

## Severity of Muscle Cramps in Hemodialysis: A Pre-Intervention Study from Solapur, Maharashtra

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### Abstract

### Original Research Article

**Background:** Muscle cramps occurring during dialysis sessions can lead to discomfort, dialysis sessions being stopped early, and dialysis sessions being less effective. Measuring the baseline severity can help with the appropriate planning of coping mechanisms. **Objective:** To measure the severity of muscle cramps before any coping techniques involving leg exercises and any demographic associations with this in dialysis patients in Solapur, Maharashtra. **Method:** This was a cross-sectional descriptive study of purposively selected patients on maintenance dialysis. The sample consisted of 60 patients who completed a demographic form and the Visual Analog Scale (VAS). Descriptive statistics were used, and the Chi-square test was used to test statistical significance. **Results:** The most common level of severity reported was Moderate (46.7%), with Severe (30%) as the next highest. The age and length of time on dialysis were the only significant associations with severity, while there was no association with gender. **Conclusion:** Muscle cramps are a common occurrence in hemodialysis, and in the majority of cases, their severity is Moderate to Severe. This is why baseline assessments of the severity of muscle cramps are important to help plan for the leg exercises as well as to individualize care for the patient.

**Keywords:** Pretest Assessment, Leg Exercise Intervention, Demographics, Muscle Cramp Severity Dialysis, Hemodialysis Patients.

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## 1: INTRODUCTION

### Background of the Study

For patients with end-stage renal disease, life-sustaining therapy is hemodialysis, which is concerned with removing extra fluids or toxins from the body when the kidneys fail to function. Although it is an indispensable hemodialysis, it comes with many issues. Patients experience hypotension, nausea, and vomiting, as well as headaches and muscle cramps, during the dialytic process. Muscle cramps are the most disruptive of the issues as it involves painful spasms of the muscle, especially in the lower limbs. These cramps can interrupt dialytic sessions, force early termination of the sessions, and negatively impact the adequacy of the treatment. Muscle cramps are a global issue, as 30-60% of hemodialysis patients are documented to experience them, and Indian studies prove it to be even more prevalent, possibly due to the differing diet, fluid management, and dialysis methods.

The recurrent cramps not only impact the physical body, it demonstrates a psychological impact,

especially with the increase in anxiety levels and the decrease in patients coming in for dialysis sessions.

### Significance of the Problem

Due to today's lifestyle changes, diabetes and hypertension, chronic kidney disease (CKD) is becoming more prevalent in India. With increasing numbers of patients requiring dialysis, the intradialytic complications have concerned clinicians. Muscle cramps are a top cause for dissatisfaction and noncompliance with dialysis treatment.

For patients in regions such as Solapur, Maharashtra, which lack comprehensive tertiary healthcare systems, cramps are a major hindrance to effective dialysis. They reduce patients' tolerance to dialysis, impede the removal of toxins, and increase the risk of adverse health outcomes. Moreover, it is imperative to solve this problem to improve the health outcomes of patients and to promote compliance with the dialysis regimen.

### Study Rationale

To date, research has investigated the use of pharmacological therapies and exercise interventions. However, little attention has been paid to the Indian context concerning the assessment of the severity of muscle cramps in a baseline context before the implementation of any interventions. Because of this, the efficacy of treatment has been grossly underestimated. In this context, the present study seeks to address this gap by evaluating the severity of muscle cramps in patients who are undertaking hemodialysis in Solapur before the implementation of a specific intervention, which consists of leg exercises.

### Objectives of the Study

1. To assess the pretest severity of muscle cramps among patients undergoing hemodialysis.
2. To analyze associations between the severity of muscle cramps and demographic variables such as age, gender, and duration of dialysis.

### Research Questions

- What is the severity of muscle cramps among patients undergoing hemodialysis before leg exercises?
- Is there an association between pre-intervention severity of muscle cramps and demographic variables?

### Scope of the Study

The study pertained to hospitals in Solapur, Maharashtra, and was based solely on the absence of any immediate interventions during the pretest severity assessments in order to establish the baseline understanding of the problem. The scope was restricted to adult patients undergoing maintenance hemodialysis for a duration of three months. The results will lay the groundwork for future interventional studies, particularly those involving submaximal leg exercises as a means of non-pharmacological management.

## 2: REVIEW OF LITERATURE

The existing literature details the frequency, intensity, underlying causes, and potential solutions to the issue of muscle cramps in patients undergoing hemodialysis. Indian researchers have made more efforts in recent years to assess the baseline severity and non-pharmacological approaches, such as the implementation of leg exercises. This review is divided into four sections: muscle cramp frequency, tools for assessing the severity of cramps, exercise as a treatment, and the relationship between muscle cramps and various demographic factors.

### 2.1 The Frequency of Muscle Cramps in Patients Undergoing Hemodialysis

Among the common intradialytic complications, muscle cramps are some of the most frequently reported. The discomfort is caused by the abrupt changes in fluids and electrolytes during the process of dialysis. Compared to Western developed

countries, the prevalence in India is likely to be more due to variations in diet, practice of fluid restriction, and dialysis adequacy.

- According to Manisha, Khan, & Kaul (2023), nearly 70% of patients in the city of Mohali have experienced cramps during their dialysis sessions, and more than half of these episodes happen in the lower limbs.
- As noted by Singh and Mehta (2021), the occurrence of cramps in the Punjabi region was described to be especially prevalent amongst the elderly and those who have been on dialysis for long periods of time.
- In the case of Patil and Jadhav (2020), for the state of Maharashtra, the authors wished to pinpoint the intradialytic complications, which are, amongst others, cramps, systematically underscored, the common occurrence of which is indicative of the necessity for a structured approach.

These studies corroborate the fact that the occurrence of cramps is a widespread problem in Indian dialysis centers, resulting in poor adherence to treatments and discomfort to the patients.

### 2.2 Cramps Assessment

The assessment of the severity of the cramps is of utmost importance to appreciate the extent of suffering caused by the cramps and to determine the effectiveness of various measures. The most common methods to determine the level of pain are the VAS and the NRS.

- Suyampirakasam *et al.* (2022) stated that the severity of pain, which can negatively affect the patient, is usually related to electrolyte imbalance and the duration of dialysis and, as a result, stresses the importance of using an appropriate standardized scale to capture the true magnitude of the problem.
- Rema, Anil, and Vaishnav (2022) established that within the context of an experiment where leg exercises were to be implemented, the severity assessment should be conducted, as it presents a point of comparison for measuring the impact of the intervention.

In India, studies have been done about pretest severity, but none have been done systematically, emphasizing the importance of studies about baseline assessments.

### 2.3 Effectiveness of Exercise Interventions

Leg exercises, among other non-pharmacological approaches, have been used to alleviate muscle cramping. It has been shown that exercises used to strengthen and/or stretch muscles improve the blood circulation to the area and, thus, decrease the incidence of painful muscle spasms.

- In the case of Ram and Dutta (2021) for Assam, it was substantiated that stretched intradialytic muscle exercises led to a palpable increase in muscle spasms, in which case the determination of baseline muscle condition was important in determining the result of the exercise.
- In a case study in Dehradun conducted by Rashmi *et al.* (2022), it was shown that a set of leg exercises increased the comfort of a patient and decreased the incidence of muscle cramps, which in turn confirmed that the exercise program can be included in the course of dialysis treatment.

There is a potential in what exercise programs can do, but in these studies, the importance of analyzing baseline levels of the outcome in exercise programs is emphasized.

#### 2.4 Association with Demographic Variables

There is a correlation of muscle cramping with various demographic variables, for example, age, sex, and length of dialysis.

- In the study by Singh and Mehta (2021), it was noted that older age participants had a greater incidence of severe muscle cramping, which may be attributed to the lack of stretchability of the muscle in the older age participants and the presence of other coexisting diseases.
- In the study by Patil and Jadhav (2020), it was found that the length of the dialysis treatment was directly proportional to the severity of the muscle cramping, which indicates the cumulative physiological stress.
- Suyampirakasam *et al.* (2022) showed that severity was also affected by fluid management practices and electrolyte imbalances. This showed that demographic and clinical variables need to be examined together.

These findings show that demographic variables are equally important and help determine baseline cramp severity.

#### 2.5 Summary of Literature Review

The studies reviewed show:

- Continuous muscle cramps affect Indian hemodialysis patients.
- Leg exercises are useful non-pharmacological interventions.
- Assessment of severity should use validated tools.
- There is a strong correlation between demographic variables (severity, age, duration of dialysis).

There is a lack of research that has been done on the pretest severity of studies of this nature. This research is

appropriate for the study that has been done in Solapur, Maharashtra.

### 3: METHODOLOGY

#### 3.1 Research Design

The study employed a descriptive quantitative methodology to evaluate the severity of muscle cramps in hemodialysis patients. This approach was optimal as it captures the problem systematically and does not require the introduction of variables or interventions, thereby capturing the clearest picture of the pretest severity.

#### 3.2 Study Setting

The study was conducted in the dialysis units of various hospitals in the city of Solapur, Maharashtra, which has a large share of the population of patients suffering from End Stage Renal Disease (ESRD). Solapur was selected due to its increasing dialysis patient population and scant published literature on the intradialytic complications in the study area.

#### 3.3 Target Population

The target population was comprised of end-stage renal disease (ESRD) patients on maintenance hemodialysis. This population was targeted because of their vulnerability to intradialytic complications, including muscle cramps.

#### 3.4 Sample Size and Sampling Method

A total of 60 patients were selected as a study sample through purposive sampling, which was the ideal sampling technique for this study as it targeted patients who experienced muscle cramps during the dialysis sessions.

#### 3.5 Inclusion Criteria

- Patients aged 18 years and above
- Patients who have been on hemodialysis for a minimum of three months.
- Patients who experienced muscle cramps during dialysis.

#### 3.6 Exclusion Criteria

- Patients suffering from neurological or musculoskeletal disorders not related to dialysis.
- Patients who have a serious illness or whose clinical condition is unstable.

#### 3.7 Data Collection Tools

- Demographic Proforma: records age, gender, duration of dialysis, and other personal details.
- Visual Analog Scale (VAS): records the severity of cramps on an increasing scale of 0 – 10, where 0 means no pain, and 10 means the worst possible pain.

#### 3.8 Data Collection Procedure

- Clearance was obtained from the ethics committee. Patients were approached during dialysis sessions, consent was obtained, and the severity of the cramps was evaluated by the VAS Scale.

### 3.9 Data Collection

- Descriptive statistics and inferential statistics using the descriptive statistics (frequency, percentage, mean, and standard deviation) and the inferential statistics (Chi-square test) to test

the hypotheses were used to assess the relationship between the severity of the pain and the demographic variables.

### 3.10 Ethical Issues

Ensured confidentiality, the participation was voluntary, and the patient was informed that participation would not cause any harm.

## 4: RESULTS AND FINDINGS

### 4.1 Demographic Characteristics

**Table 1: Demographic Characteristics of Hemodialysis Patients (N=60)**

Variable	Category	Frequency	Percentage
Age	18–40 years	12	20.0
	41–60 years	28	46.7
	>60 years	20	33.3
Gender	Male	38	63.3
	Female	22	36.7
Duration of Dialysis		10	16.7
	6–12 months	18	30.0
	>12 months	32	53.3

### 4.2 Pretest Severity of Muscle Cramps

**Table 2: Pretest Severity of Muscle Cramps (N=60)**

Severity	Frequency	Percentage
Mild	14	23.3
Moderate	28	46.7
Severe	18	30.0

### 4.3 Association Between Severity and Demographic Variables

**Table 3: Association Between Severity and Demographic Variables (N=60)**

Variable	$\chi^2$ Value	df	p-value	Significance
Age	6.24	2	0.044	Significant
Gender	1.12	1	0.290	Not Significant
Duration of Dialysis	8.56	2	0.014	Significant

### 4.4 Summary of Findings

- While moderate severity is the most common at (46.7%), severe cramps followed closely behind at (30%).
- Severity was significantly associated with age and duration of dialysis.
- There was no significant association with gender.
- Cramps are a common and distressing complication among hemodialysis patients in Solapur. This study confirms previous findings.
- The most common occurrence (46.7%) was moderate severity, while severe cramps were noted at (30%).
- Severity was significantly associated with age and duration of dialysis.
- There was no significant association with gender.

- Remaining findings confirm that, among patients on hemodialysis in Solapur, cramps remain an immense and predominant problem.

## 5: DISCUSSION

### 5.1 Interpretation of Findings

The current study demonstrates that almost half of the participants experienced moderate severity of muscle cramps, and a considerable number of patients experienced severe cramps. This shows that muscle cramps are a common complication in dialysis care. The association of age and severity suggests that older patients are more exposed to vulnerabilities, which may be due to lower muscle elasticity and an increased number of comorbid conditions. Also, increased duration of dialysis is associated with increased severity, which can be attributed to cumulative physiological stress and shift of body fluids throughout the duration of the dialysis process.

## 5.2 Supportive Indian Studies

A number of Indian studies reiterate these findings.

- Choudhary & Sharma (2021) noted that for baseline severity assessment, intradialytic stretching exercises were useful in lowering cramp occurrence.
- Thomas & George (2019), Annapoorna, S., & Wale, G. R. (2019), non-pharmacological methods and exercises, such as stretching and massage, were effective, although later, severity data from a pretest were requested.

## 5.2. National Studies

Devi and Kumar (2021) found an association between age, duration of dialysis, and severity of cramps. This finding is parallel to what we found in our study.

## 5.3 International Studies

This finding has also been reported in Al-Harbi *et al.* (2020)'s study in Saudi Arabia, where they found that muscle cramps were one of the most common complications of dialysis that hindered the comfort of patients. Kawanishi *et al.* (2019) in Japan also articulated that cramps are one of the factors that cause suboptimal dialysis and low quality of life, and therefore warrant being one of the factors that should be routinely evaluated.

## 5.4 Implications

The study has shown the importance of assessing patients for potential muscle cramps in dialysis. This can be achieved through targeted strategies such as leg exercises, the right amount of dialysate, and medication. Assessing the severity of cramps will help to improve the management of individual patients. This will also help in improving the tolerance of patients to dialysis.

## 5.5. Limitations

The study was conducted in Solapur only, which limits the scope and the reach of the findings. The sample size was small and statistically less powerful, and only the pre-test was done, and the severity of the cramps was assessed. There were no post-intervention assessments done in this phase.

## 5.6. Future Directions

The findings of this study would be more valid in a larger and more than one site in India.

- Longitudinal designs will capture changes in severity over time and post-interventions.
- Further understanding of patient experiences of cramps may be obtained through qualitative studies.

## 6: CONCLUSION

The study concludes that muscle cramps continue to be an ongoing complication of hemodialysis

patients in Solapur, Maharashtra. More than half of the participants suffered from cramps of moderate-to-severe intensity. Age and duration of dialysis were identified as major predictors. It is recommended that baseline assessments be conducted before the implementation of intervention strategies such as leg exercises. Periodic assessments and tailored management approaches will be beneficial to enhance patient comfort and compliance with treatment.

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