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RESEARCH ARTICLE

Pregnant women behaviours in early detection of preeclampsia warning signs based on health belief model: A structural equal modelling analysis

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Abstract

Background: Preeclampsia is a pregnancy complication that frequently arises during the second trimester, typically after 20 weeks of pregnancy, requiring increased awareness and vigilance. **Objective:** The aim of this study was to analyse factors affecting pregnant women's behaviours in early detection of warning signs of preeclampsia (PE) based on the health belief model. **Method:** A cross-sectional study was conducted, with 225 respondents as research subjects in Tuban Regency. The sampling technique used was stratified random sampling. Data analysis employed structural equal modeling. **Results:** The results demonstrated that sociodemographic factors had an indirect pathway toward detection behaviours of the PE warning signs through perceived susceptibility/severity and perceived barrier. Health belief factors, including perceived susceptibility/severity, perceived threat, perceived benefit, perceived barrier, and perceived self-efficacy, had direct pathways toward detection behaviours of the PE warning signs. Cues to action had both direct and indirect pathways toward detection behaviours of the PE warning signs. **Conclusion:** Improvement of promotion efforts and comprehensive health education by incorporating cognitive, physiological, and psychosocial beliefs were immensely required to enhance better detection behaviours.

Introduction

Preeclampsia is a syndrome characterised by increased blood pressure, and proteinuria occurs during the second trimester of pregnancy. Pregnant women experiencing hypertension due to pregnancy are approximately 10%, of whom 3-4% suffer from preeclampsia, 5% have hypertension, and 1-2 % suffer from chronic hypertension (Veerbeek *et al.*, 2015). Preeclampsia is the primary cause of morbidity and mortality of both the mother and the fetus. World Health Organization (WHO) estimates that the maternal mortality rate reaches approximately 500,000 worldwide, with developing countries contributing to 99% of the cases (Veerbeek *et al.*, 2015). One of those countries is Indonesia. Preeclampsia incidence in Indonesia ranges between 3% and 10% of all pregnancies (Pusdatin Kemenkes RI, 2021). In 2020, the maternal mortality due to hypertension during pregnancy was 1,110 cases and due to vascular diseases was 220 cases (Pusdatin Kemenkes RI, 2021). Meanwhile, in East Java Province, the Maternal Mortality Ratio (MMR) was 98.39 per 100,000 live births in 2020. The figure drastically increased compared to the figure in 2019 which was 89.81 per 100,000 live births. Among the causes, there were 152 cases caused by preeclampsia, 122 cases caused by bleeding, and 210 cases caused by other factors.

Preeclampsia is a pregnancy complication that requires vigilance and most frequently arises during the second trimester of pregnancy, specifically after 20 weeks pregnant. It is characterised by increased blood pressure, proteinuria, and swelling in face, hands, and feet. Preeclampsia complications can be prevented if pregnant women and their families are able to recognize

the preeclampsia warning signs during the pregnancy and immediately seek medical treatment (El-Nagar *et al.*, 2017). Pregnancy warning signs refer to symptoms experienced by women during pregnancy (Demissie *et al.*, 2015).

There are four warning signs of preeclampsia pregnancy that pregnant women may experience, including severe headache, visual impairment, swelling on face and hands, and right side abdominal pain (Park *et al.*, 2014). Active involvement of pregnant women in monitoring their pregnancy plays a role in the early detection behaviours of pregnancy warning signs (Astuti *et al.*, 2020). Meanwhile, pregnant women's behaviours in the early detection of preeclampsia warning signs can be influenced by age, number of children owned, educational level, economic capacity, pregnant mother's health literacy, and women's perception of their pregnancy. The early detection behaviours of pregnancy warning signs are also influenced by an individual's belief about their health (Health belief).

The Health Belief Model (HBM) is one of the theories used to understand and identify how and where to direct strategies for behavioural changes, as well as to explain various important aspects of human behaviour towards positive changes. The HBM theory states that behaviours (such as early detection of preeclampsia warning signs) are likely to be influenced by the following factors: 1) perceived threat of the individual against the problem, 2) perceived severity and susceptibility, 3) perceived benefit of adopting the behaviours, 4) perceived barriers, 5) perceived self-efficacy if the individual does the behaviours, and 6) cues to action (Skinner *et al.*, 2015).

The use of the Health Belief Model theory aims to identify factors among pregnant women that contribute to improving early detection behaviours for present preeclampsia warning signs, so that these behaviours can be optimally performed. Although many studies have demonstrated associations between HBM constructs and various health behaviours, further research is needed to understand how these constructs affect the health behaviours, especially in the context of early detection behaviours of preeclampsia warning signs. This study aimed to analyse factors that contribute to the early detection behaviours of preeclampsia pregnancy warning signs based on the Health Belief Model.

Methods

Design

This research employed a cross sectional study approach. The study site was located in 33 public health centers of Tuban Regency classified into 5 region clusters. Research subject sampling method employed stratified random sampling. A total number of subjects was 225 respondents.

Assessment

The instrument used in this study was a questionnaire to collect data about sociodemographic of pregnant women, perceived susceptibility and severity, perceived threat, perceived benefits, perceived barriers, perceived self-efficacy, cues to action, and pregnant women's behaviours regarding the early detection of preeclampsia pregnancy warning signs. Data analysis of the study was conducted by utilising SmartPLS, which is a variance-based structural equation modeling analysis. The value served as a reference was the *t*-table (1.96) value. Exogen factors affected endogen factors if the T-statistic value was more than the *t* -table (>1.96) with a margin of error $\alpha = 0.05$.

Results

Respondents sociodemographic

The percentage and frequency distribution of sociodemographic respondents are shown in Table I.

Individual health belief

Descriptive results of the health belief variable are listed in Table II.

Detection behaviours of preeclampsia pregnancy warning signs

Descriptive results of detection behaviours of preeclampsia pregnancy warning signs variable were listed in Figure 1. It demonstrated that across all variables of detection behaviours of severe headache, visual impairment, swelling face and hands, and right-side abdominal pain, the result all belonged to the adequate group.

Significance test result in the structural model (Inner model)

The final values of pathway coefficient that significantly affected the early detection behaviours of preeclampsia warning signs were displayed in Figure 2. It shows that sociodemographic factors had no direct pathway toward detection behaviours of preeclampsia pregnancy warning signs. Meanwhile, perceived susceptibility and severity, perceived threat, perceived benefits, perceived barriers, perceived self-efficacy, and cues to action had direct pathways toward detection behaviours of preeclampsia pregnancy warning signs.

Table I: Frequency distribution of respondent's sociodemographic

Sociodemographic	Frequency	Percentage
Age		
<20 years	10	4.4
20–35 years	193	85.8
>35 years	22	9.8
Education		
Elementary school	36	16.0
Junior high school	43	19.1
Senior high school	95	42.2
Academy/university	51	22.7
Occupation		
Unemployed	135	60
Farmer	8	3.6
Self-employed	27	12.0
Private employee	38	16.9
Civil servant/state civil apparatus	2	9.0
Others	15	6.7
Parity		
0 child	102	45.3
1 child	97	43.1
2–4 children	23	10.2
> 4 children	3	1.s3
Family income (Regional minimum wage)		
< 2,532,000	163	72.4
≥ 2,532,000	62	27.6

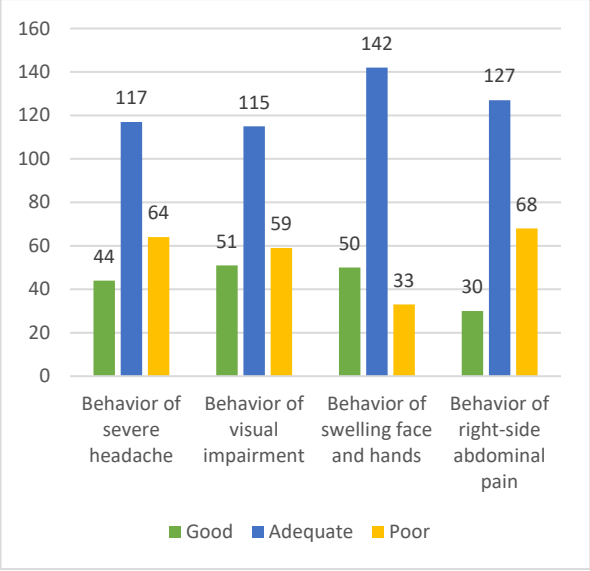

Figure 1: Frequency distribution of detection behaviours of preeclampsia pregnancy warning signs

Table II: Frequency distribution of respondent's health belief

Health belief	Frequency	Percentage
Perceived susceptibility and severity		
Good	34	15.1
Adequate	114	50.7
Poor	77	34.2
Perceived threat		
High	20	8.9
Medium	125	55.6
Low	80	35.6
Perceived benefit		
Good	78	34.7
Adequate	113	50.2
Poor	34	15.1
Perceived barrier		
Good	66	21.4
Adequate	111	49.3
Poor	48	21.3
Perceived self-efficacy		
High	79	35.1
Medium	113	50.2
Low	33	14.7
Cues to action		
Good	52	23.1
Adequate	135	60.0
Poor	38	16.9

Furthermore, cues to action also had an indirect pathway toward detection behaviours of preeclampsia pregnancy warning signs, namely through perceived self-efficacy. Pathway obtaining the highest pathway coefficient was cues to action (X7) toward detection behaviours of preeclampsia pregnancy warning signs (Y). Because cues to action had two pathways, both direct and indirect, it meant that cues to action had the biggest effect on detection behaviours of preeclampsia pregnancy warning signs.

Discussion

Sociodemographic against detection behaviours of preeclampsia pregnancy warning signs

Directly, sociodemographic did not affect the detection behaviours of preeclampsia pregnancy warning signs. However, they indirectly affected the detection behaviours of preeclampsia pregnancy warning signs via perceived susceptibility and perceived barrier pathways.

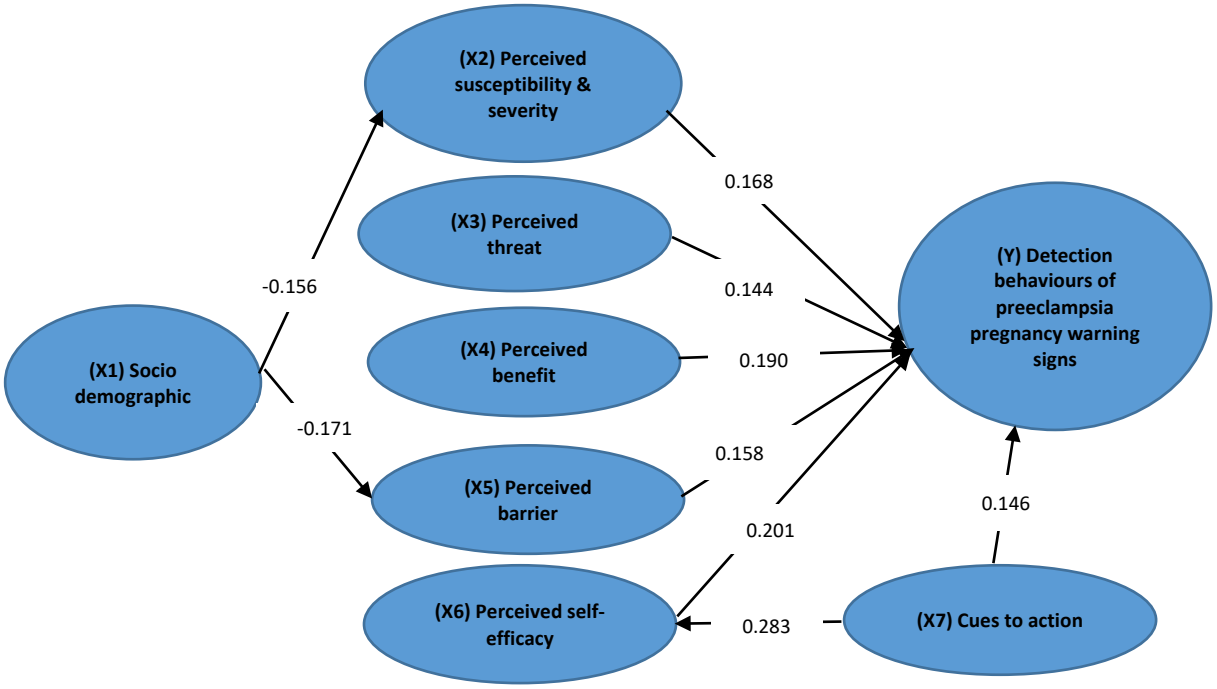

Figure 2: Final results (*Inner model*) of parameter coefficient values of health belief model pathway against pregnant women behaviours in early detection of preeclampsia pregnancy warning signs

The age of the pregnant women mostly ranged within 20-35 years old. These ages are healthy ages for pregnancy period. These women were physically and psychologically healthy in doing prevention and detection of preeclampsia pregnancy warning signs. In another study, it was also stated that age is significant toward the early detection ability against preeclampsia risks (Dessu *et al.*, 2018). A good education status and exposure to information could improve pregnant women's behaviours in early detection of preeclampsia pregnancy warning signs (Jewaro *et al.*, 2020). The occupation of most pregnant women was unemployed or a housewife. Becoming a housewife or being unable to work outside the home became a predisposing factor of knowledge of the pregnant women to detect pregnancy warning signs *(*Jewaro *et al.*, 2020). The parity of the pregnant women was dominant without any child. As a result, the pregnant women did not experience any benefits and obstacles when detecting warning signs of preeclampsia pregnancy. Parity was related to the management delay of the emergency state of preeclampsia obstetric (Nahar *et al.*, 2011).

Sociodemographic was significant in its relation to the susceptibility perception undergone by the pregnant women regarding their pregnancy condition (perceived susceptibility and severity). This was supported by a related study demonstrating results indicating that perceived susceptibility and severity in pregnant women were influenced by age and parity (Darsareh *et al.*, 2016). Sociodemographic was also significant along with perceived barrier experienced by the pregnant women whilst pregnancy, especially concerning family support.

Perceived susceptibility and severity against detection behaviours of preeclampsia pregnancy warning signs

The result of the study manifested that perceived susceptibility and severity were directly significant to influence early detection behaviours of preeclampsia pregnancy warning signs. Perceived susceptibility and severity of the pregnant women regarding their pregnancy condition were their attempts to raise state of emergency and awareness of the pregnancy, in case any problem occurs. This was supported by a related study, which found that perceived susceptibility and severity had an impact the ability to do an early detection of pregnancy warning signs (Mardiyanti & Anggasari, 2020).

Perceived threat against detection behaviours of preeclampsia pregnancy warning signs

According to the result of this study, the perceived threat was significant as it directly influenced the early detection behaviours of preeclampsia pregnancy warning signs. The perceived threat experienced by the pregnant women regarding their pregnancy condition was the state that pregnant women could undergo pregnancy risks, either for themselves or the fetuses. In another study, it was also shown that perceived threat

was significant as it was connected to healthy eating behaviours in pregnant women (Gardner *et al.*, 2012).

Perceived benefit against detection behaviours of preeclampsia pregnancy warning signs

The findings of this study showed that perceived benefit was directly significant against detection behaviours of preeclampsia pregnancy warning signs. In improving pregnant women detection behaviours of preeclampsia pregnancy warning signs, healthcare personnel have provided education to the pregnant women by conducting pregnant women class and supplying them with information during the pregnancy checkup. A pregnant woman experiencing benefits of preeclampsia prevention would conceive a commitment resulting in an improved and better detection behaviours of preeclampsia pregnancy warning signs (Anggraeni *et al.*, 2017).

Perceived barrier against detection behaviours of preeclampsia pregnancy warning signs

Based on this study's results, it was shown that perceived barrier directly affected the detection behaviours of preeclampsia pregnancy warning signs. The detection of barrier indicator was measured by the problems that could be experienced by the pregnant women in terms of family support. The barrier of family support was related to decision making, in which most of the family type was the extended family. Consequently, decision making was done not only by the husband of the pregnant woman, but also by their parents. Health education must also be given to the family members so that they can participate in the detection behaviours of preeclampsia pregnancy warning signs (Mardiyanti *et al.*, 2019).

Perceived self-efficacy against detection behaviours of preeclampsia pregnancy warning signs

This study demonstrated results that perceived self-efficacy directly influenced the detection behaviours of preeclampsia pregnancy warning signs. Pregnant women with good self-efficacy would have a commitment resulting in being able to do the detection behaviours of preeclampsia warning sings. The commitment was fostered through supportive education that focused on identifying behaviours in detecting severe headache, visual impairment, swelling face and hands, and right-side abdominal pain. Self-efficacy also negatively affected the pregnancy risks experienced by the pregnant women (Kestler-Peleg *et al.*, 2015; Miri *et al.*, 2016).

Cues to action against detection behaviours of preeclampsia pregnancy warning signs

Cues to action directly affected the detection behaviours of preeclampsia pregnancy warning signs, and indirectly could also influence the detection behaviours of preeclampsia pregnancy warning signs through perceived self-efficacy pathway. The cues can be internal ones, e.g. the pregnant women feel any preeclampsia symptom which could trigger threatened feeling, thus they have to change their behaviours to do the detection of pregnancy warning signs. Meanwhile, the external cues can be obtained from recommendations of healthcare professional and information from media (Abd El Aziz *et al.*, 2016). Health campaign efforts by the healthcare professional will be able to improve the pregnant women behaviours in better detecting preeclampsia pregnancy warning signs.

Conclusion

The results of this study demonstrated the use of Health Belief Model to understand how health belief of pregnant women could influence their behaviours in detecting warning signs of preeclampsia pregnancy. As shown in this study, there was an indirect impact of sociodemographic of pregnant women on detection behaviours of preeclampsia pregnancy warning signs. Furthermore, there was direct effect of perceived susceptibility and severity, perceived threat, perceived benefit, perceived barrier, perceived self-efficacy, and cues to action against the preeclampsia pregnancy detection behaviours. Hence, as health promotion and education on detection of preeclampsia pregnancy warning signs improve, the possibility of preeclampsia pregnancy incidence would decrease effectively.

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