



Feasibility and Effect of Yoga on the Quality of Life of Patients with Chronic Kidney Disease on Peritoneal Dialysis

Abstract

Background: Patient on Peritoneal dialysis (PD) have poor quality of life (QoL). Yoga can improve QoL in these patients. This study evaluated safety and feasibility of customized Yoga intervention in patients with continuous ambulatory peritoneal dialysis (CAPD) and assessed its impact on QoL. **Materials and Methods:** Ten patients on CAPD for at least three months participated in a three month customized yoga intervention delivered by certified yoga therapists thrice weekly. Qualitative data was gathered through in-depth interviews, pre and post-intervention. Thematic analysis was done to identify crucial issues, recurring issues, and commonly emerging topics. The QoL and caregiver burden were assessed by Kidney Disease Quality of Life Instrument–Short Form. (KDQOL-36) and Zarit Burden at the time of enrolment and after the completion of the intervention. **Results:** All ten patients completed the three month Yoga intervention uneventfully. There was no hospitalization, leak, or catheter malfunction. Thematic analysis of the in-depth interview before intervention revealed physical challenges (weakness, sleep problem, and pain), mental challenges (distress, negative thoughts, fear, and sadness). Thematic analysis of the post intervention in-depth interview revealed their experience with yoga and identified four subthemes including improved physical health, mental relaxation, positivity and barriers to Yoga practice. The mean KDQOL-36 score before and after yoga intervention were 67.4 ± 7.14 and 76.8 ± 5.18 ($p = 0.051$) while the mean Zarit Burden score was 17.5 ± 15.01 and 13.1 ± 12.31 ($p = 0.053$) respectively. **Conclusion:** This mixed-methods study provides preliminary evidence supporting the feasibility of yoga as an adjunct therapy for CKD patients on CAPD.

Keywords: CAPD, CKD, Mind body intervention, Peritoneal dialysis, Quality of life, Yoga

Introduction

Chronic kidney disease (CKD) patients undergoing dialysis face numerous physical, mental, and socio-economic challenges that significantly impact their quality of life (QoL) and treatment outcomes. Weakness, fatigue, and sleep disturbances lead to reduced mobility.¹ The chronic nature of the disease and demanding treatment regimen contribute to distress, anxiety, depression, and fear, worsening adherence to treatment and overall health.² Many patients become dependent on the family for care and face financial strain, exacerbating stress and limiting access to necessary treatments.³ These interconnected challenges create a feedback loop that can accelerate disease progression and complicate management.

With its holistic approach, yoga, a mind-body intervention (MBI) offers several

self-regulatory practices that can improve the QoL.⁴ Research over past decades has demonstrated relaxation and reduced stress levels with yoga practice. This is achieved through improved control of the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis.⁵ Multiple interventional studies have examined MBI and exercises' effects in patients with CKD on hemodialysis (HD),^{6,7} but patients on continuous ambulatory peritoneal dialysis (CAPD) have not received much attention. Patients on CAPD do not have to visit the nephrology clinic as frequently as HD patients. So, they are less likely to enroll and participate in exercise or MBI-based studies. Additionally, since CAPD patients can be taken care of at home, they tend to be socially and physically isolated and limit their interactions to clinical and

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rehabilitation staff and other patients, reducing group involvement.^{8,6} Despite the growing interest in potential benefits of Yoga for patients with CKD, gaps in evidence remain with the need for feasibility testing. This study used mixed methods to observe and evaluate the efficacy and feasibility of thrice-weekly yoga intervention in patients on CAPD. It assessed and compared their QoL.

Materials and Methods

The study used qualitative and quantitative approaches with a convergent parallel design. Patients on CAPD for at least 3 months visiting OPD of AIIMS Raipur between 30/06/2022 to 06/11/2023 were approached for participation. Patients with prior yoga experience, hemoglobin levels below 8 gm/dl, blood pressure above 160/100 mm Hg, physical disability, heart failure, abdominal hernia, and other comorbidities like chronic liver disease and chronic obstructive pulmonary disease (COPD) were excluded.

The demographic, clinical, and laboratory data, including CAPD duration, hemoglobin values, and BMI were recorded using interviews and reviewing medical records at enrollment.

Written informed consent was sought to record the interview and ethical approval was obtained. The participants were informed about respondent confidentiality. The study investigator briefed the participants on the purpose of the interview. The discussion topics were simple, easy to understand, and open-ended. Each interview was conducted with a moderator and a note-taker, lasting 30-45 minutes. Open-ended questions asked during the in-depth interview have been given in Supplementary Table 1. All the conversations were audio-taped, and note-takers noted them for ease of reference. The interview was conducted at baseline and at the end of the intervention.

A translated and validated Hindi version of the Kidney Disease Quality of Life Instrument–Short Form (KDQOL-36),⁹ developed by RAND Healthcare was used to assess the QoL. The Zarit Burden Interview was administered to evaluate caregiver^{10,11} burden. These scales were administered at enrollment and upon intervention completion.

A customized yoga module [Supplementary File-1] specially designed for patients with CKD was taught three days a week for three months by professionals. The 35 minute Yoga module included *Sookshma Vyayama* (Loosening exercises), *Asanas* (Yoga Poses), *Pranayamas* (Breathing exercises), and *Shavasana* (Audio guided meditation). The Yoga module was designed to avoid discomfort and pressure on the abdominal cavity. The Yoga sessions were held online/offline for two weeks followed by telephonic follow ups to check compliance.

Data analysis

Each recorded interview was transcribed verbatim, translated into English (where necessary), and stored in Microsoft Word format. The pre- and post-interviews were analyzed separately using thematic analysis principles for crucial issues, recurring issues, and commonly emerging topics to identify patterns. Each item was coded, and a deductive coding scheme was developed for compiling and grouping information from various interviews. The coding and charting steps were done using NVIVO 10 (QSR International, Melbourne, Victoria), a qualitative data analysis software. A reflexive thematic analysis was conducted on the qualitative interview data, following the steps outlined by Braun and Clarke.¹²

The quantitative data were expressed as mean (SD) or median (IQR) and pre- and post-intervention scores were compared using paired t-tests.

Results

This study screened 25 patients. Patients were excluded due to prior yoga experience (2), hemoglobin levels <8 mg/dl (4), uncontrolled hypertension (3), physical disabilities (2), and recurrent admissions for heart failure (2). Two patients denied consent. Ten patients completed the study. The mean age was 48.9 ± 15.83 (range 26-71) years. Four (40%) were females. Two patients had primary education, while four were postgraduates. Kidney disease was due to diabetic nephropathy in five patients and chronic glomerulonephritis (CGN) in three. The median CAPD duration was 7 (IQR: 5.5-12) months [Table 1]. All ten patients completed the Yoga intervention uneventfully.

Pre- and post-intervention qualitative analysis revealed three major themes [Supplementary Figure 1].

Challenges with CKD

Physical challenges: The first domain pertaining to physical health included three sub-domains [Figure 1a]: Weakness, Sleep problems and Pains highlighted by the following statements:

“Now I have weakness due to which I cant go to market for buying vegetables, There was a wedding at my house and I felt very tired while shopping” [A 40-year-old female with CKD due to Lupus Nephritis on CAPD for seven months]

“Yes, I sleep less now, sometimes till 1 AM in the night without sleep, it is inconsistent, sometimes I fall asleep by 10 PM but most of the times by 12 or 1 AM and I wake up by 5 AM” [A 59-year-old female with CKD due to Diabetic Nephropathy on CAPD for four months]

“I don’t have much problems, but I have this persistant pain in my hands and legs, and I ask my wife everynight to give a massage, only then I can sleep at night” [A 62-year-old diabetic male on CAPD for six months]

Table 1: Demographic profile

Sex	
Male	6
Female	4
Place	
Urban	3
Rural	7
Education level	
Primary education	2
High school	2
Graduate	4
Postgraduate	2
Age (years)	48.9 ± 15.83 (26, 71)
Duration of CKD (in months)	24.9 ± 15.8
Duration of CAPD (in months)	7 (IQR: 5.5-12)
Hemoglobin (g/dL)	8.37 (11.8-6.9)
Body mass index (kg/m ²)	25.3 (31.6-20.9)
Etiology of kidney disease	
Chronic glomerulonephritis	3
Diabetic nephropathy	5
CKD of unknown origin	2

Mental challenges: The second domain pertaining to mental health included four sub-domains: Distress, Negative thoughts, Fear, and Sadness. This are highlighted by following statements from participants:

"I get stressed, like the work that I used to do earlier, I am not able to do it now, in fact I am not able to do puja and rituals. My husband and son tell me not to eat too much salt. Yesterday my son helped me with my peritoneal dialysis four times, I felt like why are you bothering me so much, go away for a while. A lot of money has been spent on my dialysis. I feel have lived my life and its enough" [A 59-year-old female with CKD due to Diabetic Nephropathy on CAPD for four months]

"Some times I feel why things happen like this, like the otherday I was thinking oh! this shouldn't have happened, how and why did this happen to me" [A 35-year-old female with CGN on CAPD for four months]

Socio-economic challenges: The third domain pertaining to socio-economic changes included three sub-domains: family dependency, financial crisis, and difficulty in socialization.

"My mother-in-law is aged sixty plus, now my health is not very good, she is with me, all of us are together, sometimes I have to work in the kitchen alone, as of now she is helping, sometimes when I face any problem, she has to bear the burden" [A 40-year-old female with CKD due to Lupus Nephritis on CAPD for seven months]

"There is definitely some financial proble. We are middle class people, It costs about ten to fourteen thousand rupees every month on my health, some part of it is covered by Ayushman card, but it is becoming a bit difficult to spend

about eight thousand rupees every month, but now that the disease is inevitable, we have to arrange for it in some way or the other" [A 62-year-old diabetic male on CAPD for six months]

"Lot has changed in the sense, the interactions which I had earlier with people has reduced, My visits to other people and relatives has reduced, there is nothing much, rest of the things are normal, I mostly stay at home, and there is less going outside" [A 26-year-old male with CGN on CAPD for six months]

Patient experience and compliance to Yoga

The fourth domain identified pertaining to patient experience and compliance to Yoga and included four sub-domains: improved physical health, mental relaxation, positivity, and barriers in Yoga practice [Figure 1b].

"Its been three months now and I am doing Yoga regularly, I used to have stomach related issues, which has improved as compared to before. I did not have much stamina, there is a difference now, body pain has reduced a bit. When I do standing postures with much ease, before I used to get a little pain in the chest sometimes and there used to be little breathing difficulties, but by continuing doing Yoga, there is relief in that" [A 40-year-old female with CKD due to Lupus Nephritis on CAPD for seven months]

After doing yoga nidra, when I wake up, I feel good, my mind is fresh, I feel good" [A 71-year-old with CKD on CAPD for twelve months]

"I mean earlier I used to be very negative, I used to get angry a lot, now I am a little normal. I mean yoga is very

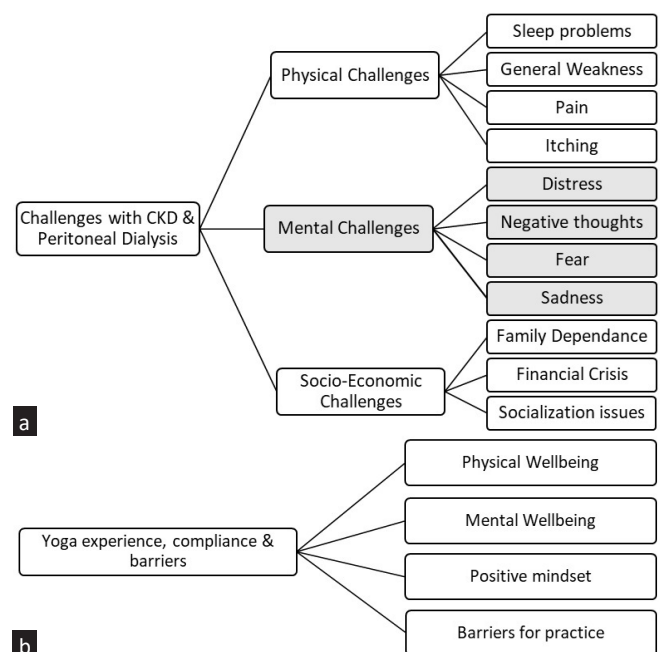


Figure 1: Themes of In-depth interview (a) Pre-intervention, (b) Post yoga intervention.

good for health, it makes a lot of difference [A 62-year-old diabetic male on CAPD for six months]

"These days my health gets upset often or I have pain in hands and legs or I get cold and cough, so I skip the Yoga practice due to that, otherwise I do it almost regularly" [A 67-year-old diabetic male on CAPD for four months]

The mean KDQoL-36 score before and after the intervention were 67.4 ± 7.14 and 76.8 ± 5.18 ($p = 0.051$) while the mean Zarit Burden score was 17.5 ± 15.01 and 13.1 ± 12.31 ($p = 0.053$), respectively [Supplementary Table 2].

Discussion

The new International Society for Peritoneal Dialysis (ISPD) guidelines have highlighted the importance of physical activity and exercise in patients undergoing CAPD. They also showed low-quality evidence backing the various recommendations in the guidelines.^{13,14} CAPD patients are often discouraged from participating in exercise programs because of perceived barriers, uncertainty about the best exercise regimen, fear of damage to the catheter, leak, and intraabdominal pressure.

While regular exercise is known to support physical and nutritional health in patients with CKD, Yoga's gentle movements, mindfulness, and stress reduction can further enhance outcomes by addressing both physical and psychological aspects. However, postures that increase intra-abdominal pressure may not be suitable for patients on CAPD. Considering the unique physiology of patients on CAPD, a group of Yoga experts developed a protocol [Supplementary File 1]. This mixed-method study highlighted the feasibility of the Yoga protocol and shed light on yoga as an adjunct therapy for patients on CAPD. The three-month protocol was well tolerated. There was no hospitalization, leak, or catheter malfunction. The yoga intervention was delivered both online and offline, and it was followed up telephonically to ensure compliance. Online sessions by trained Yoga therapists can be a good alternative for patients on CAPD as they are not required to visit dialysis centers like patients on HD.

The KDQoL scores showed some improvements, but qualitative insights revealed subjective benefits from the Yoga intervention including improved physical health, mental relaxation, and emotional positivity. This underscores the value of integrating quantitative and qualitative approaches to capture Yoga's nuanced impact. The qualitative component provided deeper insights into patients' experiences and perceptions of the disease and yoga intervention. Pre-intervention interviews highlighted significant physical, mental, and socio-economic challenges, including weakness, sadness, and financial strain. Post-intervention, patients reported improved physical health, mental relaxation, and increased positivity. However, barriers to consistent yoga practice, such as time constraints and physical discomfort, were also noted.

Qualitative and quantitative data integration provides a comprehensive understanding of yoga's impact on patients with CKD undergoing CAPD. While quantitative data shows the assessment of specific outcomes, qualitative data shows patients' experiences and perceptions. Together, these findings underscore the potential benefits of integrating yoga into the holistic care of patients with CKD, while also highlighting the need for tailored interventions and ongoing support to address individual barriers and preferences.

The main limitation was the small sample size, which was unable to generate ample quantitative data. Additionally, the intervention's short duration and follow-up period may not capture long-term effects. Future research could explore larger, multicenter studies with longer follow-up periods to validate these findings and assess sustainability.

This mixed-methods study provides preliminary evidence supporting the feasibility and potential benefits of yoga as an adjunct therapy for patients with CKD on CAPD.

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