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Digital Scales of Web-Based Partograph in Detecting the Early Postpartum Bleeding

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Abstract

Introduction: A simple graph partograph serves to record the information of the inpartu mothers during their 1st active phase of labor, to detect complications, to make an appropriate action in decision making, to prevent prolonged labor, postpartum hemorrhage, and sepsis. The aim of this research was to compare the use of digital scales of web-based partograph and the conventional partograph in detecting the early estimation of postpartum bleeding at the stage III and IV.

Materials and Methods: The study used the Quasi-Experiment method. Thirty women in labor were chosen by using the purposive sampling technique. The web digital scale and the conventional digital scale were used to weigh the underpad of the postpartum at the stage III and IV. The Independent T-test and Mann-Whitney test were employed to analyze the data.

Results: The results of the study indicated that the digital scale of the WEB-based partograph was more rapid in estimating the postpartum hemorrhage at the stage III and IV comparing to the digital scale of conventional partograph. The statistical test of Mann-Whitney revealed the p-value > 0.05, which means that there was a difference in the speed but in case of the accuracy aspect of p-value > 0.05, it means that there was no difference. In case of the estimation of the blood amount at stage III and IV, the test value of the Independent T-test revealed the p-value of > 0.05, which means that there was no difference in the estimation of the postpartum hemorrhage.

Conclusion: It was concluded that the digital scale of web-based partograph was faster in estimating postpartum hemorrhage at period III and IV comparing to the digital scales of conventional partograph and there were no differences in its accurateness and number of postpartum hemorrhage at the stage III and IV.

Keywords: partograph, web, scale, conventional, hemorrhage

1. Introduction

Partograph is the simple graphs which function to record the information of inpartu women during their 1st active phase of labor, and it is also used as a tool which can detect the complications in order to take an appropriate action in decision making. Thus, it can reduce the Maternal Mortality Rate (MMR). The first partograph was introduced by Friedman in 1950, then developed and redesigned by Philpott and Puri in 1971 by adding the concept of warning and action lines (Archa Prem 2013; Gitanjali, 2016; Sinha, 2016; Opoku & Nguah, 2015; Akpan, 2014; Mathibe Neke & Matupa, 2013; Yisma, 2013; Hasan, 2017; Fatouh & Ramadan, 2015; Suchika et al., 2014; Mandiwa & Zamawe, 2017; Nwaneri et al., 2017; Bedwell, Levin, Pett, & Lavender, 2017; Zelellw, 2016; Okokon et al., 2014; Pusparinda, 2015; Markos & Bogale, 2015).

World Health Organization (WHO) states that the appropriate use of partograph can improve the labor management, decision making, prevent prolonged labor, postpartum hemorrhage and sepsis (Abebe, 2013). Furthermore, the odds ratio 3 means that the occurrence of stillbirths increase three times if the partograph is not

used and managed properly, Thus it is necessary to develop the tool (Ashish, Wrammert, Clark, Ewald, & Malqvist, 2016).

WHO reported that there were about 289,000 of maternal deaths in 2013. Common causes of death were postpartum hemorrhage (64%), hypertension (15.62%), and (6.25%) pulmonary embolism (Kumar & Agrawal, 2016).

Postpartum hemorrhage is the loss of more than 500 cc of blood after childbirth. It is related to the main causes of maternal death include uterine atony (50–60%), residual placenta (23–24%), placental retention (16–17%) birth canal lacerations (4–5%) (Solomon, 2012; Pavol Zubor et al., 2014; Smith et al., 2014; Francoise, Chloe, Bruno Pereir, Didier, & The Hera Group, 2016; Rousseau et al., 2016).

Monitoring at the stage III plays an important role in preventing the bleeding during labor, and it is also related to the knowledge and skills of health workers in providing services. The results of the study in Ethiopia about the use of partograph showed that the health workers, in terms of having good knowledge were at 53.4% and sufficient knowledge were at 26%. The percentages were related with the use of partograph sheets at the second stage of labor, active management at the third stage which is very important in preventing bleeding around 60–70%, including administration of oxytocin, controlled cord stretching and uterine fundal massage. Furthermore, monitoring the IV stage until 2 hours of postpartum include: pulse, blood pressure, bladder, temperature, and bleeding period is the most urgent thing to prevent maternal and infant mortality (Adnan, 2017; Rani & Begum, 2017; Sentilhes et al., 2015; Egenberg, 2017; Guasch & Gilsanz, 2016; Herrick, Mvundura, Burke, & Abu-Haydar, 2017; Nyflot et al., 2017; Francoise et al., 2016; Mobeen et al., 2010; Mezmur, 2017; Mandiwa, 2017; Zalalem, 2017).

In the past, people measured the estimation of postpartum hemorrhage by using a cloth which covered by blood, buttocks, and glove. After that people weighed it manually. Previously, the estimation of blood loss was only estimated by birth attendants or visually which was not necessarily accurate. Putri yayu et al., (2018) found that computer-based partograph is more effective than conventional partograph in terms of clinical decision-making and action. Moreover, Trisna Yunita et al., (2018) found that the speed of the computer-based partograph in filling were at 8.6 hours comparing to the conventional partograph which only took 11.6 hours. Thus, the authors developed the Web-based paragraph application for early detection of hemorrhage postpartum at stage III and IV. The authors developed additional digital scales which is connected to computers or laptops with web-based partograph which includes weighing underpad which is placed under the mother's butt in every 15 minutes and then it weighed on the first hour, and 30 minutes in the second hour of postpartum so that the observation of postpartum for 2 hours can help the midwifery to provide fast and accurate services in order to reduce maternal morbidity and mortality (Montufar-Rueda, 2013; Nwaneri et al., 2017; Fatouh & Ramadan, 2015).

2. Materials and Methods

2.1 Study Design and Sample Population

The design used in this study is Quasi-Experiment design by giving the treatment to the participants. This study was conducted at the Primary health care of Antang Perumnas and Bara-Baraya Makassar starting from November 2018 to January 2019. The sample was 30 women in labor by using purposive sampling techniques, data collection primary, univariate and bivariate analysis such as the Independent T-test and Mann Whitney statistical tests. The authors also used tools such as computers, software, printers, underpads, digital web scales, conventional digital scales, gloves, stopwatches, and Wi-Fi.

The population in this study was all of the mothers at the Primary health care of Antang Perumnas and Bara-Baraya Makassar. Adopting Wilcoxon sum table with minimum sample of 5, the authors were used half of the population but in this case, due to the accurate results of this study, the number of the sample was 30 who used digital web scale and conventional digital scale. The sampling technique used by authors was purposive sampling because the subject of the research was determined based on the authors' requirement. The criterion of the subject such as the inclusion criteria was the women who experienced a normal labor at the stage III and IV, meanwhile the exclusion criteria included the women in labor who experienced complications.

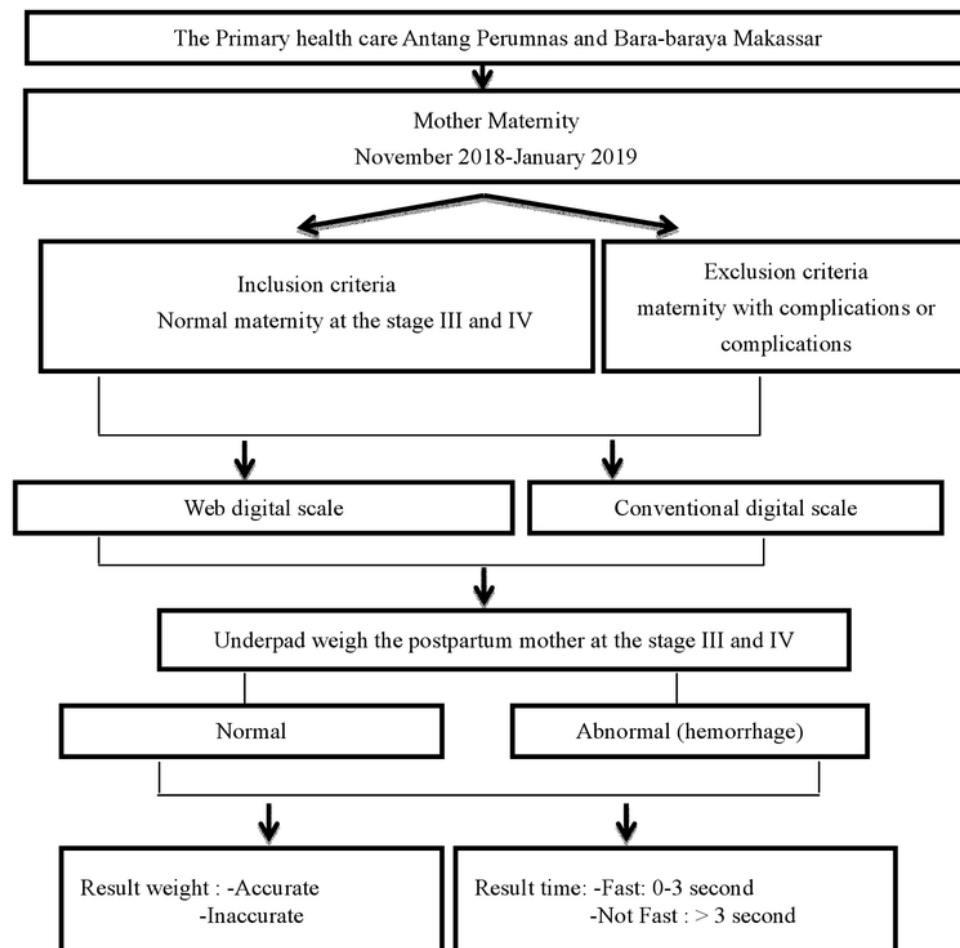


Figure 1. The flowchart of the Study

2.2 Data Collection

Primary data were obtained by conducting interviews, observation and documentation based on the sources needed. The underpad was weightby using digital web scales and conventional digital scales. The results were recorded both in a documentary sheet which starting from postpartum at the stage III to IV and a stopwatch was also used to calculate the speed of scales.

2.3 Ethical Considerations

The study followed the ethical clearance from the Research and Ethics Committee of the Medical Faculty of Hasanuddin University and was registered 905 / H4.8.4.5.31 / PP36-KOMETIK / 2018

2.4 Data Management and Analysis

The processing of the data used univariate and bivariate analysis and the results were displayed in the form of narration and frequency distribution of tables. The bivariate analysis used an independent T-test to accurately assess the results of the scales and Mann Whitney test in assessing the accuracy speed in displaying the results of the scales. Moreover, the data analysis of this study used SPSS version 24.

3. Results

3.1 Analysis Univariate

Table 1. Age of respondents

Variables	N	%
< 20 years	4	13.3
20-35 years	21	70.0
> 35 years	5	16.0
Total	30	100

Source: Primary Data.

Table 2. Characteristics of parity

Variables	N	%
Primigravida	8	26.7
Multigravida	21	70.0
Grandemultigravida	1	3.3
Total	30	100

Source: Primary Data.

Table 3. The comparison between the speed and accurateness of digital scales in web-based partograph and conventional digital scales for early detection of estimation of postpartum hemorrhage at the stages III and IV

Variables at Stage III and IV	N	<i>p-value</i>
Web and digital scales	30	.000
Accurateness of web and digital scales	30	1.000

Mann Whitney.

Table 4. The comparison between the amount of blood in digital scales of web-based partograph and conventional digital scales for early detection of estimation of postpartum hemorrhage at the stage III

Variables at stage III	N	<i>p-Value</i>
Amount of blood in Web and digital scales	30	.929

Independent T-test.

Table 5. The comparison between the amount of blood in digital scales of web-based partograph and conventional digital scales for early detection of estimation of postpartum hemorrhage at the stage IV

Variable at stage IV	N	<i>p-Value</i>
Amount of blood in Web and digital scales	30	.699
		.666
		.557
		.984
		.951
		.967

Independent T-test.

4. Discussion

The patients in this study involved 4 people who were in <20 years (13.3%), 21 people who were in 20-35 years (70%), and 5 people who were in > 35 years (16.7%). The maternal parity is 8 people who experienced

primigravida (26.7%), 21 people who experienced multigravida (70%), and 1 person who experienced grandmultigravida (3.3%). The age is related to the readiness of the mother in reproduction. < 20 years old women were still in the stage of growth and development, so that the condition of their pregnancy made her have to share the nutrition with their fetus. Conversely, > 35 years old women began to show the influence of the aging process such as hypertension, diabetes mellitus, which can prevent the entrance of the food for fetus through the placenta. Meanwhile, women who experienced multigravida became weaker in their uterus and it can cause complications since they were more often experiences pregnancy, parturition or > 3 times of parturition. The highest parity is one of the risk factors for postpartum hemorrhage because it tends to experience uterine atony. So it can be concluded that the average of maternal age around 20–35 years were still healthy and safe in reproducing, meanwhile parity in multigravida were at a risk category because they have given birth more than twice or > 3 times (Pratami, 2013).

The results of the data analysis using the Mann Whitney Test in terms of speed with a p-value .000 value or < 0.05 means that there were significant differences, in terms of accurate aspects with p-value values of 1,000 or > 0.05 means that there were no significant differences in digital scales of web-based partograph and conventional digital scales. In the past, measuring the estimation of postpartum hemorrhage was using visual birth attendants and did not use other measurements that were not necessarily accurate, so the authors developed a tool to calculate the estimation number of postpartum hemorrhage by using digital scales that was connected in the web-based partograph. The digital scales in the web-based partograph has Esp8266 d1 uno which is used to process the scales in the number of grams of the data that will be sent to Esp8266 d1 mini which functions as a receiver of the data and it is sent forward to the web-based partograph which is calculated in milliliters (ml).

Thus, it can help the health workers in knowing the speed of the postpartum hemorrhage estimation at the stage III and IV, so that early detection of postpartum emergency such as loss of more than 500 cc of blood after child birth (Hancock, Andrew, & Dame, 2015; Underwood, Sterling, & Bennett, 2012). This digital scale can help people to avoid postpartum hemorrhage, to improve the diagnosis and the management strategies. The digital scale that is connected to a web-based partograph are able to provide an early detection and to help in making decision in terms of the emergency cases during labor, a postpartum hemorrhage and a sepsis that must be referred immediately (Souza et al., 2015; Markos & Bogale, 2015; Abebe, 2013). Wilde (2009) found that the faster the health worker in detecting the problem, the better the impact on patients in terms of payment, complications, morbidity, mortality, prevention and treatment.

The estimation of postpartum hemorrhage at the stage III and IV showed that the p-value at > 0.05. It means that there were no significant differences between digital scales in web-based partograph and conventional digital scales in terms of the accuracy. Both scales measured the instruments that have the same density and its accuracy that has been calibrated. In other words, it can be said accurate if a measuring instrument is able to measure what should be measured and using digital scales has a better level of accuracy as well as the operation is more efficient than the analog scales (Edwar, Boni, & Muh, 2016).

The results of the data analysis using the Independent T-test on digital scales in web-based partograph and in the estimation of postpartum hemorrhage at the stage III obtained p-value .929 or > 0.05. It can be interpreted as insignificant or no differences. Basically, the web-based partograph which was developed by combining with the digital scales and it was also connected to the web-based partograph system is the first design obtained by the authors and has not been previously available in facilitating health workers, especially midwives. It helps them in measuring the estimation of postpartum hemorrhage at the stage III by weighing the underpad which contains the blood during stage III in order to find out the results quickly and accurately. This way can be used as an alternative choice to facilitate health workers, especially midwives in knowing the exact amount of blood loss, quickly and accurately, without having to guess the amount of blood visually (Carvalho, Gilda, Daniel, Mariana, & Metin, 2018; Hancock et al., 2015; Sloan, Durocher, Aldrich, Blum, & Winikoff, 2010). Thus, the midwives can carry on the postpartum emergency immediately and prevent the mother to experience what is commonly called 3T; being late in making decision, being late in processing the referral, and being late to get the treatment (Egenberg et al., 2017).

The analysis of the independent T-test on digital scales in web-based partograph and on the estimation of the amount postpartum hemorrhage at the stage IV showed the entire amount of the first blood to the sixth blood with p-value > 0.05. In other words, there were no significant differences between the amounts of first blood to the amount of the sixth blood on digital web scales and digital scales. This means that these two scales produced the results of the blood that are significantly different in statistical tests, although in reality there were still differences. These differences were not quite meaningful in a statistical test before the digital scales in the web-based

partograph were made in the calibration with a standardized gold standard. Partograph which is designed by using the web-based digital scales are the development of computer-based partograph that are effective in the speed, convenience and relevance of the data in clinical decision making (Putri yayu et al., 2018).

5. Conclusion

The digital scale in web-based partograph is faster in measuring the estimation of postpartum hemorrhage at the stage III and IV comparing with the conventional digital scales. In terms of accurateness and measuring the amount of blood in postpartum hemorrhage at the stage III and IV hemorrhage, the digital scale in web-based partograph can help the midwives to treat the patient who experienced bleeding.

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Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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