

# Adherence to the Exercise Program In Patients with Chronic Kidney Disease (CKD) Undergoing Haemodialysis at a Tertiary Hospital

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## Research

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# Abstract

**Background :** Chronic kidney disease (CKD) is considered as one of the current public health problem, associated with increased mortality rates. People with CKD have a greater chance of having a decreased function and quality of life (QoL). It's important to keep one active and healthy at the same time encourage and incorporate exercises and physical activity.

**Methods:** The objectives are to evaluate the adherence to exercise programme by patients diagnosed with CKD undergoing dialysis and to identify potential barriers to patient adherence to exercise program. The observational study was carried out in a tertiary hospital at dialysis unit. Total 42 patients undergoing dialysis as outpatients in a tertiary hospital completed the study. The baseline outcome measures of joint range of motion and maximum repetition rate (MRR) testing selected muscles were checked. Strengthening exercises for using resistance band were carried out during haemodialysis and a home exercise program (HEP) was taught to the patients to be followed on the remaining five days of the week. At the end of three months, adherence to the exercise was evaluated through questionnaire.

**Results:** At the end of 12 weeks 52% adhered to exercises during dialysis and 48% at Home Exercise Program (HEP)

**Conclusions:** Adherence to strengthening exercise programme in patients undergoing haemodialysis as out-patients in a tertiary hospital is average. It is clinically essential to take the adherence in to consideration while prescribing exercise program in patients undergoing dialysis.

## Background:

Chronic kidney disease (CKD) is recognized as one of the current health problem. It progresses to end-stage renal disease (ESRD) and cardiorespiratory disease thus decreasing the quality of life and function<sup>1</sup>. There has been an increased mortality rates in the patients diagnosed with CKD, with associated complications pertaining to diabetes, hypertension, mineral bone disorders having an increased mortality rates. The cardiovascular risks related with ESRD have been well established and account to the mortality<sup>2</sup>. Deaths found due to cardio vascular disease (CVD) in those on dialysis is found to be increased, thus showing a relationship between the renal disease and cardiovascular events. The mortality in ESRD with cardiovascular disease is higher when compared with the healthy individuals<sup>3</sup>. The disease is found to be associated with greater health- related expenditures, and decrease the health related quality of life (HRQoL). There has been noted decrease in the functional status in patients with ESRD setting a greater demand for activities of daily living (ADL)<sup>4</sup>. Patients with CKD are often overlooked when it comes to exercise programs<sup>5</sup>. Physical inactivity also shows significant reduction in ADL and HRQoL.

Adherence is defined as “the extent to which a person’s behavior corresponds with agreed recommendations from a health care provider” and is considered to be an important prerequisite for the

success of exercise programs for musculoskeletal disorders<sup>6</sup>. Patients who adhere to regular exercise programs are less likely to progress to recurrent musculoskeletal problems and reduce the risk of illness. It promotes functional ability and may improve the quality of life.

Regular physical activity plays an important role in the prevention of chronic diseases; it can prevent and reduce the risk of complication of chronic diseases. Exercises and physical activity has benefitted to improve the HRQoL in people with Ischemic heart disease, hypertension, CKD and diabetes. By enhancing the strength of the muscles, bones, and joints through exercising, people with CKD can improve their balance and coordination. Increasing the physical activity levels of individuals with CKD, it is possible to decrease their risk of CVD and improve their physical functioning, thus preventing premature death.

In spite of the benefits of exercise, patients are not exposed to the exercise regime during haemodialysis or at home. In spite of the decreased physical activity levels among the CKD, the prescription of exercise for CKD patients undergoing dialysis is lesser than normally compared with prescribed exercise for other chronic diseases. Moreover, exercise can improve the strength and aerobic capacity. In view of the noted benefits of physical activity, the exercise is considered as a major component of renal rehabilitation<sup>7</sup>.

Another notable factor to be considered in administering a resisted exercise programme for patients with CKD is evaluating the adherence to the exercise programme. Studies have shown that non adherence can also be another remarkable factor which leads to faulty decision making by the physiotherapist on the outcome of the therapy. Adherence to exercise programme is enhanced by family support, goal setting and guidance from healthcare professionals, facilities to perform exercise, enjoyment and social interaction<sup>8</sup>.

The lack of awareness among the population and few evident studies in Indian population has made less use of the exercise guidelines for patients with CKD. Barriers to exercise during hemodialysis have been reported by the patients, staff and nephrologist, some which can be modified<sup>9</sup>. Some of the factors leading to lesser participation by the haemodialysis patients are the patient's reluctance in understanding that the exercise can alleviate the symptoms, lack of motivation, frequent hospitalizations and time<sup>10,11</sup>. Hence, there is a need to check the adherence to exercise programme in the Indian population.

## **Methods:**

This observational study aims to evaluate the adherence to exercise programme during dialysis and at home by patients diagnosed with CKD undergoing dialysis and to identify potential barriers to patient adherence. The study was a part of the interventional study which included a structured exercise program developed with considering clinical practice guidelines for patients with CKD undergoing dialysis. The exercise program was tested through a pilot study and exercise modification was carried out substantially. In spite of the benefits and acceptance by the patients, there was a need to find out the adherence by the patients to these exercises, this study was conducted in a tertiary super speciality hospital in Mysore, India with full-fledged dialysis unit and a physiotherapy department.

A total of 48 patients undergoing dialysis as outpatients in a tertiary hospital, who were willing to actively participate were recruited for the study by convenience sampling for the duration of three months. Written informed consent was obtained from the participants and verbal informed consent from the non-participants, for their contribution in data recording at home. Ethical clearance approval from the institutional ethical committee of the medical college and hospital and permission from the hospital authorities were obtained prior to the commencement of this study.

Subjects diagnosed with Chronic Kidney Disease (CKD) undergoing haemodialysis as outpatients at a tertiary hospital were included. The patients underwent dialysis for three days in week on alternative days as outpatient. Most of the patients were accompanied by their spouse or relatives. The procedure was explained to the patient and the attendant. The importance of exercises was explained and consent obtained for their participation. The recruited patients were screened for their participation in the exercise program and recent fractures of extremities, neurologically unstable, psychologically unstable and cognitive impairment were excluded for this study.

The baseline outcome measures included the range of motion of all joints of both upper and lower limbs, Strength of biceps, triceps, quadriceps, hamstrings, abductors and adductors of hip were checked by maximum repetition rate (MRR) testing using appropriate coloured theraband. The exercises included in the intervention programme were warm up, stretching exercises, strengthening exercises for the upper limb and lower limb musculature using resistance bands of various resistance marked by its colors and aerobic exercise using pedo-cycle. The resistance color was selected based on the MRR. The duration of pedo cycle exercises were based on the heart rate monitored during dialysis, and the discomfort response by the patients. All these exercises were carried out during haemodialysis through a structured exercise protocol, which was tailored, based on the baseline evaluation. A structured home exercise program (HEP) was prescribed and taught to the patients to be followed on the remaining five days of the week in which period they did not undergo dialysis. The HEP was administered with an exercise booklet, which had description of exercise parameters and diagrams. A patient diary was maintained by the treating physiotherapist on the active days the patients underwent the exercise programme, as well as the number of days that they performed the home exercise programme (HEP). At the end of three months, adherence to the exercise was evaluated through a standard questionnaire which contained observational check list of adherence to exercise. The adherence to all the exercises taught during haemodialysis and at home was checked at every visit through patient diary. Adherence is enhanced by collective training and an encouragement environment adopted during the dialysis<sup>12</sup> and needs multiple measurements like attendance, intensity, and duration<sup>13</sup>. In this study the adherence to the exercise program is defined with respect to the attendance, the number of subjects who were able to cope up and complete the study. The attendance was measured through percentile and the barriers were noted through statement of problems reported by the patient and their attenders.

## Results:

Forty two patients undergoing dialysis as outpatients in the hospital consented to participate in the study, of which 35 were men and 7 were women, with a mean age of 47 (SD  $\pm$  12) for men and 43(SD  $\pm$  11) for women. The patients' progress data recorded in the formulated diary yielded the number of patients who performed the exercise programme during dialysis and the home exercise programme. The adherence to exercise during haemodialysis is shown graphically in Fig. 1. The exercise adherence percentile at first two weeks both during dialysis and HEP were 100%, after 3rd week both the exercise during haemodialysis and at HEP showed a decline in adherence, but HEP showed a drastic decline from 100–67% in fifth week (Fig. 2). At the end of 12 weeks 52% adhered to exercises during dialysis and 48% at HEP. The questionnaire analyzed reported lack of interest and decrease motivation among the participants, with other reasons of hospitalization, surgeries and feeling sick.

## **Discussion:**

The present study was aimed at finding out whether the patients undergoing dialysis as out-patients were performing the prescribed and taught exercise programme during dialysis as well as at home, as HEP. As evident from the results, only 52% of patients who enrolled for the study completed the prescribed set of exercises to be done during dialysis as well as at home as HEP. Nearly half the patients (48%) did not adhere to the exercise programme for the entire duration of 3 months, and there was a drastic decline in adherence to both the HEP as well as during dialysis and only 48% performed the HEP for the entire period of 3 months. Based on the study on adherence by A. Williams' et al showed that patients on dialysis for less than 2 years showed higher adherence rates when compared to dialysis for more than 6 years, the reasons stated was feeling sick, hospitalization, surgeries and decrease in motivation. In relationship to the study, majority of the patients reported lack of motivation to perform the exercises on a regular basis, as reported in the questionnaire. It could be stated that due to hospitalization and sickly feeling, and despite assisted help in the hospital, the participants in this study reported lack of interest to perform the exercise. This could be one of the many reasons to the decreased motivation to perform home exercise program. Adherence to the exercise programme, both HEP and during dialysis was 52% and 48%, indicating that adherence to the exercises by patients with CKD is average. This is despite the fact that there is a lack of strength of muscles and endurance is poor, contributing to a decrease in quality of life and increased morbidity and mortality rates in patients undergoing dialysis. Hence, measures to increase motivation levels in patients undergoing dialysis to perform exercises on a regular basis, both during dialysis and as HEP, need to be taken; this can enable to improve the quality of life by improving strength and endurance, thereby improving flexibility and reducing dependence, and decrease the mortality and morbidity rates among patients with CKD. Exercise prescription to CKD patients should be examined with determination of motivational factor into consideration. A special care to include counseling on exercise is needed to improve the adherence rate.

## **Conclusion:**

Adherence to exercise during dialysis and to HEP was 52% and 48% respectively; indicating that adherence to exercises by patients with CKD was moderate. The study concludes that the factors having an impact on adherence have to be addressed as a multidisciplinary team. The clinical implication includes the adherence to exercise may be an indicator to plan appropriate and safe exercise intervention to improve patient's quality of life (QOL). It's essential to consider the patients adherence while prescribing any new exercise program in patients undergoing dialysis.

## **Abbreviations:**

CKD - Chronic kidney disease

QoL - Quality of life

MRR - Maximum repetition rate

HEP - Home exercise program

ESRD - End-stage renal disease

HRQoL - Health related quality of life

ADL - Activities of daily living

CVD - Cardio vascular disease

SD - Standard deviation

## **Declarations:**

### **Ethics approval and consent to participate**

The project "role of exercise on fatigue in patients undergoing haemodialysis as outpatients in a tertiary hospital" has been cleared and approved by the Institutional Ethical Committee of JSS Medical College, JSSAHER, formerly and JSS University, with reference no 29/2007/2017-18.

Please Note: This study is a part of the project titled as given above.

### **Consent for publication**

Written consent was obtained from the participants, which included the details related for the publication.

### **Availability of data and materials**

- The datasets generated during and/or analysed during the current study are not publicly available and are available from the corresponding author on reasonable request.

## Competing interests

The author(s) declare(s) that they have no competing interests

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This study is not in receipt of any research funding.

## Authors' contributions

VSR framed the Conception, Analysis, design, interpretation of data and revised the work substantively with contribution in revision of manuscript.

PVM analysed and collected patient data for analysis also supervised the study and contributed in writing the manuscript.

MSS referred patients after inclusion and exclusion criterion and supervised and validated the study.

All authors read and approved the final manuscript."

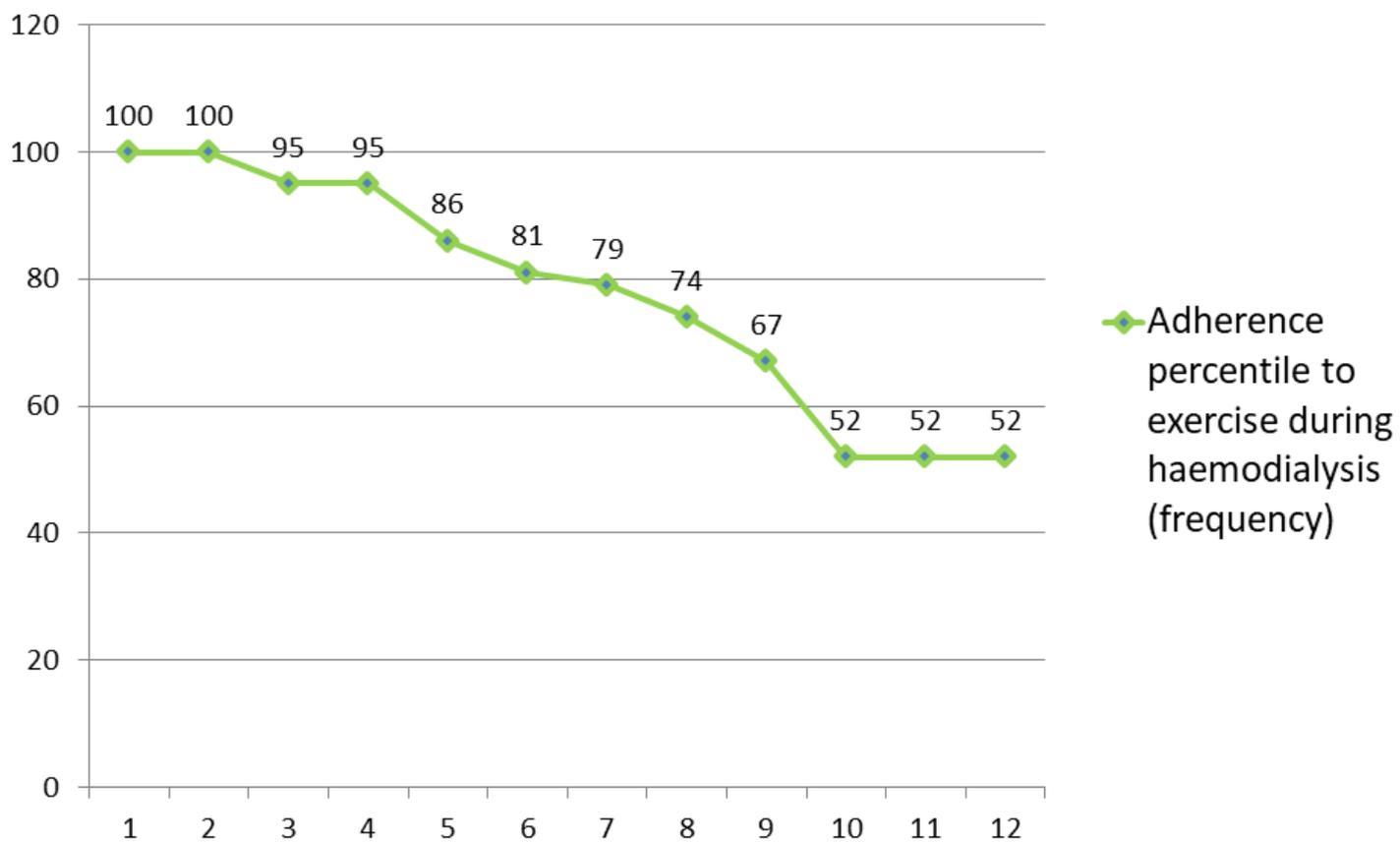
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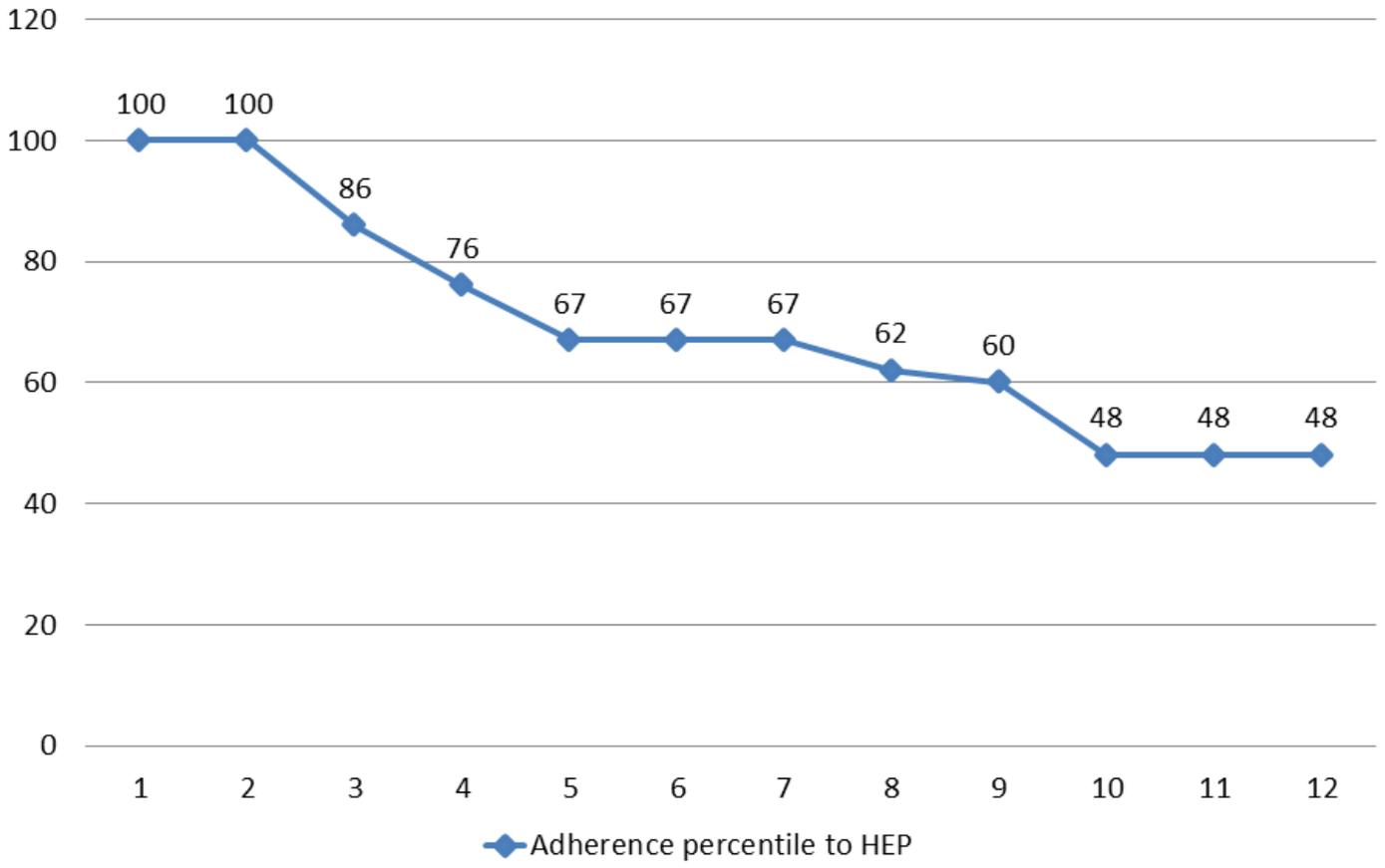
## Figures



Week	1	2	3	4	5	6	7	8	9	10	11	12
Attendance During dialysis	42	42	40	40	36	34	33	31	28	22	22	22

**Figure 1**

Adherence to exercise during haemodialysis.



Week	1	2	3	4	5	6	7	8	9	10	11	12
HEP Adherence	42	42	36	32	28	28	28	26	25	20	20	20

**Figure 2**

Adherence to exercise during Home Exercise Program (HEP)