

**EFFECTIVENESS OF INTRADIALYTIC STRETCHING  
EXERCISES ON REDUCTION OF MUSCLE CRAMPS AMONG  
PATIENTS UNDERGOING HAEMODIALYSIS AT SUNDARAM  
HOSPITAL, TRICHY**

**M.Sc (NURSING) DEGREE EXAMINATION  
BRANCH I - MEDICAL SURGICAL NURSING  
INDIRA COLLEGE OF NURSING  
KONALAI, TIRUCHIRAPPALLI**



**University Seal:**

**DISSERTATION SUBMITTED TO  
THE TAMIL NADU DR. M G R MEDICAL UNIVERSITY, CHENNAI**

In partial fulfilment of requirement of the degree of

**Master of Science in Nursing**

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**A STUDY TO ASSESS THE EFFECTIVENESS OF  
INTRADIALYTIC STRETCHING EXERCISES ON REDUCTION  
OF MUSCLE CRAMPS AMONG PATIENTS UNDERGOING  
HAEMODIALYSIS AT SUNDARAM HOSPITAL, TRICHY**

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**Institution :** Indira College of Nursing, Tiruchirappalli

Sd: \_\_\_\_\_

Internal Examiner

Date: \_\_\_\_\_

Sd: \_\_\_\_\_

External examiner

Date: \_\_\_\_\_

**The Tamil Nadu Dr. M.G.R. Medical University  
Chennai-32**

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TRICHY**

*Certified that this is the Bonafide work of*

**Register No: 301613401 Mrs. VIMALA .A**

**SPECIALITY : Branch –I Medical Surgical Nursing.**

Indira College of Nursing, Trichy-Chennai Main Road,  
Konalai, Manachanallur(Tk), Tiruchirappalli-621105, Tamil Nadu.



**COLLEGE SEAL:**

**SIGNATURE:** \_\_\_\_\_

Prof. Mrs. Sherene G. Edwin R.N., RM, M.Sc.(N), M.B.A., PhD (N)  
Principal & H.O.D of Nursing Research,  
Indira College of Nursing, Trichy-Chennai Main Road,  
Konalai, Mannachanallur(Tk), Tiruchirappalli-621105, Tamil Nadu.

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*Approved by the Research Committee in March 2017*

**NURSING GUIDE**

Prof.Mrs.Sherene G. Edwin , R.N.,R.M.,M.Sc.(N).,M.B.A.,(PhD N)

Principal & H.O.D of Nursing Research  
Indira College of Nursing ,Trichy-Chennai Main Road,  
Konalai,Manachanallur(Tk),Tiruchirappalli-621105,Tamil Nadu.

**MEDICAL GUIDE**

**Dr. SPS. Subramanian MD, DM**

**(Nephrologist)**

Sundaram Hospital,  
Trichy.

**CLINICAL SPECIALITY RESEARCH GUIDE:**

**Asst. Prof Mrs. P. PUELA CATHERINE M.Sc., (N).**

Medical Surgical Nursing Department,  
Indira College of Nursing ,Trichy-Chennai Main Road,  
Konalai,Manachanallur(Tk),Tiruchirappalli-621105,Tamil Nadu.

DISSERTATION SUBMITTED TO  
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MASTER OF SCIENCE IN NURSING

**OCTOBER 2018**

## **BONAFIDE CERTIFICATE**

This is to certify that the dissertation entitled “**Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis at Sundaram Hospital, Tiruchirappalli**” is a bonafide research work done by **Mrs. A. Vimala, II year MSc (N)**, Indira College of Nursing, Tiruchirappalli under the guidance of **Principal Prof. Mrs. Sherene G. Edwin, R.N.,R.M.,M.Sc.(N),M.B.A.,Ph.D(N)** in partial fulfillment of the requirements for the Degree of Master of Science in Nursing under Tamilnadu Dr.M.G.R. Medical University.

Place:  
Date:

**Principal**  
College of Nursing,

## **DECLARATION**

I hereby declare that the present dissertation titled “**Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis at Sundaram Hospital Trichy**”. is the outcome of the original research undertaken and carried out by me under the guidance of **Principal Prof. Mrs. Sherene G. Edwin, R.N., R.M., M.Sc.(N), M.B.A.,PhD (N)**, Indira College of Nursing. I declare that the material of this has not formed in anyway, the basis for the award of any degree or diploma in this university or any universities.

Place:  
Date:

**Mrs. A. VIMALA**  
**II Year M.Sc (N)**

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**CHAPTER I**  
**INTRODUCTION**

# CHAPTER - I

## INTRODUCTION

### **“Stretching your body & mind is essential to avoid rigidity”**

Haemodialysis is an ongoing process where patients experience complications such as hypotension, muscle cramps, disequilibrium syndrome and nausea during the procedure. It is estimated that 33 to 86% of patients experience muscle cramps during haemodialysis, which results in early termination of haemodialysis session. There is a need for special attention for diagnosis and management of muscle cramps during haemodialysis to avoid the need for termination of the haemodialysis procedure.

#### **Background of the study:**

Chronic kidney disease (CKD) describes a wide variety of kidney disorders that cause damage to the kidneys over a period of months or years. It is relatively common, affecting more than 10% of adults in most countries where studies have been done.

In addition to the risk of progressive kidney damage, CKD is associated with an increased risk of diseases affecting the heart and arteries. Management is focussed on treating the specific cause of the kidney disorder as well as general measures to protect kidney function including blood pressure treatment, weight loss, exercise and stopping smoking.

Current treatments are only partially effective and research is therefore urgently needed to develop new treatments as well as methods to identify which patients are most likely to benefit from these treatments.

Chronic kidney disease (CKD) and renal failure (RF) have been recognized as significant medical problems for most of the last 2 centuries and, until relatively recently, were uniformly fatal. Scientific and technologic improvements during the second half of the 20th century provided renal replacement therapy as a life-sustaining option for many individuals who otherwise may have died. The impact of these medical advancements has been remarkable.

Chronic kidney disease is characterized by an irreversible deterioration of renal function that gradually progresses to end-stage renal disease (ESRD). Chronic kidney disease has emerged as a serious public health problem.

Chronic kidney disease (CKD)—or chronic renal failure (CRF), as it was historically termed—is a term that encompasses all degrees of decreased renal function, from damaged—at risk through mild, moderate, and severe chronic kidney failure. CKD is a worldwide public health problem. In the United States, there is a rising incidence and prevalence of kidney failure, with poor outcomes and high cost.

CKD is more prevalent in the elderly population. However, while younger patients with CKD typically experience progressive loss of kidney function, 30% of patients over 65 years of age with CKD have stable disease.

**Monfared et al., (2015)** Haemodialysis is an epoch-making medical technology introduced clinically in the early 1960's which made it possible to prolong the lives of patients with chronic kidney disease. Haemodialysis is usually done for twice or thrice in a week with each session lasting about four or six hours. The patient quality of life can be promoted and the complications of renal failure can decrease with sufficient and effective haemodialysis.

**Holley, 2014; Kobrin & Berns, (2016)** Muscle cramps (involuntary muscle contraction associated with severe pain) occur frequently in patients receiving dialysis. Muscle cramps can involve the legs, most commonly in the feet, but can also involve arms and hands, as well as abdominal muscles. Muscle cramps begin with fasciculations or muscle twitches and are felt to be related to nerve conduction rather than the muscles themselves.

**Holley, (2015); Kobrin & Berns, (2012).** Numerous factors are influencing the muscle cramps in patients undergoing haemodialysis which includes volume contraction, hypotension, changes in plasma osmolality, hyponatremia, tissue hypoxia, hypomagnesemia, deficiency of carnitine and elevated serum leptin

**Holley & Sheon, (2017)** The most common factors related to the haemodialysis procedure are Volume depletion and hyponatremia. Preventing hypotension associated with dialysis, minimizing interdialytic weight gains, increasing the frequency of haemodialysis, have been effective in reducing the frequency of cramps.



Non-pharmacological therapy forms the cornerstone of the management of muscle cramps. It is important to discuss non-pharmacologic strategies to prevent and treat muscle cramps with patients in order to minimize pharmacotherapy. Local massage of the affected muscle and the application of moist heat may provide some comfort.

**Hallegraeff et al., (2012)** A trial of stretching program is a measure that can be done both for nocturnal leg cramps and for haemodialysis-related cramps triggered by the relaxation of the foot and ankle muscles from the prolonged recliner position for the dialysis treatment. Stretching is usually a first-line treatment for cramps, and pre-bedtime stretching has been seen as an easy treatment to decrease or eliminate nocturnal cramps. Nephrology/Dialysis nurses are in a unique position to help monitor and evaluate cramp prevention and management techniques.

#### **Need for the study:**

**Stephanie Titze et al., (2016)** Chronic kidney disease (CKD) has been increasingly recognized as a global health burden. Individuals with CKD are at risk for progressive loss of kidney function and kidney failure. One of the most common treatment for kidney failure is haemodialysis. Worldwide statistics shows that 9,20,000 people are undergoing haemodialysis per day, which constitutes about 7-8% of the total population.

**Robert A Star, (2017)** The beginning and ending supportive therapy for the kidney failure is haemodialysis.

**C. G. Okwuonu et al., (2017)** The 2016 global ranking of premature causes of death show that kidney diseases moved up from position 32 in 1990 to position 24 in 2016. Indian government has included kidney disease as a priority area and is setting up facilities to provide subsidized dialysis for the whole population. It is estimated that there are about 55,000 patients on dialysis in India and the dialysis population is growing at the rate of 10-20% annually.

Muscle cramps are a common discomfort experienced by patients undergoing haemodialysis which is characterized by a sudden, painful, involuntary contraction of a muscle which originates from the peripheral nerves. The most commonly affected muscles are the gastrocnemius (calf muscles), triceps (the muscles in the upper

arms), the hamstrings (the muscles behind the thighs), and the quadriceps (the muscles in front of the thighs). Many non pharmacologic therapies are employed by patients prior to treatment, but there is only a little evidence to support the use of non pharmacological measure .

**Manisha Jhambe, Steven D Weisbord, Jennifer L Steel, Mark Unruh, (2008)** There are different therapies like flexibility exercises and strengthening exercises to improve the physical functioning of the patient. Leg stretch exercises done during the dialysis procedure like quadriceps knee strengthening exercise, hamstring exercise and gluteal strengthening exercise will improve the muscle protein synthesis and breakdown, which helps in determining both strength and overall function of the body.

**Kathleen Mccann, Jeniffer. R.P. Boore,(2000).** The health benefits of stretching are amazing as it can increase stamina, relax body and mind, improve focus and concentration, and reduce the risk of injury. Other benefits of stretching exercises are reduction of stress and tension, muscle pain, soreness and increase flexibility and suppleness. It makes muscles more elastic and reduces the risk of injury. Stretching exercise can lower the build-up of lactic acid in muscles and eliminate tightness and any chance of damage.

Almost all patients complain of muscle cramps during dialysis. They are managed with normal saline and dextrose 25% routinely in hospital. Prophylactic stretching exercises can prevent the muscle cramps. The patients can practice stretching exercises during the post dialysis period.

It is important to discuss non-pharmacologic strategies to prevent and treat muscle cramps with patients in order to minimize pharmacotherapy and to utilize hemodialysis interventions such as sodium modeling and reassessing dry weight. The literature describing effective pharmacotherapeutic interventions to prevent muscle cramps in patients with chronic kidney disease is lacking. Patient education about the available evidence for benefit and potential for harm of pharmacotherapy, is an important aspect of treatment.

**Holley, 2015; Sheon, (2016)** Performing stretching exercises before dialysis, performing mild exercise such as riding a stationary bicycle during dialysis prevent cramps. Local heat (including showers or baths) or ice, massage, walking or leg

jiggling followed by leg elevation, are other methods reported to help relieve muscle cramps.

**Magda Mohamed, Amal Mohamed, Shalabia Abo Zead, (2016)** Exercises are very important element in the overall health of people at any age. Stretching exercises are the best measure to reduce or prevent cramps from occurring during haemodialysis among chronic renal failure patients.

**Khajehdehi, Mojerlou, Behzadi, Rais Jalali, (2001)** A study found an association between the use of vitamin E, Vitamin C and the muscle cramps for the patients undergoing haemodialysis. A total of 60 haemodialysis patients with a mean of 4.4 cramps per week were randomized to receive vitamin E 400 IU daily, vitamin C 250 mg daily, a combination, or placebo for eight weeks. The mean number of cramps per week decreased by 54%, 61%, 97% and 7% for the vitamin E, vitamin C, combination and placebo groups respectively. But the adverse effects of Vitamin E is known to cause bleeding, and to interact with Warfarin to increase the risk of bleeding and vitamin c can result in the accumulation of a metabolite called oxalate. High levels of oxalate in the blood may lead to the development of kidney stones.

**Miller, et al., (2005)** A meta analysis of 19 clinical trials with 135,967 participants in studies of vitamin E found that high-dosage (> or =400 mg) causes increased mortality.

**Brenner I, (2009)** Regular physical activity can reduce the complications associated with CKD by inducing adaptations in the cardiovascular, nervous, and musculoskeletal systems. This increases the functional capacity and enhances quality of life in patients on HD. Haemodialysis patients can safely participate in a variety of exercise programs with minimal adverse effects. Intradialytic exercise programs that can incorporate aerobic and resistance exercise that promote exercise adherence and should be encouraged on dialysis units.

**Johansen .KL,(2007).** Interventions during haemodialysis sessions have become more popular and have been shown to be safe. The risks of exercise in this population have not been rigorously studied, but there have been no reports of serious injury as a result of participation in an exercise training program. It is time that we incorporate exercise into the routine care of patients who are on dialysis.

**Capitanini .A, et al., (2014)** Staff in dialysis unit have a crucial role to encourage and assist patients during intra-dialysis exercise, but other professionals should be included in the ideal "exercise team" for dialysis patients. In this scenario, dialysis nurses play a pivotal role since they guarantee a constant and direct approach.

Muscle cramps reduce quality of life, sleep and participation in activities of daily living. Many interventions are available for lower limb cramps but some are controversial and no treatment guidelines exist and often people experience no benefit from the interventions prescribed. Hence there is a need to practice some interventions for muscle cramps during haemodialysis. Intradialytic stretching exercises help to improve the efficacy of haemodialysis thus preventing or reducing the muscle cramps.

#### **Statement of the problem:**

**A study to evaluate the effectiveness of intradialytic stretching exercises on reduction of muscle cramps among patients undergoing haemodialysis at Sundaram hospitals , Trichy.**

#### **Objectives:**

- To Assess the level of muscle cramps among patients undergoing haemodialysis before and after intradialytic stretching exercise.
- To Evaluate the effectiveness of intradialytic stretching exercises on muscle cramps among patients undergoing haemodialysis.
- To associate the level of muscle cramps with selected demographic variables after intradialytic stretching exercises.

#### **Hypothesis:**

H1 - There will be a significant difference in the level of muscle cramps before and after intradialytic stretching exercises among patients undergoing aemodialysis

H 2 - There will be a significant association between the level of muscle cramps and selected demographic variables among patients under going Haemodialysis at  $p < 0.05$  level of significance.

**Operational definitions:****Evaluative:**

To determine in the significance, worth or condition usually careful appraisal and study.

In this study it refers to the process used to estimate the muscle cramps using muscle cramp questionnaire and Numerical Pain Rating Scale.

**Effectiveness:**

It is the ability to produce desired and measured value in terms of decrease level of muscle cramps among the patients undergoing Haemodialysis after administration of intradialytic stretching exercise.

In this study it refers to the reduction in the muscle cramps after administration of stretching exercises which is measurable by a cramp questionnaire chart and Numerical pain rating scale.

**Intradialytic stretching exercise:**

Intradialytic stretching exercises are very important element in the overall health of people at any age. Stretching exercises are the best measure to reduce or prevent cramps from occurring during haemodialysis among chronic renal failure patient.

In this study it refers to Intradialytic stretching exercise is a form of physical exercise in which the calf, gastrocnemius, soleus, hamstring and quadriceps muscles are flexed or stretched to improve the muscle's elasticity, muscle tone and reduce the cramps during haemodialysis at a frequency of once per sitting for 20 minutes for 5 days.

**Muscle Cramps:**

A muscle cramp is a strong, painful contraction or tightening of a muscle that comes on suddenly and lasts from a few seconds to several minutes. It often occurs in the legs.

In this study muscle cramp refers to painful involuntary muscle contraction felt in the calf, gastrocnemius, soleus, hamstring and quadriceps muscles of the patients undergoing haemodialysis.

**Patient Undergoing Haemodialysis:**

A patient undergoing haemodialysis a medical procedure to remove fluid and waste products from the blood and correct electrolyte imbalances. This is accomplished using a machine and a dialyzer, also referred to as an “artificial Kidney.

In this study, it refers to Chronic kidney disease (CKD) Patients undergoing haemodialysis in Sundaram Hospital, Tirichy.

**Assumptions:**

1. Muscle cramps reduce the efficacy of haemodialysis.
2. Muscle cramps limit a patient's ability to tolerate the complete session of haemodialysis.
3. Exercises restores blood flow and relaxes the muscle tightness. Intradialytic stretching exercises helps to reduce the discomfort related to muscle cramps during haemodialysis.

**Delimitations:**

- In this study the intradialytic stretching exercises were limited only to the lower limb cramps.
- The study was limited to Chronic kidney disease (CKD) patients undergoing haemodialysis at sundaram hospital, Trichy.
- The sample was limited to 30 samples only.
- Data collection period was limited to 4 weeks only

**Projected outcome:**

Intradialytic stretching exercises could reduce the muscle cramps among patients undergoing haemodialysis.

**Conceptual framework:**

Modified Wiedenbach's helping art of clinical nursing theory is used as the conceptual framework to assess the effectiveness of intradialytic stretching exercises on reduction of muscle cramps among patients undergoing haemodialysis.

The conceptual framework was developed by Ernestine Wiedenbach in 1964. The theory has two parts (a)helping art of clinical nursing theory and (b) nursing practice. Helping art of clinical nursing theory is a prescriptive theory for nursing which describes a desired action and the ways to attain it. It consists of three factors, central purpose, prescription, and realities.

**Central purpose:**

It refers to what the researcher wants to accomplish. It is the overall goal. It is the task or the assignment directing towards the attainment of goal and knowledge on

intradialytic stretching exercises and the skill in performing intradialytic stretching exercises during haemodialysis . The central purpose of the study is the reduction of muscle cramps after giving intradialytic stretching exercises.

**Prescription:**

It is the plan of care for a patient. It includes the action and the rationale for that action which fulfils the central purpose. In this study intradialytic stretching exercises was used as a procedure. The procedure was done for 20 minutes and the muscle cramps were assessed using the muscle cramp questionnaire chart and the Numerical Pain Rating scale.

**Realities:**

It refers to the physical, physiological, emotional and spiritual factors that involves in nursing actions. There are five realities, they are as follows:

**Agent:**

One who directs all actions towards the goal and has capacities, capabilities, commitment and competence to provide care. In this study the researcher is the agent who directs the action towards the goal.

**Recipient:**

One who is vulnerable and dependent and receives all attention. In this study the patients who are undergoing haemodialysis experiencing muscle cramps.

**Goals:**

It refers to the desired outcome of the action. The reduction of the muscle cramps is the goal need to be attained.

**Means:**

It refers to the activities used to achieve the goal. In this study Intradialytic stretching exercises is given to the patients undergoing haemodialysis to reduce the muscle cramps.

**Framework**

It refers to the facilities in which it is practiced. It refers to the dialysis unit of Sundaram Hospital Trichy- 620017 .

Wiedenbach's nursing practice consists of identification, ministration and validation.

**Identification:**

It refers to the individual unique experiences and the perceptions. In this study it refers to the selection of the samples and the assessment of muscle cramps.

**Ministration:**

It refers to the provision of needed help. Here it refers to the administration of intradialytic stretching exercise to the patients undergoing Haemodialysis.

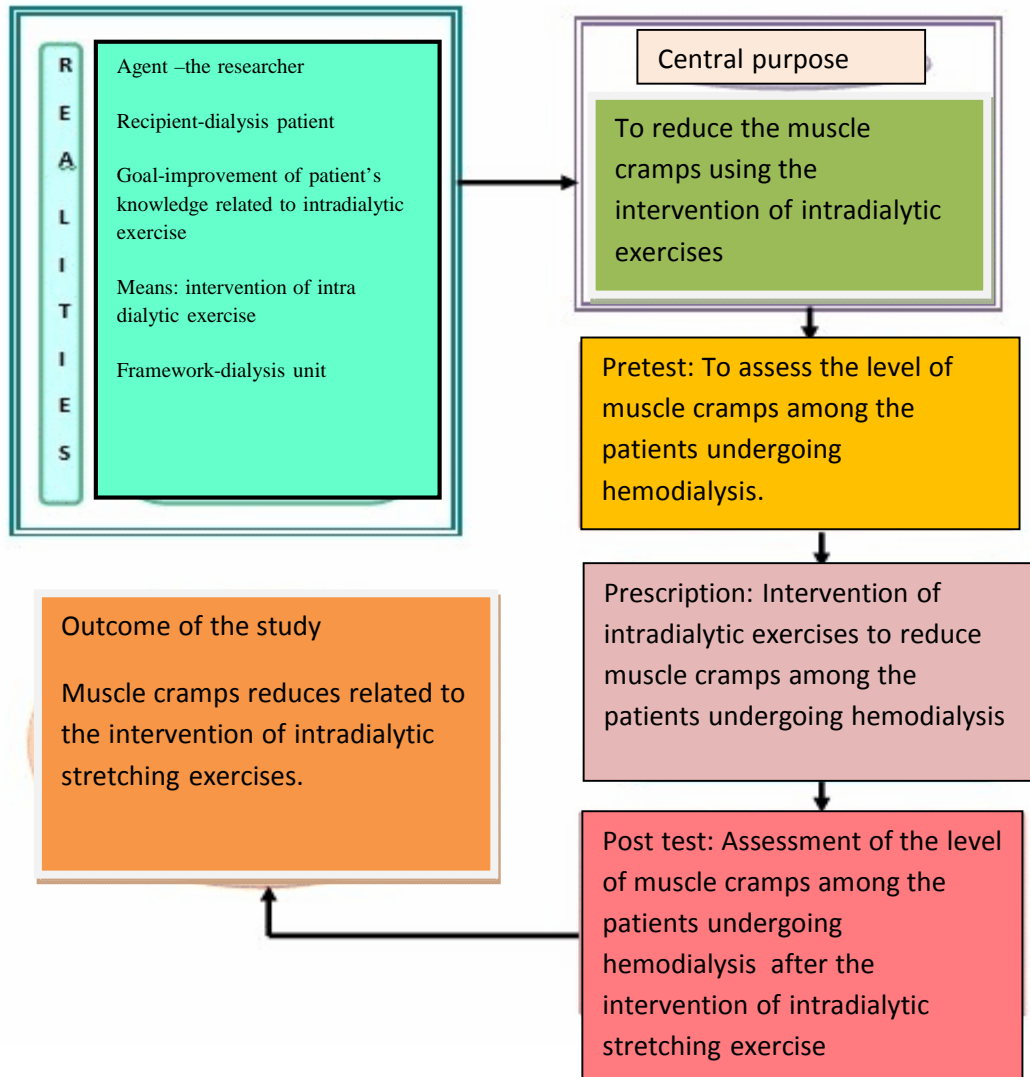
**Validation:**

Evaluating the patient after performing intradialytic stretching exercises for reduction in the level of muscle cramps during the haemodialysis.

In this study the assessment of muscle cramps before and after administering the intradialytic stretching exercises helps to validate



**Fig. 1.1: Conceptual Frame Work**



**CHAPTER II**  
**REVIEW OF LITERATURE**

# CHAPTER II

## REVIEW OF LITERATURE

**Polit, (2009)** A literature review helps to lay the foundation and provide context for a new study. An entire chapter often is devoted to a literature. The literature review is designed to appraise a body of research. Reviewing the literature can help to identify the relevant conceptual frameworks or appropriate research methods.

**Section-I** Literature related to prevalence of chronic kidney disease

**Section-II** Literature related to intradialytic stretching exercises on patients undergoing haemodialysis.

**Section-III** Literature related to intradialytic stretching exercises on muscle cramps.

### Literature related to prevalence of chronic kidney disease

**P.P Varma,( 2015)** A screening was done to study the prevalence of CKD among adults in a rural population near Shimoga, Karnataka. Among 2091 people the dipstick proteinuria and serum creatinine was measured. It was found that the prevalence of proteinuria was 2.8% and the CKD was 16.54%.The study concluded that the prevalence of CKD is higher in rural population when compared to the urban population.

**P.P Varma, (2015)**A cross sectional study was done in New Delhi among central government employees over 18 years of age to estimate the prevalence of early stages of CKD using the kidney disease quality outcomes initiative. Among 3398 participants the serum creatinine ratio and the GFR rate was measured. It was found that the prevalence of CKD stage 1,2 was 13-15.04% and 3 as 6.62%, 5.40% and 3.02% respectively.

**Richards. N, Hassan. M, Saleh .A.K, (2015)** An epidemiological study of Chronic kidney disease was undertaken in Abu Dhabi among 331,360 samples from 212,314 individuals to determine the prevalence of CKD patients. Based on serum creatinine and the GFR rate the CKD was identified. The mean serum creatinine and the GFR rate the CKD was identified.The mean serum creatinine was  $61 \pm 48 \mu\text{mol/L}$

in females ( $59 \pm 43 \mu\text{mol/L}$  in Emiratis,  $63 \pm 54 \mu\text{mol/L}$  in expatriates) and  $87 \pm 69 \mu\text{mol/L}$  in males ( $80 \pm 59 \mu\text{mol/L}$  in Emiratis,  $92 \pm 74 \mu\text{mol/L}$  in expatriates). Among Emiratis, 4.6% of males and 2.8% of females had a GFR between CKD stage 3 and 5. Among expatriates, 4.2% of males and 3.2% of females had a GFR between CKD stage 3 and 5. This study has defined the prevalence of CKD within Abu Dhabi and demonstrated the need to improve identification and referral of CKD patients.

**Malleshappa. P, Shah. B.V, (2015)** An epidemiological study was conducted to determine the prevalence of chronic kidney disease and incidence of acute kidney injury (AKI) in patients with coronary artery disease (CAD) demonstrated on coronary angiography among 125 patients in Lilavati Hospital and Research Centre, Mumbai. All the patients were evaluated for Serum creatinine, routine urine analysis, and spot urine for protein to creatinine ratio. The study concludes that there is a very high prevalence of CKD (39.2%) in patients with chronic kidney disease and (38.4%) patients with acute kidney injury. The study suggested for nephrology referral in patients with abnormal urinalysis, spot urinary protein to creatinine ratio and in patients whose creatinine clearance is  $<60 \text{ ml/min}$ .

**Singh, et al., (2012)** A survey was conducted in the urban and semi urban population of Delhi to determine the prevalence of patients with 3rd stage of chronic kidney disease. In the screened population there were 31.2% hypertensives and 7.3% diabetes mellitus. All the subjects underwent dipstick proteinuria and GFR calculation. The survey concluded that 4.2% of population is suffering from stage 3 CKD.

#### **Literature related to intradialytic resistance exercises on patients undergoing haemodialysis**

**Azra Sadat Musavian, et al., (2015)** A quasi-experimental study was conducted to compare the effects of active and passive intradialytic pedaling exercises among haemodialysis patients in the dialysis center of Akhavan Hospital, Iran. This study was performed on 18 patients for 8 months. All patients were dialyzed using high-flux dialyzer membranes for the first 8 weeks. Afterwards, for eight weeks, the patients received the passive intradialytic exercise using the electrically powered

Mini-Bike adapted to the patient's bed for 30 minutes per session during the first 2 hours of dialysis session. After 8 weeks the active intradialytic pedalling exercise was performed similarly for eight weeks. Paired t-test and the Wilcoxon signed rank and Friedman tests were used to compare the variables. The results found that the mean diastolic blood pressure was significantly decreased after the passive exercise ( $P = 0.039$ ) and QOL was  $63.78 \pm 21.15$  at the beginning of the study, which was increased to  $77.07 \pm 21.14$  after performing the intradialytic exercise ( $P = 0.007$ ). The study concluded that both the exercise programs improve the quality of life among haemodialysis patients.

**Kirkman, et al., (2014).** A randomized controlled study was done in North Wales, UK to examine the impact of a novel intra-dialytic progressive resistance exercise training (PRET) program on muscle volume, strength, and physical function in HD patients as well as in non-HD healthy patients. In this single-blind controlled study, 23 HD and 9 non-HD patients were randomized to PRET, which consisted of thrice-weekly high-intensity leg press exercises and control (SHAM) therapy, which consisted of low-intensity lower body stretching activities using ultra-light resistance bands. After a 12-week interventional period, PRET resulted in a significant increase in the muscle volume with the mean difference [95 % CI]:  $193[63 \text{ to } 324] \text{ cm}^3$  at  $p=0.007$  compared to healthy SHAM (mean difference [95 % CI]:  $169[-41 \text{ to } 379] \text{ cm}^3$  at  $p=0.1$ ). Patients undergone SHAM therapy in the HD group, experienced clinically significant amounts of muscle volume loss.

**Giannaki CD, et al., (2013).** A quasi experimental study was conducted in University of Thessaly, Larissa, Greece to determine the effect of prolonged intradialytic exercise in haemodialysis efficiency indices. Ten stable high-functioning haemodialysis patients were performed supine exercise (cycling) for 3 hours at 40% of maximum exercise capacity and no exercise as usual. Blood sampling was acquired pre- and post- haemodialysis in both scenarios to calculate the HD efficiency indices. All patients were completed the exercise regimen without adverse effects. The urea reduction ratio, and creatinine reduction ratio significantly improved by 20%, 11%, and 26%, respectively, while potassium plasma levels were reduced by 77.5% ( $p <$

0.05). The results concluded that prolonged low intensity intradialytic exercise improved HD efficiency, with no adverse effects.

**Paul N Bennett et al., (2013).** A stepped wedge randomised control study was conducted in Deakin University to examine the effect of an coordinated resistance exercise on physical function among haemodialysis patients. An exercise program was implemented among 180 participants for 12, 24 or 36 weeks. The participants need to perform leg abduction, plantar flexion, dorsi flexion, straight-leg, bent-knee raise, knee extension and knee flexion in a seated position for 15-20 repetitions in each exercise. The standard  $\alpha$  value of the three tests were ( $p < 0.05$ ) was divided by three  $\alpha = 0.0167$ . The study concluded that there is an improvement in the physical function of people with end stage kidney disease who are receiving haemodialysis.

**Mohseni.R,et al., (2013)** An open randomized controlled trial was done in dialysis center of Imam Khomeini hospital in Sari, Iran to determine the impact of an 8-week intradialytic exercise program on dialysis efficacy. Among 50 patients there were two groups which comprises of aerobic exercise group ( $n=25$ ) and the control group ( $n=25$ ). Aerobic exercises were done in the intervention group for 15 min/day, three times a week for 2 months. The dialysis efficacy was assessed prior to and at the end of each month of the program by measuring the urea concentrates and urea kinetics. It was found that values of the variables increased by 11% in URR ( $p=0.003$ ) and 38% in  $spKt/V$  ( $p=0.001$ ) at the 8th week post-treatment in the intervention group. The study concluded that simplified aerobic exercise program has increased the efficacy of dialysis and considered as a safe, complementary and effective modality for haemodialysis patients.

**Justine Magnard, et al., (2013)** An open label randomized controlled trial was done in Laennec and Confluent dialysis unit of the ECHO dialysis Association to analyze the impact of a progressive intra-dialytic exercise program combined with nutritional support to evaluate the functional performance, body composition and health-related quality of life in HD patients. A six-month adapted rehabilitation program was conducted among 210 patients undergoing haemodialysis by means of progressive submaximal individualized cycling exercise, consisting of three sessions per week. The exercise was prescribed during the first two hours of dialysis session using an adapted cycle ergometer 30 min duration of continuous cycling at a moderate

exercise intensity. The results concluded that there was a statistically significant difference in the effects of exercise to reverse the poor functional performance. For each analysis, the level of significance was  $p < 0.05$ .

**Justine Magnard, et al., (2013)** A randomised controlled trial study was conducted at the Launceston General Hospital and Burnie Satellite Renal Units in Northern Tasmania and the Hobart Renal Unit which, combined service a population of approximately 485,000. The objective of the study was to compare the effects of supervised intradialytic and home-based exercise training on physical function and arterial stiffness among haemodialysis patients. Intradialytic training was administered during the first two hours of each dialysis session, three times per week for 6 months. Home-based participants were asked to perform unsupervised walking for six months two hours of each dialysis session, three times per week for 6 months. Power output (w) and duration (minutes) of each exercise session were recorded to estimate the participants' individual energy expenditure per session during the training period. The results explains that there is 10% improvement in 6 MWD which is statistically significant  $p < 0.05$  ( $\alpha=0.05$ , and  $\beta=0.9$ ).

**Orcy RB, (2012)** A randomized controlled trial was conducted in the dialysis unit of a Brazilian University hospital to compare the effects of combined resistance and aerobic exercise with a resistance programme on functional performance among haemodialysis patients. Thirteen patients were allocated for each group of intervention. The patients were assigned to receive the resistance exercise combined with an aerobic training or to maintain an ongoing resistance programme alone for a period of 10 weeks. The functional performance of patients was assessed before and after the intervention through the 6-minute walk test (6MWT). The difference in distance walked before and after intervention in the combined training group was of  $+39.7 \pm 61.4$ m, and the difference in the resistance training group was of  $-19.2 \pm 53.9$ m,  $p=0.02$ . The study concluded that combination of aerobic and resistance training was more effective than resistance training alone to improve functional performance among haemodialysis patients.

### **Literature related to intradialytic stretching exercises on muscle cramps**

**Basemath.S.S. Morris, (2014)** A Quasi experimental study to assess the effect of intradialytic stretching exercises on muscle cramps among patients undergoing haemodialysis was conducted in selected hospitals at Chennai. Forty five patients undergoing haemodialysis who experienced muscle cramps were included purposively. Intradialytic exercises were performed every 30 minutes during the last two hours of dialysis. It was found that in the pretest 53.3% had severe muscle cramps, 46.7% had moderate muscle cramps. After performing the exercises 40% had no cramps, 24.4% had mild and 35.6% had moderate cramps. The study concluded that intradialytic stretching exercises during the last two hours of haemodialysis helps to reduce and prevent the muscle cramps.

**Hallegraef.J.M, et al., (2013).**A randomized controlled trial was done in Hanze University, Groningen to assess the stretching before sleep reduces the frequency and severity of nocturnal leg cramps in older adults. Eighty adults over 55 years with nocturnal leg cramps who were not being treated with quinine were selected. Pretest posttest with comparison group design was adopted. Participants recorded the frequency of nocturnal leg cramps. At six weeks,the frequency of nocturnal leg cramps decreased significantly more in the experimental group with the mean difference of 1.2 cramps per night (95% CI 0.6 to 1.8). The severity of the nocturnal leg cramps had also decreased significantly more in the experimental group than in the control group with the mean difference 1.3 cm (95% CI 0.9 to 1.7) on the 10-cm visual analogue scale. The study concluded that stretching before going to sleep reduces the frequency and severity of nocturnal leg cramps in older adults.

**Silva. S.F, et al., (2013)** A study to assess the physical therapy during haemodialysis in patients with chronic kidney disease was conducted .The therapy consists of muscle strengthening exercises, stretching and stationary exercises. Fifty six chronic kidney disease patients were participated. They underwent evaluation before the start of the program and after the training. The mean values of HR, RR, BP at the end of the test were  $97.57 \pm 16.82$  beats per minute  $22.26 \pm 2.46$  breaths per minute and  $133.43 \pm 15.52$  mmHg. The Borg Scale scores had a mean initial value of  $0.97 \pm 0.98$  and a median of 0.50. After performing the exercises the mean value was  $0.43 \pm 0.47$  and median value equal to the initial, 0.50 ( $p < 0.001$ ). Thus there was a



significant difference between these scores and concluded that there is an improvement in the quality of life and physical ability of patients with chronic kidney disease.

**Ahsan M, et al., (2010)** A study was conducted in Michigan, U.S.A to prevent the haemodialysis related muscle cramps cramps by intradialytic use of sequential compression devices. Four patients on thrice-weekly haemodialysis who experienced two or more episodes of lower extremity cramps weekly in the month before the study were selected. Sequential compression devices were applied before each haemodialysis on both the legs and compressions were intermittently applied at 40 mmHg during treatment. All four patients were reported the complete resolution of cramping during the study period that lasted 1 month or 12 consecutive dialysis treatments. The study concluded that application of sequential compression devices to lower extremity may prevent the generation of lower extremity haemodialysis -related cramping in a selected group of patients.

**Chadchavalpanichaya, Srisawasdi, Suwannakin, (2009)** A prospective, randomized single-blinded controlled trial was done in Sriraj hospital, Mahidol University, Thailand to assess the effect of calf stretching box on stretching calf muscle compliance. Eighty patients older than 45 years with calf muscles tightness were enrolled. Patients were randomized into two groups, the study group (stretching by using calf stretching box) and the control group (stretching by the conventional exercise method). Patients in both groups were asked to hold the stretch for at least 1 minute and to perform the stretching program at least two times per day, every day for two weeks.

They were asked to record the real frequency and duration of their exercise and complications in a logbook every day. It was found that there was a reduction in the calf muscle tightness with less pain than the control group ( $p < 0.05$ ).The study concluded that the stretching calf muscle with calf stretching box can increase compliance, decrease calf muscle tightness and decrease complications when compared with the conventional exercise method.

**CHAPTER III**  
**METHODOLOGY**

# CHAPTER III

## METHODOLOGY

**Polit, (2009)** Research design of a study spells out the basic strategies that researchers adopt to develop evidence that is accurate and interpretable. The present study is designed to evaluate the effectiveness of intradialytic stretching exercises on reduction of muscle cramps among patients undergoing haemodialysis. The study was conducted by adopting the steps of research process such as research design, setting, selection of population and sampling, criteria for selecting the samples, instruments and tool for data collection and method of data analysis. Pilot study was conducted and changes were incorporated.

### **Research approach:**

This study adopted evaluative research approach.

### **Research design:**

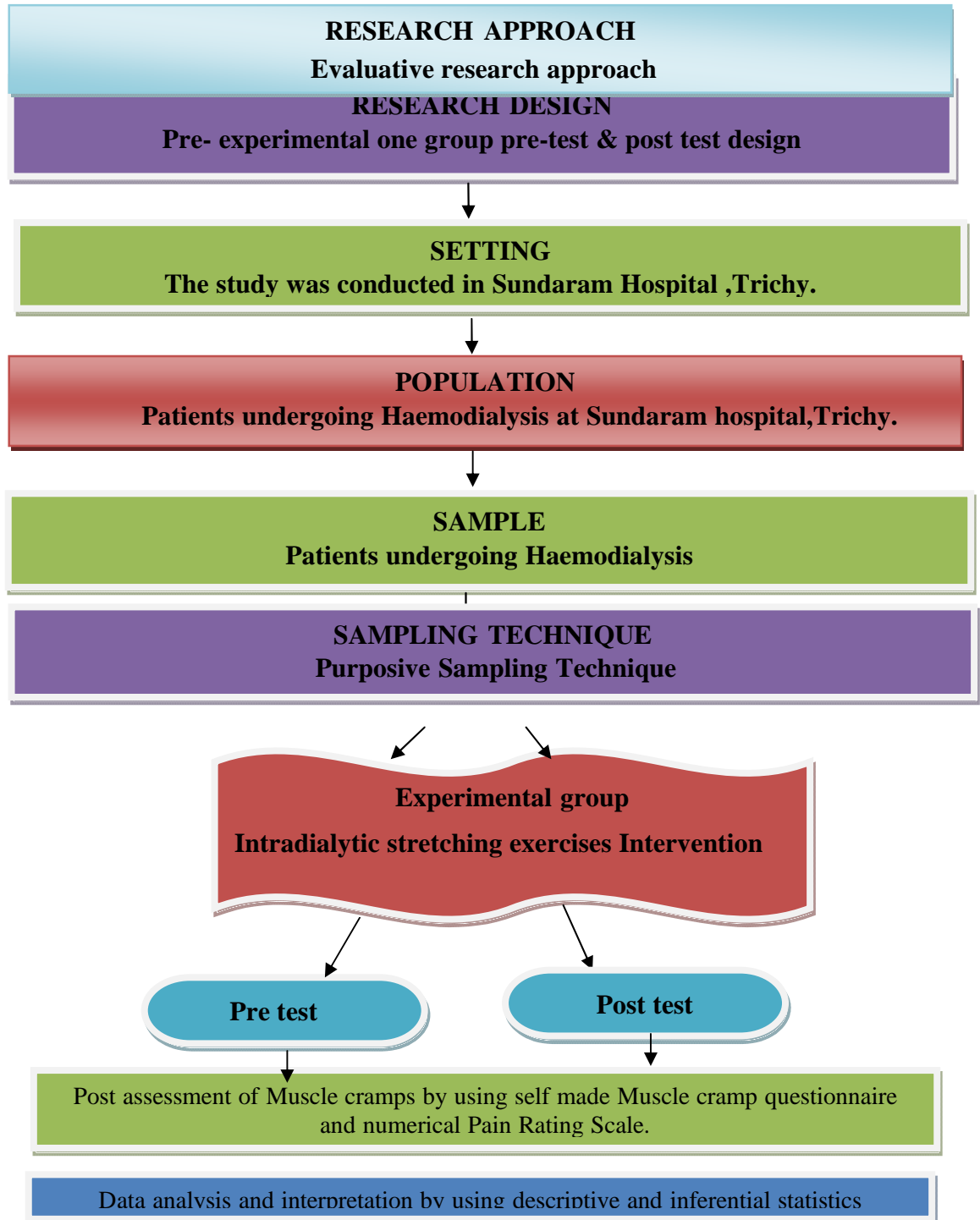
Quasi experimental research design was used in this study.



O1 X O2

- O1 - Pre test assessment of muscle cramps using the muscle cramp questionnaire.
- X - Intra dialytic stretching exercise
- O2 - Post test Assessment of muscle cramps using the muscle cramp questionnaire.

**Fig: 3.1 Schematic Representation of research DESIGN**



**Variables of the study:****Independent Variable:**

The independent variable of this study was intradialytic stretching exercises.

**Dependent Variable:**

The dependent variable of this study was reduction of muscle cramps.

**Setting of the study:**

This study was conducted in dialysis unit of Sundaram Hospital Trichy-620017. The hospital is a multispecialty hospital with bed strength of 60. The dialysis department of this hospital which has bed strength of 7. The total number of patients undergoing haemodialysis for each month is 65 and each day they have four shifts with the population of 7 patients. The dialysis department of this hospital has 1 in-charge dialysis technician, 3 experienced and qualified staff nurses, 4 technicians, and 2 ward assistants. The staff nurses of this hospital undergo training and classes to upgrade their knowledge through ward teaching programme.

**Population :**

The Population of this study was of patients undergoing haemodialysis.

**Sampling:****i. Sample:**

The Sample of the study was chronic kidney disease patients undergoing haemodialysis at Sundaram Hospital during the study period and those who met the inclusion criteria.

**ii. Sample Size:**

The Sample size for this study was 30 patients with muscle cramps undergoing haemodialysis.

**iii. Sampling Technique:**

The sampling technique used in this study was Purposive sampling.

**Sample selection criteria:****Inclusion Criteria:**

- The Patients with chronic kidney disease
- Patients who had muscle cramps during haemodialysis.
- Patients who are alert and cooperative.

- Patients undergoing Haemodialysis at Sundaram Hospital,Trichy.

**Exclusion Criteria:**

- Patients undergoing emergency and first haemodialysis
- Patients with any lower limb disability
- Patients undergoing peritoneal dialysis.
- Patients referred from other hospital for dialysis.
- Patient with altered sensorium.

**Description of Tool:**

**Section-A**

**Demographic variable:**

It includes age, gender,Religion,Education, Occupation, Family Monthly Income, Marital Status, Locality, duration of treatment and food habits. No score was allotted for this section and it was used for descriptive analysis.

**Section- B:**

**Self made muscle Cramp questionnaire chart.** The muscle cramp questionnaire chart was designed to assess the level of muscle cramps during haemodialysis, before and after intervention. It contains various features of muscle cramps such as the frequency of muscle cramps, duration of muscle cramps, level of pain, temperature and discomfort which was comprehensively scored as level of muscle cramps ranging from (0-13).

**Score Interpretation:**

<b>Description</b>	<b>Score</b>
No cramps	0
Mild cramps	1-4
Moderate cramps	5-8
Severe cramps	9-13

**Section-C**

The Numerical Pain rating Scale. This Scale Consisted of Pain Score ranging from 0-10.

**Score Interpretation:**

Description	Score
No Pain	0
Mild Pain	1-4
Moderate Pain	5-8
Severe Pain	10

**Validity**

Content validity of the tool was obtained on the basis of opinion of medical surgical Nursing experts (3). The tool was found valid, suggestions were incorporated.

**Reliability:**

The reliability of the muscle cramp questionnaire scale was established by Karl Pearson's co-relation co-efficient, by test- retest method and reality was  $r = 0.93$ . Hence the tool was reliable and it was used for the study.

To ensure the reliability of the tool, it has been administered to three patients with muscle cramp. The reliability of the Numerical Pain rating Scale was established by inter – rater reliability method. Hence the tool was reliable and it was used for the study.

**Pilot Study:**

In order to find out feasibility and practicability a pilot study was conducted at Kauvery Hospital for a period of one week among 3 patients with muscle cramp. The study was found feasible to conduct.

**Method of Data Collection:****Ethical Consideration:**

Formal permission was obtained from the chairman of the Sundaram Hospital Trichy, informed consent was obtained.

**Period of Data Collection:**

The Data Collection was done at Sundaram hospital, Trichy. Permission was obtained before data collection. The Objective of the study was explained to the director and other professional to get the cooperation during the procedure. Oral consent was obtained. 30 patients with muscle cramps during haemodialysis was

selected on the basis of purposive sampling technique. Before Administering the intra- dialytic stretching exercise to the subjects, demographic data, muscle cramp status was assessed as a pre-test. Then the intra-dialytic stretching exercise was administered to the subjects with muscle cramp questionnaire from the first day. The investigator administered intradialytic stretching exercise to the subjects for 20mints for five consecutive days. Then the post-test muscle cramp was assessed every day after intervention. Five patients were interviewed per day and it took 20 minutes for each subject.

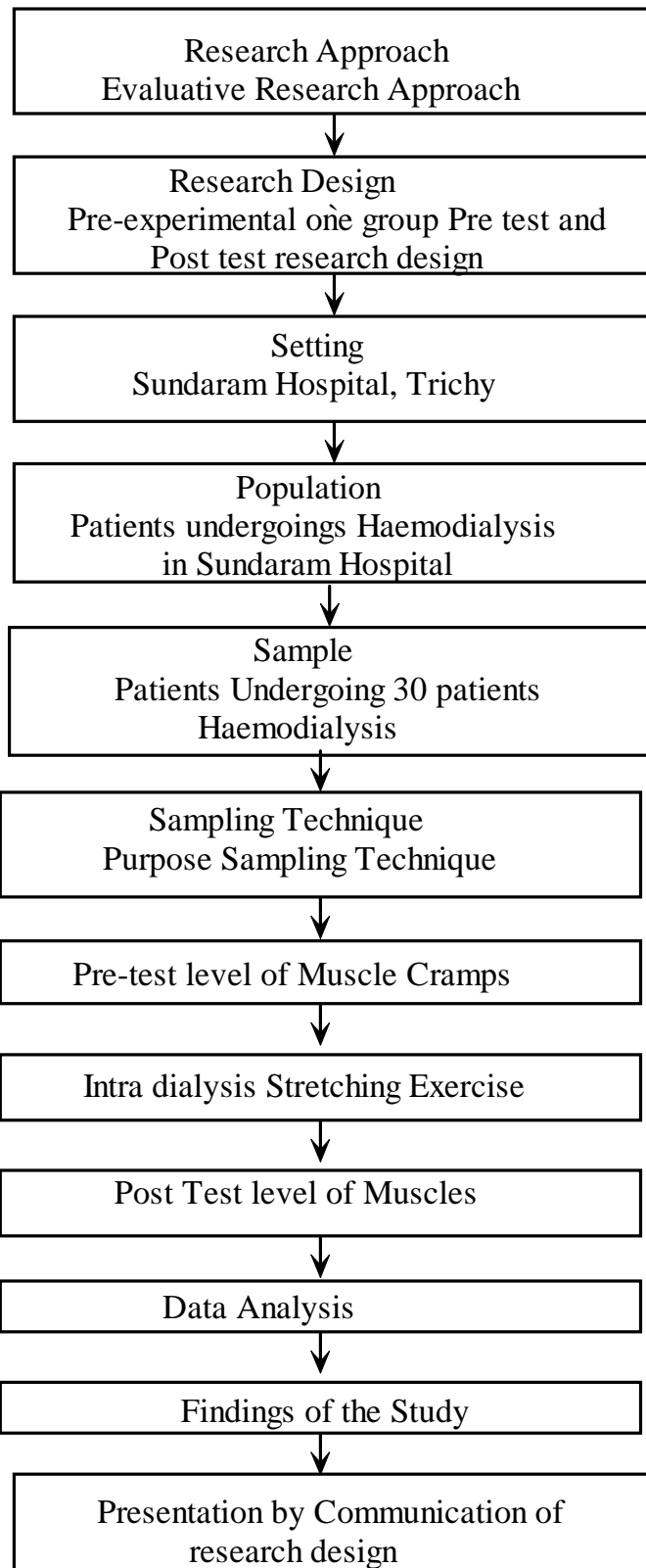
**Plan for Data Analysis:**

Both descriptive and inferential statistics will be used to analyse the data.

**PROTECTION OF HUMAN RIGHTS**

The study was approved by the dissertation committee prior to the conduction of pilot and main study. The investigator obtained oral and written permission from the respective authorities of the hospital. Both verbal and informed written consent was obtained from each subject by explaining the purpose of the study prior to the data collection. Assurance was provided to the subject that the anonymity, confidentiality and subject privacy will be guarded throughout the study.





**FIG: 3.2 Schematic representation of the study**

**CHAPTER IV**  
**DATA ANALYSIS AND**  
**INTERPRETATION**

## **CHAPTER-IV**

### **DATA ANALYSIS AND INTERPRETATION**

**Polit and Hungler,(2015)** Analysis is a process of organizing the data in such a way that research question can be answered. Interpretation is the process of making sense of results and examining the simplification of the findings within a broader context.

In this chapter the data collected were systematically processed, tabulated and made suitable for analysis and interpretation. The data was collected to assess the effectiveness of the intradialytic stretching exercises in reducing the muscle cramps during haemodialysis. A sample of 30 respondents was selected, the result obtained were classified, tabulated and the following analysis were performed in fulfilling the objective of the study.

#### **ORGANIZATION OF DATA**

The analysis of data was organized and presented under the following sections.

##### **Section A:**

Assessment of demographic variables of patients undergoing haemodialysis with muscle cramps.

##### **Section B:**

Assessment of level of muscle cramps before and after intradialytic stretching exercise among patients undergoing Haemodialysis.

##### **Section C:**

Effectiveness of Intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis.

##### **Section D:**

Association between the post test level of muscle cramps and selected demographic variables.

## PRESENTATION OF DATA

### SECTION A:

**Table: 4.1 Distribution of Subject according to their Demographic Variables.**  
N=30

S.NO	DEMOGRAPHIC VARIABLES	F	%
1	<b>AGE</b>		
	40-50 years	08	26.7
	51-60 years	16	53.3
	61-70 years	06	20.0
2	<b>SEX</b>		
	Male	20	66.7
	Female	10	33.3
3	<b>RELIGION</b>		
	Hindu	26	86.7
	Christian	03	10.0
	Muslim	01	03.3
4	<b>EDUCATION</b>		
	No formal education	02	06.7
	Primary education	09	30.0
	High school	08	26.7
	Higher secondary	01	03.3
	Collegiate	10	33.3
5	<b>OCCUPATION</b>		
	Home maker	09	30.0
	Daily wage labourer	05	16.7
	Business	05	16.7
	Government employee	09	30.0
	Private employee	02	06.3
6	<b>FAMILY MONTHLY INCOME</b>		
	Below 3000	09	30.0
	3001-5000	02	06.7
	5001-10000	10	33.3

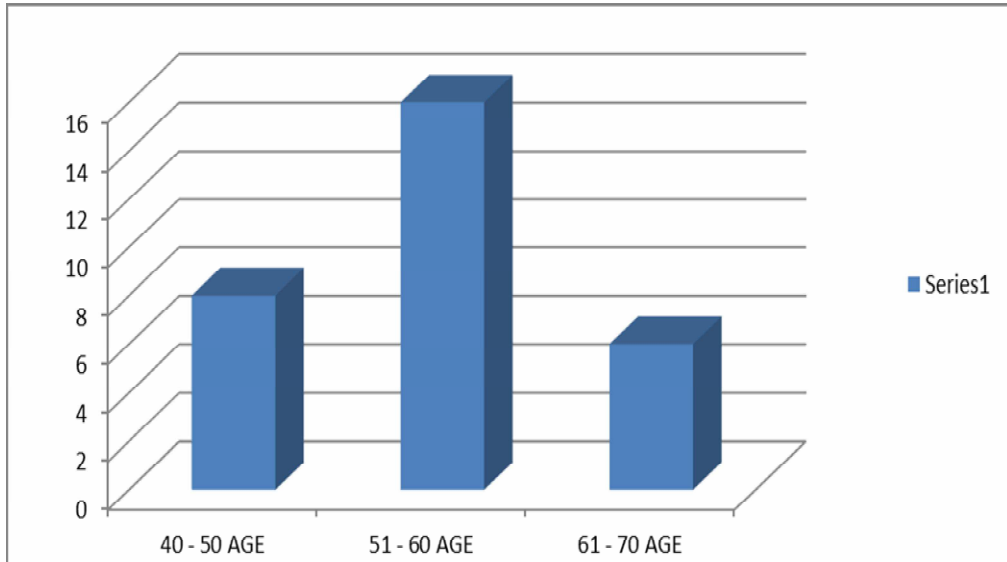
	Above 10000	09	30.0
7	<b>MARITAL STATUS</b>		
	Married	30	100
	Unmarried	-	-
	Divorced	-	-
8	<b>LOCALITY</b>		
	Urban	20	66.7
	Rural	10	33.3
9	<b>DURATION OF TREATMENT</b>		
	Less than 01 year	17	56.7
	01-03 years	13	43.3
	More than 03 years	-	-
10	<b>FOOD HABITS</b>		
	Vegetarian	12	40
	Non-Vegetarian	13	43.3
	Both	05	16.7

Table 4.1 shows the distribution of demographic variables among the patient undergoing Haemodialysis with muscle cramps.

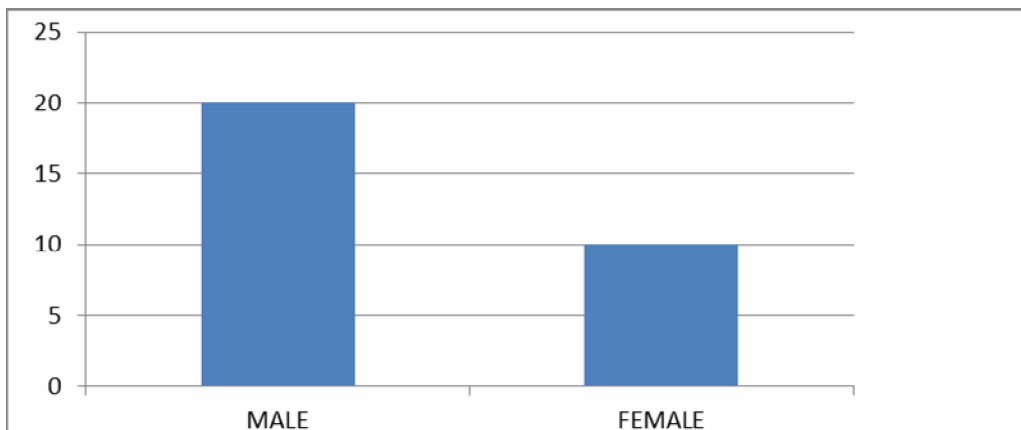
This table revealed that according to their demographic variables majority of the subjects 16(53.3%) were in the age group of 51-60years, Gender 20(66.7%) were Male, Religion 26(86.7%) were Hindu, Education 10(33.3%) were collegiate, Occupation 09(30.7%) were of Home maker and 09(30.7%) were of Government employee.

According to Family income 9(30.0%) were between 5001-10000, and 9(30.0%) were of below 30,000, Marital status 30(100%) were married, Locality 20(66.7%) were and 9(30.0%) were urban, Duration of treatment 17 (56.7%) were of less than one year and food habits 13 43.3% were of non - vegetarian

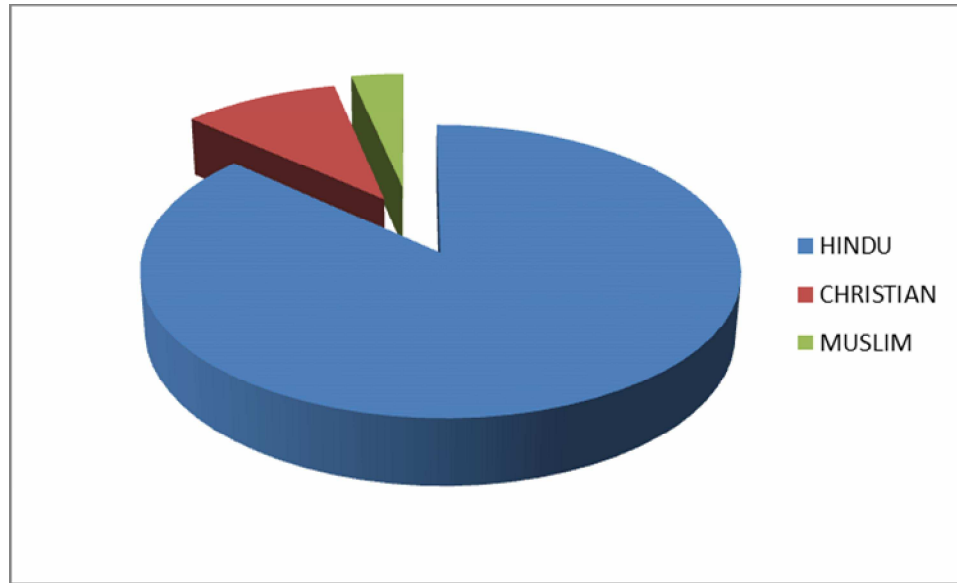
**Fig. 4.1 Distribution of Age**



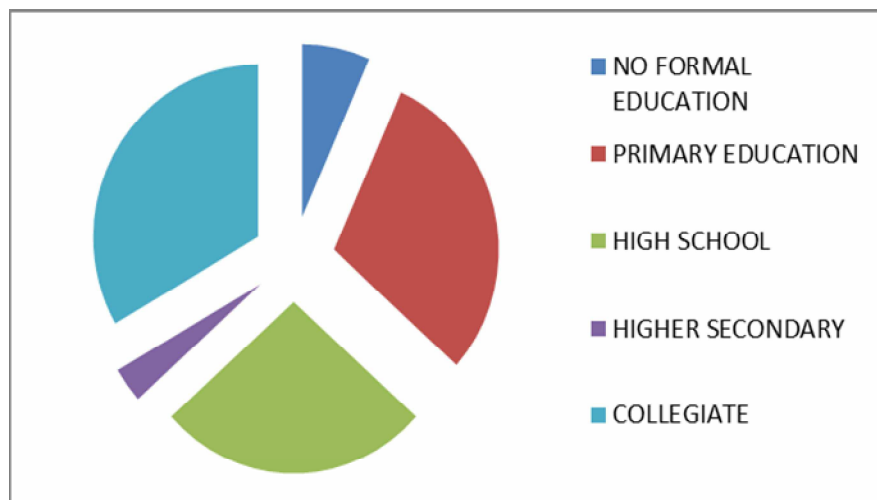
**Fig. 4.2 Distribution by Sex**



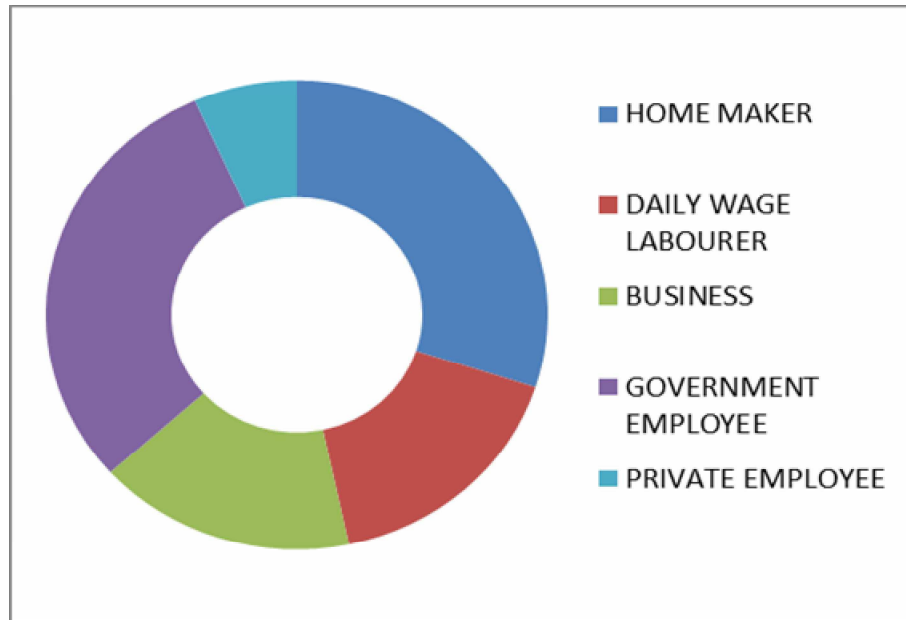
**Fig. 4.3 Distribution by Religion**



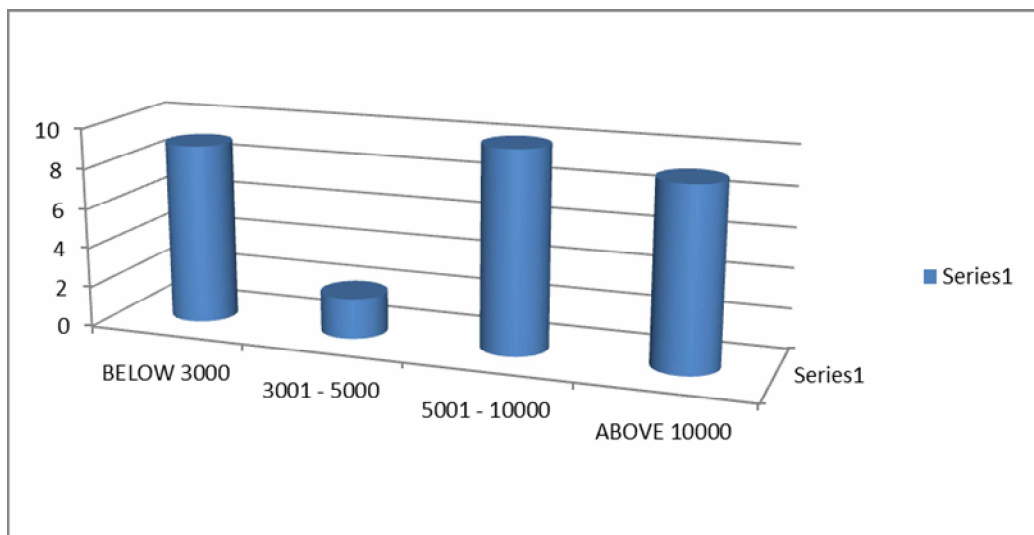
**Fig. 4.4 Distribution by Education**



**Fig. 4.5 Distribution by Occupation**

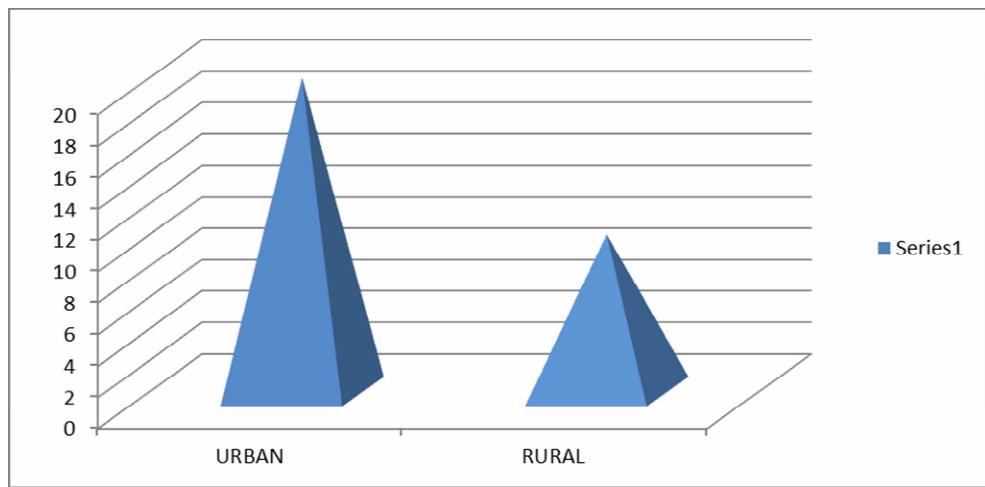


**Fig. 4.6 Family Monthly Income**





**Fig. 4.7 Distribution by Locality**



## SECTION B

**TABLE: 4.2 Assessment of Level of muscle cramps among the patients under going haemodialysis before and after intradialytic stretching exercise.**

S.no	Level of muscle cramps	Before Intra dialytic stretching exercise		After Intra dialytic stretching exercise	
		Frequency	Percentage	Frequency	Percentage
1	No muscle cramps (0)	0	0	0	0
2	Mild muscle cramps(1-4)	0	0	0	0
3	Moderate muscle cramps(5-6)	4	13.33	12	40.00
4	Severe muscle cramps(9-13)	26	86.67	18	60.00

The above table shows the level of muscle cramps before and after the intradialytic stretching exercise. It shows that majority of the patients undergoing haemodialysis had severe 26(86.67%) muscle cramps before the intradialytic stretching exercise and 4(13.33%) Patients had moderate muscle cramps. But after the intervention of intradialytic stretching exercise 18(60%) had severe muscle cramps. 12 (40%) had moderate muscle cramps. And this value shows that there is a significant improvement in the reduction of muscle cramps after the intervention of intradialytic stretching exercises.

## SECTION: C

**TABLE 4. 3: Assessment of pre-test and post-test levels of muscle cramps among the patients undergoing haemodialysis.**

	MEAN	SD	PAIRED T VALUE	MEAN DIFFERNCE
PRE TEST	11.1	1.44	10.07	-2.34
POST TEST	8.76	1.65		

\* Significant at  $P \leq 0.05$ .

The value of t is -10.074721. The value of p is  $< 0.00001$ . The result is significant at  $p \leq 0.05$ .

**SECTION: D**

**TABLE 4.4 : Assessment of association between the post test scores of muscle cramps among the patients undergoing haemodialysis with demographic variables.**

S no	Demographic variable	Level of cramp		Chi Square	Df	Level of significance 0.05
		0- moderate	Severe			
1	<b>Age</b>					
	40-50 yrs	5	3	5.781	2	5.991
	51-60 yrs	7	9			
	61-70 yrs	0	6			
2	<b>Gender</b>					
	Female	4	6	12.981*	1	3.841
	Male	8	12			
3	<b>Religion</b>					
	Hindu	12	14	3.077	2	5.991
	Christian	0	3			
	Muslim	0	1			
4	<b>Education</b>					
	No formal	0	2	16.123*	4	9.488
	Primary education	2	7			
	High school	1	7			
	Higher secondary	0	1			
	Degree	9	1			
5	<b>Occupation</b>					
	Home maker	3	6	4.583	4	9.488
	Daily wage labourer	1	4			
	Business	4	1			
	Government employee	3	6			
	Private employee	1	1			
6	<b>Family income</b>					
	Below 3000	1	8	7.13	3	7.815
	3001-5000	1	1			
	5001-10000	7	3			
	Above 10000	3	6			
7	<b>Marital status</b>					
	Married	12	18	2	3	7.815
	Unmarried	0	0			
	Divorced	0	0			

	Widow	0	0			
8	<b>Locality</b>					
	Urban	5	15	<b>5.625</b>	1	3.841
	Rural	7	3			
9	<b>Duration of treatment</b>					
	Less than 1 year	3	10	5.129	2	5.991
	1-3 years	11	6			
	More than 3 years	0	0			
10	<b>Food habits</b>					
	Vegetarian	4	8	1.0628	2	5.991
	NON vegetarian	5	8			
	Both	3	2			

The above table shows association between level of muscle cramp score and demographic variables.

There is a significant association such as gender, education and locality. But there is no any significance association between age, religion, occupation, family income, marital status, duration of treatment, Food habits.

\* Significant at  $P \leq 0.05$

**CHAPTER V**  
**RESULT AND DISCUSSION**

## CHAPTER –V

### RESULTS AND DISCUSSION

This chapter deals about the discussion of the study with appropriate statistical analysis and the finding based on the objectives and hypothesis of the study.

The study was a quasi-experimental study. The problem stated as A study to evaluate the effectiveness of intradialytic stretching exercises on reduction of muscle cramps among patients undergoing haemodialysis at Sundaram hospitals, Trichy

#### **Distribution of sample characteristics**

Thirty demographic variables were assessed the distribution of demographic variables among the patient undergoing Haemodialysis with muscle cramps.

This study revealed that according to their demographic variables majority of the subjects 16(53.3%) were in the age group of 51-60years, Gender 20(66.7%) were Male, Religion 26(86.7%) were Hindu, Education 10(33.3%) were collegiate, Occupation 09(30.0%) were of Home maker and 09(30.0%) were of Government employee.

According to Family income 10(33.3%) were between 5001-10000, Marital status 30(100%) were married, Locality 20(66.7%) were and 9(30.0%) were urban, Duration of treatment 17 (56.7%) were of less than one year and food habits 13 (43.3%) were of non – vegetarian. The study shows the level of muscle cramps before and after the intradialytic stretching exercise. It shows that majority of the patients undergoing haemodialysis had severe 26(86.67%) muscle cramps before the intradialytic stretching exercise and 4(13.33%) Patients had moderate muscle cramps. But after the intervention of intradialytic stretching exercise 18(60%) had severe muscle cramps. 12(40%) had moderate muscle cramps. And this value shows that there is a significant improvement in the reduction of muscle cramps after the intervention of intradialytic stretching exercises

Assessment of pre-test and post-test levels of muscle cramps among the patients undergoing haemodialysis.

The value of t is -10.074721. The value of p is  $< 0.00001$ . The result is **significant at  $p \leq 0.05$** .

Assessment of association between the post test scores of muscle cramps among the patients undergoing haemodialysis with demographic variables shows that there is a significant association such as gender, education and locality. But there is no any significance association between age, religion, occupation, family income, marital status, duration of treatment, Food habits.

**\* Significant at  $P \leq 0.05$**

**Memune Sena Ulu, Ahmet Ashen., (2015)** This chapter deals with the discussion of the study findings and the results by relating with the results of previous studies. The discussion section makes sense of the research results. Muscle cramps during haemodialysis can be so severe that the dialysis treatment can be stopped. Many approaches for the treatment of haemodialysis treatment related cramps have been proposed, but most have been associated with serious side effects. Immediate relief from the cramp can be obtained by passively stretching the affected muscle. The use of regular stretching exercises helps to prevent the muscle cramps.

**Demographic profile and clinical variables of patients undergoing haemodialysis:**

**Chadchavalpanichaya, Srisawasdi, Suwannakin, (2009)** Most of the patients belongs to 51-60 years of age which comprises of 16 (53.3%) patients from the intervention group. This study was supported by a prospective, randomized singleblinded controlled trial in which the mean age of the patients undergoing haemodialysis was older than 51 years.

**Basemath .S.S. Morris, 2014** Majority of the patients were male which comprises of 20(66.7%) patients from the intervention group. This was stated contradictory by a study in which the majority of the patients were female who has reported muscle cramps.

**Silva. S.F, et al., (2013)** Most of the patients were diagnosed to have chronic kidney disease and their duration of treatment for less than 1 year which comprises of 17(56.7%) patients from the intervention group. It was supported by a study



conducted to assess the physical therapy on muscle cramps in which the patients with chronic kidney disease were participated.

### **5.2 Assessment of muscle cramps among patients undergoing haemodialysis after performing intradialytic stretching exercises.**

**Magda Mohamed, Amal Mohamed, Shalabia Abo Zead, (2007)** Among 30 patients in intervention group, majority of the patients 13 (43.3%) patients experienced mild muscle cramps during the post test. More than half of the patients 17 (56.7%) patients did not experience cramps during the post test. This results describes the effect of intradialytic stretching exercises in reducing the muscle cramps during haemodialysis. This study were supported by an another study in which performing intradialytic stretching exercises reduces the level of muscle cramps were statistically significant with the level of significance at  $p < 0.05$ .

### **Assessment of pain level of muscle cramps among patients undergoing haemodialysis after performing intradialytic stretching exercises.**

**Blyton. F, Chuter. V, Walter. K.E, Burns. J., (2007)** Among 30 patients in intervention group, Most of the patients 17 (56.7%) experienced no pain during the post test. Some of the patients 13 (43.3%) did not experience pain during the post test. This results describes the effect of intradialytic stretching exercises in reducing the pain level of muscle cramps during haemodialysis. This study were supported by a randomised controlled trial of non drug therapies for lower limb muscle cramps in which performing stretching exercises reduces the level of pain and the severity of the muscle cramps during haemodialysis.

### **Association between the level of muscle cramps and demographic variables in intervention group among patients undergoing haemodialysis.**

**Brass, Adler, Siestema, et al., (2007)** There was no association found between the level of muscle cramps and the demographic variables. It was also supported by a study in which the peripheral arterial disease has no relationship on muscle cramps.

**CHAPTER VI**  
**SUMMARY AND**  
**CONCLUSION**

## CHAPTER VI

### SUMMARY AND CONCLUSION

The present study focused on reducing the level of muscle cramps of patients undergoing haemodialysis by providing intradialytic stretching exercises during the third and fourth hour of a haemodialysis. Literatures related to the intradialytic stretching exercises on reduction of muscle cramps were reviewed. It revealed that intradialytic exercise every 20 minutes during the last two hours of dialysis helped to reduce and even prevent muscle cramps.

Some of the other studies revealed that stretching before sleep reduces the nocturnal leg cramps. There were many studies tested the level of muscle cramps by performing resistance exercises than the stretching exercises. Most of the studies were focused on the muscle loss, functional performance, and the efficacy of the haemodialysis. Hence this study was focused on the reduction of muscle cramps and incorporated this intradialytic stretching exercises as an evidenced based nursing practice.

The design adopted for this study is pre-test post-test with control group, which is a type of quasi-experimental research design. The study was conducted on 30 samples those who had muscle cramps during the haemodialysis, during a period of 4 weeks in Dialysis unit Sundaram hospital, Trichy. After obtaining an informed consent, Demographic data was collected by an interview method, level of muscle cramps was assessed using the self made muscle cramp questionnaire chart (0-13 scores) which is comprehensively scored with the various features of muscle cramps. The intradialytic stretching exercises were given passively to the samples during the third and fourth hour of haemodialysis for a period of 20 minutes twice per sitting. Data were categorized and analyzed using descriptive (mean, percentage, and standard deviation) and inferential statistics (independent paired 't test', chi-square analysis).

#### **6.1 Major findings of the study:**

Thirty demographic variables were assessed the distribution of demographic variables among the patient undergoing Haemodialysis with muscle cramps.

This study revealed that according to their demographic variables majority of the subjects 16(53.3%) were in the age group of 51-60years, Gender 20(66.7%) were Male, Religion 26(86.7%) were Hindu, Education 10(33.3%) were collegiate, Occupation 09(30.0%) were of Home maker and 09(30.0%) were of Government employee.

According to Family income 10(33.3%) were between 5001-10000, Marital status 30(100%) were married, Locality 20(66.7%) were urban, Duration of treatment 17 (56.7%) were of less than one year and food habits 13 (43.3%) were of non – vegetarian

The study shows the level of muscle cramps before and after the intradialytic stretching exercise. It shows that majority of the patients undergoing haemodialysis had severe 26(86.67%) muscle cramps before the intradialytic stretching exercise and 4(13.33%) Patients had moderate muscle cramps. But after the intervention of intradialytic stretching exercise 18(60%) had severe muscle cramps. 12 (40%) had moderate muscle cramps. And this value shows that there is a significant improvement in the reduction of muscle cramps after the intervention of intradialytic stretching exercises

Assessment of pre-test and post-test levels of muscle cramps among the patients undergoing haemodialysis.

The value of t is -10.074721. The value of p is  $< 0.00001$ . The result is significant at  $p \leq 0.05$ .

Assessment of association between the post test scores of muscle cramps among the patients undergoing haemodialysis with demographic variables shows that there is a significant association such as gender, education and locality. But there is no any significance association between age, religion, occupation, family income, marital status, duration of treatment, Food habits.

**\* Significant at  $P \leq 0.05$**

**Conclusion:**

Muscle cramps are the most prevalent intradialytic complication and it is a subjective feeling that can be expressed by all the patients. There are many pharmacological and non pharmacological measures are adopted to treat the muscle cramps but the data from various studies revealed that there were no complete relief from the cramps. This study was taken up to assess the effectiveness of intradialytic stretching exercises on the reduction of muscle cramps among patients undergoing haemodialysis at Sundaram hospital, Trichy. Intradialytic stretching exercises is an effective method which can be used as a preventive therapy in the treatment of muscle cramps. By conclusion intradialytic stretching exercises helps to reduce the level of muscle cramps. Regular stretching exercises during the haemodialysis prevents the occurrence of muscle cramps and improves the quality of life among the patients undergoing haemodialysis.

**6.3 Nursing Implications:**

The present study has implications for nursing practice, nursing education, nursing administration and nursing research.

**6.3.1 Nursing Practice:**

- Intradialytic stretching exercises can be adapted as a procedure to the patients undergoing haemodialysis.
- Nurses can introduce the evidenced based practice of doing this stretching exercises during the haemodialysis session.
- Nurses must emphasize the patients comfort during haemodialysis thus helps to reduce the muscle cramps experienced by the patients.

**6.3.2 Nursing Education:**

- Intradialytic stretching exercises can be included in the literature on reduction of level of muscle cramps.
- The procedure of performing intradialytic stretching exercises for reducing the level of muscle cramps.

- Nursing students and staff nurses can be taught about the intradialytic stretching exercises for the reduction of muscle cramps.

### **6.3.3 Nursing Administration:**

- Policies for the procedure of intradialytic stretching exercises can be developed based on the study findings by incorporating the stretching exercises in to the procedure.
- Nurse Managers can educate the medical surgical nurses regarding the intradialytic stretching exercises through in service education programs.
- Nursing administrators can take up initiatives in planning and implementation of non- pharmacological therapies along with the routine therapy.

### **6.3.4 Nursing Research**

- Nurse researchers can conduct studies to verify the scientific rationale and the physiology behind the effect of intradialytic stretching exercises on level of muscle cramps.
- Randomized clinical trials could be under taken so that the validity of the results can be increased and it can be incorporated into the evidence based nursing practice.
- Guide lines for the procedure of intradialytic stretching exercises can be prepared.

### **6.4 Limitations:**

This study was limited to the samples of 30

### **6.5 Recommendations:**

6.5.1 Training can be provided to the staff nurses regarding passive intradialytic stretching exercises.

6.5.2 Structured teaching programme on active intradialytic stretching exercises can be provided to the patients undergoing haemodialysis.

6.5.3 Encourage the patients to note the frequency of muscle cramps in a diary after performing the exercises.

## **6.6 Suggestions for further study:**

6.6.1 The study can be repeated by performing massage therapy on reduction of muscle cramps.

6.6.2 A similar study can be conducted by comparing the resistance exercises and the stretching exercises on reduction of muscle cramps.

6.6.3 A similar study can be repeated in another setting in order to increase the external validity.

6.6.4 A study can be done to assess the effect of ultrafiltration rate on the level of muscle cramps.

6.6.6 A cohort study can be done to understand the effect of long term stretching exercises on prevention of muscle cramps.

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# **APPENDIX**

## **ANNEXURE- A**

### **LETTER SEEKING PERMISSION TO CONDUCT RESEARCH SYUDY**

Dated:

Trichy.

**From,**

M/S.Vimala .A,  
II Year, M.Sc Nursing Student,  
Indira college of Nursing, Konalai,  
Trichy.

**To**

**The Medical Director,**  
Sundaram Hospital,  
Trichy.

**Through,**

The Principal,  
Indira College of Nursing, Konali,Trichy.

**Respected Sir/Madam,**

**Subject:** Permission to conduct research study “Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis” at Sundaram hospital, Trichy.

I am M/s.Vimala .A studying II year M.Sc Nursing (Medical Surgical Nursing Department) in Indira college of Nursing, Konalai. As part of my M.Sc Nursing Post Graduate Degree Course, I am conducting a research project on patients undergoing haemodialysis. In this regard I would study the “Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis”. So I kindly request your permission to conduct data collection for this study in your hospital. Anticipating cooperation from your esteemed self. Kindly do the needful.

Thanking you

Yours sincerely,

301613401

## **ANNUXURE - B**

### **LETTER SEEKING EXPERT'S OPINION FOR CONTENT VALIDITY**

Dated:  
Trichy.

**From,**

M/S.Vimala.A  
II Year, M.Sc Nursing Student,  
Indira college of Nursing, Konalai,  
Trichy.

**To**

**Respected Sir/Mam,**

**Subject:** Requisition for content validity tool.

I am M/s. Vimala .A studying II year M.Sc Nursing (Medical surgical Nursing Department) in Indira college of Nursing, Konalai. As part of my M.Sc Nursing Post Graduate Degree Course, I am conducting a research project on **“A study to evaluate the Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis at Sundaram Hospital, in Tiruchirappalli District”**. A tool has been developed for the research study. I am sending the study above stated for your expert and valuable opinion. I will be thankful for your kind consideration. Kindly return it to the undersigned

Thanking you

Yours sincerely,  
301613401



## **ANNEXURE – C**

### **MEDICAL SURGICAL NURSING**

#### **LIST OF EXPERTS OF VALIDATION**

1. **DR. SPS. SUBRAMANIAN,MD, DM, (Nephrologist)**

Sundaram Hospital,

Trichy.

2. **MRS. DEVI, M.Sc (N).,**

Reader,

Child Jesus College of nursing,

Trichy.

3. **MRS. SUGANTHI, M.Sc (N).,**

Associate professor,

Jennies College of nursing,

Trichy.

4. **MRS. DAISY, M.Sc (N).,**

Associate professor,

Child Jesus College of nursing,

Trichy.

5. **MR.SENTHIL KUMAAR, S. M.Sc.,**

External professor of statistics,

Trichy.

## **ANNEXURE - D**

### **CONTENT VALIDITY CERTIFICATE**

Hereby, I certify that I have validated the tool of 301613401 studying II year M.Sc (Nursing) course (Medical Surgical Nursing) at Indira college of Nursing, Trichy, working on the dissertation of “A study to evaluate the effectiveness of Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis”.

**Signature of the expert:**

**Name:**

**Designation:**

**Date:**

**Place:**

## **ANNUXURE - E**

### **CERTIFICATE FOR ENGLISH EDITION**

#### **TO WHOMEVER IT MAY CONCERN**

This is to certify that the tool developed by 301623251 II Year M.Sc Nursing student of Indira College of Nursing for dissertation “A study to evaluate the Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis at Sundaram Hospital, in Tiruchirappalli District” edited for English language appropriateness by Mrs. Delphine xavier, M.A, B.Ed.,

**SIGNATURE:**

**NAME:**

**DESIGNATION:**

**INSTITUTION:**

**ANNUXURE – F**

**CERTIFICATE FOR TAMIL EDITION**

**TO WHOMSOEVER IT MAY BE CONCERN**

This is to certify that the tool developed by 301623251 II Year M.Sc Nursing student of Indira College of Nursing for dissertation “A study to evaluate the Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis at Sundaram Hospital, in Tiruchirappalli District” edited for Tamil language appropriateness by Mr. Thomas M.A., M.Phil., B.Ed.,

**SIGNATURE:**

**NAME:**

**DESIGNATION:**

**INSTITUTION:**

## **ANNEXURE – G**

### **CONSENT FORM- ENGLISH**

**NAME:**

**DATE:**

I have been well explained about the intradialytic stretching exercise and its importance, Here by I agree to participate in this study if any complications arises the doctors, nurses and the management is not responsible for that. I have given full freedom to leave the study at anytime and I am assured by the researcher that my information will be confidential.

**SIGNATURE**

### **நோயாளியின் தகவல் படிவம்**

நான் இந்த ஆராய்ச்சியின் நோக்கம் மற்றும் அதன் பயன்பாட்டினைப் பற்றி தெளிவாகவும், விளக்கமாகவும் தெரியப்படுத்தப் பட்டுள்ளேன். இந்த ஆராய்ச்சியில் பங்கு கொள்ளவும், இந்த ஆராய்ச்சியின் மருத்துவ ரீதியான குறிப்புகளை வரும் காலத்திலும் உபயோகப்படுத்திக் கொள்ளவும் முழு மனதுடன் சம்மதிக்கிறேன்.

ஆய்வுக்குட்படுபவரின் பெயர், முகவரி:

கையொப்பம்:

தேதி:

## ANNEXURE IV

### INSTRUMENTS AND TOOL FOR DATA COLLECTION

#### Demographic Data:

Sample No:

S.NO	DEMOGRAPHIC VARIABLES	F	%
1	<b>AGE</b> 40-50 years 51-60 years 61-70 years		
2	<b>SEX</b> Male Female		
3	<b>RELIGION</b> Hindu Christian Muslim		
4	<b>EDUCATION</b> No formal education Primary education High school Higher secondary Collegiate		
5	<b>OCCUPATION</b> Home maker Daily wage labourer Business Government employee Private employee		

<b>S.NO</b>	<b>DEMOGRAPHIC VARIABLES</b>	<b>F</b>	<b>%</b>
6	<b>FAMILY MONTHLY INCOME</b> Below 3000 3001-5000 5001-10000 Above 10000		
7	<b>MARITAL STATUS</b> Married Unmarried Divorced		
8	<b>LOCALITY</b> Urban Rural		
9	<b>DURATION OF TREATMENT</b> Less than 01 year 01-03 years More than 03 years		
10	<b>FOOD HABITS</b> Vegetarian Non-Vegetarian Both		



## **Part B**

### **Clinical Variable:**

1. What is the duration of your dialysis treatment?

- a) Days
- b) Month
- c) Years

2. How many hours you are being on dialysis in a day?

- a) 4 hours
- b) 6 hours
- c) 8 hours

3. How many sittings of hemodialysis do you have in a week?

- a) Once
- b) Twice
- c) Thrice

4. If yes, when do you experience the muscle cramps during hemodialysis?

- a) First hour
- b) Middle hour
- c) Last hour

5. Do the muscle cramps restrict your activities and movements during hemodialysis?

- a) Yes
- b) No

6. In which leg do you experience muscle cramps?

- a) Right Leg
- b) Left Leg
- c) Both Leg

7. Where do you feel the cramps?

- a) Calf
- b) Hamstring
- c) Soleus

8. Have you been diagnosed with medical condition?

- a) Diabetes mellitus
- b) Peripheral arterial disease
- c) Cirrhosis of liver
- d) Neurological disorder
- e) Any other

9. Has your quality of life deteriorated because of muscle cramps?

- a) Very much
- b) Somewhat
- c) Not at all

## SUBJECTIVE ASSESSMENT OF PAIN

### I. NUMERICAL PAIN RATING SCALE



## செய்தி சேகரிப்பதற்கான கருவிகள்

**தொகுதி அ:**

பகுதி அ: புள்ளிவிவர ஆய்வு செய்திகள்

பகுதி ஆ: மருத்துவமனை சார்ந்த கேள்விகள்

தொகுதி ஆ: தசைபிடிப்பு கேள்விகளுடன் கூடிய அட்டை மற்றும் பார்வை நிகழ்ச்சி அளவுகோலினை பயன்படுத்தி தசைப்பிடிப்பினை அளவிடுதல்

**தொகுதி :அ**

**பகுதி :அ**

புள்ளிவிவர ஆய்வு செய்திகள்:

1. மாதிரி எண்:
2. வயது:
3. பாலினம்:
4. தீர்மானிக்கப்பட்ட நோய்:
5. நோய் இருக்கும் காலஅளவு:
6. இரத்தஊடுசிகிச்சையின் எண்ணிக்கை:
7. கல்வித்தகுதி:
8. தொழில்:

## பகுதி - ஆ

1. நீங்கள் எவ்வளவு காலமாக இரத்தஊடுசிகிச்சை பெற்று வருகிறீர்கள்?  
அ. நாட்களாக                      ஆ. மாதங்களாக                      இ. வருடமாக
2. உங்களுக்கு இரத்தஊடுசிகிச்சை எத்தனை மணி நேரம் நடைபெறும்?  
அ. 4 மணி நேரம்                      ஆ. 6 மணி நேரம்                      இ. 8 மணி நேரம்
3. ஒரு வாரத்திற்கு எத்தனை முறை இரத்தஊடுசிகிச்சை பெற்று வருகிறீர்கள்?  
அ. ஒரு முறை                      ஆ. 2 முறை                      இ. 3 முறை
4. தசைப்பிடிப்பு பிரச்சனை எப்பொழுது ஏற்படும்?  
அ. முதல் மணி நேரத்தில்                      ஆ. இடைப்பட்ட நேரத்தில்                      இ. இறுதிகட்ட நேரத்தில்
5. தசைப்பிடிப்பு பிரச்சனை ஏற்படும் பொழுது வேறு இயக்க பிரச்சனை ஏற்படுகிறதா?  
அ. ஆம்                      ஆ. இல்லை
6. தசைப்பிடிப்பு பிரச்சனை எந்த காலில் ஏற்படுகிறது?  
அ. வலது கால்                      ஆ. இடது கால்                      இ. இரண்டு காலிலும்
7. உங்களுக்கு காலில் எந்த பகுதியில் தசைப்பிடிப்பு பிரச்சனை ஏற்படுகிறது?  
அ. கெண்டை கால் பகுதி                      ஆ. தொடை பகுதி                      இ. விரல் பகுதி
8. உங்களுக்கு மருத்துவ பிரச்சனை உள்ளதா?  
அ. சர்க்கரை நோய்                      ஆ. இரத்த குழாய் பிரச்சனை                      இ. கல்லீரல் வீக்க நோய்  
அ. நரம்பியல் நோய்                      உ. வேறு ஏதாவது?
9. தசைப்பிடிப்பு பிரச்சனையால் உங்கள் வாழ்க்கை தரம் பாதிக்கப்படுகிறதா?  
அ. மிகவும்                      ஆ. சில சமயம்                      இ. இல்லவே இல்லை.

**தசைப்பிடிப்பு அம்சங்கள்**

வ.எண்	தசைப்பிடிப்பு அம்சங்கள்	மதிப்பெண்
1	தசைப்பிடிப்பு ஏற்படும் முறைகள்	
அ	தசைப்பிடிப்பு ஏற்படாது	0
ஆ	தசைப்பிடிப்பு 3 முறைக்கு குறைவாக ஏற்படும்	1
இ	தசைப்பிடிப்பு 3 முறைக்கு அதிகமாக ஏற்படும்	2
2	தசைப்பிடிப்பு ஏற்படும் கால அளவு	
அ	ஏற்படாது	0
ஆ	தசைப்பிடிப்பு 5 நிமிடத்திற்கு குறைவாக ஏற்படும்	1
இ	தசைப்பிடிப்பு 5 நிமிடத்திற்கு அதிகமாக ஏற்படும்	2
3	வலியின் கால அளவு	
அ	வலி இல்லை	0
ஆ	வலியின் கால அளவு 1-3	1
இ	வலியின் கால அளவு 4-6	2
ஈ	வலியின் கால அளவு 7-10	3
4	உடல் வெப்பநிலை	
அ	வெதுவெதுப்பாக	0
ஆ	குளுமையாக	1
இ	குளுமை (அ)	2
5	தசைப்பிடிப்பினால் ஏற்படும் அசௌகரியங்கள்	
அ	தசைப்பிடிப்பு ஏற்படாது	0
ஆ	தசைப்பிடிப்பு ஏற்படுவதற்கான அறிகுறிகள் ஏற்படும்	1
இ	தசைப்பிடிப்பினை உணர முடியும்	2
ஈ	வலி இருக்கும்	3
உ	தாங்க முடியாது	4

## II. SELF MADE MUSCLE CRAMP QUESTIONNAIRE CHART

<b>S.NO</b>	<b>Feature of muscle cramps</b>	<b>Scores</b>
<b>I</b>	<b>Frequency of cramps</b>	
1	Does not occur	<b>0</b>
2	Cramps occur less than 3 times /hour	<b>1</b>
3	Cramps occur more than 3 times /hour	<b>2</b>
<b>II</b>	<b>Duration of the cramps</b>	
	Cramps does not occur	<b>0</b>
	Cramps occur lasts for less than 5 minutes	<b>1</b>
	Cramps occur lasts for more than 5 minutes	<b>2</b>
<b>III</b>	<b>Level of pain (VAS)</b>	
	No pain	<b>0</b>
	Pain 1-3	<b>1</b>
	Pain 4-6	<b>2</b>
	Pain 7-10	<b>3</b>
<b>IV</b>	<b>Temperature- Leg</b>	
	Warm	<b>0</b>
	Cold	<b>1</b>
	Cold / clammy	<b>2</b>
<b>V</b>	<b>Discomfort</b>	
	No cramps	<b>0</b>
	Perceptible	<b>1</b>
	Sensitive	<b>2</b>
	Painful	<b>3</b>
	Unbearable	<b>4</b>

### Score Interpretation:

- 0 No cramps
- 1-4 Mild cramps
- 5-8 Moderate cramps
- 9-13 Severe cramps

## **INTRADIALYTIC STRETCHING EXERCISES**

### **1. Ankle Dorsiflexion**

Place the non dominant hand over the knee to stabilize the knee Place the dominant hand under the heel, with the foot against the forearm, and push the heel downward with this hand.

- Hold the position for 20-30seconds.
- Repeat the action for 3 times.

### **2. Gastrocnemius-Passive Stretch**

To stretch one muscle (the gastrocnemius), extend the knee with one hand, place the other hand on top of the ankle, and push in the opposite direction

### **3. Soleus-PassiveStretch**

To stretch the second muscle (the soleus), flex the knee with one hand, place the other hand under the calf, and push in the opposite direction.

### **4. Hamstring Stretch**

- Place one hand under the knee and the other hand under the heel.
- With the knee straight and the kneecap pointed toward the ceiling, raise the whole leg toward the ceiling.
- When the raised knee begins to bend slightly, the hand under your knee should be moved to the top of your knee.

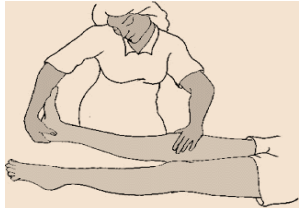







## **5. Quadriceps Stretch**

- Flex the knee of the patient until the heel touches his back.
- Place the non dominant hand over the pelvis to restrict the pelvic rotation.
- Hold the flexed knee on the hands and try to extend the hip as much as
- possible.
- Hold the position for 20 Seconds and allow to relax.
- Repeat the procedure for 3times.

## ANNEXURE V

### INTRADIALYTIC STRETCHING EXERCISES

Sl.No	Exercise	Description	Picture
1	<b>Ankle Dorsification</b>	<ul style="list-style-type: none"> <li>• Place the non dominant hand over the knee to stabilize the knee</li> <li>• Place the dominant hand under the heel, with the foot against the forearm, and push the heel downward with this hand.</li> <li>• Hold the position for 20-30 seconds.</li> <li>• Repeat the action for 5 times.</li> </ul>	
2	<b>Gastrocnemius-Passive Stretch</b>	To stretch one muscle (the gastrocnemius), extend the knee, place the other hand on top of the ankle, and push in the opposite direction	
3	<b>Soleus-Passive Stretch</b>	To stretch the second muscle (the soleus), flex the knee, place the other hand under the calf, and push in the opposite direction.	
4	<b>Hamstring Stretching</b>	<p><b>METHOD 1</b></p> <ul style="list-style-type: none"> <li>• Kneel between the legs and support the ankle with your arm or shoulder.</li> <li>• The knee will be straight.</li> <li>• Place one or both hands just above your knee, stabilizing the hip joint.</li> <li>• Raise the leg straight up to approximately 90 degrees.</li> <li>• Hold it for 20-30 seconds.</li> <li>• Repeat the action for 5 times.</li> </ul>	

		<p><b>METHOD 2</b></p> <ul style="list-style-type: none"> <li>• Place one hand under the knee and the other hand under the heel.</li> <li>• With the knee straight and the kneecap pointed toward the ceiling, raise the whole leg toward the ceiling.</li> <li>• When the raised knee begins to bend slightly, the hand under your knee should be moved to the top of your knee.</li> </ul>	
5	<p><b>Quadriceps Stretch</b></p>	<ul style="list-style-type: none"> <li>• Flex the knee of the patient until the heel touches his back.</li> <li>• Place the non –dominant hand over the pelvis to restrict the pelvic rotation.</li> <li>• Hold the flexed knee on the hands and try to extend the hip as much as possible.</li> <li>• Hold the position for 20-30 minutes and relaxes.</li> <li>• Repeat the procedure for 5 times.</li> </ul>	

## **PLAGIARISM FORM**

This is to certify that this dissertation work titled **A study to evaluate the Effectiveness of Intradialytic Stretching Exercises on Reduction of Muscle Cramps Among Patients Undergoing Haemodialysis at Sundaram Hospital, in Tiruchirappalli District**” with registration number 301613401 for the award of M.Sc (Nursing) in the branch. I Medical surgical Nursing I personally verified the [smallSEOTools.com](http://smallSEOTools.com) website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and results shows 100 percentage of unique content in the dissertation.

**Guide & supervisor sign with seal**