow-up on infant injury prevention education, it was not a comprehensive pregnancy education based on HBM [20]. Therefore, future research designs should consider longer observation periods to comprehensively assess the profound impact of HBM-based pregnancy health education on the long-term health and well-being of mothers and infants.

Pregnancy health education based on the HBM has been substantiated by a solid theoretical foundation and an increasing number of empirical research results. It goes beyond the traditional transmission of knowledge, systematically influencing pregnant women's perceived susceptibility, severity, benefits, obstacles, cues for action, and self-efficacy, thereby fundamentally stimulating their intrinsic motivation to adopt and maintain healthy

behaviors. Practice has proven that this model can effectively improve the immediate and short-term health outcomes of both mothers and infants, including optimizing weight management, preventing complications, enhancing the health level of newborns, and promoting key safety behaviors.

However, in order to fully realize its potential, future practice and research must address three major challenges. Firstly, enhance the research on cultural adaptability to make intervention measures more in line with the cultural backgrounds of different groups. Secondly, embrace digital transformation and explore innovative models of integrating mobile health technologies with the HBM theory through high-quality randomized controlled trials. Thirdly, conduct long-term longitudinal studies to assess the lasting impact of prenatal health education on the health of mothers and infants. Through continuous efforts in these directions, we can continuously improve and optimize the prenatal health education system, laying a more solid foundation for the healthy future of every mother and newborn.

6. Conclusion

In conclusion, the Health Belief Model provides a robust and effective theoretical framework for pregnancy health education, facilitating the transformation of knowledge into sustained healthy behaviors. By systematically addressing perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy, HBM-based interventions significantly improve maternal and infant health outcomes, enhance specific health knowledge, and promote healthy lifestyles. However, challenges such as cultural adaptation, digital integration, and the lack of long-term evaluation remain. Future efforts should focus on culturally tailored strategies, technology-enabled education, and longitudinal studies to optimize the prenatal health education system and better safeguard the health of mothers and infants.

Disclosure statement

The author declares no conflict of interest.

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