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Effect of pre-surgical physical exercise on post-surgery consciousness recovery

Ines Dwi Kencana[*1], M Choerul Anwar[2], Djenta Saha[3]
[1, 2, 3] Department of Nursing, Ministry of Health Polytechnic of Semarang, Indonesia

Abstract
Surgery and anesthesia are stressful events which may cause anxiety to the patients. Patients with major surgery will be given general anesthesia which has complications, so it is necessary to provide understanding and pre-surgery physical exercises that are useful for post-surgery recovery. The pre-surgical physical activity given was in the form of deep breathing, productive cough, and range of motion (ROM) exercises. The objective of the research was to determine the effect of pre-surgical physical activities on post-surgery consciousness recovery. This research used quasi-experiment research with the post-test only design. The study population was the average client with general anesthesia in a national hospital in Semarang City, Indonesia. Data analysis was performed using an independent t-test, Pearson Correlation, and multiple linear regression test. The results showed a significant effect on the group given pre-surgical physical exercise on post-surgery consciousness recovery ($p = 0.011$). Based on Pearson's analysis, there was no significant relationship between anxiety and age with post-surgery consciousness recovery. Multiple linear regression analysis showed that 14.9% of consciousness recovery is affected by pre-surgical physical exercise, anxiety, and age.

Keywords: anxiety, consciousness recovery, physical exercise, pre-surgical

1. Introduction
Surgery is a sophisticated experience which is tense for the patients and may cause anxiety. Anxiety experienced by the patients is caused by the use of anesthesia in the surgery which endangers the safety of the patients. Three types of anesthesia are known in surgery, namely local, regional, or general [1]. Anesthesia is given according to the kind of operation to be performed whether major or minor surgery.
Clients given general anesthesia (GA) will experience temporary loss of pain and consciousness throughout the body because of central or sensory nervous system suppression. The administration of general anesthesia causes complications, such as paralysis of the bladder muscle which causes the client to be unable to urinate, delayed recovery of consciousness, heart attack, stroke, brain damage, and even death [2]. The delay in consciousness recovery is due to the effects of inhaled anesthesia sedation, extended surgical procedures, and high concentrations of anesthetic drugs. This situation is also caused by several factors, such as the dose of the anesthetic drug (fentanyl), inhalation anesthesia, duration of anesthesia, and body temperature after anesthesia [3]. If this is not handled correctly, it may prolong the length of the therapy.
Besides, anxiety also affects consciousness recovery. Anxiety affects the body's function in surgery [4, 5]. Nurses need to provide therapeutic communication about the procedure, complications, equipment to be used in surgery. Nurses also need to measure the anxiety level of the client using the Hamilton Anxiety Rating Scale (HARS). Considering the impact of general anesthesia and patients' anxiety levels, proper management is needed after surgery. One of them is by providing pre-surgical physical exercise that is useful to speed up the recovery time of the patients after given the general anesthesia. The condition of patients will be determined using Aldrete Score. Pre-surgical physical exercise is intended in the form of deep breathing, productive cough, and ROM exercises.
The general objective of this study was to determine the effect of pre-surgical physical exercises on post-surgery consciousness recovery. This research also explicitly intended to establish the relationship between the level of anxiety and age to post-surgery consciousness recovery and also to find out the effect of physical exercise on treatment and control groups.

2. Materials and methods
The type of research conducted in this study was quasi-experiment research with purposive sampling. The study population was the average client with general anesthesia in a national hospital in Semarang City, Indonesia. Exclusion criteria include clients with heart, lung, and diabetes mellitus diseases, and also patients who undergo further treatment in the intensive care unit (ICU) or high care unit (HCU). The sample used was 30 respondents for each treatment and control group.
The sample used was 30 respondents for each treatment and control group. The research instrument used in this study was Aldrete Score filled in every 5 minutes and Hamilton Anxiety Rating Scale (HARS) was carried out before the surgery, as well as using the standard operating procedure (SOP) of deep breathing, productive cough, and ROM which were performed 2 times before surgery for 15 minutes. The study was conducted in March-April 2018
Researchers divided the respondent group into treatment groups who received pre-surgical physical training and the control group who received deep breathing exercises. The level of anxiety for both the treatment and control groups was

measured. Monitoring was carried out using Aldrete Score to determine post-surgery consciousness recovery.

The Aldrete Score format used to measure the recovery rate of patients after general anesthesia contained five criteria, namely movement of the limbs, breathing, circulation, skin color, and consciousness performed every 5 minutes in the recovery room. The patient's anxiety level was measured using the Hamilton Anxiety Rating Scale (HARS) which includes 14 components consisting of feelings of anxiety, tension, fear, sleep disturbances, intelligence disorders, feelings of depression, somatic symptoms, sensory symptoms, cardiovascular symptoms, breathing symptoms, food digestive tract symptoms, urogenital symptoms, vegetative symptoms, and behavior during the interview. HARS measurement was done when the research subject was in the pre-surgery treatment room.

3. Results & discussion

Statistical test results obtained p = 0.011 which means that at 5% significance level there was a significant difference in the mean value of Aldrete Score in both treatment and control group. The results of this study are supported by the previous research which found that there was an effect of physical exercise on the recovery of patients after general anesthesia at 5, 10, and 15 minutes in the treatment group compared to the control group [6]. Another study also concluded that ROM exercise had a significant effect on the post-surgery consciousness recovery with general anesthesia [5]. The mean value of Aldrete Score is shown in Table 1.

Table 1: The mean value of Aldrete Score of Treatment and Control Group

Group	N	Mean	SD	SE	p-value
Control	30	8.93	0.785	0.143	0.011
Treatment	30	9.43	0.679	0.124	

There was no significant relationship between anxiety and consciousness recovery. A negative correlation indicated that a high consciousness recovery was obtained in respondents who had a low level of anxiety. This was in line with the previous research conducted which stated that there was no significant difference between the level of anxiety before and after surgery [3]. Besides, the assessment of anxiety levels on post-surgery consciousness recovery had a mean value of 18.22 which was categorized in the level of mild anxiety. Mild anxiety experienced by patients could be caused by a variety of factors, such as physical disturbances, the effects of giving medication that caused concern, and conflicts with individuals that were not resolved [7]. The relationship between anxiety and consciousness recovery is presented in Table 2.

Table 2: The Relationship between Anxiety and Consciousness Recovery

Group	N	R	p-value
Control	60	-0.189	0.148
Treatment			

It could be concluded that there was no significant relationship between age and consciousness recovery. The negative correlation which was shown by the R-value of -0.065 indicated that higher consciousness recovery was obtained in younger respondents. The results of linear regression analysis are given in Table 3. This was not following the previous research which concluded that older adults had a faster recovery after surgery because of increased knowledge and experience [8]. Another study also revealed that middle-aged adults experienced a quicker recovery of consciousness because of the faster return of the physiological function of the body after anesthesia is given. Age differences will also affect the recovery time of intestinal peristalsis because age affects the body's ability to adapt to post-surgery intestinal peristalsis recovery [9].

The results of the linear combination of the treatment group showed that the level of anxiety and age had a significant relationship with the consciousness recovery as indicated by the results of F = 3.265 and p = 0.028 which concluded that the estimated regression model was appropriate to explain the effect of pre-surgical physical exercise, anxiety, and age towards post-surgery consciousness recovery.

Analysis of regression coefficients obtained significant values in the pre-surgical physical exercise of 0.012, which means that pre-surgical physical activity had a substantial effect on post-surgery consciousness recovery. Regression coefficients on the level of anxiety obtained a significant value of 0.113 which means that the level of anxiety did not significantly influence consciousness recovery. The regression coefficient value at the age obtained results of 0.518 which means that age did not affect substantially post-surgery consciousness recovery.

The determination coefficient was 0.149 which showed that the proportion of pre-surgical physical exercise, anxiety, and age on consciousness recovery was 14.9%. This means that pre-surgical physical activity, anxiety, and age affect post-surgery consciousness recovery by 14.9%, while the remaining 85.1% consciousness recovery was influenced by other factors, such as body temperature, type of anesthetic given, type of surgery performed, and the severity of the disease [10].

Table 3: The Results of Linear Regression Analysis

Variable	r-square	F	p-value	Sig Coef. Reg.	Coefficient
Pre-surgical physical exercises	0.149	3.265	0.028	0.12	0.493
Anxiety				0.113	-0.036
Age				0.518	-0.010

Analysis of the regression coefficients in the pre-surgical physical exercise was 0.493, anxiety was -0.036, and age was -0.010 as shown in Table 3. Regression coefficient on pre-surgical physical exercise was positive, meaning that when pre-surgical physical exercise is given, post-surgery consciousness recovery will be faster. The negative regression coefficient showed the opposite effect, suggesting that if the level of anxiety is high, then consciousness recovery will be slow. The negative regression coefficient of age indicated that if the patients' is young, then consciousness recovery becomes slow

It can be concluded that pre-surgical physical exercise had a significant effect on post-surgery consciousness recovery

when compared with anxiety and age. The results of this study are supported by the previous research which found that there was an effect of physical exercise on the recovery of patients after general anesthesia at 5, 10, and 15 minutes in the treatment group compared to the control group. Also, the level of anxiety and age did not have a significant relationship in the recovery of consciousness. Apart from the provision of pre-surgical physical exercise, it is necessary to know various other factors that can affect post-surgery recovery.

4. Conclusions

Based on this research, it can be concluded that pre-surgical physical exercise had a significant effect on post-surgery consciousness recovery with a p-value of 0.011. Based on Pearson's analysis, there was no significant relationship between anxiety and age with post-surgery consciousness recovery, shown by the p-value of 0.148 and 0.623 respectively. Pre-surgical physical exercise, anxiety, and age affect post-surgery consciousness recovery by 14.9%, while other factors influenced the remaining 85.1% consciousness recovery.

5. References

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