The Effectiveness of Slow Deep Breathing to Decrease Blood Pressure in Hypertension: a Systematic Review

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Abstract: Hypertension is a disorder of the circulatory system and lifelong condition that requires ongoing treatment after the blood pressure is under control. The prevalence of hypertension continues to increase each year. Slow deep breathing is a non-pharmacological action for people with hypertension. This systematic review was performed to assess changes blood pressure during exercise. The literature search used predefined keywords through several electronic databases such as Scopus, ProQuest, SpringerLink, and Science Direct. The initial search retrieved 353 studies that were potentially relevant, and 18 studies were selected for review. Result showed that slow deep breathing exercise can decrease blood pressure. These study result could be a reference to health workers and hypertension education needs to be considered as one of the interventions in hypertension patients.

1 INTRODUCTION

According to the World Health Organization, approximately 22% of adults aged 18 and over have raised blood pressure (Mahtani et al., 2016). Hypertension can also lead to other diseases such as stroke, myocardial infarction, heart failure, chronic kidney disease, continuous atherosclerosis and dementia (memory loss) (Gupta, 2014).

The main cause of hypertension is the imbalance of the autonomous role. The imbalance is characterized by the onset of hypertension to sustained hypertension. Baroreflex is also one of the mechanisms associated with hypertension. However, if baroreflex is compromised, it will suppress the increase in sympathetic activity. So it can arise hypertension (Joseph et al., 2005).

Irregular eating patterns, obesity or overweight, less physical activity and smoking are always associated with the development of hypertension and make health worse. Patients with 140/90 mmHg are recommended to change lifestyle as the first stage of hypertension management (Mahtani et al., 2016). Hypertension is considered a major risk factor for the incidence of morbidity (rates of illness) and mortality of the cardiovascular system. Antihypertensive drugs are drugs that can reduce the risk of such morbidity and mortality (Grossman et al., 2001).

Although many pharmacological treatments are provided, the patient’s blood pressure remains uncontrolled so the need for nonpharmacologic therapy is essential in addition to or substitutes for pharmacological therapy (Cernes and Zimlichman, 2017).

There are several studies that show that breathing can decrease respiratory rates, breathing patterns, and high blood pressure for example doing slow breathing exercises (Kaushik et al., 2006).

Deep slow breathing also plays a role in the cardiovascular system, respiration and sympathetic nervous activity. Breathing is done regularly and slowly can reduce blood pressure so this exercise is very suitable in the choice of therapy management. Meditation and yoga are two of the few practices that have been accepted in various circles as complementary hypertension therapy (Mahtani et al., 2016).

Breathing in effectively reduces heart rate in patients with essential hypertension and may also affect patients with gynecology and cardiac abdominal surgery (Hayama and Inoue, 2012).

The conclusion of the real role of slow and regular breathing is a very good component in relaxation exercises and can lower blood pressure slowly and sustainably (Grossman et al., 2001). Slow and regular breathing exercises can lower high blood pressure (Schein et al., 2001).
2 METHODS

The literature search used predefined keywords that are slow deep breathing, blood pressure, hypertension and systematic review, thorough several electronic databases such as Scopus, ProQuest, SpringerLink, and Science Direct. Randomized, controlled trials, case-control, and quasi experimental studies were included.

Selection Criteria
1. A specific vocational program that affects people with hypertension.
2. All subjects who were diagnosed with hypertension and moderate disease.
3. Interventions of slow deep breathing to improve blood pressure.

Data Source
The title and abstract of this articles that are in the search, are screened for their relevance. The complete required articles for further evaluation according to predetermined criteria.

Eligibility Criteria
The systematic review eligibility criteria include all interventions that investigate the effect of slow deep breathing exercises on adult patients (ages over 18 years) with hypertension (systole $\geq 140$ mmHg and diastole $\geq 90$ mmHg). In line with previous reviews, deep breathing exercises are non-pharmacological treatments that qualify and are included in this study. This study has no gender, time and language restrictions imposed. Studied involving therapy or breathing exercises in other combinations with other interventions are included.

3 RESULTS

Search articles in the Scopus, Proquest and Science Direct, with keywords slow deep breathing, blood pressure, hypertension and systematic review. A total of 2337 articles (22 scopus, 1197 Proquest, and 118 Science Direct). A total of 353 articles in abstract review. The eliminated another 328 articles that do not fit the topic, into 25 articles. 25 articles are screened to take articles that fit the criteria. Obtained 18 journals according to criteria.

4 DISCUSSION

From the overall study showed that significantly slow and deep breath From the overall study showed that significantly slow and deep breathing in lowering blood pressure in patients with hypertension.

Slow deep breathing techniques were found in the study (Gupta, 2014), muscle relaxation and deep breathing exercises, significantly affected the systolic blood pressure reduction in 40 patients with hypertension.

Slow breathing with BIM (Breathe with Interactive Music) tools, affects rapid and significantly reduce systolic and diastolic blood pressure in patients with hypertension (Grossman et al., 2001). Slow breathing exercises at the rate of 6 breaths/min, performed half an hour daily for 4 weeks decreased spontaneous respiratory rate and MAP (Mean Arterial Pressure) significantly. This study was conducted on healthy individuals (Nagarajan, 2014).

A role of baroreflex in changing up and down blood pressure. This process begins when the active echanoreceptor responds to an increase in tidal volume and inhibits the sympathetic flow of skeletal muscle vessels resulting in vasodilation resulting in decreased peripheral resistance and decreased blood pressure. Baroreflex is very important role against hypertension (Joseph et al., 2005; Reyes Del Paso et al., 2006). In addition, slow and effective deep breathing techniques are performed not only in patients with hypertension but in cancer patients undergoing chemotherapy (Hayama and Inoue, 2012). Breathing exercises with device guidance reduced systolic and diastolic blood pressure at 5.5 / 3.6 mmHg ($p < 0.05$ for diastolic blood pressure) and mean blood pressure of 5.4 / 3.2 mmHg ($p < 0.001$ for systolic and diastolic blood pressure). That is breathing exercises done at home, more effective than patients should visit to the doctor to do this exercise (Meles et al., 2004). Slow breathing also significantly decreased systolic blood pressure in the intervention (37 patients essential hypertension) group at 1 month follow-up visit (125 mmHg; $p < 0.05$) (Modesti et al., 2015). Blood pressure measurements should be more careful such as manual and automatic blood pressure measurements. Because this will affect the result of blood pressure measurements should be strictly controlled and careful in order to provide the best accuracy value (Zheng, Giovannini and Murray, 2012).
The implication of these findings is that breathing exercises can control central cardiovascular so as to affect a positive pressor response to muscle contraction throughout the body (David, Science and Jones, 2015). Then regular slow-breathing exercise can lower systolic blood pressure significantly (Anderson, McNeely and Windham, 2010).

The results obtained also from slow breathing is a significant decrease in heart rate, respiratory rate and diastolic blood pressure in one hundred patients of essential hypertension (Kaushik et al., 2006; Zheng et al., 2012). A drop in diastolic blood pressure is also present in the group of devices after the intervention of the group that only listens to the Walkman (Schein et al., 2001).

Slow breathing of the BRS (Baroreflex Sensitivity) reduces sympathetic tones and blood pressure. Apparently, RESPERATE provides good benefits and patients with hypertension can be done at home every day for 15 minutes. However, patients are expected to be independent of this therapy without the need for coaches (Cernes and Zimlichman, 2017). Deep breathing done also by healthy subjects, can lower blood pressure in short-term intervention (Herakova et al., 2017). Device-guided respiration can also lower systolic blood pressure in twenty one patients with hypertension and patients have problem with obstructive sleep apnea (Bertisch et al., 2011).

5 CONCLUSIONS

The effects of slow deep breathing in everyday life vary and depend on individual ability. We demonstrated that slow deep breathing may produce clinically meaningful changes in systolic and diastolic blood pressure in patients with hypertension. Thus, this technique can be used in people with hypertension to reduce or lower high blood pressure.

REFERENCES


