

PREECLAMPSIA CARE (A WEB-BASED INFORMATION SYSTEM) EFFECTIVE FOR DETECTING THE RISK OF PREECLAMPSIA IN PREGNANT WOMEN

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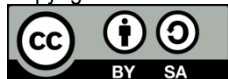
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ABSTRACT

One of the leading causes of maternal and newborn fatalities worldwide is preeclampsia. Only healthcare professionals can now detect the risk of preeclampsia, and they still do so manually. Pregnant women can't know if they have preeclampsia risk factors or not. Preeclampsia risk detection is significant because it can determine a pregnant woman's preeclampsia risk, allowing for early diagnosis and prevention. A web-based information system can be used to identify pregnant women who are at risk of preeclampsia. Women who are expecting can utilize laptops or smartphones linked to the internet. Numerous research studies have demonstrated that information technology solutions can enhance health services regarding data transmission, health outcomes, prescription adherence, and patient monitoring compliance. This descriptive study explained its usefulness; live sampling was used as the sampling method, and 33 pregnant women served as the study's subjects. Web-based information systems and questionnaires are used to collect data. Pregnant women's ability to independently recognize preeclampsia risk can be enhanced by employing a web-based information system to identify different levels of preeclampsia risk. Of these, 51.5% have no risk of preeclampsia, 18.2% have a moderate risk, and 24.24% have a high risk. The effectiveness rate used in the Technology Acceptance Model (TAM) questionnaire is 92%.

Keywords: Early Detection, Information System, Preeclampsia

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INTRODUCTION

Pregnancy problems are a possibility for a pregnant woman and can result in discomfort or even death. Therefore, early identification of health risk factors must be one of the preventive measures (Sari, R. I., & Ardiyanti, A., 2020).

One of the leading causes of mother and child death globally, particularly in underdeveloped nations, is preeclampsia. According to estimates from the World Health Organization (WHO), preeclampsia cases are seven times more common in underdeveloped countries than in industrialized ones (Park, H. J., Shim, S. S., & Cha, D. H., 2015). As of right now, midwives are the only ones who can manually detect preeclampsia, unfortunately pregnant women cannot identify preeclampsia risk factors on their own. However, preeclampsia prediction is crucial because it can identify at-risk individuals to provide an earlier diagnosis, monitor

at-risk moms and fetuses, and implement prevention measures (English, F. A., Kenny, L. C., & McCarthy, F. P., 2015). Numerous studies have demonstrated that information technology solutions, including phone calls, video communications, text messages (SMS), and internet access, can enhance health services regarding data transmission and health outcomes, prescription adherence, and patient monitoring compliance (Shiferaw, S., Spigt, M., Tekie, M., Abdullah, M., Fantahun, M., & Dinant, G. J., 2016). This is because data collected through applications and information technology networks will differ from data written by hand. Because the authenticity of the handwritten data is still uncertain, it may contain erroneous information and have serious repercussions (Van Den Heuvel, J. F., Groenhouf, T. K., Veerbeek, J. H., Van Solinge, W. W., Lely, A. T., Franx, A., & Bekker, M. N., 2018). Health professionals can view data acquired through information system technology at

any time and from any location, which will help them make therapeutic judgments (Miah, S. J., Hasan, N., & Gammack, J, 2019) The availability of a clinical decision support system will significantly aid medical professionals in making decisions about patient care since the information gathered is more accurate and comprehensive (Bakibinga, P., Kamande, E., Omuya, M., Ziraba, A. K., & Kyobutungi, C, 2017).

The advantage of this information system is that every pregnant woman is able to recognize the risk factors for preeclampsia which can be implemented anywhere and anytime as long as they are connected to the internet. Easy to use and health workers can also access data on pregnant women at risk of preeclampsia in real time.

METHOD

Preeclampsia Care (a web-based information system) is designed using a rule-based system. The information system was developed based on the information system development methodology, namely the Systems Development Life Cycle (SDLC), which includes the stages of planning, analysis, design, implementation, testing and maintenance, as shown in Figure 1.

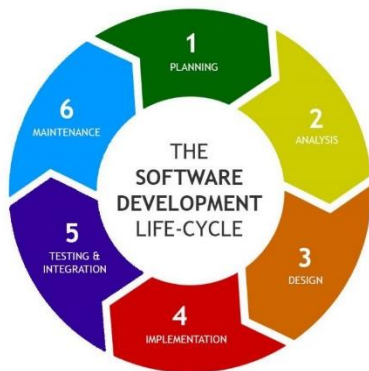


Figure 1. The Software Development Life-Cycle

To access this information system, pregnant women can use smartphones or computers connected to the internet. Pregnant women register first by input their data, email address, and password. After that the pregnant woman can access the examination menu. Pregnant women input their condition about risk factors of preeclampsia. After that, the system processed the data into a conclusion about the condition of pregnant women that has high risk,

moderate risk or no risk of preeclampsia. The information system diagram was build is shown in Figure 2:



Figure 2. The Diagram of Information System

This research is a descriptive research with a quantitative method, namely research that attempts to show the results of a collection of quantitative or statistical data such as surveys as they are, without calculating or seeing the relationship with treatment or other variables.

A population of 30,095 pregnant women was calculated based on the target of pregnant women in Banyumas district within a period of 1 year. The number of samples was calculated using the Solvin formula and the number of samples obtained was 33 pregnant women. The sampling technique used is purposive sampling.

Data collection consists of 2 stages, namely the preparation and implementation stages. The preparation stage includes the preparation of research permits, the preparation of research instruments and the preparation of research data collection schedules. The implementation stage consists of informed consent, an explanation of how to access the website, then respondents are asked to register by entering their biodata. After that, it is continued by filling in the preeclampsia risk detection menu and the results will be concluded whether the respondent is at high risk / low risk / not at risk of preeclampsia. The last stage, respondents are asked to fill out the TAM questionnaire to assess the effectiveness of the website. The research was conducted for 2 weeks.

The instrument of this study used a web-based information system and a questionnaire based on the Technology Acceptance Model. The univariate research examines the risk factors for preeclampsia in pregnant women and the acceptability of information systems using the Technology acceptability Model (TAM) hypothesis. The processed data is utilized as a foundation for

debating statement matters, which are then presented in tabular form to allow conclusions to be reached.

RESULTS

This study employs a web-based information system to determine the risk of preeclampsia in pregnant women. Pregnant women can individually assess their risk of developing preeclampsia. To determine the risk of preeclampsia, pregnant women first register by filling out the biodata as shown in figure 2 and 3:

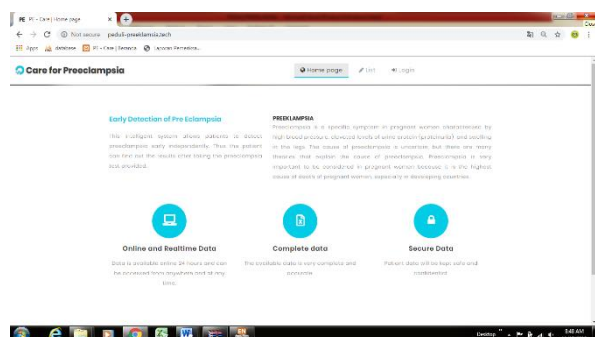


Figure 2. Home

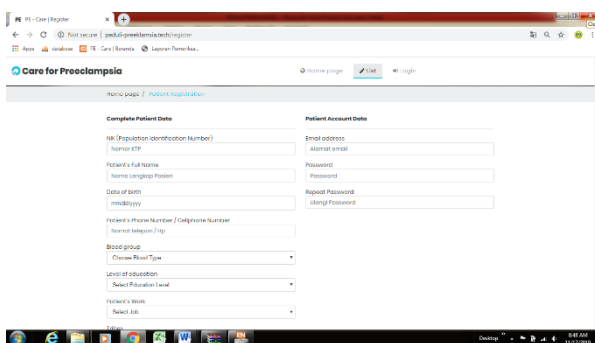


Figure 3. Registration Menu

After the registration process is completed, the pregnant women will enter the risk examination stage for preeclampsia. Pregnant women input their condition into the column in accordance with the conditions about the risk factors of preeclampsia, then the system will processed the data. The system will show the results of examination of pregnant women have a high risk, moderate or no risk of preeclampsia. The examination processes are seen in figures 4 and 5.

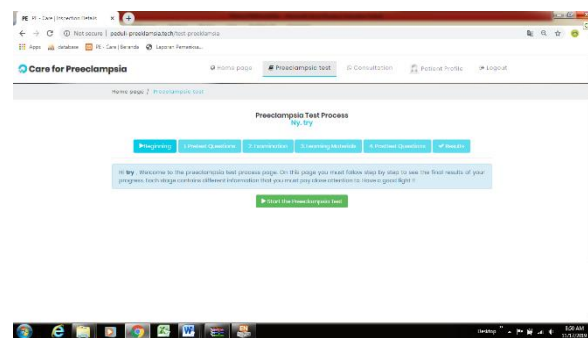


Figure 4. The Examination Menu

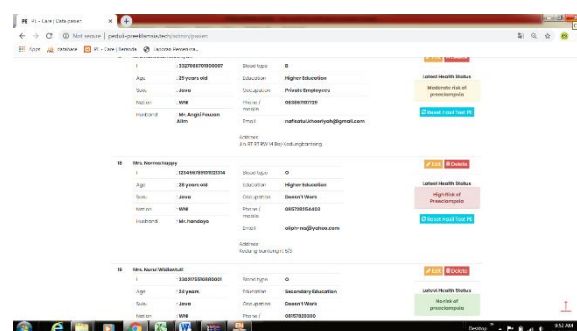


Figure 5. The Output of Examination

The number of pregnant women using this information system results in the detection of preeclampsia risk as shown in Table 1:

Table 1. Frequency Distribution of Preeclampsia Risk in Pregnant Women Using Web-Based Information Systems

The Risk of Preeclampsia	n	%
No risk	17	51.5
Immediate Risk	6	18.2
High Risk	10	24.24
Total	33	100

Based on the data in table 1, pregnant women who were previously unable to perform early detection of preeclampsia independently, then by using this web-based information system, pregnant women are able to detect the risk of preeclampsia in themselves independently. The data obtained by the majority of pregnant women are not at risk of preeclampsia which is equal to 51.5%. However, pregnant women who were previously undetected are at risk of preeclampsia, so by using this

information system, it can be found that there are 18.2% of respondents at moderate risk and 24.24% at high risk of preeclampsia.

The effectiveness of the information system measured using the Technology Acceptance Model (TAM) questionnaire obtained data as in table 2.

Table 2. Effectiveness of Information Systems Based on Technology Acceptance Model (TAM)

Effectiveness Variables	n	Mean	%
Purpose	33	4.7	94
Speed	33	4.7	94
Compliance	33	4.6	92
Ease	33	4.6	92
Accuracy	33	4.2	84
Trust	33	4.7	94
Total Mean		4.6	92

According to Table 2, the most incredible score for information system effectiveness in terms of usability is 4.7 (94%), while the lowest in terms of accuracy is 4.2 (84%). The average score for information system effectiveness regarding purpose, speed, compliance, ease, accuracy, and trust is 4.6 (92%). As a result, the early detection information system for preeclampsia is highly successful.

DISCUSSION

These data demonstrate that the convenience of getting information utilizing a web-based information system accessed via a smartphone or computer can increase one's capacity to detect health independently. According to Sevani's research (2016), using computer apps to identify body disorders can help overcome these health difficulties, particularly web-based applications, which can speed up detection time. Furthermore, this program is convenient because it can be accessed anytime and anywhere. According to the report, 61 million Indonesians use the internet for over three hours. Therefore, computer applications are very significant for the community as a first step in illness prevention (Sevani, N., & Chandra, Y. J, 2016).

The results of the detection of preeclampsia which is carried out independently by pregnant women will immediately be known by midwives. So the midwife can find out the condition of pregnant women in the target area. The use of web-based applications, able to report the risk of disease quickly, and able to communicate the findings of the examination so that it is expected that treatment and prevention efforts can be done quickly and accurately (Aini, F. N., Widyawati, M. N., & Suryono, S., 2019). Using this information system, traditional patient care is no longer necessary because midwives do not need to be face to face to detect risk factors for preeclampsia (Yuhefizar, Y., Nasution, A., Putra, R., Asri, E., & Satria, D., 2019).

According to Lestari and Nawang (2023), the expert system application program was designed to test the feasibility of early detection of the risk of preeclampsia during pregnancy. It is predicted that by developing and building this expert system, pregnant people will gain a better understanding of how to detect the danger of preeclampsia in pregnancy early and precisely to avoid dire psychological difficulties and hurry to health services (Lestari, D., & Nawang, E., 2022).

Early detection efforts of preeclampsia risk need to be balanced with ANC efforts that are in accordance with standards. Participation of pregnant women needs to be increased in terms of planning and evaluation of results, including by participating in counseling and pregnant women's class programs held by health workers. With the existing model, counseling on the importance of ANC behavior is very important to be given to pregnant women. The support that arises is not only obtained from health workers, but also support from husbands and families (Handayani, S., & Milie, P., 2020).

The information system is a solution to the many problems that exist in health services, such as the lack of available resources, the length of the reporting process, the length of the administrative

process, the incomplete data available, the delay in establishing the diagnosis and treatment, the distance to go to the health service, the high cost of transportation to the health service, etc. (Agarwal, S., LeFevre, A. E., Lee, J., L'engle, K., Mehl, G., Sinha, C., & Labrique, A., 2016).

The information system also simplifies new patient registration and allows for faster access to existing patient data. Using information systems will also make it easier to store vast volumes of data and access it more quickly. Information systems also aid in reporting systems, data security and maintenance, and avoiding the same medical record number. (Utami, D. H. N., 2015).

The use of information system can be one way to prevent preeclampsia because if a pregnant woman is suspected of having hypertension in pregnancy without the risk of preeclampsia, then it should be a warning for the mother to be careful in maintaining her blood pressure, her health and her pregnancy condition. In addition, this system is also an early warning by detecting early the possibility of preeclampsia risk in pregnant women so that the mother is advised to immediately consult a doctor to get fast and appropriate treatment and handling before it continues to become eclampsia (Fitrilina, F., Albbi, M., Agustian, I., Herawati, A., & Massardi, N. A., 2021). Application maintenance is carried out by collaborating with the developer. Maintenance is carried out at least once a year to extend the domain.

CONCLUSION

Preeclampsia Care (a web-based information system) can help pregnant women identify the danger of preeclampsia. Web-based information systems are highly effective at detecting the risk of preeclampsia in pregnant mothers.

REFERENCE

Agarwal, S., LeFevre, A. E., Lee, J., L'engle, K., Mehl, G., Sinha, C., & Labrique, A. (2016). Guidelines for reporting of health interventions using mobile phones: mobile health (mHealth) evidence reporting and assessment (mERA) checklist. *bmj*, 352.

- Aini, F. N., Widyawati, M. N., & Suryono, S. (2019). Early Detection of Preeclampsia using a Rule-Based System Information System. In *Journal of Physics: Conference Series* (Vol. 1179, No. 1, p. 012139). IOP Publishing.
- Bakibinga, P., Kamande, E., Omuya, M., Ziraba, A. K., & Kyobutungi, C. (2017). The role of a decision-support smartphone application in enhancing community health volunteers' effectiveness to improve maternal and newborn outcomes in Nairobi, Kenya: quasi-experimental research protocol. *BMJ open*, 7(7), e014896.
- English, F. A., Kenny, L. C., & McCarthy, F. P. (2015). Risk factors and effective management of preeclampsia. *Integrated blood pressure control*, 7-12.
- Fitrilina, F., Albbi, M., Agustian, I., Herawati, A., & Massardi, N. A. (2021). Sistem Peringatan Awal Resiko Preklamsia pada kehamilan menggunakan metoda Certainty Factor dan Android. *Jurnal Nasional Teknik Elektro*, 45-54.
- Handayani, S., & Milie, P. (2020). Pengaruh Pendidikan Kesehatan Melalui Whatsapp Group Terhadap Pengetahuan Dan Sikap Ibu Hamil Dalam Deteksi Dini Preeklampsia Pada Masa Pandemi Covid-19. *Jurnal Kebidanan*, 217-230.
- Lestari, D., & Nawang, E. (2022). Aplikasi Sistem Pakar Deteksi Peringatan Awal Resiko Preeklamsia Pada Kehamilan Menggunakan Metode Forward Chaining: Application Of Expert System Detection Of Early Warning Risk Of Preeclampsia In Pregnancy Using Forward Chaining Method. *Media Publikasi Penelitian Kebidanan*, 5(1), 38-41.
- Miah, S. J., Hasan, N., & Gammack, J. (2019). Follow-up decision support tool for public healthcare: a design research perspective. *Healthcare Informatics Research*, 25(4), 313-323.
- Park, H. J., Shim, S. S., & Cha, D. H. (2015). Combined screening for early detection of pre-eclampsia. *International journal of molecular sciences*, 16(8), 17952-17974.
- Sari, R. I., & Ardiyanti, A. (2020). Faktor-Faktor Yang Berhubungan Dengan Penatalaksanaan Deteksi Dini Preeklampsia Oleh Petugas Kesehatan: Systematic Review. *J. Ilmu Keperawatan dan Kebidanan*, 12(2).
- Sevani, N., & Chandra, Y. J. (2016). Web based application for early detection of vitamin and mineral deficiency. *CommIT (Communication and Information Technology) Journal*, 10(2), 53-58.
- Shiferaw, S., Spigt, M., Tekie, M., Abdullah, M., Fantahun, M., & Dinant, G. J. (2016). The effects of a locally developed mHealth intervention on delivery and postnatal care utilization; a prospective controlled evaluation among health centres in Ethiopia. *PloS one*, 11(7), e0158600.

- Utami, D. H. N. (2015). Evaluasi Ketepatan Reseleksi Diagnosis Utama Sebelum dan Setelah Verifikasi pada Kasus Pasien BPJS di Rumah Sakit Hidayah Boyolali (Doctoral dissertation, Universitas Gadjah Mada).
- Van Den Heuvel, J. F., Groenhouf, T. K., Veerbeek, J. H., Van Solinge, W. W., Lely, A. T., Franx, A., & Bekker, M. N. (2018). eHealth as the next-generation perinatal care: an overview of the literature. *Journal of medical Internet research*, 20(6), e202.
- Yuhefizar, Y., Nasution, A., Putra, R., Asri, E., & Satria, D. (2019). Alat Monitoring Detak Jantung Untuk Pasien Beresiko Berbasis IoT Memanfaatkan Aplikasi OpenSID berbasis Web. *Jurnal RESTI (Rekayasa Sistem dan Teknologi Informasi)*, 3(2), 265-270.