

## **Effectiveness of Acupressure to Reduce Vomiting Nausea in Patients Receiving Chemotherapy**

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**Abstract:** Vomiting nausea is one of the side effects of cytostatics and is often found in patients receiving chemotherapy. Vomiting nausea felt by patients receiving chemotherapy causes discomfort and can even affect the quality of life of patients. Acupressure is one way to treat vomiting nausea in patients receiving chemotherapy. Data collection was carried out using assessment questionnaires developed by Ahmad and Alafafsheh (2016) based on the rhodes index for nausea, vomiting and retching (INVR) instruments. This research is a quasi-experimental study with a total of 70 respondents consisting of 35 control groups and 35 intervention groups selected by simple random sampling technique. Statistical analysis using the wilcoxon signed rank test showed that there were differences to vomiting nausea in the control group and the intervention group ( $p = 0.064$ ;  $p = 0.000$ ) and the mann-whitney test showed that there were differences in vomiting nausea between the control group and the intervention group after acupressure administration. and antiemetic ( $p = 0,000$ ). The results of multivariate analysis showed that the experience of vomiting nausea was not controlled, history of alcohol consumption, history of motion sickness, chemotherapy drugs were not a confounding factor. Based on research results, vomiting nausea can decrease after acupressure. It is recommended to nurses to make acupressure one of the independent nursing interventions.

**Keywords:** Acupressure, Vomiting, Nausea

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### **I. Introduction**

Breast cancer is a disease that starts when cells in the breast begin to grow out of control (American Cancer Society, 2019). Data from the American Cancer Society (2019) shows that the number of breast cancer sufferers in the United States is 268,600 (30%), California 27,700 people, Florida 19,130 people, New York 17,490 people. Indonesia in 2013 had 0.5% of breast cancer (61,682 people), Sumatra Utara 0.4% of (2,682 people) (Ministry of Health RI Infodatin, 2015). Data from the Haji Adam Malik Hospital Medical Record Medan in 2018 there were 7,997 patients suffering from breast cancer.

Handling is done on patients suffering from breast cancer one of which is chemotherapy. Chemotherapy is one treatment procedure that uses chemicals that are very powerful to stop or inhibit the growth of cancer cells in the body (Byju, Pavithran, & Antony, 2018). Data from WHO in 2017 shows that the highest number of patients undergoing chemotherapy is in developing countries such as Africa (62.4%), America (52%), Southeast Asia (49%), Western Pacific (45%), Eastern Mediterranean (14.9%) (WHO, 2019). Data from the Haji Adam Malik Hospital Medical Record in Medan in 2017 there were 2483 patients who received chemotherapy.

One of the side effects of chemotherapy is vomiting nausea. Vomiting nausea if neglected can cause complications such as electrolyte imbalance, anorexia, weight loss, dehydration, worsening of the patient's general condition, reduction in chemotherapy doses and the patient can refuse or leave treatment (Ahmad, Dardas, & Ahmad, 2015).

The results of the study of Escobar et al. (2015) in 19 hospitals in Spain 42% of patients complained of nausea and 20.8% complained of vomiting when receiving chemotherapy. Kottschade et al. (2016) in America 35% of patients complain of nausea and 19% complain of vomiting when receiving chemotherapy. Al Qadire (2017) research results in Jordan show that although patients used antiemetic therapy, the overall incidence of nausea and vomiting was still high at 71.4% and 57.3%.

Management of nonpharmacological nausea and vomiting in patients receiving chemotherapy, one of which is acupressure (Genc & Tan, 2015). Acupressure is a therapy that uses fingers or blunt objects to stimulate points on the body to balance energy (Wang et al., 2019). Acupressure has been found to have a promising effect in reducing nausea and vomiting during chemotherapy. Study results of Byju, Pavithran and Antony. (2018) said that acupressure was effective in reducing nausea and vomiting in patients receiving chemotherapy.

The advantage of using acupressure is a non-invasive, natural, safe, no-cost treatment that is easy to apply without side effects (Avci, Ovayulu, & Ovayulu, 2016). According to Miao et al. 2017 also says that acupressure can be done by the patient himself. Acupressure can be integrated into current nursing practice and nurses can teach patients because acupressure skills are easy to learn and can be used to help broadly relieve various symptoms and patient care settings. Acupressure plays a role in increasing the release of beta endorphin dihipofise around TriggerZone Chemoreceptors (CTZ). Other studies have found that acupressure increases gastric motility which contributes to nausea and vomiting (Devi & Latha, 2015).

## II. Methods

The research design used was quasi experimental with the nonequivalent control group pretest posttest design method. The study was conducted in May-August 2019 in the one day care (ODC) room of Haji Adam Malik General Hospital Medan. The study population was all breast cancer patients who received series II chemotherapy at the Haji Adam Malik General Hospital Medan taken by simple random sampling technique. Inclusion criteria in sampling were one day care patients, had been diagnosed with breast cancer, stage III and IV, received chemotherapy drugs besides containing cisplatin, using ondansetron antiemetics, cycle II. Criteria for exclusion of respondents were skin problems in the arms or legs such as wounds, infection or lymphedema, physical disability, unable to communicate. The material used in this study is an acupressure therapy pen. The data collection method begins by asking about nausea and vomiting before treatment and answering the questionnaire sheet. The measuring instrument in this study is the index nausea vomiting and retching (INVR) developed by Ahmad and Alafafsheh (2016). Next the researchers performed acupressure at PC6 and ST12 points for 3 minutes for each point for a total of 12 minutes, that is 30 minutes before chemotherapy, 4 hours and 12 hours after chemotherapy. Measurement of nausea and vomiting done after 48 hours. The questionnaire was filled in with a measuring cup.

Analysis of the data used to compare the differences in nausea and vomiting of patients who received chemotherapy before and after the intervention was using a statistical analysis of the Wilcoxon signed ranks test while to compare the differences in nausea and vomiting before and after the intervention in the control group and the intervention group was using the mann-whitney test statistic.

## III. Results and Discussion

### 3.1 Results

Based on research that has been done can be presented as follows:

**Table 1. Characteristics of Respondents (n = 70)**

| Characteristics                                      | Control |      | Intervention |      |
|--|---------|------|--------------|------|
|  | n (35)  | %    | n (35)       | %    |
| Age  |         |      |              |      |
| 26 – 35 Years  | 3       | 8,6  | 4            | 11,4 |
| 36 – 45 Years  | 7       | 20,0 | 11           | 31,4 |
| 46 – 55 Years  | 15      | 42,9 | 12           | 34,3 |
| 56 – 65 Years  | 8       | 22,9 | 7            | 20,0 |
| >65 Years  | 2       | 5,7  | 1            | 2,9  |
| Gender   |         |      |              |      |
| Male   | -       | -    | -            | -    |
| Female   | 35      | 100  | 35           | 100  |
| Stadium  |         |      |              |      |
| III  | 31      | 88,6 | 30           | 85,7 |
| IV   | 4       | 11,4 | 5            | 14,3 |
| The experience of vomiting nausea was not controlled |         |      |              |      |
| Yes  |         |      |              |      |
| No   | 2       | 5,7  | 1            | 2,9  |
|  | 33      | 94,3 | 34           | 97,1 |
| History of alcohol consumption                       |         |      |              |      |
| Yes  | -       | -    | -            | -    |
| No   | 35      | 100  | 35           | 100  |
| Travel sickness history                              |         |      |              |      |
| Yes  | 2       | 5,7  | 1            | 2,9  |
| No   | 33      | 94,3 | 34           | 97,1 |
| Type of chemotherapy                                 |         |      |              |      |
| Moderate emetogenic                                  | 21      | 60   | 22           | 62,9 |
| High emetogenic                                      | 14      | 40   | 13           | 37,1 |

Table 1. shows the distribution of breast cancer patients who received chemotherapy according to age in the control group most aged 46-55 years (early elderly) as many as 15 people (42.9%), while in the intervention group the same was also the most aged 46-55 years (early elderly) as many as 12 people (34.3%).

The distribution of breast cancer patients who received chemotherapy by sex in the control group were 35 women (100%), while in the intervention group the same were all 35 women (100%). The distribution of breast cancer patients who received chemotherapy according to stage in the control group was mostly stage III as many as 31 people (88.6%), while in the intervention group it was also the same as stage III as many as 30 people (85.7%). The distribution of breast cancer patients who received chemotherapy according to the experience of uncontrolled nausea and vomiting in the control group that most did not have the experience of vomiting nausea was not controlled as many as 33 people (94.3%), whereas in the intervention group was also the same that did not have experience of vomiting nausea was not controlled as many as 34 people (97.1%). The distribution of breast cancer patients who received chemotherapy according to history of consuming alcohol in the control group and the intervention group was the same ie there was no history of consuming alcohol as many as 35 people (100%) in both groups. The distribution of breast cancer patients who received chemotherapy according to a history of travel sickness in the control group the most was not having a history of travel sickness as many as 33 people (94.3%), while in the intervention group it was also the same that did not have a history of travel sickness as many as 34 people (97.1%) and the distribution of breast cancer patients who received chemotherapy according to chemotherapy drugs in the control group the most was the level of moderate emetogenesis of 21 people (60%), the same as the intervention group which was the most was 22 people (62.9%).

**Table 2. Vomiting Nausea Before Intervention and After Acupressure Intervention in One Day Care Room (n = 70)**

| Vomiting Nausea | Control     |      | Intervention |      |             |      |             |      |
|-----------------|-------------|------|--------------|------|-------------|------|-------------|------|
|                 | Pre         |      | Post         |      | Pre         |      | Post        |      |
|                 | n           | %    | n            | %    | n           | %    | n           | %    |
| Light           | 20          | 57,1 | 22           | 62,9 | 20          | 57,1 | 34          | 97,1 |
| Middle          | 15          | 42,9 | 13           | 37,1 | 15          | 42,9 | 1           | 2,9  |
| Mean±SD         | 8,00 ± 2,02 |      | 7,77 ± 1,78  |      | 8,14 ± 1,76 |      | 5,03 ± 1,99 |      |
| Min-Max         | 5-11        |      | 5-11         |      | 5-11        |      | 2-9         |      |

Based on table 2 the distribution of vomiting nausea of patients who received chemotherapy in the control group before giving antiemetics according to hospital standards the majority of mild nausea was vomiting by 20 people (57.1%), whereas in the intervention group before giving acupressure and antiemetics the majority of mild nausea was vomiting by 20 people (57.1%). While the distribution of respondents after administration of antiemetics according to hospital standards in the control group the majority of mild vomiting nausea were 22 people (62.9%), while in the intervention group the majority of mild vomiting nausea as many as 34 people (97.1%).

The average vomiting nausea in the control group before administration of antiemetics according to hospital standards was 8.00 (SD = 2.02), the minimum vomiting nausea was 5 and the maximum value of vomiting nausea was 11, while in the intervention group before giving acupressure and antiemetics is 5.03 (SD = 1.99), the minimum vomiting nausea value is 5 and the maximum vomiting nausea value is 11.

The average vomiting nausea in the intervention group after administration of antiemetics according to hospital standards was 7.77 (SD = 1.78), the minimum vomiting nausea was 5 and the maximum value of vomiting nausea was 11, whereas in the intervention group after administration of acupressure and antiemetics is 5.03 (SD = 1.99), minimum vomiting nausea value 2 and maximum vomiting nausea 9.

**Bivariate Analysis**

The bivariate analysis used in this study is the wilcoxon signed ranks test which is to compare the differences in vomiting nausea of patients who received chemotherapy before and after intervention in each group and the mann-whitney test to compare differences in vomiting nausea before and after intervention in the control group and the intervention group.

**Table 3. Differences in the Proportion of Vomiting Nausea in Breast Cancer Patients Receiving Chemotherapy in the Control Group (n = 35)**

| Vomiting Nausea | Median<br>(Minimum-Maximum) | p value |
|-----------------|-----------------------------|---------|
| Pre             | 8.00 (5-11)                 | 0.640   |
| Post            | 8.00 (5-11)                 |         |

Based on the results of bivariate analysis using the wilcoxon signed ranks test, a significant p value was obtained in the control group of 0.640 (p > 0.05), so there was no difference in vomiting nausea in the control group.

**Table 4. Differences in the Proportion of Vomiting Nausea in Breast Cancer Patients Receiving Chemotherapy in the Intervention Group (n = 35)**

| Vomiting Nausea | Median<br>(Minimum-Maximum) | p value |
|-----------------|-----------------------------|---------|
| Pre             | 8.00 (5-11)                 | 0.000   |

Based on the results of bivariate analysis using the wilcoxon signed ranks test, a significant p value was obtained in the intervention group of 0,000 ( $p < 0.05$ ), so there were differences in vomiting nausea in the intervention group. Thus it can be said that there are significant differences in vomiting nausea in the intervention group before and after the administration of acupressure and antiemetics. Thus acupressure and antiemetics are effective against vomiting nausea in patients receiving chemotherapy.

**Table 5. Differences in Vomiting Nausea in Breast Cancer Patients Receiving Chemotherapy Control Group and Intervention Group (n = 70)**

| Variable        | Control   | Intervention | P value |
|-----------------|-----------|--------------|---------|
|                 | Mean Rank | Mean Rank    |         |
| Vomiting Nausea | 47.40     | 23.60        | 0.000   |

The difference in vomiting nausea of breast cancer patients who received chemotherapy between the control group and the intervention group in Table 5 can be seen by comparing the difference in the value of vomiting nausea of the control group that only received antiemetics according to hospital standards against the intervention group with acupressure and antiemetics tested using mann-whitney test.

The results of the mann-whitney test obtained the mean rank of the control group 47.40 and the intervention group with acupressure and antiemetics had a mean rank of 23.60 with a p value of 0,000 ( $p < 0.05$ ). Thus it can be stated that acupressure has a significant effect on nausea and vomiting of breast cancer patients receiving chemotherapy.

**Multivariate Analysis**

**Table 6. Interaction Variable Test**

| Variable   | Koef.   | S.E.      | Wald  | Df | Sig. | OR    |
|--|---------|-----------|-------|----|------|-------|
| Acupressure  | -3.178  | 1.079     | 8.665 | 1  | .003 | .042  |
| The experience of vomiting nausea was not controlled | -20.190 | 19741.885 | .000  | 1  | .999 | .000  |
| Travel sickness history                              | -20.190 | 19741.885 | .000  | 1  | .999 | .000  |
| Chemotherapy drugs                                   | .288    | .700      | .169  | 1  | .681 | 1.334 |
| Constant   | -.438   | .459      | .913  | 1  | .339 | .645  |

Table 6 shows the results of interaction tests in the logistic regression test of risk factor models to determine the relationship between acupressure and antiemetics with vomiting nausea. Variables are said to interact if ( $p < 0.05$ ), so it can be stated there are no interaction variables in this study.

**Table 7. Confounding Test Variable Vomiting Nausea Experience Uncontrolled**

| Variable                | Koef.   | S.E.      | Wald  | df | Sig. | OR    |
|-------------------------|---------|-----------|-------|----|------|-------|
| Acupressure             | -3.068  | 1.076     | 8.124 | 1  | .004 | .047  |
| Travel sickness history | -20.261 | 21457.720 | .000  | 1  | .999 | .000  |
| Chemotherapy drugs      | .234    | .685      | .117  | 1  | .733 | 1.263 |
| Constant                | -.524   | .452      | 1.345 | 1  | .246 | .592  |

Table 7 shows the results of confounding test variables that experience vomiting nausea are not controlled. Variables are considered as confounding variables when the OR value changes for the main variable (acupressure) with a confounding candidate variable issued  $> 10\%$ . After the experience of vomiting nausea was uncontrolled, OR changes in the main variable (acupressure) were seen  $(0.047-0.042) / 0.042 = 0.11\%$ . Thus the experience variable vomiting nausea is not controlled not confounding variable.

**Table 8. Conflicting Test Variable History of Travel Sickness**

| Variable           | Koef.  | S.E.  | Wald  | Df | Sig. | OR    |
|--------------------|--------|-------|-------|----|------|-------|
| Acupressure        | -2.998 | 1.073 | 7.799 | 1  | .004 | .050  |
| Chemotherapy drugs | .195   | .673  | .084  | 1  | .772 | 1.215 |
| Constant           | -.605  | .446  | 1.837 | 1  | .175 | .546  |

Table 8 shows the results of the confounding test variable travel history variable. After a history of motion sickness was excluded, visible changes in the OR independent variable:  $(0.050-0.047) / 0.047 = 0.06\%$ . Thus the variable travel history is not a confounding variable.

**Table 9. Confounding Test for Chemotherapy Drug Variables**

| Variable    | Koef.  | S.E.  | Wald  | df | Sig. | OR   |
|-------------|--------|-------|-------|----|------|------|
| Acupressure | -3.000 | 1.073 | 7.815 | 1  | .004 | .050 |
| Constant    | -.526  | .350  | 2.262 | 1  | .133 | .591 |

Table 9 shows the results of the variable confounding test for chemotherapy drugs. After the chemotherapy drug was released, the OR variable was seen to be independent:  $(0.050-0.050) / 0.050 = -0.95\%$ . Thus the chemotherapy drug variable is not a confounding variable.

#### IV. Discussion

The average nausea score of vomiting after acupressure was significantly different between the groups that did acupressure and the groups that did not do acupressure ( $p$  value = 0.000). The results of this study support the research hypothesis that the average score of vomiting nausea in the intervention group is lower than in the control group. The results of this study have shown that acupressure performed on respondents who received chemotherapy or intervention groups can reduce the nausea score of vomiting by 3.11. The same thing happened in the control group also experienced a slight decrease in the score of nausea and vomiting that is equal to 0.23.

Vomiting nausea due to chemotherapy is pathophysiologically due to a complex multifactorial process that involves communication between several neurotransmitters and receptors in the central nervous system and digestive tract. Hydroxytryptamine (5HT3), P supplementation, neurokinin-1 (NK1) and dopamine play an important role in the process of nausea and vomiting. Response to nausea, vomiting chemotherapy occurs through two mechanisms, namely the peripheral nervous system and the central nervous system. Hydroxytryptamine (5HT3) in the central nervous system is associated with the peripheral nervous system that originates in the gastrointestinal tract and is activated in the first 24 hours after administration of chemotherapy. NK1 in the central nervous system is associated with the main receptors of the brain involved in the process of nausea and vomiting that occurs through the central nervous system (Aapro, 2018).

Data relating to the description of the value of vomiting nausea after intervention in breast cancer patients who received chemotherapy is shown in Table 4.3 that nausea and vomiting after the intervention of acupressure with the category of mild nausea, vomiting, there were 34 people (97.1%) breast cancer patients who received chemotherapy and moderate category of nausea, vomiting, 1 person (2.9%) breast cancer patients who received chemotherapy. After being given an acupressure intervention the number of respondents in the category of mild-to-mild nausea and vomiting increased in the category of mild nausea and vomiting. Wilcoxon signed ranks test analysis results in the intervention group obtained  $p$  value = 0.000 ( $p < 0.05$ ) so that it can be concluded that there is a difference in the value of nausea and vomiting before and after acupressure, meaning that the action or intervention has an effect on nausea and vomiting experienced by breast cancer patients who received chemotherapy.

After acupressure intervention was suppressed or massaged at PC6 and ST36 points conducted 30 minutes before chemo, 4 hours after chemo and 12 hours, the majority of respondents experienced a decrease in nausea and vomiting scores after being assessed using a nausea vomiting and retching (INVR) index questionnaire developed by Ahmad and Alafafsheh (2016), meaning that the majority of breast cancer patients who receive chemotherapy experience a decrease in nausea and vomiting after administration of the intervention. The results of this study are in line with the findings of Gehan et al (2017) in Egypt who reported in their research results that acupressure is effective for nausea and vomiting in breast cancer patients who receive chemotherapy with a  $p$  value  $< 0.05$ .

The results of this study have shown that acupressure can significantly reduce nausea and vomiting scores in breast cancer patients who receive chemotherapy who experience nausea and vomiting due to chemotherapy. So it can be concluded that acupressure is an effective intervention in order to reduce nausea and

vomiting in breast cancer patients who receive chemotherapy. This finding is in accordance with the findings of Shen, C. H., & Yang, L. Y. (2017) who said that acupressure is one of the appropriate actions in the management of nausea and vomiting due to chemotherapy.

Research that can be used as a supporter of this research has also been conducted by Soliman, et al. (2017). The aim of their study was to examine the effectiveness of P6 acupressure as a non-pharmacological technique in chemotherapy. The study was conducted on 100 outpatient women who received chemotherapy at the oncology clinic, 50 of them as a group who received acupressure therapy for a maximum of three minutes every morning and as needed to cure symptoms. The results showed that the group that received acupressure was effective for nausea and vomiting ( $p < 0.01$ ). The study concluded that there were statistically significant differences in the experience of nausea and the intensity of nausea and vomiting when compared with the control group.

Acupressure can reduce nausea and vomiting due to chemotherapy through the effects of manipulation at acupressure points P6 and ST36 can provide benefits in the form of improved vagus nerve function in the spleen and stomach meridians, thereby strengthening digestive tract cells to the effects of chemotherapy that can reduce the stimulation of vomiting nausea and vomiting to the vomit center. This manipulation can also increase beta endorphins in the pituitary which can be a natural antiemetic through its work to reduce the impulse of nausea and vomiting in the chemoreceptor trigger zone (CTZ) and the vomiting center (Devi & Latha, 2015).

The frequency distribution and percentage of subjects in the group who received antiemetics according to hospital standards and the group that received acupressure and antiemetics were calculated using computerization. Analysis of sociodemographic and clinical variables is shown in Table 1. Nausea and vomiting were assessed using the nausea vomiting and retching (INVR) index developed by Ahmad and Alafafsheh (2016). The results of the study have described the action of acupressure in breast cancer patients who received chemotherapy showed a positive effect namely reducing nausea and vomiting experienced and also breast cancer patients who received chemotherapy felt more comfortable.

## V. Conclusion

The conclusions of this study are 1)provision of antiemetics based on hospital standards is not effective against decreasing nausea and vomiting in patients receiving chemotherapy; 2)giving acupressure and antiemetics is effective against decreasing nausea and vomiting in patients receiving chemotherapy; 3)there is a difference in the effectiveness of acupressure and antiemetics compared to antiemetics against nausea and vomiting in patients receiving chemotherapy; 4)there is no relationship between the experience of nausea and vomiting, history of consuming alcohol, history of motion sickness, type of chemotherapy to nausea and vomiting in patients receiving chemotherapy.

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