Primary dysmenorrhea is painful menstruation without pelvic abnormalities and it usually occurs among adolescents and female adults. Primary dysmenorrhea processing the increasing of lipid peroxide (oxidative stress) and decreasing of antioxidant level. The aim of this study to identified the differences of Superoxide Dismutase and Malondialdehyde levels among adolescents with primary dysmenorrhea. The research design used Case Control. The population of this study were all female students at Health Science Faculty of Unipdu Jombang who got menstruation, the sample of this study were 24 respondents who met the inclusion and exclusion criteria. Sampling method in this study used Purposive Sampling technique. NBT method was to measured SOD levels, Thioharbituric Acid (TBA) test used to measured MDA levels, and the measurement in this study used Spectrophotometer. The data analysed by using Independent Sample T-Test with α ≤ 0.05. Independent Sample T-Test results showed that there were significant differences between SOD and MDA levels in both of case group and control group (p<0.05). In primary dysmenorrhea there is an increasing of Malondialdehyde (MDA) levels and a decrease of superoxide dismutase (SOD) levels, so the requiring efforts to balance the condition and reduce symptoms of primary dysmenorrhea are needed.

Keywords: Superoxide Dismutase, Malondialdehyde Levels, Adolescents, Primary Dysmenorrhea

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INTRODUCTION
Dysmenorrhea describes a sensation of cramps, severe pain at the lower abdomen and half of it followed by systemic symptoms including sweating, headaches, nausea, vomiting, diarrhea, fatigue and irritability [1-2]. These symptoms occur at few hours before menstruation and continue until 48-72 hours of menstruation [3]. Primary dysmenorrhea is painful menstruation without caused by pelvic abnormalities and commonly it occurs among adolescents and young adults [4-6]. Dysmenorrhea has a negative impact to quality of life of women or teenagers such as the relationships with family and school friends, work performance and recreational activities and absence from their school [7-8].

The incident of primary dysmenorrhea ranged 34% - 95% occurred among women worldwide who experienced menstruation [8-9]. The incidence of dysmenorrhea in Mexico was 48.4% - 64% [10-11], 85.4% was in Ethiopia [12], 85.6% occurred among high-school students in Kuwait [13], 87.7% of Turkish University students [7], 88% of Australian Teenager [14], 89.9% of students in Iran [15].

The pathogenesis of dysmenorrhea associated with serious inflammatory and the release of large volume of free radical oxygen in typical tissue and endothelial injuries with dysmenorrhea [16-18]. Primary dysmenorrhea occurs an increasing of prostaglandin levels, so it also induces uterine contractions and reduce blood flow to the myometrium (ischemia) and it do an increase the sensitivity of peripheral nervus [19-22]. Ischemia in uterine muscle and endometrial cells are the condition of reperfusion ischemia so it produces free radicals of oxygen and takes antioxidant superoxide dismutase (SOD) [23]. The increasing of free radical activity can identify by using high levels of MDA in the body [24]. In primary dysmenorrhea occurs an increasing of lipid peroxidation (oxidative stress) and a decrease of antioxidants levels [25].

Pharmacological therapy to primary dysmenorrhea can use NSAIDs and contraceptives pills, but NSAIDs and contraceptives pills consumption have causes side effects such as discomfort of gastrointestinal, abnormal kidney and liver function [25-26], alternative interventions are needed, and the interventions does not have cause side effects. The interventions can be use β-carotene and Vitamin E β-carotene, because it can clean up free radicals and stop the process of lipid peroxidation [27-29]. Moreover, Vitamin E can inhibit arachidonic acid oxidation and prostaglandin production, so it can reduce the severity and duration of primary dysmenorrhea [30-31]. Based on this description, the researchers are interest to conduct this research. The objective of this research was to found the differences of the Superoxide Dismutase and Malondialdehyde levels among adolescents who have primary dysmenorrhea and without primary dysmenorrhea.

RESEARCH METHODOLOGY
Design
The research design in this study used Case Control. Cases group in this research is the female student who got menstruation with dysmenorrhea and control group was female student who got menstruation without dysmenorrhea.

Participants
All female students in Faculty of Health Science of Unipdu Jombang who got menstruation were the population in this study, 24 respondents (case group n = 12 and control group n = 12) were taken as the sample by using inclusion and exclusion criteria. The inclusion criteria in this study are: 1) Case group: Students experienced primary dysmenorrhea; Has not received anti-pain therapy; Cooperative students; 2) Control group: Students who got menstruation without pain. Female students who experienced secondary dysmenorrhea was being exclusion criteria. Sampling method used Purposive Sampling technique.

Procedure of Data Collections
After getting permission from the head of the research institute and Ethical Clearance from the Ethics Commission of the Nursing Faculty, Airlangga University, Surabaya, the researchers approached the students who experienced menstrual pain (dysmenorrhea) and the student who didn't have menstrual pain.
to get approval from them to being sample in this study. After that the researchers taken whole blood samples (3 mL) at peripheral vein. The blood sample of case group was taken at the first dysmenorrhea and blood sample was taken at the first menstruation for control group.

Measurement of SOD Level and MDA Levels
The measurement tool used a Spectrophotometer. NBT (Nitro Blue Tetrzolium) method used to measure SOD levels and the Thiobarbituric Acid (TBA) method used to measure MDA levels.

Statistical Analysis
Statistical Package for Social Sciences (SPSS) version 16 used to

| Characteristics                  | Case group | Control group | P value |
|----------------------------------|------------|---------------|---------|
| N (%)                            |            |               |         |
| 1. Age (year)                    |            |               |         |
| < 20                             | 3 (25)     | 4 (33.3)      | 0.399   |
| 20 - 25                          | 9 (75)     | 8 (66.7)      |         |
| 2. Age of Menarche (year)        |            |               |         |
| 9 – 11                           | 2 (16.7)   | 1 (8.3)       | 0.881   |
| 12 – 14                          | 8 (69.6)   | 9 (75)        |         |
| 15 – 17                          | 2 (16.7)   | 2 (16.7)      |         |
| 3. Duration of menstruation (days) |          |               |         |
| 5 – 6                            | 0 (0)      | 3 (25)        | 0.000   |
| ≥ 7                              | 12 (100)   | 9 (75)        |         |

To find the differences between SOD and MDA levels in case group Test statistical test, as shown in Table 2. and control group the researcher used the Independent Sample T-

| Variable          | Case group (Mean ± SD) (pg/ml) | Control group (Mean ± SD) (pg/ml) | Beda Mean (95% CI) | p     |
|-------------------|--------------------------------|-----------------------------------|-------------------|-------|
| SOD level         | 1024.17 ± 68.57                 | 1093.75 ± 20.72                   | -69.58 (-114.26 – -24.91) | 0.005 |
| MDA level         | 290.00 ± 31.21                  | 76.83 ± 16.33                     | 213.17 (192.08 – 234.26) | 0.000 |

This research found that the mean of SOD levels in case group was 1024.17 pg/ml and in control group was 1093.75 pg/ml, this showed that the SOD level among case group was lower than control group. The mean of MDA levels in case group was 290 pg/ml and in control group was 76.83 pg/ml, this means that the mean of MDA level in case group was higher than control group. The result of Independent Sample T-Test statistic showed that there were statistically significant differences between SOD and MDA levels in both of case and control groups (p<0.05).

Primary dysmenorrhea is pelvic pain that occurs during menstruation without pathological abnormalities [32]. Dysmenorrhea occurs because of the increasing production of prostaglandins in uterine endometrium. Endometrial secretion contain arachidonic acid and it become prostaglandin F2α and prostaglandin E2 during menstruation. The release of prostaglandin during menstruation occurred along 48 hours [33]. The increasing of prostaglandins leads uterine contractions, decrease blood flow to the myometrium and the end of process is ischemic and increase peripheral nerve sensitivity [20-21]. Hypoxemia-ischemia occurs during uterine contractions by use activates phospholipase A2, hydrolyses aschherolipoids and produces fatty acids, especially arachidonic acid. When the perfusion is maintained during myometrial relaxation and maximum of oxygen supply, arachidonic acid metabolized by three enzymes, it is cytooxygenase, lipooxygenase, and cyctochrome P450 which is they lead to formation process of eicosanoids and the release of Reactive Oxygen Species (ROS) [19] [22]. The release of Reactive Oxygen Species (ROS) are causes by lipid peroxidation and protein.

The results of this study showed that the average SOD level in group with primary dysmenorrhea was lower than group without primary dysmenorrhea and the average MDA level in group with primary dysmenorrhea was higher than group without primary dysmenorrhea. The results of examination of SOD and MDA levels in this study were taken on the first day of menstruation, where at 48 hours most of prostaglandins were released so this impacted on ischemia and pain. The decreasing of SOD levels in primary dysmenorrhea group because of the increasing of free radical activity, this can be seen from the decreasing of MDA levels of respondents. SOD is one of the types of antioxidant and has a function to protects cells against oxidant disorders (free radicals), which is it can cause several diseases by preventing the formation of new free radical or changing free radicals to become less reactive molecules. SOD converts superoxide anions to be hydrogen peroxide and oxygen, and it called the primary defence against oxidative stress because superoxide is a strong initiator of chain reactions [34-35]. Free radicals in the body can cause lipid oxidation. Lipid peroxidation is an oxidative destruction of long-chain unsaturated fatty acids (Polysaturated Fatty Acid) that produce malondialdehyde (MDA) compounds. MDA is an index indicator to measure free radical activity. The increasing of free radical activity can be seen by the high levels of MDA in the body [24]. The increasing of oxidative stress and decreasing of antioxidants are important pathogenesis factors in primary dysmenorrhea [16] [36]. The decreasing of antioxidants caused by an increase consumption of antioxidants to detoxify the increasing of oxidants or free radicals in primary dysmenorrhea [23]. Oxidative stress occurred when the balance of antioxidants and reactive oxygen species (ROS)
SUPEROXIDE DISMUTASE AND MALONDIALDEHYDE LEVELS IN ADOLESCENTS WITH PRIMARY DYSMENORRHEA

were disrupted due to depletion of antioxidants or increasing of ROS formation [22] [37].

Some results from previous studies showed that MDA levels were higher among women with dysmenorrhea compared to women without dysmenorrhea [16] [18] [38-40]. This mean that dysmenorrhea there is an increase in lipid peroxidation, an oxidative stress index and it characterized by an increasing of plasma malondialdehyde (MDA) levels.

The results of the study by Rao et al [23], found had a decreasing of antioxidant levels (SOD) among women with primary dysmenorrhea compared with healthy women. The measure method to measure SOD in that study use the Beacham and Friderovich methods, while in this study using the NBT method. Although the methods used to measure SOD levels are different with this study but the results on both studies were same. This mean that in primary dysmenorrhea occurred the decrease of antioxidant levels (SOD), and this is needed to detoxify an increase of oxidants.

CONCLUSION
In primary dysmenorrhea there is an increasing of Malondialdehyde (MDA) levels and a decrease of superoxide dismutase (SOD) levels, so the requiring efforts to balance the condition and reduce symptoms of primary dysmenorrhea are needed.

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