

## Prevalence of Intradialytic Muscle Cramps and Quality of Life in Haemodialysis Patients

Somiya Naz, Mubashar Nazar, Waqas Khalid, Laraib Akhtar Malik, Abeera Tahir, Muhammad Mujtaba ur Rehman

### ABSTRACT

**Objective:** The aim of this study was to find out prevalence of intradialytic muscle cramps and quality of life in hemodialysis patients.

**Study design and settings:** This was a cross-sectional study conducted in three different hospitals in Rawalpindi and Islamabad.

**Methodology:** Following ethical approval, a cross-sectional study was conducted on 361 patients undergoing hemodialysis through Convenience Sampling Technique. A self-structured questionnaire was used for demographic data and clinical characteristics. Numeric pain rating scale (NPRS) was used to assess severity of muscle cramps and WHOQOL- BREF was used to assess quality of life in hemodialysis patients.

**Result:** During hemodialysis, 78% participants experienced muscle cramps, the mean severity of cramps during hemodialysis was noted to be  $7.08 \pm 1.94$ . The most of participants i.e. 45% reported muscle cramps in leg region. The QOL of patients undergoing hemodialysis was low in physical ( $59.95 \pm 19.19$ ), psychological ( $58.60 \pm 17.04$ ), and environmental ( $33.06 \pm 10.51$ ) domains while good in the social domain ( $83.26 \pm 23.75$ ) of WHOQOL- BREF questionnaire

**Conclusion:** The current study's findings showed that muscle cramps in patients undergoing hemodialysis is common. The most reported muscle cramps region were legs. Patients undergoing hemodialysis have a low quality of life except social domain.

**Keywords:** Hemodialysis, Intradialytic muscle cramps, Quality of life.

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### INTRODUCTION

Renal disorders are a serious public health concern and the tenth biggest cause of mortality worldwide.<sup>1</sup> The number

**Somiya Naz**  
Assistant Professor, Department of Physical therapy  
Margalla Institute Of Health Sciences  
Email: Somiyanaz12@yahoo.com

**Mubashar Nazar**  
Assistant Professor, Department of Nephrology  
Farooq Hospital Bhara Kahu Islamabad  
Email: Mobi\_nazar89@yahoo.com

**Waqas Khalid**  
Physiotherapist, Department of Physical therapy  
Margalla Institute Of Health Sciences  
Email: waqasmis@gmail.com

**Laraib Akhtar Malik**  
Clinical Physiotherapist, Department of Physical therapy  
Haleema Siraj Hospital  
Email: Laraib.akhtar@hotmail.com

**Abeera Tahir**  
Physiotherapist, Department of Physical therapy  
Margalla Institute Of Health Sciences  
Email: tahirabeera488@gmail.com

**Muhammad Mujtaba Ur Rehman**  
Consultant Nephrologist, Department of Nephrology  
Social Security Teaching Hospital  
Email: doc\_zeeshan2000@yahoo.com

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of people suffering from chronic renal failure is increasing every year. Individuals above the age of 40 are more likely to have chronic renal disease.<sup>2</sup> Chronic renal disease is characterized as a glomerular filtration rate (GFR) reduction of less than 60ml/min.<sup>3</sup> Chronic renal failure is an irreversible progressive illness that causes significant morbidity and mortality. Patients' quality of life (QOL) is considerably reduced because it necessitates lifelong treatment in the form of renal replacement therapy.<sup>4</sup> The quality of life is defined as "The physical, psychological, socioeconomic and environmental well-being". when the World Health Organization defined health as being not only the absence of disease and infirmity but also the presence of physical, mental, and social well-being, quality-of-life issues have become steadily more important in health care practice and research. There has been a nearly exponential increase in the use of quality-of-life evaluation as a technique of clinical research. The chronic kidney disease is treated with lifestyle changes, medicine, dialysis, and kidney transplantation. Hemodialysis is an effective treatment for chronic as well as acute renal failure.<sup>5</sup> Extracorporeal circulation is utilized in the hemodialysis technique to eliminate irritants from the patient's blood. The kidney's normal function is to filter waste materials from the blood and generate urine. Blood passes through nephrons, which filter waste and store essential nutrients within the body. Kidneys that are failing eventually

lose their ability to focus and eliminate waste materials. Hemodialysis is a common treatment for people with end-stage renal failure.<sup>5</sup> Surgery is performed to construct an entrance point (vascular access) into blood arteries in order for blood to flow during hemodialysis. There are three types of entrance points: Arteriovenous fistula, AV graft and vascular catheter access.<sup>6</sup> Hemodialysis treatment lasts for 4 to 5 hours. Despite being a life-saving procedure, hemodialysis has many deleterious effects on overall body. Patients undergoing hemodialysis may experience life-threatening or life-altering intradialytic complications.<sup>7</sup> These complications can affect quality of life of patients going through hemodialysis. Muscle cramps are among other intradialytic complications like hypotension, intradialytic weight gain, arrhythmias, nausea, shortness of breath, headaches and complications of vascular access. These complications affect the patient in multiple ways ultimately compromising the quality of life.<sup>8</sup> Muscle cramps occur frequently in patients on maintenance hemodialysis. Muscle cramps during hemodialysis can be caused by a variety of factors. The first is intradialytic hypotension, which occurs when there is a failure in systolic or mean arterial pressure of more than 20 mmHg. The second most common cause of muscle cramps during hemodialysis is hypo osmolality.<sup>9</sup> Muscle cramps can be caused by disturbances in electrolyte and mineral metabolism, such as raised plasma calcium, phosphorus, and decreased sodium, potassium, and magnesium levels, increased parathyroid hormone levels, Carnitine deficiency, and vitamin inadequacy.<sup>10</sup> Disruption of muscular energy metabolism is one of the proposed reasons for hemodialysis-associated muscle cramps (HAMC). Excessive dialysis ultrafiltration or tissue hypoxia promotes aberrant energy utilization by muscles, resulting in cramps. Sometimes dialysis process has to be stopped because of severity of muscle cramps and patient goes into state of under dialysis.<sup>5</sup> At the national level, there is a scarcity of research on muscle cramps, particularly among hemodialysis patients. The Current study focused on finding prevalence and severity of the intradialytic muscle cramps and quality of life in hemodialysis patients.

## METHODOLOGY

The cross-sectional study was conducted in dialysis units of public and private sectors of Rawalpindi and Islamabad, from May, 2019 to December, 2020. The sample size was calculated to be approximately 360 with confidence level 95%, level of alpha 5 % and estimated proportion 0.39 by using Epi tool Software.<sup>11</sup> Data was collected from patients undergoing hemodialysis for more than 3 months, age more than 18 year either gender. Patients with history of muscle cramp before the initiation of hemodialysis were not included. Self-structured questionnaire was used for demographic data and dialysis related questions, Severity of muscle cramps was assessed by using Numeric Pain Rating Scale (NPRS) and the Urdu version of World Health Organization Quality

of Life Scale (WHOQOL-BREF) was used for assessing quality of life in dialysis patients. The validity and reliability of both tools has been proven in literature.<sup>12,13</sup> The WHOQOL-BREF is a self-reported questionnaire and consists of 26 items, of which the first two items measure the perceived QOL and general health satisfaction whereas the remaining 24 items are grouped into four domains of QOL (physical health, psychological health, social relationships and environment). The physical domain of quality of life addresses the following factors: pain, energy, sleep, mobility, activities of daily living, medications, and work. The psychological domain of Quality of life considers the following factors: Positive Feeling, Thinking, Esteem, Body Image, Negative Feeling, and Spirituality. The social domain takes into account the following factors: personal relationships, social support. The environmental domain comprises aspects such as safety, home environment, financial resources, access to services, access to information, leisure activities, physical environment, and access to transportation. All items were assessed on a 5-point Likert scale by the subjects. The mean score of items within each domain was used to produce the mean domain score, which was then multiplied by four to make domain scores comparable with WHOQOL-100 scores, as per the measure's recommendations. Domain scores were scaled in a positive direction on a 0-100 scale, with higher scores indicating higher QOL.<sup>14</sup> In this study Intradialytic muscle cramp is defined as, "Episodic, strong, painful contraction or tightening of a muscle that comes on suddenly and lasts from a few seconds to several minutes during hemodialysis" and Quality of life is defined as, "The physical, psychological, socioeconomic and environmental well-being". Written informed consent was obtained from every individual for his or her voluntary participation. The Margalla Institute of Health Sciences ethical committee approved the project. (ERC Ref No: LA/57/19)

## DATA ANALYSIS

Result was analyzed in terms of Descriptive statistics i.e. Mean, frequency and percentage. The data was given in tabular and graph formats. SPSS 23 version was used for data analysis.

## RESULTS

In this study, total 400 participants were approached for data collection, out of which 35 refused to take part in study and 04 participants were not fulfilling the eligibility criteria so finally data was analyzed for 361 participants.

The mean age of the participants was  $49.62 \pm 15.9$ . The most of participants reported having multiple comorbidities (32.68%) followed by diabetes mellitus (35.18%) and 11.63% had hypertension and diabetes both as shown in Table 1.

Among the participants, 78% had muscle cramps during hemodialysis. The participants had variability of region of cramps. The most reported muscle cramps were in the region of leg i.e. 45% as displayed in Figure 1.

Among the participants 61% had cramps during the second half of hemodialysis and 39% had cramps during first half. Among participants 45% reported that dialysis never had to be stopped because of severity of cramps, 39% reported few times it happened, 13% stopped only once and 3% reported it frequently. Major consultations regarding muscle cramps were made to nephrologists and dialysis technician i.e. 129 and 80 respectively and only 14 participants consulted a physical therapist for their muscle cramps (Figure 2)

Highest scores were observed in social domain indicating support from family and friends, good interpersonal relationships and strong moral values. Lowest scores were observed in environmental domain because of lack of health ensuring environment and lack of financial resources as represented in Table 2

Table 1 shows patients characteristics, frequency and severity of muscle cramps

Variables	Mean $\pm$ SD	Frequency / Percentage
Age	49.62 $\pm$ 15.9	
BMI	24.64 $\pm$ 3.21	
Marital status		
Single		50/14
Married		277/77
Divorced		21/6
Widowed		13/3
Duration of disease		
Less than 6 months		106/29
6 months- 1 year		78/22
2-5 years		110/30
More than 5 years		67/19
Comorbidities		
Hypertension		48/13.29
Diabetes mellitus		127/35.18
Cardiovascular disease		16/4.43
Anemia		05/1.38
Hepatitis B and C		04/1.10
HIV AIDS		01/0.27
Hypertension & diabetes mellitus		42/11.63
Multiple		118/32.68
Frequency of dialysis		
Twice every week		305/84.48
Thrice every week		45/12.46
Everyday		01/0.27
Others		10/3.3
Muscle cramps		
Yes		283/78.39
No		78/21.60
Severity of muscle cramps	7.08 $\pm$ 1.94	

Figure 1 shows region of muscle cramps in participants

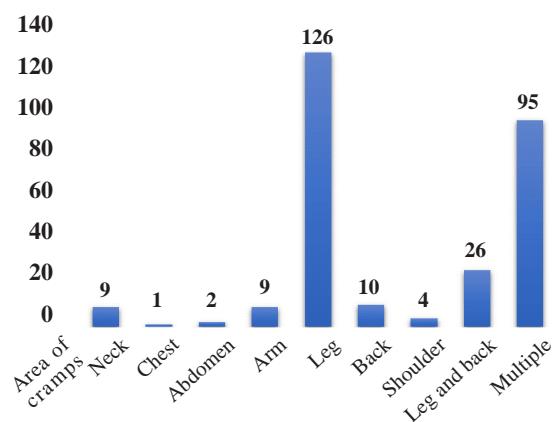


Figure 2 shows consultation to health care provider by participants for muscle cramps

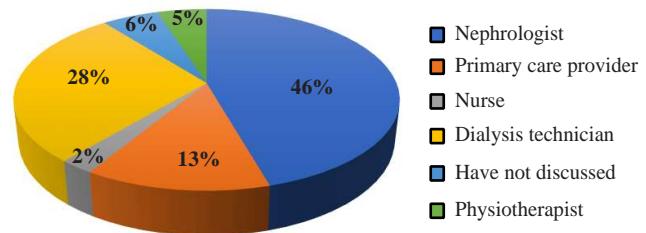


Table 2 shows the mean of four domains of WHO QOL-BREF

WHO QOL-BREF DOMAINS	Mean $\pm$ Std. Deviation
Physical	59.95 $\pm$ 19.19
Psychological	58.60 $\pm$ 17.04
Social	83.26 $\pm$ 23.75
Environmental	33.06 $\pm$ 10.51

## DISCUSSION:

Current research focuses on prevalence of intradialytic muscle cramps, and quality of life of dialysis patients. Sample size was 361. The mean age of the participants was 49.62 $\pm$ 15.9.

In this study male patients were found to be predominantly in greater number than female patients. According to the previous study, the number of male patients with ESRD is higher than the female patients.<sup>1,9</sup>

The results of this study showed that 78% of hemodialysis patients experienced muscle cramps. In previous study by Ghimire et al, it was pointed out that muscle cramps occur in 33 to 86 percent of patients during hemodialysis.<sup>15</sup> Furthermore, Parmakovska et al stated that 62.5% of the patients had experienced muscle cramps at least once a week. Cramps are felt most often in the lower extremities.<sup>16</sup> Qureshi et al concluded in a previous study that 39% of the patients suffered with complications of cramps during dialysis.<sup>11</sup>

The result of current study showed that male participants

reported more muscle cramps as compared to females. Parmakovska et al stated that 54% of male go through cramps during dialysis and 46% of females experienced muscle cramps. Ghimire et al concluded that males are more prone to muscle cramps.<sup>15</sup>

The mean severity of the intradialytic muscle cramps in the current study was reported to be  $7.08 \pm 1.94$ . Parmakovska et al found the mean severity score of the muscle cramps to be  $5.78 \pm 1.73$ .<sup>16</sup>

Findings of this study highlight the fact that patients experienced more muscle cramps during second half of hemodialysis. These findings are consistent with Ghimire's findings that cramps are caused by changes in extracellular fluid volume and plasma osmolality near the end of a dialysis session, as well as an increase in tonic electromyographic activity near the end of hemodialysis.<sup>15</sup> Punj et al concluded that muscle cramps occur towards the end of dialysis session.<sup>17</sup> The present study findings point out that 55% respondents reported that dialysis had to be stopped because of severity of cramps. This result was also supported by earlier study which estimated that 33 to 86% of patients experience muscle cramps during haemodialysis, which results in early termination of haemodialysis session.<sup>18</sup> Another study highlighted that 79% participants claimed that the dialysis session sometimes been interrupted because of the cramps.<sup>5</sup>

In this study, the muscle cramps were mostly reported in leg region. The previous study showed most of patients on hemodialysis had moderate level of leg muscle cramps(53%).<sup>19</sup> Another study stated that Almost 80% of patient undergoing Hemodialysis will experience leg muscle cramps, 36.6% were feel the muscle cramps at Sole.<sup>20</sup>

Major consultations regarding muscle cramps were made to nephrologists and dialysis technician in the study. Only 5% participants consulted a physical therapist for their muscle cramps, the lack of awareness of physical therapy has been observed. In earlier study Participants reported other barriers to exercise such as lack of exercise facilities at home or near their home and lack of encouragement by hemodialysis staff to exercise.<sup>21</sup> In this regard, Tentori et al. showed that offering exercise programs by dialysis facilities increases 38% of the likelihood of engaging patients in the exercise program.<sup>22</sup> Wang et al. conducted a study in the United States and found the lack of exercise equipment (86.2%) and lack of support of the health care team working in hemodialysis centers (93.1%) as barriers to exercise.<sup>23</sup>

Most of the respondents of the current study reported low QOL in all domains except social domain. The participants had highest score in social domain because of interpersonal relationship and social support. The domain with lowest score was environmental domain it may be because of lack of financial resources, freedom, physical safety and insecurity, opportunities for recreation and leisure activities, physical environment (Pollution, Noise, Traffic and climate) and

transport. However In a previous study by Anees et al patients had poor QOL in physical health, psychological health, and social relationship domains than their caregivers.<sup>9</sup> Willik et al stated that Patients experienced a high symptom burden and a decreased physical HRQOL,<sup>24</sup> Nazar et al concluded that that patients with CKD receiving dialysis have a low quality of life.<sup>25</sup> The study's drawback was that it was only conducted in two cities (Rawalpindi and Islamabad). Because of the non-probability convenient sampling technique, the results may not be generalizable. Data may be under or over-reported because it is self-reported. It is recommended that Dialysis units should consult physical therapists for prevention of intradialytic muscle cramps. There is a need to raise knowledge about exercises and physical activity among hemodialysis patients. Interventional trials should be conducted to assess the efficacy of physical therapy in the treatment of intradialytic muscular cramps.

## CONCLUSION:

The findings of the current study showed that muscle cramps in patients undergoing hemodialysis is common. The most reported muscle cramps region were legs. Patients undergoing hemodialysis have a low quality of life except social domain.

### Authors Contribution:

- Somiya Naz:** conception and design, or acquisition of data, or analysis and interpretation of data; Drafting the article or revising it critically; Final approval & Agreement to be accountable for all aspects of the work
- Mubashar Nazar:** Acquisition of data, Drafting the article or revising it critically; Final approval & Agreement to be accountable for all aspects of the work
- Waqas Khalid:** Acquisition of data, analysis and interpretation of data; Final approval & Agreement to be accountable for all aspects of the work
- Laraib Akhtar Malik:** Acquisition of data, Final approval & Agreement to be accountable for all aspects of the work
- Abeera Tahir:** Acquisition of data, Final approval & Agreement to be accountable for all aspects of the work
- Muhammad Mujtaba ur Rehman:** Acquisition of data, Final approval & Agreement to be accountable for all aspects of the work

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