

The Effect of Acupuncture Therapy on Blood Oxygen Saturation in Patients with Blood Pressure Disorders and Coughs in Elderly Health Post, Surakarta

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ABSTRACT

Background: One way to detect functional disorders of respiration, heart, blood vessels and muscle oxidative mechanisms is to check blood gas saturation using a pulse oximeter, especially during the Covid-19 pandemic. Acupuncture is one of the managements of health problems at the promotive level, preventing functional disorders of the respiratory system, cardiovascular system and oxidative muscle rehabilitative which is used to improve health status, especially those who experience changes in blood gas saturation due to chronic cough, hypertension, hypotension, and muscle fatigue. The aim of the study was to determine the effect of acupuncture therapy on peripheral blood oxygen saturation (peripheral SpO₂) in patients with a history of respiratory system disorders and blood pressure disorders, especially old age at the Surakarta Health Post.

Subjects dan Method: The form of the research was pre-experimental (quasy experimental), using two groups of pre-test and post-test purposive samples totaling 20 people. Dependent variable Oxygen saturation. The independent variable was acupuncture therapy. Data were analyzed using Wilcoxon's test.

Results: Peripheral blood oxygen saturation values were higher in the intervention group before the intervention (Mean= 83.00; SD= 11.59) than after the intervention (Mean= 82.00; SD= 7.53) and not statistically significant (p= 0.294).

Conclusion: Acupuncture therapy reduces blood gas saturation values in patients with blood pressure and cough disorders.

Keywords: acupuncture therapy, peripheral blood gas saturation, pulse oximeter, history of cough, blood pressure disorders.

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BACKGROUND

Oxygen saturation (SpO₂) is a benchmark for assessing blood oxygen levels. Oxygen is tightly regulated in the body, venous oxygen saturation reflects tissue oxygenation required to maintain normal organ function and cardiac output, arterial blood oxygen concentration (SaO₂), oxygen-

carrying capacity (Hb) and body metabolic demands (VO₂). If hypoxaemic conditions occur, it can have an acute adverse effect on organ systems, further explained that organs are very sensitive to changes in oxygen saturation (Chemtob and Møller-Sørensen, 2018).

Oxygen saturation of systemic arterial blood is associated with adequate respiration, and can be measured non-invasively by pulse oximetry. The oxygen saturation of blood in the pulmonary artery, mixed venous blood, reflects the balance between oxygen supply to systemic tissues and oxygen demand. Mixed venous oxygen saturation also has clinical significance because it is used in the measurement of the Fick equation. The proposed pulmonary pulse oximeter includes a light source of two infrared wavelengths, which illuminates the lung tissue through the thoracic wall determining the ratio of the oxygen binding level in hemoglobin (oxyhemoglobin) to the instantaneous deoxygenation of hemoglobin in a person. Part of the scattered light returns from the lung tissue and passes through the thoracic wall, and for each wavelength a photoplethysmographic curve of the lung is obtained. The photoplethysmographic curve of the lung reflects the increase in blood volume during systole in the pulmonary arteries in the lung tissue, which contains mixed venous blood (Nitzan and Nitzan, 2013)

Health complaints Chronic Obstructive Pulmonary Disease (COPD) is a chronic disease condition caused by airflow obstruction that is not reversible. The manifestation conditions in this COPD case can be checked or checked for Pulse Oxygen Saturation (Edwin et al., 2013). Another disease related to the respiratory tract is shortness of breath, this condition can cause hypoxemia from mild to severe. Complaints that usually appear include chest pressure, tightness, coughing, chest muscle retraction, fatigue, anorexia, cyanosis and restlessness. So it is necessary to have oxygen therapy to increase oxygen levels in the blood, maintain adequate oxygen in the tissues, reduce the work of

breathing and decrease the work of the heart (Purwanto et al., 2014).

Research conducted by Dalia El Sada- way in 2013 in the Journal of Education and Practice reported on the Effects of Acupressure on Dyspnea and Fatigue in COPD Patients. The results of this study are that acupressure has an effect as the traditional therapy of choice for COPD patients to improve dyspnea, respiratory rate, and oxygen saturation. Another study conducted by Lei Fang and Yueming Wen in 2017 on Acupuncture and Moxibustion Therapy for Chronic Bronchitis patients, it was found that acupuncture and moxibustion therapy are safe, low-cost, therapy options for COPD patients.

The problem in this study is whether acupuncture is beneficial for oxygen saturation in patients with chronic cough and hypo/hypertension. The purpose of this study was to determine the benefits of acupuncture on oxygen saturation in patients with respiratory disorders (cough) and heart blood vessels (blood pressure disorders) in Surakarta.

SUBJECTS AND METHOD

1. Study Design

This was a quasi-experimental study with two groups pre and post-test. The study conducted at the Mojosongo Elderly Health Post, Surakarta, from February to November 2020. The study began with measuring oxygen saturation and in the treatment group a combination of point acupuncture therapy was performed. Measurement of oxygen saturation in both groups was carried out 6 times.

2. Population and Sample

The subjects of this study involved 20 people, namely experiencing chronic cough, abnormal blood pressure conditions (hypertension, hypotension), fulfilling the inclusion and exclusion criteria in the study

and willing to undergo acupuncture therapy at least 6 times with a frequency of 2 times a week.

3. Study Variables

The dependent variable of this study was peripheral blood oxygen saturation. The independent variable is acupuncture therapy.

4. Operational Definition of Variables

In this study, there were 2 variables, namely acupuncture therapy and oxygen saturation.

Acupuncture therapy is acupuncture therapy technique using fine needle acupuncture at the ashi point. The parameter used is the accuracy of the location of the "de Qi" sensation, with a nominal scale.

Oxygen saturation is the percentage of hemoglobin that binds oxygen compared to the total amount of hemoglobin in the blood. The parameter used is to measure the intensity of the LED light exposed on the skin surface of the finger, with an Ordinal scale. 95%-10% is normal and < 95% is hypoxia.

5. Study Instruments

This study used a questionnaire that was used to obtain data on the characteristics of the respondents in the form of age and gender. Documentation studies were also conducted to obtain additional data such as respondent characteristics, examination of blood oxygen saturation analysis before the procedure, measurement of the degree of blood oxygen saturation at each therapy visit. The tool used is an oxymeter.

6. Data Analysis

Data were analyzed using Wilcoxon's test.

RESULTS

1. Sample Characteristics

This study was divided into two groups, namely: acupuncture therapy treatment group and control group. The characteristics of the respondents in this study included gender, age, occupation, history of blood pressure disease and/or complaints of coughing. Based on table 1, the sex of the respondents in the treatment group is 60% male. Characteristics of the most age between 55-64 years 60%. History of complaints of pain 70% cough rarely.

Table 1. Characteristics of the Intervention Group Sample

Variables	Category	Frequency	Percentage
Gender	Male	6	60
	Female	4	40
Age	36-45	1	10
	46-54	3	30
	55-64	6	60
History of Sick Complaints	Ever Cough	3	30
	Rarely Cough	7	70

Based on table 2, the sex of the respondents in the treatment group is 60% female. The most characteristic age is between 55-64

years 80%. History of complaints of pain 100% cough is rare.

Table 2. Characteristics of the Control Group Sample

Variable	Category	Frequency	Percentage
Gender	Male	4	40
	Female	6	60
Age	36-45	2	20
	46-54	8	80
History of Sick Complaints	55-64	0	0
	Ever Cough	10	100

Table 3. Characteristics of Samples based on History of Blood Pressure

Variable	Category	Frequency	Percentage
Intervention Group	High blood pressure	6	60
	Low blood pressure	4	40
Control Group	High blood pressure	7	70
	Low blood pressure	3	30

Based on table 3 below, the sample characteristics of the intervention group based on history of blood pressure show high blood pressure with the highest frequency of 6 people, the percentage is 60%. While the characteristics of the control group respondents based on blood pressure history showed high blood pressure as many as 7 people, the percentage was 70%.

1. Bivariate Analysis

This study aims to determine the effect of acupuncture therapy on P6 (Niguan), ST36 (Zusanli), CV22 (Tiantu), BL13 (Feishu) points, DU14 (Dazhui), LU1 (Zhongfu) and LU10 (Yuyi) points on Peripheral blood oxygen saturation stability in Surakarta. In the treatment group there are differences in the mean value of oxygen saturation as shown in the table of Ranks values below:

Table 4. Effect of acupuncture therapy on peripheral blood oxygen saturation

Oxygen Saturation	Mean	SD	p
Pre Intervention			
Intervention	83.00	11.59	0.294
Control	84.30	7.33	0.890
Post Intervention			
Intervention	82.00	7.53	0.294
Control	83.60	8.98	0.890

The effect of acupuncture therapy on blood oxygen saturation as written in table 4 is in the intervention group before giving the intervention (Mean= 83.00; SD= 11.59) and after giving the intervention (Mean= 82.00; SD= 7.53). Meanwhile in the control group before giving the intervention (Mean= 84.30; SD= 7.33) and after giving the intervention (Mean= 83.60; SD= 8.98).

DISCUSSION

Acupuncture can change the degree of stimulation of the sympathetic autonomic nervous system, causing a balanced metabolic temperature reaction of the vascular circulation (Zhang et al., 2019). The study found that, acupuncture can change blood oxygen saturation, blood flow, and glucose metabolism in areas of the brain that are still functioning. Acupuncture significantly improves the quality of life in patients with

COPD through improvements in physiological conditions including relaxation of muscle tension, increased muscle fatigue, increased muscle blood flow, and sympathetic control. The positive effect of acupuncture is associated with an increase in endurance time which is influenced by an increase in oxygen utilization. Acupuncture may be a new intervention for COPD as an adjunct to conventional maintenance therapy (Maekura et al., 2019). In this study, it was seen that there was a change in oxygen saturation in the treatment group compared to the control group.

Next, Ohkubo et al. (2009) reported that the increase in oxy hemoglobin and t-hemoglobin during and after undergoing stimulation at acupuncture points indicated the presence of oxygen supply in the bloodstream in small blood streams (arterioles, capillaries and venules) in the local area (acupuncture punctures were performed on the trapezius muscle). PC6 and GV26 acupuncture points based on Xingnaokaiqiao theory are useful for improving heart function and cerebral perfusion. PC6 point is the right point to improve cardiac function and increase cerebral tissue perfusion (Liu et al., 2018). In another study, it was also explained that the PC6 acupuncture point can increase cardiac output (cardiac output) so that the blood supply and brain oxygen are met in cases of brain edema in experimental animal models.

Zhang et al. (2019) reported that acupuncture can change the degree of sympathetic autonomic nervous stimulation, causing a balanced vascular-circulation-metabolism temperature reaction. The study found that, acupuncture can change blood oxygen saturation, blood flow, and glucose metabolism in areas of the brain that are still functioning. Another study that discussed the effects of acupuncture

therapy in patients with Chronic Obstructive Pulmonary Disease found that this therapy was very safe to use in improving function and quality of life in COPD patients. In addition, it can also improve lung function in COPD patients by reducing the manifestations that appear in patients such as shortness of breath (Wang et al., 2018).

In the science of acupuncture therapy in cases of cough or respiratory disorders can use the main points that are most often chosen are Feishu (BL-13) and Hegu (LI-4). In the case of coughing with excessive phlegm add Fenglong (ST-40). For itching in the throat and cough add Tiantu (CV-22). For chest tightness add Neiguan (PC-6) and Danzhong (CV-17). For chronic cough with lethargy add Feishu (BL-13), Shenshu (BL-23) and Pishu (BL-20). In general, for exogenous cough using sedation method (Maciocia, 2008). In this study, the acupuncture points used were able to improve oxygen saturation in the respondents.

Utilization of acupuncture therapy at points PC6 (Neiguan), CV 22 (Tiantu), CV 17 (Danzhong), BL 13 (Feishu), BL 20 (Pishu), BL 23 (Shenshu), LI 4 (Hegu), ST 40 (Fenglong) to oxygen saturation in cases of chronic cough and blood pressure disorders, the significance was proven significantly and had a Ranks value in the treatment group (N) of 10, namely Ranks after acupuncture therapy (Post-test) were negative Ranks of 0, Mean Ranks of 00 and Sum of Ranks of 0.00. While the Ranks before acupuncture therapy (Pre-test) were Positive Rank of 10, Mean Ranks of 5.50 and Sum of Ranks of 55.00 and the treatment group before and after acupuncture therapy had ties of 0.

Analysis of the Z test data (Wilcoxon Signed Ranks test) for the acupuncture treatment group obtained a Z-count of -

2.84. and the critical Z value at N 10 with an alpha of 0.05 of 8, so that the Z-count value is < from the critical Z-value, with the Asymp value. Signed (2 tailed) of .005. This means that, there is a difference in the effect of oxygen saturation in the treatment group between before and after acupuncture therapy.

Acupuncture therapy can be applied in cases of decreased blood gas saturation, especially patients with blood pressure disorders and a history of chronic cough. For example, using points PC-6, CV-22, ST-36, BL-13, LU-1 and LU-10. To be useful, acupuncture therapists always follow the development of acupuncture science and technology. For the community, acupuncture therapy can be used as an alternative to improve blood oxygen saturation.

AUTHOR CONTRIBUTION

Researcher I and Researcher II in this study both contributed to the preparation of research proposals, research reports, data analysis, revision of research journal articles from the beginning to the end of research activities and publication of research articles.

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CONFLICT OF INTEREST

This research was carried out in a transparent and objective manner without any particular conflict of interest in the process.

REFERENCE

- Chemtob RA, Møller-Sørensen H (2018). Peripheral measurements of venous oxygen saturation and lactate as a less invasive alternative for hemodynamic monitoring. *Scand. j. trauma resusc.* 26(75): 1-7. doi: 10.1186/s13049-018-0537-7.
- Fang L, Wen Y (2017). Acupuncture and moxibustion for treating chronic bronchitis. School of rehabilitation and science Shanghai University of Traditional Chinese Medicine.
- Fang L, Wen Y (2017). School of rehabilitation and science, Shanghai University of Traditional Chinese Medicine.
- Liu J, Xue X, Wu Y, Yang C, Li N, Li H (2018). Efficacy and safety of electroacupuncture treatment in improving the consciousness of patients with traumatic brain injury: study protocol for a randomized controlled trial. *Trials.* 19(296): 1-6. doi: 10.1186/s13063-018-2687-3.
- Maciocia G (2008). The practice of chinese medicine: the treatment of diseases with acupuncture and chinese herbs. Europe: Elsevier. ISBN: 978-0-443-07490-5.
- Maekura T, Miki K, Miki M, Kitada S, Maekura R (2019). Clinical effects of acupuncture on the pathophysiological mechanism of chronic obstructive pulmonary disease during exercise. *Int J Chron Obstruct Pulmon Dis.* 14 2787–2798. doi: 10.2147/COPD.S225694.
- Nitzan M, Nitzan I (2013). Pulse oximetry in the pulmonary tissue for the non-invasive measurement of mixed venous oxygen saturation. *Med Hypotheses.* 81(2):293-6. doi: 10.1016/j.mehy.2013.04.026.
- Ohkubo M, Hamaoka T, Niwayama M, Murase N, Osada T, Kime R, Kurosawa Y,

- et al. (2009). Local increase in trapezius muscle oxygenation during and after acupuncture. *Dyn Med.* 8 (2): 1-8. doi: 10.1186/1476-5918-8-2.
- Purwanto U, Makarromah N, Mundzakir (2014). Study kasus pemberian posisi semi fowler dan oksigen nasal kanula 3 lpm untuk mengurangi frekuensi sesak nafas pada pasien status asmatikus di RSI Siti Hajar Sidoarjo (Case study of provision of semi-fowler's position and oxygen nasal cannula 3 lpm to reduce the frequency of shortness of breath in patients with asthmatic Status at Siti Hajar Hospital Sidoarjo). Universitas Muhammadiyah Surabaya Repository. Retrieved from: <http://repository.um-surabaya.ac.id/id/eprint/1666>.
- Wang J, Li J, Yu X, Xie Y (2018). Acupuncture therapy for functional effects and quality of life in COPD Patients: A systematic review and meta-analysis. *Biomed Res Int.* 1-19. doi: 10.1155/2018/3026726.
- WHO (2020). Coronavirus disease 2019 (COVID-19): situation report, 82. 2020. Retrieved from: [20200311-sitrep-51-COVID-19.pdf](https://www.who.int/docs/default-source/coronavirus/situation-reports/20200311-sitrep-51-covid-19.pdf) (who.int).
- Zhang YF, Han YD, Zhao ZT (2019). Effect of acupuncture on blood oxygen concentration in brain of rats with post-traumatic stress disorder based on functional near-infrared spectroscopy. *J Acupunct Tuina Sci.* 17(1): 9-15.
- Zhao J, Yang Y, Huang H, Li D, Gu D, Lu X, et al. (2020). Relationship between the ABO blood group and the COVID-19 susceptibility. *Infect Dis Soc of Amer.* 73 (2): 328-331. doi: 10.1101/2020.03.11.20031096.
- Zietz M, Zucker J, Tatonetti NP (2020). Associations between blood type and COVID-19 infection, intubation, and death. *Nat Commun.* 11: 5761. doi: 10.1038/s41467-020-19623-x.