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Short Communication

Effect of sama vritti pranayama on intradialytic hypertension in patients with chronic kidney disease: a pilot study

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ABSTRACT

Chronic kidney disease is identified when the glomerular filtration rate is less than 60 ml per minute/1.73-meter square for a period of greater than or equal to 3 months but with evidence of injury to renal structure. Intradialytic hypertension (IDH) is defined as an increase in the BP, especially systolic BP of >10 mmHg during or immediately after dialysis. Vritti pranayama is a type of pranayama which includes samavritti and visamavritti pranayama. In samavritti pranayama, an attempt is made to achieve uniformity in the duration of all 4 processes of breathing namely, inhalaltion, retention, exhalation and retention A pilot study on 10 patients was conducted on patients with chronic kidney disease having intradialytic hypertension. Samavritti pranayama was performed by the patients for 6 cycles/session 2-3 times/week for four weeks and blood pressure was measured before and after 4 weeks of intervention. The results of the study showed that the mean value of intradialytic systolic blood pressure before the intervention in the 1st week was 181.25 mmHg and that of diastolic was 92.45 mmHg. The mean intradialytic systolic blood pressure after 4 weeks was 161.85 mmHg and diastolic was 84.07 mmHg. This study concluded that there was a significant difference in the intradialytic systolic and diastolic blood pressure after 4 weeks of samavritti pranayama.

Keywords: Samavritti pranayama, Intradialytic hypertension, Chronic kidney disease, Blood pressure

INTRODUCTION

Chronic kidney disease (CKD) is defined as clinical syndrome secondary to definitive change in structure or function of kidney and is characterised by its irreversibility and slow progressive evolution. CKD is identified when the glomerular filtration rate is less than 60 ml per minute/1.73-meter square for a period of greater than or equal to 3 months but with evidence of injury to renal structure. CKD is classified into 5 stages depending on the GFR.[1] Individuals with CKD suffer from various symptoms such as hypertension, shortness of breath, peripheral edema, and decreased urine output.[2]

The global estimated prevalence of CKD is 13.4% and patients with end stage renal disease (ESRD) needing replacement therapy is estimated between 4.9 to 7 million.[3] In India, patients on chronic dialysis are about 1,75,000 giving a prevalence of 129/million population according to the data estimated in the year 2018.[4] CKD is the world's 12th largest cause of death and 17th major cause of disability. Even though the complication of CKD is ESRD, patients are more likely to die of cardiovascular illness than ESRD.[5]

The treatment options for ESRD involve kidney replacement therapy in the form of dialysis or kidney transplant or conservative care also called as palliation or dialytic care. Haemodialysis is a process of functionally replacing the impaired renal function of filtration in which fluid and electrolytes are maintained in a balanced

condition by excreting excess fluid and excreting accumulated toxins using dialyser.[6]

Dialysis is associated with various risk factors such as repeated large intradialytic fluid and blood pressure shifts which is likely to play a substantial role in cardiovascular risk factors associated with dialysis. The main complications associated with dialysis which increase the rate of mortality and morbidity are variations from normal BP involving intradialytic hypotension and hypertension out of which intradialytic hypertension(IDH) has received less attention. IDH is defined as an increase in the BP, especially systolic BP of >10 mmHg during or immediately after dialysis.[7] It affects up to 15% of patients undergoing haemodialysis.[8]

The word pranayama is comprised of 2 components- "prana" and "ayama". "Prana" means vital energy or life force and "ayama" is defined as extension or expansion. In practise of pranayama there are 4 important aspects of breathing such as, Puraka (inhalation), Recheka (exhalation), Antar kumbhaka (internal breath retention) and Bahaya kumbhaka (external breath retention). Pranayama has various effects in cardiovascular system in which it has shown to reduce stress level, low frequency of heart rate variability (HRV) spectrum (indicative of reduction in sympathetic drive to the heart) and increase in high frequency of HRV spectrum (increase in parasympathetic output to heart) resulting in lowering of blood pressure.[9]

Vritti pranayama is a type of pranayama which includes samavritti and visamavritti pranayama. In samavritti pranayama, an attempt is made to achieve uniformity in the duration of all 4 processes of breathing namely, inhalaltion, retention, exhalation and retention. This retention of breath is useful for reducing BP.[10] IDH in patients with CKD is eventually leading to discontinuation of dialysis in between which is intern leading to poor prognosis. So in an attempt to reduce the frequency of discontinuations, a treatment approach is necessary. Hence this study focuses on evaluating the effects of samavritti pranayama on IDH in patients with CKD.

METHODS

A pilot study was conducted in order to determine the effect of Samavritti pranayama on IDH in patients with CKD. A sample of 10 patients diagnosed with CKD and undergoing haemodialysis were recruited in the month of August-September 2022. The study was approved by the institutional ethical committee and patients sign informed consent was taken before enrolling them in the study.

Participants

A sample of 10 patients diagnosed with CKD were enrolled in the study from dialysis centre. The inclusion criteria comprised of patients diagnosed with CKD of stage 4 and 5, patients undergoing haemodialysis for a period of ≥6 months, patients having intradialytic hypertension, patients requiring 2 sessions of dialysis, patients between the age of 25-55 years.

Exclusion criteria was patients with altered consciousness, patients with uncontrolled hypertension, patients with severe shortness of breath, patients unable to follow commands, pregnant and lactating females.

The blood pressure measurements were done using the blood pressure cuff of dialysis machine. The measurements were before and after performing Samavritti Pranayama during each session every week for 4 weeks.

Intervention

Sama vritti pranayama

It involves equal ratio breathing. Patients perform inhalation, followed by breath retention, exhalation followed by breath retention for equal duration this completes on cycle. In the current study the duration of all the four phases was 4 seconds. First the patient inhales and exhales normally for 3-5 breaths the performs Samavritti pranayama for 6 cycles/session 2-3 times/week for four weeks.

Procedure

Procedure included: inhalation through nose for 4 seconds, breath retention for 4 seconds (hold your breath at the end of inhalation), exhalation for 4 seconds, and breath retention for four seconds (hold your breath at the end of exhalation).

Statistical analysis

A paired t test was done to assess the differences in blood pressure before and after intervention. A bar diagram is used to illustrate the differences after four weeks of intervention.

RESULTS

A total sample of 10 patients, 6 males and 4 females with mean age of 44.3±8.62 diagnosed with stage 4 and 5 of chronic kidney disease.

The mean value of intradialytic systolic blood pressure before the intervention in the 1st week was 181.25 mmHg and that of diastolic was 92.45 mmHg. The mean intradialytic systolic blood pressure after 4 weeks was 161.85 mmHg and diastolic was 84.07 mmHg.

Table 1 shows that there was a statistically significant difference in the intradialytic systolic and diastolic blood pressure measurements of patients after four weeks of intervention. The p value is 0.0002 that is there is a significant difference.

Table 1: Systolic and diastolic blood pressure of 1st week and 4th week.

Blood pressure (mmHg)	Week 1	Week 4
Systolic	181.25	161.85
Diastolic	92.45	84.07

Table 2 shows week wise difference in the systolic and diastolic blood pressures at the end of 4 weeks of intervention. The difference in the systolic blood pressure was more in the 3rd and 4th week of intervention.

Table 2: Week wise intradialytic systolic and diastolic blood pressure measurements.

Blood pressure (mmHg)	Week 1	Week 2	Week 3	Week 4
Systolic	181.25	175.2	171.25	161.85
Diastolic	92.4	89.8	88.4	84.07

Figure 1 represents the systolic and diastolic blood pressure of 1st week and 4th week.

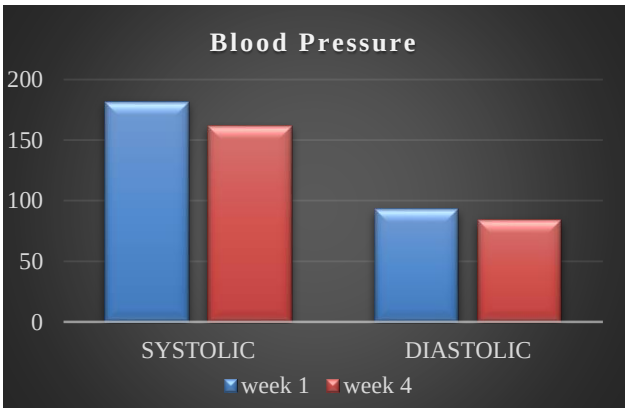

Figure 1: Systolic and diastolic blood pressure of 1st week and 4th week.

Figure 2 represents the week wise intradialytic systolic and diastolic blood pressure measurements.

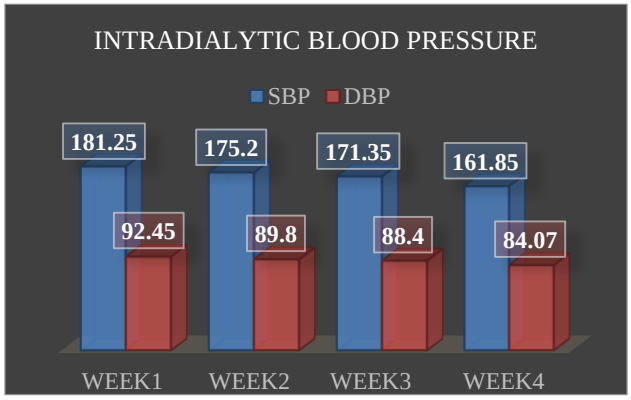

Figure 2: Week wise intradialytic systolic and diastolic blood pressure measurements.

DISCUSSION

A pilot study was conducted in patients with chronic kidney disease with an aim to evaluate the effects of Samavritti pranayama on intradialytic hypertension. The total number of participants included in the study was 10 with 6 males and 4 females with stage 4 and 5 of chronic kidney disease undergoing haemodialysis 2 times/week. Samavritti pranayama was performed for 6 cycles 3 times a week for a duration of 4 weeks.

The result of the study evaluated that there was a significant difference in the blood pressure measurements of systolic and diastolic at the end of 4 weeks of intervention. The mean value of intradialytic systolic blood pressure was 181.25 mmHg in 1st week which changed to 175.2 mmHg, 171.35 mmHg and 161.85 mmHg in the 2nd, 3rd, and 4th week respectively. Intradialytic diastolic blood pressure also showed significant differences after 4 weeks of intervention. Measurement was 92.45 mmHg in the 1st week, 89.8 mmHg, 88.4 mmHg and 84.07 mmHg in the 2nd, 3rd, and 4th week respectively.

The fall in blood pressure can be correlated to the effects of pranayama which causes increase in the parasympathetic activity and inhibition of sympathetic activity. A study done by Noventi et al on the effectiveness of mindfulness based stress reduction and sama vritti pranayama on reducing blood pressure, improving sleep quality and reducing stress levels in the elderly with hypertension also found results similar to the present study in which the blood pressure was reduced after 8 sessions of intervention.[11] Another study done by Samiksha et al to find out the immediate effects of Bhramari pranayama on blood pressure and oxygen saturation also obtained a significant difference in systolic blood pressure after practicing the pranayama.[12]

The results obtained in the present study can be attributed to the mechanism in which pranayama augments a balance of autonomic functions as well as improves cardiovascular rhythms as a result of increased vagal modulation or decreased sympathetic activity and improved baroreflex sensitivity. Controlled slow breathing may modify neural respiratory elements and it leads towards parasympatho-dominance which may decrease blood pressure and heart rate immediately.[13]

Another possible mechanism by which pranayama causes reduction in blood pressure is pranayama increases the production and release of nitric oxide which may help to dilate the blood vessels which in turn decreases the blood pressure.[15] Consistent with the results of the current study a study done by Sathe et al to see the immediate effects of Buteyko breathing and Bhramari pranayama on blood pressure and HRV observed that there was a reduction in the systolic blood pressure in both the groups while increase in diastolic blood pressure was seen in the Bhramari pranayama group. The similar results obtained in

current study can be attributed to the mechanism of nitric oxide in lowering blood pressure.[15]

The study had few limitations as the sample size was small, the patients undergoing only haemodialysis and not peritoneal dialysis were included in the study. Also the patients undergoing dialysis only twice weekly were included and the study was conducted only at a single centre so the results could not be generalized. The results of current study can be used for conducting further studies on larger population in order to generalize the results.

CONCLUSION

The study concluded that Samavritti pranayama has a positive effect on intradialytic hypertension as a significant difference was seen in the intradialytic blood pressure after 4 weeks of intervention. This pranayama is simple to practice and can be done without any equipment. Samavritti pranayama can also be practiced by individuals who cannot participate in more intense exercise programme. However, a study on larger population will aid in obtaining more generalise and accurate findings.

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