

Effectiveness of a Breathing Training Program on Quality of Life in Patients with Predialysis Chronic Kidney Disease: A Randomized Controlled Trial

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Abstract

Context: Chronic kidney disease (CKD) patients have suboptimal quality of life (QOL). Various studies/researches have revealed that breathing exercises have a positive and favorable impact on different systems of the body. **Aims:** This study aims to assess the effect of a breathing training program on QOL in patients with predialysis CKD. **Settings:** The study was a single-center study conducted at PGIMER, Chandigarh. **Design:** Randomized controlled trial. **Methods:** Sixty individuals were enrolled and randomized using lottery method. QOL was assessed or evaluated by Kidney Disease and QOL questionnaire (KDQOL™-36). Breathing exercises were taught to the intervention group. Patients included in control group continued with the routine care. Assessment of QOL was done after 4 weeks in both the groups. **Results:** Change in KDQOL™-36 scores showed significant difference between control and the intervention group. The mean scores of control group in the subscale effects of kidney disease, SF-12 Physical functioning (Physical Health Composite) and SF-12 Mental functioning (Mental Health Composite) were 84.79, 39.16 and 37.40, respectively, whereas in intervention group, the respective mean scores were 91.88, 43.92, and 44.16. The difference was statistically significant ($P = 0.04$, $P = 0.01$, and $P = 0.003$, respectively). **Conclusions:** Breathing training program improves QOL in patients with predialysis CKD.

Keywords: Breathing training program, chronic kidney disease, quality of life

INTRODUCTION

Chronic kidney disease (CKD) is a rapidly increasing illness with high rate of morbidity and mortality. The prognosis is generally poor with worsening of physical functioning leading to psychological distress.^[1] CKD patients have suboptimal quality of life (QOL) in comparison with normal general population.^[2] In all stages of kidney disease, QOL is decreased.^[3] An important aspect of health and well-being is QOL. Effectiveness of any treatment is determined by QOL. Since chronic diseases are intractable, the target is to better the health of patients.^[4-6]

Previous conducted studies/researches have revealed that exercises involving breathing have beneficial results on different systems of the human body.^[7-16] Breathing exercises can improve the prognosis of CKD. Since beneficial effects of breathing exercises were found in chronically ill patients in other population, there was a probability for a similar study

in patients suffering from CKD. The study was aimed to determine if breathing training program is beneficial to enhance the QOL of CKD patients. The objective was to assess/evaluate the effectiveness of a breathing training program on QOL in patients with predialysis CKD.

METHODS

A randomized controlled trial was carried out at PGIMER, Chandigarh. In the study, predialysis CKD patients between the

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age group of 18–65 years, who have clinically stable course for last 1 month and estimated glomerular filtration rate between 15 and 45 ml/min/1.73 m² were included. Those on dialysis, pregnant or lactating females were excluded. Using lottery method, randomization into intervention and control group was done. Individuals were interviewed using pro forma containing socio demographic variables and clinical profile. Assessment of QOL was assessed in both experimental and control group by using Kidney Disease and QOL questionnaire (KDQOL™-36) at baseline and after 4 weeks in both the group.

Intervention: Breathing training program consisting of three breathing exercises, i.e. Alternate nostril breathing or anulom-vilom, 4-7-8 breathing exercise and breath counting.^[17,18] It was taught with the help of a video and demonstration to the individuals in the intervention group individually.

The first practice session of the breathing exercises was demonstrated by the researcher. The individuals were then asked to perform return demonstration which was evaluated by the researcher for correct technique. The individuals in the experimental group were handed over a prerecorded video to practice the exercises at home. The individuals were asked to perform breathing exercises at home for 5 min three times a day daily.

- Frequency – thrice daily
- Number of sessions – three times a day for 4 weeks, i.e., total 90 sessions
- How long each session – 5 min
- Total intervention – 4 weeks' intervention period with total 15 min/day.

The video acted as a reminder and reference to the patients about the steps to be followed. A daily record sheet was given to the individuals to record daily the date and time of performing the breathing exercises.

Follow-up was done via phone calls made by the researcher (every 7th day) to the individuals to ensure that they are doing the breathing exercises. The control group received routine care. Assessment of QOL was done after 4 weeks in both the groups by the same researcher.

Outcome and outcome measures

Quality of life

Change in the KDQOL score as measured or assessed by KDQOL™-36.

KDQOL™-36 is a standardized tool. It is a public document available without charge. It is a kidney disease-specific measure of health related QOL (HRQOL). This instrument consists of 36 items or questions, divided in two components: one general component, including 12 QOL questions based on the SF-12 (short version of the SF-36), and a specific 24-question component about the kidney disease. At the same time, each item or question is regrouped in five subscales or domains, where the general component groups the SF-12 subscale Physical health composite (questions 1–12) and SF-12 subscale Mental health composite (questions 1–12)

while the specific component groups the subscales Burden of Kidney Disease (questions 13–16), Symptoms and Problems (questions 17–28) and Effects of Kidney Disease on Daily Life (questions 29–36).

Scores of the different subscales were calculated according to Kidney Disease QOL (KDQOL™-36) scoring program. Raw precoded numeric values for each item were transformed linearly to a 0–100 range, with higher scores reflecting better QOL. Item scores range from 0 to 100, with 0 indicating the worst and 100 the best QOL.

Each item was put on a 0–100 range so that the lowest and highest possible scores are set at 0 and 100, respectively. Scores represent the percentage of total possible score achieved. It includes averaging items in each scale together.

Statistical considerations

To check the feasibility of the intervention and for sample size calculation, we conducted a pilot study in June 2016. Sample size was calculated according to the effect size determined in the pilot study. The result of the calculated effect size indicated that a total of 52 individuals (26 in each group) were required with 80% power at a significance level of 5%. For the present study, we recruited 62 individuals (31 in each group). Collected data was entered in IBM SPSS (Statistical Package for Social Science) Statistics version 20 (IBM Corp., Armonk, NY, USA) for descriptive and inferential analysis. QOL scores were calculated according to KDQOL™-36 scoring program. $P \leq 0.05$ was considered as statistically significant.

Ethical clearance was obtained from the Institution Ethical Committee. All the study participants gave their consent to participate in the study. They were assured of the confidentiality of the information. Registration of the study was done under the Clinical Trials Registry-India (CTRI/2017/07/008973).

RESULTS

Participants were recruited between July and October, 2016. Among 77 individuals screened, 15 individuals were excluded because they did not meet eligibility criteria [Figure 1]. Sixty-two patients were enrolled and randomized using lottery method into intervention and control group. One subject from each group was lost to follow-up. Analysis was done only for the 60 individuals who completed the posttest questionnaires. The dialysis-specific component was excluded because only predialysis patients were included.

Mean age was 51.83 ± 10.27 years in control and 52.06 ± 6.97 years in intervention group. 70% were males in control and 50% were males in intervention group. In Table 1, the baseline sociodemographic and clinical profile of the individuals are mentioned. Both the groups were comparable as per $P > 0.05$. Change in KDQOL™-36 scores for the subscales symptom/problem list and SF-12 physical health composite showed significant difference in mean score in the group receiving intervention. No significant difference was observed in mean score in the control group post intervention [Table 2].

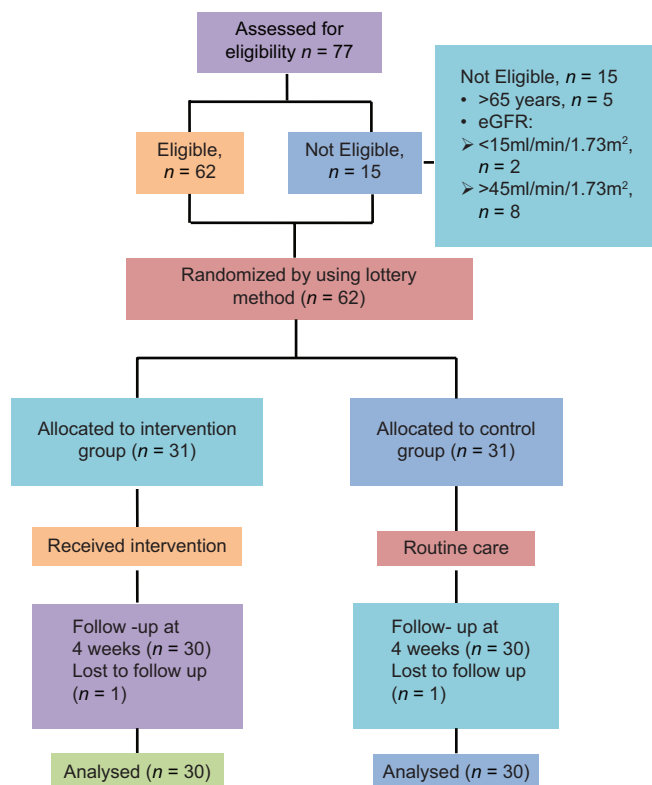


Figure 1: Consort diagram

KDQOL™-36 scores for the subscales-effects of kidney disease, symptom/problem list and burden of kidney disease were comparable at baseline [Table 3]. The *t*-test analyses revealed that the score changes were significantly greater in the group receiving intervention than in the control group in the subscale effects of kidney disease ($P = 0.04$), SF-12 physical functioning or physical health component ($P = 0.01$) and SF-12 mental functioning or mental health composite ($P = 0.003$).

DISCUSSION

In the present randomized trial, we evaluated the effectiveness of a breathing training program on QOL in patients with pre-dialysis CKD. The breathing training program administered to pre-dialysis CKD patients showed significant improvement in patients' KDQOL™-36 scores in the intervention group.

The findings of the present study are supported by observation of studies reported earlier. It was stated by Pal *et al.*^[7] that a brief time of breathing induces a reaction of relaxation, indicating a decrease in sympathetic nervous system activity, reduces the result of strain as well as stress on the human body, boosts cardiovascular as well as respiratory functions, improves the physical and mental health. Tsai *et al.*^[8] showed that there is significant improvement in the mental component summary and the role emotional domain in hemodialysis patients in the breathing training group. Malathi^[9] revealed significant increase in the QOL amidst patients suffering from COPD with breathing training program. Yoyok *et al.*^[10]

showed that breathing exercise which is done on a regular basis increase the secretion of IgG, endorphins and decrease blood glucose. Silva *et al.*^[11] stated that practicing deep breathing exercises significantly decreased the diastolic blood pressure and anxiety level in patients with Coronary Artery Disease. It was also found that yoga breathing improve mental QOL, sleep and reduces anxiety among patients with cancer.^[12] In another study, there is reduction in anxiety, pain, fatigue and insomnia in patients on hemodialysis.^[13] Vitality and mental health scores of patients with obstructive sleep apnea improved with relaxation breathing training.^[14] A scrutiny of researches of patients with asthma showed that QOL improved after they were taught and performed diaphragmatic breathing.^[15] Other studies have shown that breathing leads to relaxation. They help to promote relaxation, inner peace and calmness while reducing stress, agitation and anxiety. The regular practice of breathing exercise decreases strain and stress on the human body, betters physical and mental health.^[16]

In present study, the mean age was 52.06 ± 6.97 years in the intervention and 51.83 ± 10.27 years in the control group. Most participants were males, married, Hindu by religion and educated up to secondary level. Similar finding were reported by Guerra-Guerrero *et al.*^[19] and Kim *et al.*^[20] The most common co-morbidity was hypertension (HTN) followed by diabetes. Hypertension being most common co morbidity could be due to the deterioration in kidney function leading to hypertension. This finding was in contrast to Kim *et al.*^[20] where diabetes was the most common followed by HTN.

Our results indicate that breathing training program can be successful in upgrading QOL of patients. This intervention helps in promoting relaxation to the body and mind, it provides a feeling of well-being, improves the normal physiological function of the body thus improving physical and mental health. The benefits of breathing exercises are well worth the effort and a person is less prone to health issues.

Breathing training program can be voluntarily incorporated by nurses into the charge of such suffering patients. Furthermore, this intervention can be a beneficial aid that any nurse or caregiver might utilize for the betterment of other patients. This intervention seems to give nurses a pathway to offer support to a vulnerable population. Nurses can promote QOL through patient education and planning programs such as breathing training programs.

Limitations of the study: Long term or continuing follow up is required to see total impact of breathing training program on QOL. The duration of the data collection was limited, therefore, generalization cannot be made from the findings out of the small study sample.

CONCLUSIONS

The study was aimed to assess or evaluate the effectiveness of a breathing training program on QOL in patients

Table 1: Sociodemographic and clinical profile of the individuals in both the groups (n=60)

Variables	Intervention group, n ₁ =30, f (%)	Control group, n ₂ =30, f (%)	P
Gender			
Male	15 (50.0)	21 (70.0)	0.11
Female	15 (50.0)	9 (30.0)	
Religion			
Hindu	23 (76.7)	16 (53.3)	0.06
Others (Sikh, Muslim, Buddhism)	7 (23.3)	14 (46.6)	
Marital status			
Ever married	29 (96.7)	30 (100.0)	0.60
Never married	1 (3.3)	0	
Educational status			
Illiterate	3 (10.0)	5 (16.7)	0.89
Primary	4 (13.3)	4 (13.3)	
Secondary	17 (56.7)	16 (53.3)	
Graduate or above	6 (20.0)	5 (16.7)	
Occupation			
Professional	5 (16.7)	7 (23.3)	0.10
Skilled worker	3 (10.0)	1 (3.3)	
Unskilled worker	2 (6.7)	10 (33.3)	
Homemaker	13 (43.3)	8 (26.7)	
Retired	4 (13.3)	3 (10.0)	
Others (unemployed, student)	3 (10.0)	1 (2.2)	
CKD stage			
Stage 3	21 (70.0)	25 (83.3)	0.22
Stage 4	9 (30.0)	5 (16.7)	
Types of comorbidities			
Hypertension	19 (51.4)	15 (39.5)	0.27
Diabetes mellitus	8 (21.6)	8 (21.1)	
No comorbidities	5 (13.5)	12 (31.5)	
Others (arthritis, cholelithiasis, hypothyroidism, CAD, benign prostatic hyperplasia)	5 (13.5)	3 (7.9)	
Age (years)*	52.06±6.97 (41-65)	51.83±10.27 (21-65)	0.91
Per capita income (monthly in Rs.)*	3322.2±2782.5 (5000-50,000)	4519.7±4530.17 (1000-17,500)	0.49
Duration of illness (months/years)*	2.89±2.41 (2-10)	4.07±2.99 (4-10)	0.09

*Mean±SD (range). CAD: Coronary artery disease, SD: Standard deviation

Table 2: Quality of life of the individuals as per kidney disease and quality of life questionnaire™-36 (n=60)

Scale (number of items in scale)	Intervention group		P	Control group		P
	Preintervention	Postintervention		Preintervention	Postintervention	
Symptom/problem list, mean±SD (range)	82.05±18.11 (25-100)	87.35±16.80 (25-100)	0.04	81.14±14.97 (43.18-100)	83.56±12.20 (56.82-100)	0.19
Effects of kidney disease, mean±SD (range)	89.48±11.06 (62.50-100)	91.88±11.65 (59.38-100)	0.29	85.10±15.46 (43.75-100)	84.79±14.97 (43.75-100)	0.86
Burden of kidney disease, mean±SD (range)	54.17±29.01 (0-100)	60.63±28.01 (6.25-100)	0.12	48.13±33.16 (0-100)	47.29±29.71 (0-100)	0.77
SF-12 Physical health composite, mean±SD (range)	42.76±7.79 (27.56-57.66)	43.92±6.57 (30.68-57.66)	0.04	38.71±7.73 (19.04-51.7)	39.16±7.32 (27.11-51.49)	0.71
SF-12 mental health composite, mean±SD (range)	43.51±7.12 (26.88-54.5)	44.16±7.74 (21.89-56.13)	0.66	38.29±8.96 (19.97-58.73)	37.40±8.93 (19.95-58.83)	0.49

SD: Standard deviation

with predialysis CKD. The study showed that as per KDQOL™-36, significant difference was noted between the intervention and control group. It is concluded that breathing training program is significantly effective in improving QOL in CKD patients.

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Table 3: Comparison of quality of life of the individuals as per kidney disease and quality of life questionnaire™ -36 in both the groups pre- and post-intervention (n=60)

Scale (number of items in scale)	Preintervention		P	Postintervention		P
	Intervention group	Control group		Intervention group	Control group	
Symptom/problem list, mean±SD (range)	82.05±18.11 (25-100)	81.14±14.97 (43.18-100)	0.83	87.35±16.80 (25-100)	83.56±12.20 (56.82-100)	0.32
Effects of kidney disease, mean±SD (range)	89.48±11.06 (62.50-100)	85.10±15.46 (43.75-100)	0.21	91.88±11.65 (59.38-100)	84.79±14.97 (43.75-100)	0.04
Burden of kidney disease, mean±SD (range)	54.17±29.01 (0-100)	48.13±33.16 (0-100)	0.45	60.63±28.01 (6.25-100)	47.29±29.71 (0-100)	0.07
SF-12 physical health composite, mean±SD (range)	42.76±7.79 (27.56-57.66)	38.71±7.73 (19.04-51.7)	0.05	43.92±6.57 (30.68-57.66)	39.16±7.32 (27.11-51.49)	0.01
SF-12 mental health composite, mean±SD (range)	43.51±7.12 (26.88-54.5)	38.29±8.96 (19.97-58.73)	0.01	44.16±7.74 (21.89-56.13)	37.40±8.93 (19.95-58.83)	0.003

SD: Standard deviation

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Conflicts of interest

There are no conflicts of interest.

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