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Tummy crunch-based gastrocnemius strengthening exercise (TCGS) on reducing fatigue and muscle cramps among patients undergoing hemodialysis

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Abstract

Introduction: Chronic kidney disease (CKD) is a serious health issue in India, affecting over 10% of the global population, or over 800 million people. Low - and middle-income nations bear a disproportionately heavy burden from CKD due to their inability to manage its effects.

Aim of the study: The main objective of the study to assess the level of fatigue and muscle cramps of the patients undergoing hemodialysis and to evaluate the effectiveness of tummy crunch-based Gastrocnemius (TCGS) exercise on the level of fatigue and cramps among hemodialysis patients.

Methodology: A quantitative research approach was adopted for the present study. The sample size for this study was 75 CKD patients who was selected using convenience sampling technique.

Results: The present study revealed that in pretest among patients undergoing hemodialysis majority 34 (45.33%) had severe fatigue, nearly 33(44%) had very severe fatigue and only 8(10.67%) had moderate fatigue and in the posttest after the intervention almost 64(85.33%) had no fatigue and only 11 (14.67%) had mild fatigue. In pretest among patients undergoing hemodialysis, majority 51(68%) had very severe cramps, almost 14(18.67%) had severe cramps and only 10(13.33%) had moderate cramps and in the posttest after the intervention, nearly 69(92%) had no cramps and only 6(8%) had mild cramps.

Conclusion: The researcher concluded that after the administration of tummy crunch-based Gastrocnemius strengthening exercise it was found to be effective in reducing the level of fatigue and muscle cramps among hemodialysis patients in the study group.

Keywords: Knowledge, clinical features, complications, coronary artery disease, adults

Introduction

Chronic kidney disease (CKD) is a serious health issue in India, affecting over 10% of the global population, or over 800 million people. Low- and middle-income nations bear a disproportionately heavy burden from CKD due to their inability to manage its effects. CKD has emerged as one of the leading causes of death globally, with an estimated 843.6 million individuals affected in 2017. CKD is defined as decreased renal function or renal damage lasting for ≥ 3 months and is classified into five stages. People affected by CKD present with symptoms such as hiccoughs, ankle edema, muscle cramps, chest pain, breathing difficulties, pruritus, and hypertension. Dialysis, a common treatment for renal failure, is the most common treatment for CKDs, but it affects patients' everyday routine and quality of life (QOL).

Muscle cramps are the most uncomfortable experience reported by patients undergoing hemodialysis, which can be prevented by care and therapies such as massage and exercise. Depression is the most common psychological issue observed in CKD patients, leading to a high suicide rate. Hemodialysis is an ongoing process with complications like hypotension, muscle cramps, disequilibrium syndrome, and nausea during the procedure.

Fatigue is connected with low health-related quality of life and significantly predicts hemodialysis patient survival. Increased activity levels have been proven to reduce fatigue and enhance physical functioning in cancer patients. Fatigue can impair physical and psychological function and exercise performance.

Exercise-based therapies are intended to increase physical function and minimize sedentary behavior in CKD patients, with the goal of increasing exercise capacity, decreasing tiredness,

and improving QOL. Intra Dialytic exercise prescription can help improve the quality of life for CKD patients.

Need for the study

India's noncommunicable disease care, the leading cause of premature mortality and disability in the twenty-first century, is mixed. The management of people with and at risk of developing kidney disorders is particularly neglected. To better understand the burden of kidney disease, it is necessary to establish appropriate screening and early detection programs in various parts of India. Nontraditional risk factors such as maternal malnutrition, exposure to nephrotoxins, and heat stress must be better understood. In India, kidney disease is a major public health concern with high morbidity and mortality rates. The National Programme for the preventive and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) does not cover kidney treatment. Exercise is a probable preventive measure to decrease muscle protein loss and maintenance of muscle functions. Intradialytic exercise is recommended for patients to be physically active and improve their quality of life and exercise tolerance. Intradialytic exercise can also increase the efficacy of dialysis, alleviate inflammation, improve nutrition, and bone mineral density.

Statement of the problem

“A study to evaluate the effectiveness of tummy crunch-based gastrocnemius strengthening exercise (TCGS) on reducing fatigue and muscle cramps among patients undergoing hemodialysis in selected hospitals of Puducherry”

Objectives of the study

1. To assess the level of fatigue and muscle cramps of the patients undergoing hemodialysis.
2. To evaluate the effectiveness of tummy crunch-based Gastrocnemius (TCGS) exercise on the level of fatigue and cramps among hemodialysis patients.
3. To correlate the level of fatigue with muscle cramps among patients undergoing hemodialysis.
4. To determine the association among the post-test level of fatigue and muscle cramp score with selected demographic and clinical variables.

Hypothesis

H1: There will be a significant difference in level of fatigue and muscle cramp before and after implementing Tummy Crunch Based Gastrocnemius strengthening exercise patients undergoing hemodialysis.

H2: There will be a significant correlation between posttest level of fatigue and muscle cramp among the patients undergoing hemodialysis.

Assumption

- The CKD patients may have fatigue and leg muscle cramps during haemodialysis.
- The TCGS exercise may reduce the level of muscle cramp and fatigue.

Methodology

The research approach adopted for this study was Quantitative research approach. The research design

adopted for this study was pre-experimental - time series design. The setting of the study was Hemodialysis unit in selected tertiary hospitals of Puducherry. The sample size for this study was 75 CKD patients who was selected using convenience sampling technique. Inclusion criteria includes Hemodialysis patients who were willing to participate in this study and Hemodialysis patients who were available during the period of data collection.

Data collection procedure

Informed written consent was obtained from the individual patients prior to the data collection. The patients were selected who fulfill the inclusive criteria. Biographic data, pretest was performed from each patient per shift. Approximately it took 10 minutes. After that, the investigator teaches Tummy Crunch Based Gastrocnemius Strengthening exercises to each patient which took approximately 20 minutes. The TCGS exercise taught with patients during first 2 hours of hemodialysis. Per shift 8-9 patients were given TCGS exercise, totally 25 patients collected per day. The exercise was given for two days per week. For this purpose, regularly coming patients were selected. The first day 8-9 patients in 3 shifts were given Tummy Crunch Based Gastrocnemius Strengthening exercises, totally 25 patients were collected per day, during first two hours. The same intervention was provided to the same patients during their 2nd day hemodialysis treatment. Each week, two times the exercise was done by the patients during first 2 hours of hemodialysis and it was observed and monitored. Same procedure was done in each shift until 75 patients were selected. Each patient received 2 exercise per week and totally 8 interventions per month. After completing all the procedures, post-test was carried out using the same tool which used for the pretest on fourth week.

Results and Discussion

Considering the distribution of demographic variables with respect to age of the subjects on the study, majority 41 (54.7%) were among the age group of 40 - 50 years, 28 (37.3) were among the age group of >50 years, 6(8.0) was among the age group of 30-40 years, were among the age group of 18-30 nil frequency and percentage.

Regarding the gender, majority 63 (84.0) were male, 12 (16.0) were female. As per educational status, 57 (76.0) had primary education, 9 (12.0) were secondary education, 4 (5.3) had higher secondary education, 5 (6.7) were graduate and above. Regarding occupational status, 37 (49.30) were coolie, 12 (16.0) had company work, 26 (34.7) were home maker, most of the government job had not frequency and percentage.

As data pertaining to income per month, around 7 (9.3) were Rs. < 5,000/-. 68 (90.70) had an income of Rs. >10,000/- With reference to marital status, 71 (94.7) were married, 4 (5.3) were unmarried, others had not frequency and percentage. With respect to religion, 62 (82.6) were Hindu, 8 (10.7) were Christian, 5 (6.7) were Muslim, others had not frequency and percentage as statistically.

With Regard to the type of the family, 52 (69.3) were nuclear family, 14 (18.7) were joint family, 9 (12.0) were extended. Concerning the residence area of the participants, 31 (41.3) were urban, 20 (26.7) were rural, 24 (32.0) were semi urban. Distribution of Clinical Variables. With regard to family history, 25 (33.3) were diabetes mellitus, 42 (56.0)

were hypertension, 8 (10.70) where bronchial asthma others had not frequency and percentage as statistically. With reference to co morbid condition 27 (36.0) were diabetes, 41 (54.7) were hypertension, 7 (9.3) were diabetes and hypertension, others had not frequency and percentage as statistically. Concerning the duration of disease 9 (12.0) were >6-1 year, 50 (66.7) were >1-5 years, 16 (21.3) were > 5 years, others had not frequency and percentage as statistically. With reference to duration of dialysis 75 (100.0) were 4 hours, other hours had not frequency and percentage as statistically. Concerning the amount of fluid removed during dialysis 41 (54.7) were 3 liters fluid removed during dialysis, 34 (45.3) were 4 liters fluid removed during dialysis, other 1 and 2 liters had not frequency and percentage as statistically. With reference to number of current dialysis 5 (6.7) were 1-20 times, 4 (5.3) were 21-30 times, 6 (8.0) were 31-40 times, 60 (80.0) had more than 40 times. With regard to pre dialysis weight 6 (8.0) were less than or equal to 40 kg, 54

(72.0) were 41-50 kg, 15 (20.0) were 51-60, other 61-70kg and more than 70 kg had not frequency and percentage as statistically.

The first objective of the study was to assess the level of fatigue & cramps of the patients undergoing hemodialysis.

The pretest among patients undergoing hemodialysis majority 34 (45.33%) had severe fatigue, nearly 33 (44%) had very severe fatigue and only 8 (10.67%) had moderate fatigue and in the post test after the intervention almost 64 (85.33%) had no fatigue and only 11 (14.67%) had mild fatigue.

The pretest among patients undergoing hemodialysis, majority 51 (68%) had very severe cramps, almost 14 (18.67%) had severe cramps and only 10 (13.33%) had moderate cramps and in the post test after the intervention, nearly 69 (92%) had no cramps and only 6 (8%) had mild cramps.

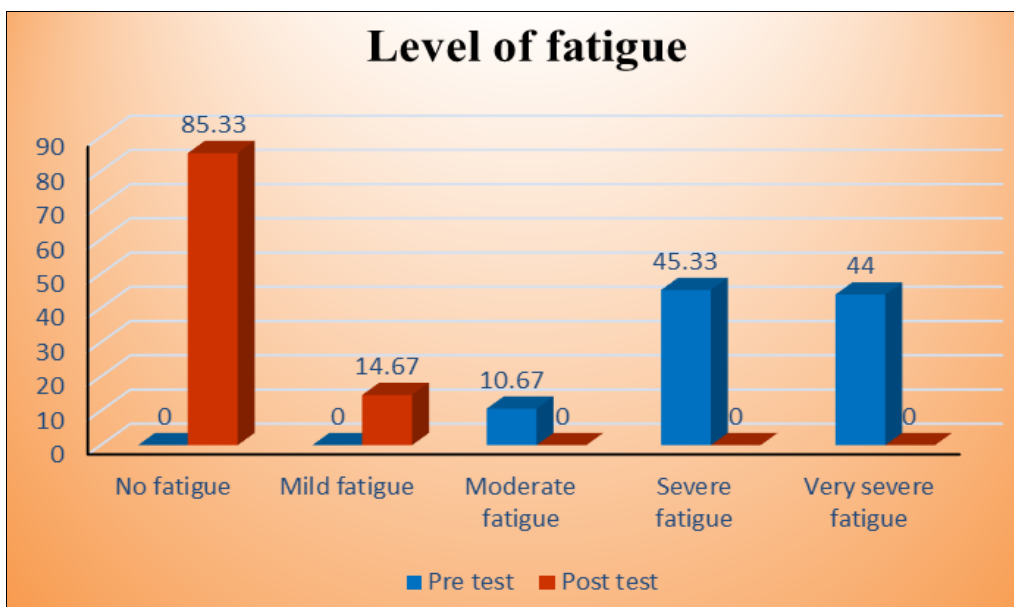


Fig 1: Percentage distribution of pretest and post-test level of fatigue among patients undergoing haemodialysis

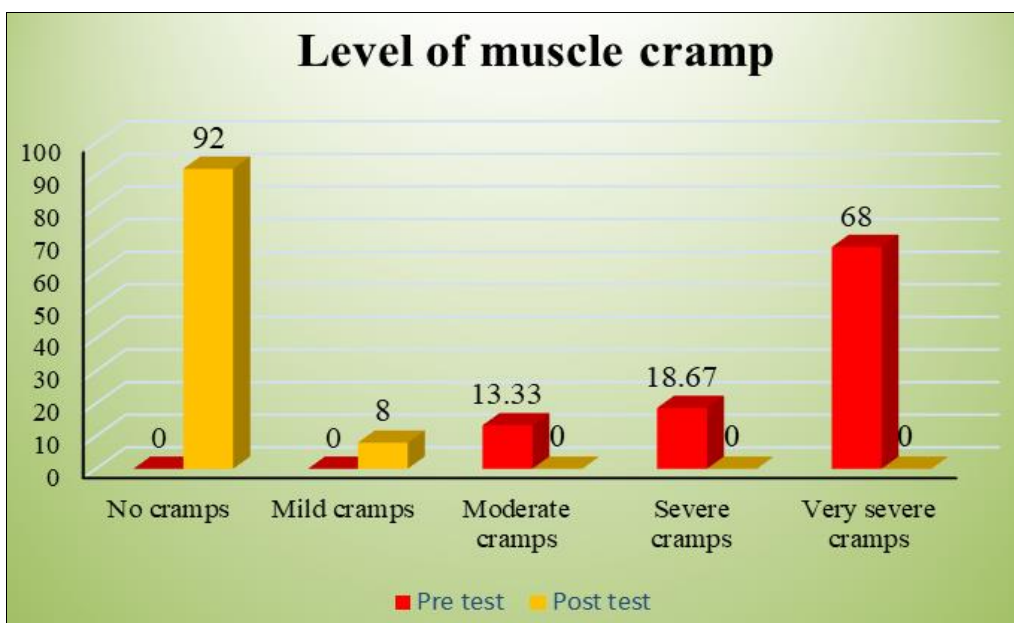


Fig 2: Percentage distribution of pretest and post-test level of muscle cramps among patients undergoing hemodialysis

The Second objective of the study was to evaluate the effectiveness of (TCGS) exercise on level of fatigue and cramps among hemodialysis patients.

The pretest mean score of fatigue was 39.76 ± 9.03 and the post-test mean score was 0.87 ± 2.15 . The mean difference score was 38.89. The calculated paired t^{''} test value of $t = 32.023$ was statistically significant at $p < 0.001$ level. This showed that there was statistically significant difference between the pretest and post-test level of fatigue scores which clearly infers that Tummy Crunch Based Gastrocnemius Strengthening Exercise on fatigue administered among patients undergoing hemodialysis was found to be effective in reducing the level of fatigue in the post test.

The pretest mean score of muscle cramps was 18.88 ± 3.84 and the post-test mean score was 0.19 ± 0.65 . The mean difference score was 18.69. The calculated paired t^{''} test value of $t = 40.890$ was statistically significant at $p < 0.001$ level. This showed that there was statistically significant difference between the pre-test and post-test level muscle cramp scores which clearly infers that Tummy Crunch Based Gastrocnemius Strengthening Exercise on muscle cramp administered among patients undergoing hemodialysis was found to be effective in reducing the level of cramp in the post test.

Table 1: Effectiveness of Tummy Crunch based Gastrocnemius strengthening exercise (TCGS) on reducing fatigue among patients undergoing hemodialysis. N = 75

Fatigue	Mean	S.D	Mean Difference	Paired 't' test Value
Pre-test	39.76	9.03	38.89	t = 32.023 p=0.0001, S***
Post Test	0.87	2.15		

*** $p < 0.001$, S - Significant

The table 1 shows that the pretest mean score of fatigue was 39.76 ± 9.03 and the post-test mean score was 0.87 ± 2.15 . The mean difference score was 38.89. The calculated paired „t“ test value of $t = 32.023$ was statistically significant at $p = 0.001$ level. This shows that there was statistically significant difference between the pretest and post-test level

The third objectives of the study was to correlate the level of fatigue with cramps among patients undergoing hemodialysis

The calculated Karl Pearson's Correlation value of $r = 0.624$ shows a moderate positive correlation which was found to be statistically significant at $p < 0.001$ level the posttest mean score of fatigue was 0.87 ± 2.15 and the posttest mean score of muscle cramps was 0.19 ± 0.65 . This clearly inferred that when after the administration of Tummy Crunch Based Gastrocnemius Strengthening Exercise the muscle cramp level among patients undergoing hemodialysis decreases which in turn decreases the level of fatigue among them.

The fourth objectives of the study were to determine the association between the posttest level of fatigue and cramp score with selected demographic and clinical variables.

The present study result revealed that the demographic variables and clinical variables had shown significant statistical association with posttest level of fatigue at $p < 0.001$ level and the posttest level of muscle cramp at $p < 0.001$ level. The others demographic and clinical variables had not statistically significant association with posttest level of fatigue and muscle cramps among patients undergoing hemodialysis.

fatigue scores which clearly infers that Tummy Crunch Based Gastrocnemius Strengthening Exercise on fatigue administered among patients undergoing hemodialysis was found to be effective in reducing the level of fatigue in the post test.

Table 2: Effectiveness of Tummy Crunch based Gastrocnemius strengthening exercise (TCGS) on preventing cramps among patients undergoing hemodialysis. N = 75

Muscle cramp	Mean	S.D	Mean Difference	Paired 't' test Value
Pre-test	18.88	3.84	18.69	t = 40.890 p=0.0001, S***
Post Test	0.19	0.65		

*** $p < 0.001$, S - Significant

The table 2 shows that the majority pretest mean score of muscle cramps was 18.88 ± 3.84 and the post-test mean score was 0.19 ± 0.65 . The mean difference score was 18.69. The calculated paired t^{''} test value of $t = 40.890$ was statistically significant at $p = 0.001$ level. This showed that there was statistically significant difference between the pretest and

post-test level muscle cramp scores which clearly infers that Tummy Crunch Based Gastrocnemius Strengthening Exercise on muscle cramp administered among patients undergoing haemodialysis was found to be effective in reducing the level of cramp in the post test.

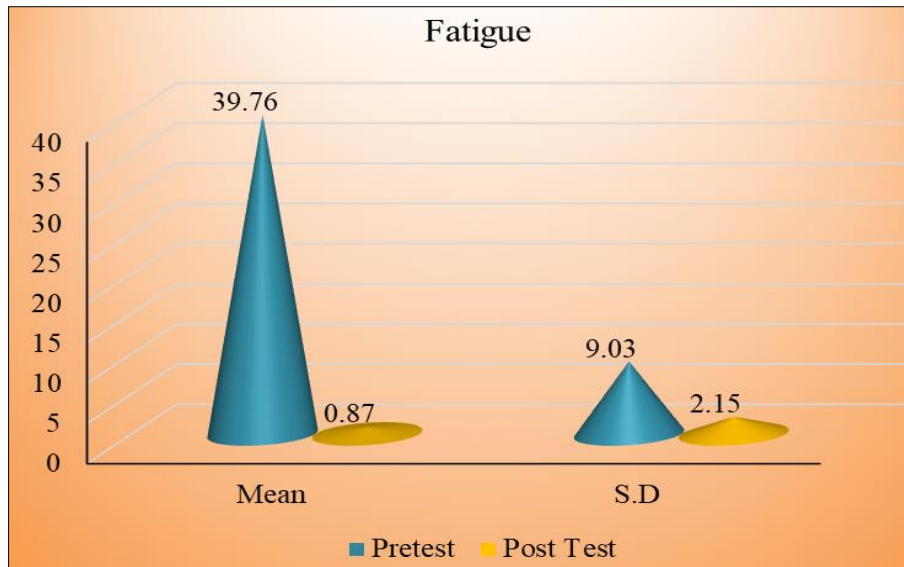


Fig 3: Comparison of pre-test and post-test fatigue scores among patients undergoing hemodialysis

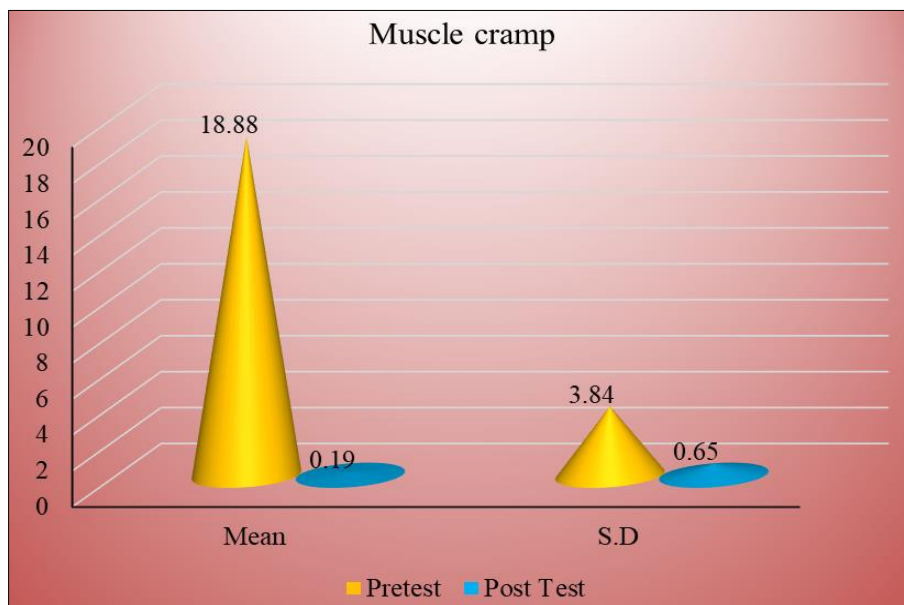


Fig 4: Comparison of pre-test and post-test muscle cramp scores among patients undergoing hemodialysis

Conclusion

The researcher concluded that after the administration of tummy crunch-based Gastrocnemius strengthening exercise it was found to be effective in reducing the level of fatigue and muscle cramps among hemodialysis patients in the study group. So, this method of selected (TCGS) exercise interventions on hemodialysis patients can be promoted by nurses in their day-to-day activities in hospital and community settings.

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