

# The Effect of Slow Stroke Back Massage, Cold-compress and Warm-compress on Superokside Dismutase and Malondialdehyde Levels in Primary Dysmenorrhoea

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## Abstract

During dysmenorrhea occurred inflammation and endothelial dysfunction with lipid peroxidation sign and it was an indication of oxidative stress. Several previous studies have showed in dysmenorrhoea there was an increase of MDA levels and a decrease of SOD plasma. The aim of this study was to determine the effect of Slow Stroke Back Massage (SSBM), cold-compress and warm-compress on Superokside Dismutase and Malondialdehyde levels in Primary Dysmenorrhoea. This study used a Quasy Experiment design with approach a Post Test Only Control Group Design. The population in this study was all female students in Health Science Faculty of Unipdu Jombang who experienced dysmenorrhoea, a total sample in this study was 50 respondents and they were divided into 4 groups. The instruments in this study were included: thermometer for measured the temperature, and a Spectrophotometer which consists of NBT (Nitro Blue Tetrazolium) method for measured SOD level, Thiobarbituric Acid (TBA) method for measured MDA level. The data were analyzed by using the Kruskal-Wallis test and Post Hoc Test with  $\alpha \leq 0.05$ . The results of this study showed that there were disfferences of SOD level in SSBM, warm-compress compared to control and there were no differences in SOD levels between cold-compress with the control. There were significant differences of MDA levels in all treatment groups and control.

**Keywords:** *Slow Stroke Back Massage, Cold-compress, Warm-compress, Superokside Dismutase Malondialdehyd*

## Introduction

Primary dysmenorrhea is a complaint of lower abdominal pain during menstruation among young women without pelvic pathology<sup>(1-3)</sup>. Cramping pain of menstruation occur  $\geq 2$  days and accompanied some symptoms such as nausea, diarrhea, headaches and bloating<sup>(4-7)</sup>.

The incidence of primary dysmenorrhea was estimated at 60%-88% occurred young women<sup>(7-8)</sup>. Dysmenorrhoea give an impacts for personal health and social. A study mentioned that about 600 million of work hours and the economic losses of around 2 billion dollars per year in the United States<sup>(9)</sup>. Studies in

Korea showed that about 83%-94% of female students complained of cramps during menstruation<sup>(10-11)</sup>. The menstrual cramps defined as colic pain before or during menstruation in the pelvis, lower back, or upper legs that last for 48-72 hours<sup>(12)</sup>.

In primary dysmenorrhea has an increase of endometrial secretion, PGF2 $\alpha$  and leukotriene levels during menstruation so it makes an increasing of uterine tone and pain<sup>(13)</sup>. Also occurred an inflammation and endothel dysfunction characterized by lipid peroxidation which is an indication of oxidative stress<sup>(14-15)</sup>. Lipid peroxidation can be identified by an increasing of malondialdehyde (MDA) levels<sup>(16)</sup>. On healthy conditions, oxidative stress and free radical are balanced in the cellular system. Oxidative stress occurs because of an imbalance between pro-oxidants and antioxidants<sup>(17)</sup>. It men has an increase on concentration of reactive oxygen species (ROS) and or reactive nitrogen species (RNS) and has a decrease in defense of

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antioxidant mechanisms<sup>(18-22)</sup>. Some of ROS are needed for the development of normal cell function with the condition on the oxidation of each molecule returning to the reduced status<sup>(23)</sup>. Excessive ROS can defeat the body's natural antioxidant defending system<sup>(17)</sup>, induce lipid peroxidation and the damage of DNA and cell membranes<sup>(18,24-25)</sup>. One of endogenous antioxidant is superoxide dismutase (SOD). Several previous studies said that in dysmenorrhoea process will increases MDA<sup>(26-28)</sup> and decreases in plasma SOD<sup>(29)</sup>.

Nonsteroidal anti-inflammatory drugs (NSAIDs) consumption can reduce menstrual pain by inhibiting the cyclooxygenation enzyme especially in acute phase and reducing prostaglandin F2 levels in menstrual fluids<sup>(30-31)</sup>. Eventhough this drug is beneficial but it also has side effect such as dyspepsia, nausea, breast tension, bleeding between two menstrual cycles, visual and hearing disorders and abnormal results of kidney and liver function<sup>(32-37)</sup>, so effective and efficient interventions are needed for patients who experienced primary disminorhea. These efforts can be giving a SSBM, cold-compresses and warm-compress. Massage can reduce the production of NF-κB, inflammatory cytokines and TNF-α<sup>(38)</sup>. Cold-compress can reduce prostaglandins and it maked strengthen the sensitivity of pain and other subcutaneous at the site of injury by inhibiting the inflammatory process by reducing blood flow and giving analgesic effects by slowing the speed of nerve delivery so the pain impulses are late or less to reach the brain<sup>(39)</sup>. Warm-compress can increase the circulation on pelvic area. Previous studies said that local heat intervention was effectives as ibuprofen<sup>(40)</sup> and paracetamol<sup>(41)</sup>. However, the study about the impact of SSBM, cold-compresses and warm-compresses on SOD and MDA level are limited so the researchers are interested to conduct this research with the aim of this study was to determined the effect of SSBM, cold-compresses and warm-compresses on SOD and MDA in Primary Dysmenorrhoea.

**Method**

This research used Post-Test Only with Control Group Design. The population were all female students in Faculty of Health Sciences Unipdu who experienced dysmenorrhoea. Sample size was 50 respondents, divided into 4 groups, it were SSBM (n=13), cold-compress (n=12), warm-compress (n=13), control (n=12). The sampling technique was purposive sampling. Inclusion criteria were 1) primary dysmenorrhoea; 2) pain

intensity: moderate to severe, 3) have not received anti-pain medicine; 3) Cooperative. Exclusion criteria were 1) experienced secondary dysmenorrhoea; 2) refused in the middle of intervention. The instruments were: thermometer and a Spectrophotometer which consists of NBT for measured SOD level, TBA for measured MDA level. The data were analyzed by using the Kruskal-Wallis test.

**Findings**

**Table 1. The differences of SOD level after giving intervention**

Group	Median (Min-Max) pg/ml	p
SSBM	1099 (1069.2-1190.8)	0.001
Cold-compress	1061 (1029.2-1187.5)	
Warm-compress	1081 (1035.8-1215.8)	
Control	1034 (900.8-1135.8)	

Kruskal-Wallis test

**Table 2. The differences of SOD level after giving intervention**

Group	p
SSBM vs Cold-compress	0.005
SSBM vs Warm-compress	0.068
SSBM vs Control-group	0.001
Cold-compress vs warm-compress	0.205
Cold-compress vs control	0.106
Warm-compress vs control	0.007

Post Hoc Mann-Whitney test

The Kruskal-Wallis test obtained p=0.001 (there was significant differences of SOD levels between the two groups). The Mann-Whitney Post Hoc Test showed that there were significant differences of SOD in SSBM vs. Cold-compress, SSBM vs. Control and Warm-compress vs control.

**Table 3. The differences of MDA level after giving intervention**

Group	Median (Min-Max) pg/ml	p
SSBM	164.17 (142.5-194.2)	0.000
Cold-compress	100.83 (52.5-127.5)	
Warm-compress	72.5 (40.8-114.2)	
Control	286.67 (234.2-347.5)	

Kruskal-Wallis test

**Table 4. The differences of MDA level after giving intervention**

Group	P
SSBM vs Cold-compress	0.000
SSBM vs Warm-compress	0.000
SSBM vs Control	0.000
Cold-compress vs Warm-compress	0.014
Cold-compress vs control	0.000
Warm-compress vs control	0.000

*Post Hoc* Mann-Whitney test

The Kruskal-Wallis test showed there were significant differences in MDA between each the 2-groups.

### Discussion

The pain of primary dysmenorrhea can spread to the lower back and thighs and occurred 2-3 days<sup>(42)</sup>. Primary dysmenorrhea occurs due to an increasing of endometrial prostaglandin production so it makes uterine hypercontractility and increasing uterine basal pressure followed by the decreasing of blood flow in large or small blood vessels in uterus and in the end giving impacts like ischemia and pain<sup>(43-44)</sup>. Endometrial ischaemia can activates phospholipase A2 so it will hydrolyze acylgliserolipids and producing free fatty acids, especially arachidonic acid which is metabolized by the enzyme lipoxigenase, cyclooxygenase, and cytochrome P450 to eicosanoid formation and activated the release of ROS<sup>(45-46)</sup>. Excessive ROS can defeat the defense of body's natural antioxidant system<sup>(17)</sup> so in primary dysmenorrhoea there is an increase of MDA levels and a decrease of SOD levels.

The results of this study showed that SOD level among intervention group was higher than control group. SSBM and warm-compress were effected the increases of SOD level in primary dysmenorrhoea and statistically there is no differences of SOD level between cold-compress group and control group, however the maximum value of SOD levels in cold-compress group was higher than control group. SSBM, cold-compress and warm-compress were effected to reducing MDA level in primary dysmenorrhea.

SSBM give impact on an increase of SOD level and a decrease of MDA level, this occurs because the mechanical pressure of the massage will encourages on increasing blood circulation by increasing arteriolar

pressure<sup>(47-48)</sup>. The massage on the neck and shoulders are increase peripheral blood flow and it can detected by using infrared thermography<sup>(49)</sup>. The increasing of blood circulation can improve the oxygenation in tissues and also improves ischemia and reduce the production of free radicals and the uptake of the antioxidant SOD. Ischemia in uterine endometrial cells and muscles is a condition of reperfusion ischemia which generates a lot of oxygen free radicals which is it gives an impact on the uptake of SOD<sup>(29)</sup>.

The results showed that there were no differences of SOD level in cold-compress and control, and there were differences of MDA level in cold-compress and control. Although, there was no differences of SOD level in cold-compress and control, the maximum of SOD was higher than control. Cold-compress works by reducing the inflammatory process, reducing edema and reducing local pain<sup>(50)</sup>. The decreasing of MDA, possibly due in cold-compress work by reducing the inflammatory process so the prostaglandin products also decrease, and in the end also decreasing uterine contractility, and oxygenation in endometrial tissue will improves.

SOD and MDA after given a warm-compress also given an impacts where there was an increase of SOD and a decrease of MDA. A warm-compress given an impacts on blood flow of pelvic region increases because the effects of vasodilation<sup>(51)</sup>. The changes mechanism in SOD and MDA levels after given of warm-compress intervention was same as the SSBM intervention. Hot hip-bath intervention for 10 minutes every day in 7 days before menstruation was effected to reducing menstruation pain among women with primary dysmenorrhea. This happens because the hot hip bath can increase blood flow in myometrium, which is it can clear prostaglandins and in the end it will reducing cramps and pain<sup>(52)</sup>.

### Conclusion

1. The SSBM, warm-compress were effected to increasing of SOD levels in primary dysmenorrhoea
2. The SSBM, cold-compress and warm-compress are effective to reducing MDA levels in primary dysmenorrhoea

**Ethical Clearance**-obtained from the ethics commission of Nursing Faculty, Airlangga University.

**Conflict of Interest**-no conflict of interests

regarding the publication

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