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The Effect Of Open Chain Exercises With And Without Resistance On Fatigue During Hemodialysis

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ABSTRACT

Background: The cases of chronic kidney diseases is increasing day with higher fatality. One of the commonly used treatment method for chronic kidney disease is hemodialysis. Prevalence of hemodialysis is increasing as the prevalence of chronic kidney disease is increasing. Patients who are receiving hemodialysis many times suffers from poor functional capacity , quality of life, reduced physical strength , altered mental status, fatigue. Intradialytic exercises helps in improving cardiovascular health, respiratory health, improve physical function and mental status.

Method: Sample size was 50, derived using the standard formula. The inclusion criteria were, Subjects undergoing hemodialysis having fatigue Age group 18-60 years , person willing to participate. The exclusion criteria were Patients having psychological problems, Acute or chronic conditions like MI, Congestive heart failure, unstable during dialysis, risk of fracture because this condition may worsen the condition of patient

Result: The total number of subject participated in this study was 50. The result of this study showed that in all age groups 18-29 years, 30-39 years, 40-49 years, 50-59 years there is significant improvement from pre- to post- interventions according to the Fatigue severity scale

Conclusion: According to the data obtained grom the data assessment sheet and search results, The data indicates that open chain exercises with and without resistance significantly reduce fatigue severity across all age groups studied (18-29 years, 30-39 years, 40-49 years , and 50-60 years)

Keywords: *Hemodialysis, fatigue , resistance, open chain exercises, intradialytic.*

1. INTRODUCTION

Age-associated declines in renal function is related to chronic kidney disease (CKD), which is accelerated in primary renal diseases, diabetes, obesity, and hypertension. The leading cause of morbidity and mortality is cardiovascular disease (CVD), and chronic kidney disease (CKD) is thought to be both a separate risk indicator for cardiovascular diseases (CVD) events and an accelerator of cardiovascular diseases (CVD) risk. Whatever the age, sex, or other risk factors, there is a graded inverse association between glomerular filtration rate (GFR) and the risk of Cardiovascular diseases (CVD). Poor quality of life, cognitive impairment, and hospitalization are all predicted with decreased renal function. Due to higher prevalence, the healthcare burden is greatest in the early stages, impacting approximately 35% of people. Imaging or proteinuria (often measured by the albumin to creatinine ratio) and reduced renal function (below GFR criteria derived from serum creatinine concentration) are indications of kidney impairment that characterize CKD [1]

Recent technological developments have lowered the mortality rate of end-stage renal disease (ESRD); nonetheless, the Global Burden of Disease studies have revealed chronic kidney disease (CKD) as the world's new top cause of death. According to a recent meta-analysis, individuals who began dialysis had a median five-year survival rate of just 45%. Nevertheless, renal dialysis patients worry about their survival and quality of life. The dialysis procedure is seen by the patients as a significant burden that lowers their HRQoL (health-related quality of life). Hemodialysis patients must go to the hospital or a dialysis facility two to three times a week for a three to four-hour dialysis session, which can be extremely demanding and have an impact both on their social and professional lives. Patients on kidney dialysis also frequently suffer from psychiatric illnesses, with depression being the most prevalent. [2]

Regardless of whether they are getting HD or PD or are pre-dialysis, people with chronic renal illness are known to have significant levels of weariness and frequently find it difficult to carry out their regular daily activities. Both patients' and caregivers' quality of life and capacity for self-care can be adversely affected by fatigue. Patients may be unable to conduct daily living tasks such as eating, dressing, toileting, transferring (walking), or maintaining continence to a lesser extent, depending on the intensity of their exhaustion.[4]

Hypotension, fluid overload, pericarditis, cardiovascular events, ischemic heart disease (IHD), stroke, infection (local or systemic), respiratory (pulmonary edema), gastrointestinal (nausea, vomiting), and neuromuscular (muscle cramps, restless legs, fatigue) manifestations are some of the complications of HD. Other common conditions include anemia, metabolic bone disease, soreness, itching, and sleep disturbance. After beginning HD, psychological illnesses (such as anxiety, depression, and mood swings) and HD access site issues may arise. Those who have received hemodialysis (HD) for more than five years are more likely to develop amyloidosis. There is variation in the tolerance of long-term HD, and a group of patients reported having a suboptimal ability to deal. Long-term HD patients have been found to have acquired cystic kidney disease, peripheral neuropathy, and parathyroid hyperplasia [5]

All patients were provided routine hemodialysis three times a week, with each session lasting four hours, and the researcher and resident physicians performed in-person interviews in the hemodialysis units.[6]

Research is desperately needed to find novel medicines and ways to determine which patients are most likely to benefit from them, as current treatments are only partly successful. For the majority of the previous 200 years, chronic kidney disease (CKD) and renal failure (RF) have been acknowledged as serious health issues. [7]

HD patients are more likely to die if they have sedentary lifestyles, have poorer quality of life, and have lower VO2 max. The results of earlier systematic reviews demonstrated that IDE had a good impact on HD patients, improving their quality of life (QOL), VO2 max, and dialysis efficiency (Kt/V). [8]

Intradialytic exercise training can help hemodialysis (HD) patients regain their functional ability and quality of life, since they are more passive.[9]

Low exercise capacity is an independent predictor of death in several clinical populations, because exercise necessitates the coordinated function of several essential organs.[10]

Although the life expectancy of these patients is rising dramatically with the advancements in dialysis therapy, the quality of life for those with chronic renal disease is declining due to factors such as disease stage, degree of physical activity, and cardiovascular disease.[11]

Many people on long-term dialysis suffer from fatigue, a devastating symptom or side effect. Some patients think that fatigue is more important than survival, and it has an important effect on their health-related quality of life. When attempting to reduce dialysis patients' fatigue doctors encounter multiple challenges. Correctly determining this symptom is made more difficult by the absence of a legitimate, sensitive, and reliable fatigue scale. Fatigue and the symptoms of depression and daytime sleepiness overlap, making it challenging to target particular therapies. Furthermore, a number of chronic illnesses that are prevalent in the population receiving long-term dialysis may cause fatigue and contribute to the daily and daily fluctuations in patients' fatigue levels.

Enhancing our understanding of probable mediators and potential treatments is essential to better diagnosing and treating fatigue. In summary, among dialysis patients, fatigue is a significant and frequently overlooked complaint. Potential strategies to reduce weariness in patients receiving long-term dialysis treatment should focus on raising awareness among healthcare professionals, creating better assessment techniques, better comprehending the pathophysiology, and controlling recognized contributory factors.

Subjective feelings of weakness, lack of energy, and exhaustion are called fatigue, it can be thought of as existing on a continuum with vitality and energy at one end and fatigue and exhaustion at the other. Fatigue may be associated with individual, treatment-related, behavioural, and physiological parameters in the dialysis population. Anemia, malnourishment, uremia, inadequate dialysis, hyperparathyroidism, concurrent chronic illnesses, sleep disturbances, depression, and adverse drug reactions are examples of physiological reasons. Limitations on diet and fluid intake might also be important. Higher degrees of weariness have been linked to physical inactivity. [12]

Individuals receiving renal replacement treatment exhibit a range of disease severity, which impairs their physical and mental well-being and lowers their quality of life. Changes brought on by dialysis include severe bodily discomfort, frequent bouts of exhaustion, poor self-assessment of physical health, and limits in social, self-care, and physical activities. Psychological anguish, emotional issues pertaining to the treatment's social impact, and inadequate mental health evaluation are examples of mental alterations.

Depressive symptoms were also linked to emotional and physical problems, according to a meta-analysis of hemodialysis patients. Additionally, fatigue is reported by people who exhibit symptoms of depression. Therefore, it is thought that the pathogenic mechanism for mood disorders and depression may be the same. Additionally, fatigue is sometimes linked to sleep difficulties.

Although the exact meaning of weariness is still unknown, it is frequently defined as a greater sense of weakness, exhaustion, and low energy. It is also characterized as a mental and physiological feeling [13]

Surprisingly, deep breathing and aerobic exercise have been shown to regulate the physiological functions of nearly every bodily system. Therefore, in addition to speeding up the process of producing energy, deep, slow breathing increases the amount of oxygen that is transported to essential bodily organs. Additionally, it reduces insulin resistance, lowers cholesterol, corrects anaemia, improves cardiovascular function, relaxes muscles, and lowers cholesterol, all of which help to lessen fatigue. [14]

The ability to isolate specific muscle groups using open kinetic chain exercises may aid to strengthen and reduce muscle related fatigue. For example, leg extensions primarily target the quadriceps.[15]

Multiple research investigations conducted on HD patients have demonstrated improvements in walking ability, cardiovascular function, aerobic capacity, muscle functioning and health-related quality of life with HD programs that include resistance and aerobic exercise. Finding strategies to increase the physical functioning of older patients in HD units is crucial since a growing percentage of them exhibit more sedentary behaviour. The benefits of exercise for the general public include improved insulin resistance and diabetes management, improvement in blood pressure regulation, a lower risk of cardiovascular death, better mental and physical performance, and an improvement in health-related quality of life. Since all of these comorbidities are very prevalent in CKD patients, exercise training may offer significant benefits to these patients. [16]

In hemodialysis patients, interventions that promote physical function and minimize sedentary behaviour may lower cardiovascular disease risk, improve physical functioning, increase the fitness of kidney transplant candidates, lessen tiredness, and ultimately improve quality of life. Multiple systematic studies have demonstrated that a variety of exercise training regimens can improve physical function and exercise capacity in people with dialysis-dependent chronic kidney disease (CKD). The greatest gains were seen after six months of training, and they were ascribed to higher exercise intensities and attentive monitoring. Individual aerobic and resistance exercise programs can improve aerobic capacity, but when combined, they can improve a greater variety of outcomes, including exercise capacity, according to the most recent systematic review on intradialytic exercise training.

It is commonly recognized that one of the most crucial factors influencing physical function and a prerequisite for preserving daily living activities in patients with end-stage renal disease (ESRD) is muscular strength. Furthermore, hemodialysis patients with end-stage renal disease (ESRD) have weaker muscles than people in the general population who lead sedentary lives. Isokinetic muscular strength was a significant predictor of VO2peak in dialysis patients, according to a prior study [17]

Fatigue Severity Scale

High sum scores indicate greater exhaustion. The fatigue severity scale is a nine-item, unidimensional questionnaire16 that is evaluated on a seven-point Likert scale. Studies on a variety of illnesses, such as Parkinson's disease, fibromyalgia, multiple sclerosis, and chronic hepatitis, have confirmed the scale's psychometric qualities. The fatigue severity scale has demonstrated a high level of internal consistency and acceptable test-retest reliability overall.[18]

Aim of the study-

The effect of open chain exercises with and without resistance on fatigue during hemodialysis

Materials and Methodology

The Institutional Ethics Committee approved this study. It was an experimental study. The sampling technique used was simple random sampling. Sample size was derived using the standard formula. The inclusion criteria were, Subjects undergoing hemodialysis having fatigue

Age 18-60 years , person willing to participate. The exclusion criteria were Patients having psychological problems, Acute or chronic conditions like MI, Congestive heart failure, unstable during dialysis, risk of fracture because this condition may worsen the condition of patient . Patients who are undergoing hemodialysis treatment and having fatigue were approached and motive of this study and its process was explained to each one of them. Fatigue severity scale is self reported scale . In that we assess the severity of fatigue among the subjects. After asking for consent, data from fifty patients was collected using a data collection sheet. Material used include resistance band. The study’s duration was 6 months. The main objective was determining the effect of open chain exercises with and without resistance on fatigue during hemodialysis. Pretest was taken from patients; fatigue severity scale was used to calculate fatigue. Then a structured treatment plan was given to the patient for 4 weeks. After 4 weeks of treatment protocol posttest was given to the patient and responses were taken. The data analysed using descriptive statistics for further calculation of results

Outcome measures-

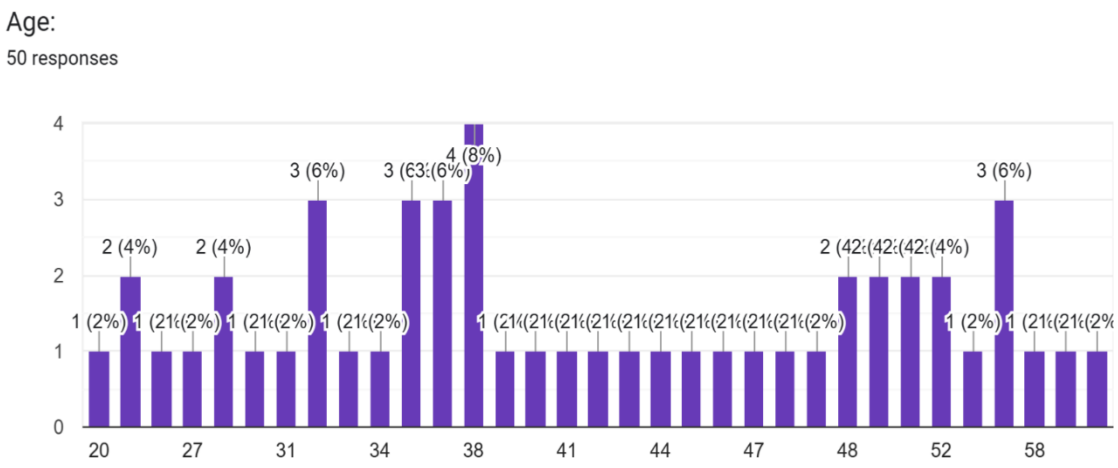
Fatigue Severity scale-

The Fatigue Severity Scale (FSS) was a used to evaluate the impact of fatigue on an individual. It is a self-reported questionnaire consists of 9 components.

Patients with chronic illnesses are greatly impacted by fatigue, a prevalent subjective health problem. The nine-item Fatigue Severity Scale (FSS-9) is well known fatigue questionnaire.

Scoring- Each item on the FSS is scored on a 7-point scale, where 1 indicates strong disagreement and 7 indicates strong agreement. The final score is calculated by summing the scores of all nine items and dividing by 9, resulting in a score between 1 and 7. A score above 4 typically indicates clinically significant fatigue.

Result



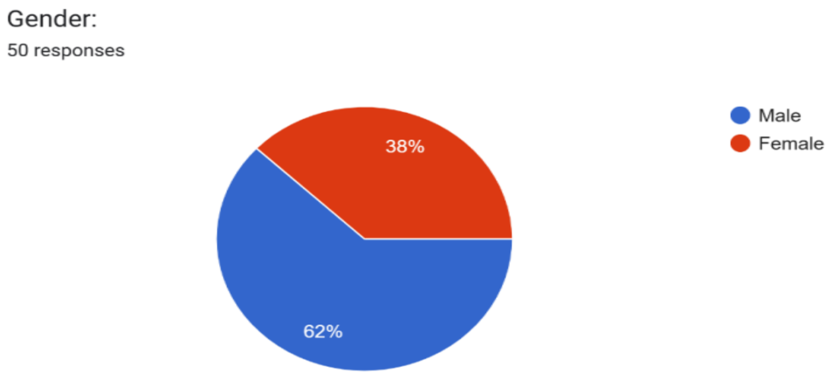
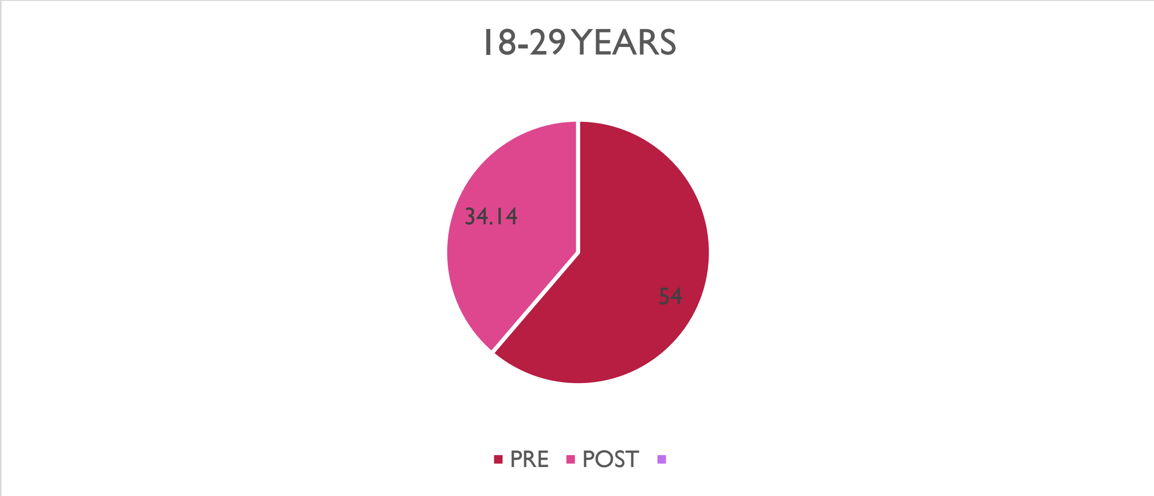


Table-1

18-29 yrs	No.of Participants	Pre	Post	p-value	t-value
Fatigue severity scale	8	54.000 ± 3.109	34.143 ± 4.914	<0.0001	10.619

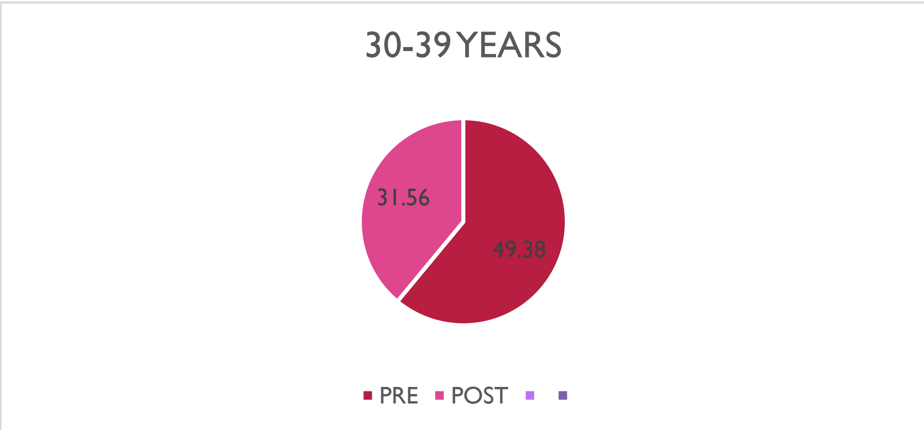


Interpretation-

In 18-29 yrs of age group 8 participant participated in study. According to the fatigue severity scale the subjects involed in this study complained of moderate fatigue there is extremely significant difference between the subjects who received the treatment protocol.

Table-2

30-39	No.of Participants	Pre	Post	p-value	t-value
Fatigue severity scale	18	49.389± 5.596	31.556 ± 4.218	< 0.0001	13.944

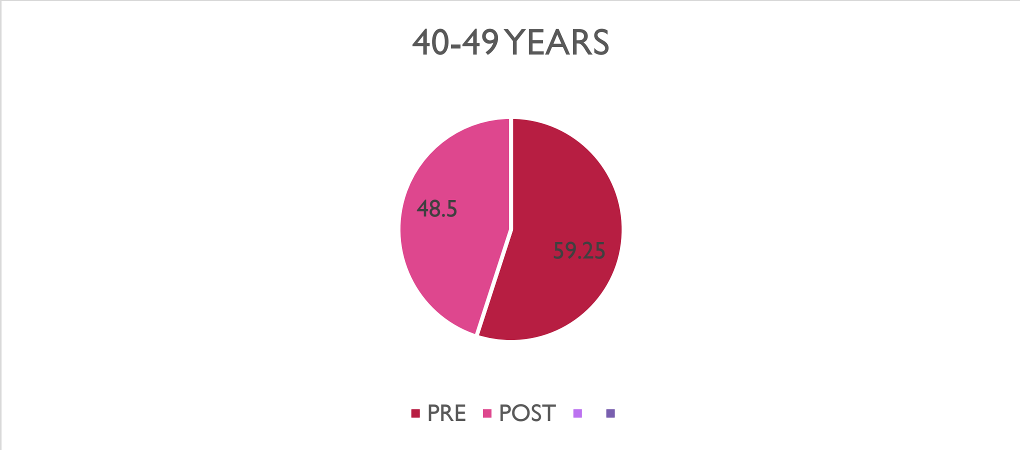


Interpretation-

In 30-39 yrs of age group 18 participant participated in study. According to the fatigue severity scale subject complained of severe fatigue there is extremely significant difference between the subjects who received the treatment protocol.

Table-3

40-49	No. of Participant	Pre	Post	p-value	t-value
Fatigue severity scale	13	59.250 ± 1.913	48.500 ± 6.516	<0.0002	5.522

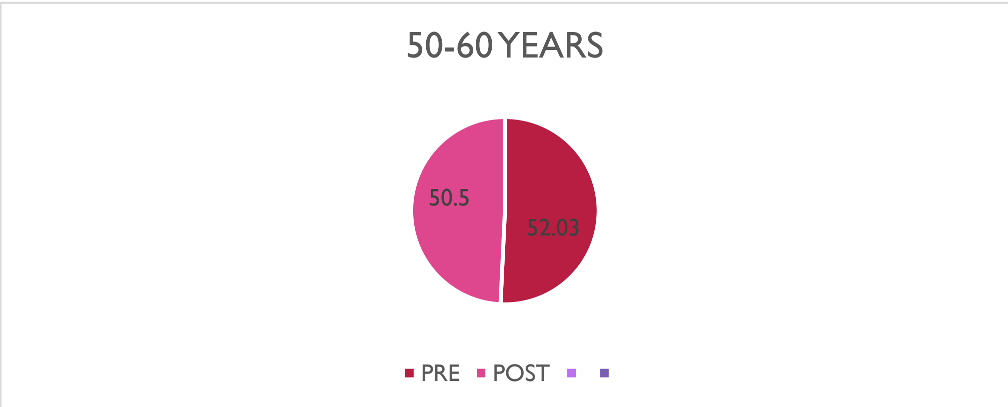


Interpretation –

In 40-49 yrs of age group 13 participant participated in study. According to the fatigue severity scale subject complained of moderate fatigue there is extremely significant difference between the subjects who received the treatment protocol

Table -4

50-60	No. of Participant	Pre	Post	p-value	t-value
Fatigue severity scale	11	52.033 ± 3.730	50.500 ± 4.338	<0.0002	5.897



Interpretation-

In 50-60 yrs of age group 11 participant participated in study. According to the fatigue severity scale subject complained of severe fatigue there is extremely significant difference between the subjects who received the treatment protocol

2. DISCUSSION

The results from the study reveal a consistent pattern of improvement in fatigue severity across all age groups. Participants aged 18-29 showed a reduction from an average fatigue score of 54.000 to 34.143, indicating a significant decrease in moderate fatigue ($p < 0.0001$). In the 30-39 age group, participants experienced a drop from 49.389 to 31.556, reflecting a shift from severe to moderate fatigue ($p < 0.0001$). Similarly, the 40-49 age group demonstrated a decrease from 59.250 to 48.500 ($p < 0.0002$), while those aged 50-60 saw their scores change from 52.033 to 50.500, also indicating significant improvement ($p < 0.0001$).These findings underscore the effectiveness of open chain exercises in reducing perceived fatigue across various demographics, suggesting that such exercises can be beneficial for individuals experiencing different levels of fatigue severity.

Understanding how open chain exercises contribute to reduced fatigue is crucial for interpreting these results. Open chain exercises typically involve movements where the distal segment (e.g., hands or feet) is free to move, allowing for targeted muscle engagement without the constraints of weight-bearing activities. This isolation can lead to focused muscle strengthening, which may enhance overall muscle efficiency and reduce fatigue during daily activities. Fatigue can arise from various factors, including muscle overuse, inadequate recovery, and psychological stressors. Open chain exercises allow for controlled movements that can help individuals build strength without excessive strain on joints or surrounding tissues. By improving muscle strength and endurance through targeted training, participants may experience less fatigue during functional tasks.

The study's findings highlight important age-related considerations regarding fatigue management through exercise. Younger participants (18-29 years) exhibited moderate fatigue levels before intervention, which decreased significantly post-exercise. In contrast, participants aged 30-39 reported severe fatigue initially, suggesting that as individuals age, they may experience greater challenges related to fatigue management. The results indicate that older adults (40-60 years) also benefit significantly from open chain exercises despite starting with higher levels of baseline fatigue. This suggests that open chain exercises can be an effective intervention across various life stages and may particularly benefit older adults who often face increased fatigue due to age-related physiological changes.

3. CONCLUSION

According to the data obtained grom the data assessment sheet and search results, here's a conclusion regarding the effect of open chain exercises with and without resistance on fatigue severity across different age groups The data indicates that open chain exercises with and without resistance significantly reduce fatigue severity across all age groups studied (18-29 years, 30-39 years, 40-49 years, and 50-60 years). In each age group, the p-value is less than 0.0002, indicating an significant difference between pre- and post-treatment fatigue levels. The t-values further support this conclusion, showing a substantial difference between the means before and after the exercise protocol. While the search results confirm that both open and closed kinetic chain exercises can reduce localized fatigue, the provided data suggests that the specific open chain exercise protocol used in this study effectively reduced perceived fatigue severity.

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