

# 34. Application of digital rubbing massage in pain level

*by Ismi Rajiani*

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**Submission date:** 10-Apr-2022 09:49PM (UTC-0700)

**Submission ID:** 1807471945

**File name:** 34. Application of digital rubbing massage in pain level.pdf (335.77K)

**Word count:** 3054

**Character count:** 16186

# Application of Digital Rubbing Massage in Pain Level, Comfort, and Duration of Labor Phase

Sudirman<sup>1</sup>, Sumarni<sup>1</sup>, Hartati<sup>1</sup>, Hendra M.<sup>2</sup>, Ismi Rajiani<sup>3</sup>

<sup>1</sup>Ministry of Health Polytechnic, Semarang, Indonesia; <sup>2</sup>Ministry of Health Polytechnic, Jakarta II, Indonesia; <sup>3</sup>Department of Business Administration, STIAMAK Barunawati Surabaya, Indonesia

## ABSTRACT

**Background:** Childbirth process is always marked with pain due to the existence of uterine contractions and the cervical dilation at stage one. The objective of this research was to investigate the intervention of independent nursing using digital rubbing massage (DRM) pain relief and its effect on pain level, comfort, and duration of active labor phase of primiparous women.

**Method:** This research used the true experimental pre-test - post-test design with a control group. The population in this study was all primipara pregnant women in inpartu condition in a health center of Pekalongan City, Indonesia. The subject of this research was 36 people who were selected by random sampling and divided into two groups. The distribution of subjects as intervention group and control group was determined randomly by using a lottery. The data were analyzed using a t-test.

**Results:** The results showed that there were significant differences in the degree of pain ( $p < 0.0001$ ), comfort ( $p < 0.0001$ ), and duration of labor ( $p < 0.0001$ ) in primiparous maternity women between the intervention group and the control group. The intervention of Digital Rubbing Massage (DRM) Pain Relief has an effect on decreasing the level of pain, increasing the comfort and shortens the duration of active labor phase in primiparous maternity.

**Conclusion:** The DRM Pain Relief instrument should be applied as an independent nursing intervention to relieve pain and increase comfort during childbirth process on a maternal unit or obstetric neonatal service in health care center.

**Keywords:** Digital Rubbing Massage, Pain Relief, Maternal Pain, Primiparous

## INTRODUCTION

Giving birth is always characterized by pain originating from uterine contractions and cervical dilatation. The first stage of childbirth is the opening time of cervix between the opening of 0 cm until the complete opening of 10 cm. The depletion and opening of the cervix in primigravida last for approximately 12 hours. In this phase, the increment in both the length and frequency of uterine contractions will make the perceived pain grow and become stronger. Most women

experience pain during delivery with moderate to severe pain intensity. Several studies have suggested that by using visual scale analog pain assessment, the mean intensity of pain during labor is  $8.21 \pm 2.65$  <sup>(1)</sup>. Primigravidas experience severe pain as much as 54%, moderate pain as much as 30% and light pain as much as 16% <sup>(2)</sup>. The intensity of maternal pain that experienced by women was the severe pain of 53.33% and moderate pain of 46.67% in Pekalongan City, Indonesia <sup>(3)</sup>.

Birth pain should be addressed as it affects the functional mechanisms that lead to hyperventilation, thereby lower the CO<sub>2</sub> levels and increase the blood pH. When the mother's CO<sub>2</sub> level is low, the fetus' CO<sub>2</sub> level is also low resulting in a slow deceleration of the fetal heart rate. Pain also causes uncoordinated uterine activity resulting in longer labor which ultimately threatens the lives of both mother and fetus <sup>(4)</sup>. The pain

### Corresponding Author:

Sudirman  
Department of Nursing,  
Ministry of Health Polytechnic, Semarang, Indonesia  
Email: sudirman@yahoo.co.id

represents the discomfort, while the comfort describes the controlled pain.

The nurse or midwife says it is very inefficient to massage the patient with the fingers whenever a pain complaint occurs. On the other hand, the use of massage electronic devices has not been specifically used to overcome discomfort during labor and facilitate labor. The majority of massage equipment is only for the purpose of eliminating fatigue, and not yet to measure comfort for active phase and duration of labor. As such, this research aims at exploring the use of digital rubbing massage in eliminating the pain during labor.

### METHODOLOGY

This research used true experimental design pre-test - post-test control group. This design is used to determine the effect of Digital Rubbing Massage (DRM) Pain Relief to the pain level, comfort, and duration of active labor phase of primiparous women. Digital Rubbing Massage Tool (DRM) Pain Relief was self-developed by the authors so that the overall research consisted of 2 stages, namely the development of the instrument and the validation of the usage of the instrument.

Development of the instrument began from literature studies, expert consultation, and then carried out the preparation of prototypes. The pain reliever was developed based on a principle similar to the developed Pain Digital Acupressure (5) Digital Rubbing Massage (DRM) Pain Relief is designed with a binary beat to provide rubbing sensation and combined using an Android or a notebook applications. Determination of

wave type, frequency, amplitude, and duration of massage was done by trial and identification of 20 respondents. The subjects of the study were 36 primiparous mothers in the active phase.

This study had three dependent variables which were pain level, comfort, and duration of active labor phase and four independent variables which were education, occupation, mother's age, and pregnancy age. Simple descriptive pain intensity scale instruments were used to measure pain and childbirth comfort questionnaire was used to measure comfort during childbirth. A statistical test was used to analyze the difference of variable degree of pain and comfort by using t-test.

### RESULTS

The results of this study indicated that the sine wave with the frequency of 50 Hertz was felt most comfortable by the respondents so that this wave was selected as the wave of DRM Pain Relief with Amplitude of 0.8 and duration of massage of 30 minutes. the average comfort score in both the intervention group and the control group experienced an increase. However, the increase in comfort score in the intervention group was more significant with the mean difference of 11.61 than the control group which was only an average difference of 325 between the scores before and after the treatment. The results showed that there was a difference of comfort before and after treatment (p < 0,05) in each group. Table 1 shows that there was a difference of average score between intervention group and control group on pre or post application of Digital Rubbing Massage (DRM) Pain Relief (p < 0,05).

Table 1: The Difference of Comfort Before and After the Application of DRM

Comfort	Intervention Group		Control Group		t*	p-value
	Mean	Standard Deviation	Mean	Standard Deviation		
Pre-application	25.78	2.463	28.11	1.844	-3.218	0.003
Post-application	37.39	1.914	29.06	1.474	14.634	0.000

The duration of active labor phase is measured from the fourth opening of the cervix to the born of the baby (in hours). Table 2 shows that the mean duration of the active labor phase between the intervention and control groups found a significant difference of p < 0.0001. The length of the active phase of labor in the intervention group was shorter by 2.39 hours compared with the control group.

Table 2: The duration of Active Labor Phase After the Application of DRM

Variable	Intervention Group		Control Group		t*	p-value
	Mean	Standard Deviation	Mean	Standard Deviation		
Duration of active labor phase (hours)	5.50	1.339	7.89	1.451	-5.133	0.000

t\*: independent t-test

## DISCUSSIONS

The Pain Relief (DRM) instrument is the development of the PDA (Pain Digital Acupressure) tool. The development of DRM is required because doing massage and rubbing manually at the same time are very inefficient and exhausting due to prolonged labor and uterine contractions that cause pain during the active labor phase within 6 to 8 hours in the normal delivery period <sup>(6,7)</sup>.

Sine wave was chosen in this study because based on the result of identification of wave characteristics, the most comfortable perceived response was the sine wave (65%). These results were consistent with the previous study results of which suggests that square waves provide more pain sensation than sine waves <sup>(8)</sup>. The sine wave is the simplest type of wave, does not contain harmony tone and sounds soft or smooth, so it is very suitable for maternity and safe to for the baby. The principle in these waves is rapidly increasing in amplitude (rate rise) means the greater the ability of waves to generate neural networks <sup>(9)</sup>.

The results of this study were relevant to the results of other studies in efforts to reduce the labor pain. The pain stimulus from cervical dilatation runs through the hypogastric plexus enters the spinal cord in thoracic 10, 11, 12, and lumbar 1. Based on this scientific reason, the location of the installation of two pairs of pads of the DRM device was in the area and proved capable significantly to relieve labor pain. DRM will stimulate the release of endorphin hormone which is an endogenous analgesic of the body.

Maternal mothers who had massage on their back had a lower pain intensity of 29.62 points than those that did not have; so there was a massage effect on the intensity of pain in the first stage of normal delivery ( $p = 0.001$ ). Researchers also measured endorphin hormone levels using human beta-endorphin elisa kit. The results indicated that the mothers who had massage had higher levels of endorphins, which was 142.82 pg/mL. There was an effect of massage on normal maternal endorphin levels ( $p = 0.001$ ). This study was conducted in the maternal mothers at the first stage of latent phase in normal labor, not performed on the active phase of labor. The intensity of pain occurring in the first stage of latent phase is still rare and the intensity is still in the category of mild pain <sup>(10)</sup>.

The intervention of back massage has also been studied with the result that there were effects of back massage on the adaptation of active labor phase pain, duration of second stage of labor, and primigravida labor bleeding ( $p = 0.001$ ) <sup>(11)</sup>. Previous study stated that there was a relationship of husband's assistance with the decrease of pain in the first stage of active labor phase ( $p = 0,015$ ). However, based on the scale of pain, with a good husband's assistance, there were still mothers who experienced severe pain <sup>(12)</sup>. This was because the mother could not concentrate when the husband gave attentions of both verbal and non verbal communication, so that the expected results of the husband's assistance was not optimal. Digital Rubbing Massage (DRM) is a solution in overcoming labor pain by establishing clients according to their needs. Nevertheless, measurements of endorphin levels have not been done in this study. Endorphin levels also play a role to give pleasure or happy that is part of comfort <sup>(13)</sup>.

The hypothesis of this research stated that the independent nursing care of Digital Rubbing Massage (DRM) Pain Relief has an effect on the active labor phase enhancement in primiparous maternal <sup>35</sup>thers has been proven acceptable although the initial comfort score between the intervention group and the control group is already different. This condition is clinically very helpful for mothers in dealing with discomfort problems, the less mothers who experience discomfort or more mothers who experience comfort, the contraction of the uterus will be more adequate, reducing the number of prolonged labor, and prevent the emergence of complications in the mother and fetus <sup>(14)</sup>.

<sup>36</sup> The results of this study support the results of previous research which stated that massage as electrical stimulation could improve comfort, reduce one's condition from anxiety, emotional distress, nausea, and pain <sup>(15)</sup>. Interferential current electro-massage massage overcomes disability, pain, and improved quality of life in patients with low back pain <sup>(16)</sup>.

The results of this study indicated the relationship between the degree of pain and comfort in the intervention group. When the pain score increased then the comfort score decreased and vice versa <sup>(17)</sup>. Comfort is in the same direction as relaxed conditions. Comfort and pain are two things that go incompatibly <sup>(18)</sup>.

Results of the statistical analysis showed that the intervention group experienced active phase labor more quickly than the control group. The average duration of active labor phase in the intervention group was 5.5 hours, while the mean duration of active labor was 7.9 hours. This condition is clinically very useful for reducing the number of mothers who have an active time span of more than eight hours which may pose a risk to the mother and baby.

Digital Rubbing Massage (DRM) Pain Relief was developed to provide a rubbing massage sensation. Massage as well as rubbing movement has been proven to make the delivery process becomes faster and delivery becomes more smoothly although the duration and process are also affected by factors such as power (myometrial contractions and the ability of the mother to strain), passager (position, presentation, and size of the fetus), passageway, and psychology (fear, anxiety and stress conditions in the mother)<sup>(19)</sup>. The duration of labor may affect the health condition of the mother, even impact on maternal and fetal death. The problem of pain during labor is due to postpartum hemorrhage, infection, and obstetric fistula, whereas maternal death problems are associated with prolonged periods due to uterine rupture and infant mortality due to asphyxia<sup>(20)</sup>.

### CONCLUSION

The installation of the Digital Rubbing Massage (DRM) Pain Relief tool in the intervention group had proven that the tool was capable of reducing shorter labor duration in the primiparous maternal active phase which may reduce the likelihood of prolonged labor. The installation of the DRM instrument could also improve comfort during labor. This comfort will decrease catecholamines thereby increasing the effectiveness of uterine contractions.

**Ethical Clearance:** Ethical clearance was obtained from The Ministry of Health Polytechnic Semarang, Indonesia. We also wish to thank all the participants who contributed to this study.

**Conflict of Interest:** Nil.

**Source of Funding:** Ministry of Health Polytechnic Semarang, Indonesia.

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