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THE IMPACT OF AEROBIC EXERCISE ON DEPRESSION, ANXIETY, AND STRESS IN PATIENTS WITH CHRONIC RENAL DISEASE- A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background and objectives

Chronic kidney disease (CKD) is a worldwide health issue, and its prevention necessitates the adoption of a healthy lifestyle. Recent studies have endorsed low-intensity exercise for patients with renal disease; however, maintaining a healthy lifestyle remains essential for treating chronic kidney disease. **Method:** The study investigates the effects of therapeutic aerobic exercise on 150 subjects with chronic renal disease, dividing the patients into two groups: a control group and an intervention group. The intervention group received a six-month aerobic exercise regimen alongside conventional therapy, while the control group received conventional care. **Results:** The study found that aerobic exercises can improve depression, anxiety, and stress. **Conclusion:** Aerobic exercise has been shown to improve depression, anxiety, and stress levels in individuals with CKD, but it is crucial to consider the patient's condition and disease stage when recommending fitness regimens.

Keywords: aerobic exercise; chronic kidney disease; CKD; Depression, Anxiety, Stress

INTRODUCTION

Chronic kidney disease (CKD) is a condition characterised by kidney damage or a glomerular filtration rate (eGFR) below 60 mL/min/1.73 m², resulting in progressive kidney function loss, and often necessitating renal replacement therapy like dialysis or transplantation. [1] Renal disorders are a global public health issue affecting over 800 million adults and 4 million people needing kidney replacement treatments. Symptoms include changes in blood or urine composition and structural abnormalities. The prevalence is rapidly spreading, with a projected 10% annual growth and similar financial and clinical burden. [2] Early detection is crucial for slowing kidney development, as increased blood pressure is a modifiable risk factor, regardless of prior kidney damage. [3]

According to a recent clinical study, by 2030, around 5 million patients with end-stage renal disease (ESRD) may require HD as a kidney replacement therapy globally. [4] Even though hemodialysis patient care and therapy have advanced significantly, the patient's long-term prognosis is still quite poor. [5] Research indicates that depression is more common in CKD patients. Moreover, oxidative damage, chronic inflammation, and cardiovascular diseases have been connected to chronic kidney

disease (CKD). Consequently, treatments that lessen stress and guard against cardiovascular problems are required. One alternative to drug methods to reduce stress and anxiety and prevent depression is to exercise [6-11]. Anxiety and depression worsen life quality and increase morbidity and death in people with chronic kidney disease [12-14]. Currently, pharmacological and non-pharmacological therapies are used in the main treatment approaches for depression. However, the majority of antidepressants cause side effects such as addiction, drug dependence, and low tolerance [15]. A prior research study showed encouraging results for non-pharmacological therapies, particularly when exercise training was added to medication. [16]

Recent international studies suggest that frequent low-intensity exercise may be beneficial for renal patients, a new concept in renal rehabilitation. [17] Further research is needed to explore the correlation between aerobic exercise and the progression of CKD in individuals already diagnosed with the condition. [18] Depression significantly affects the clinical results, treatment adherence, quality of life, and mortality of hemodialysis patients. Exercise significantly benefits people with depression; however, its quantitative effects remain unclear. [19]

METHODOLOGY

The study was conducted at the Datta Meghe Institute of Higher Education & Research in Sawangi Wardha, India, to assess the effectiveness of aerobic exercise intervention in treating CKD in patients aged 30-70 years, both male and female. Patients are divided into two groups: control and intervention, who received a six-month aerobic exercise regimen alongside conventional therapy, and the control group, which received conventional care. Participants with hypotension or hypoglycaemia were evaluated using sphygmomanometers and glucometers. Data for control group A were collected at the trial's start and six months post-intervention, while data for group B exercise intervention were collected at the trial's start and six months post-intervention. The study excludes athletes, sportspeople, those with cardiovascular dysfunction, or those unfit for aerobic exercise. Patients were instructed to perform aerobic exercise interventions, including warming up for 5 minutes, stretching, strengthening, and coordinating exercises for up to 15 minutes, and cooling down for up to 10 minutes. A DASS-21 questionnaire was used to assess depression, anxiety, and stress scores. [20]

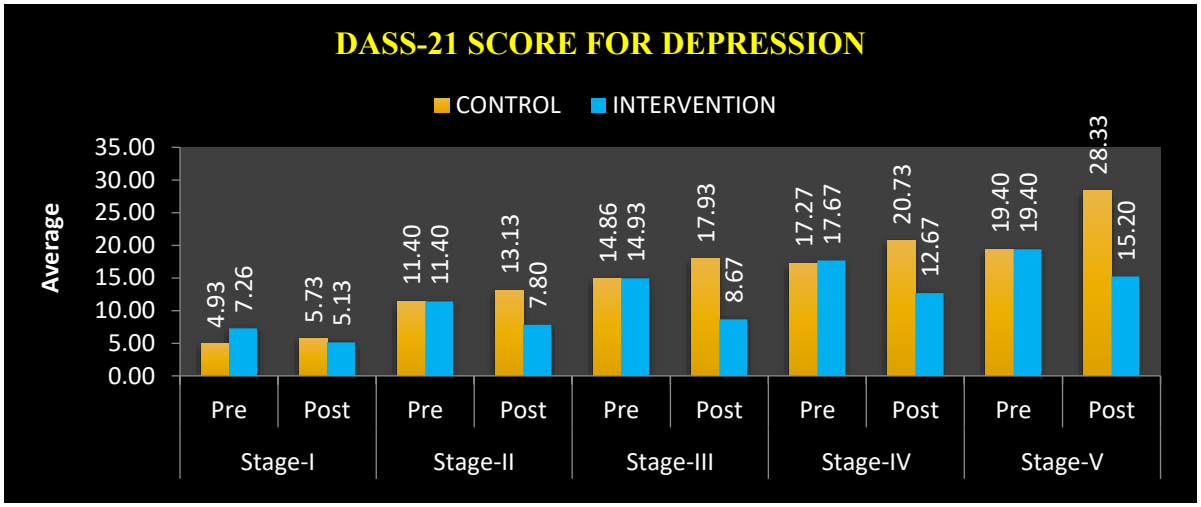
STATISTICAL ANALYSIS

The data was analysed using descriptive statistics, mean with standard error, and paired and unpaired t tests to compare the mean variables of the control and experimental groups.

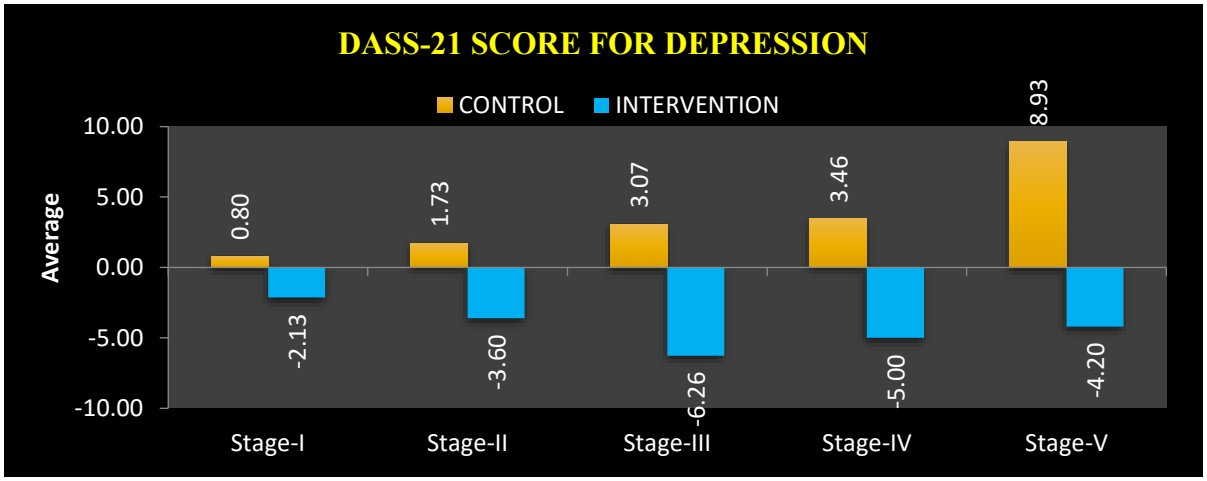
RESULT

ANTHROPOMETC VARIABLE		CONTROL					INTERVENTION				
		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Age (years)	Mean	28.13	37.50	50	55.2	66	34.53	41.53	49.87	54.8	58.8
	SD	5.99	10.06	6.76	7.87	3.96	13.82	11.04	9.43	11.64	11.6
Gender	Male	10	12	11	12	8	12	10	12	9	13
	Female	5	3	4	3	7	3	5	3	6	2
Height (cm)	Mean	158.60	167.67	165.60	166.93	163.13	162.07	163.53	166.40	165.80	165.80
	SD	9.94	4.67	7.47	4.19	4.20	8.19	5.28	4.71	3.58	4.64
Weight (kg)	Mean	64.67	67.20	66.66	72.00	66.46	66.53	65.71	66.28	67.28	66.64
	SD	6.17	4.66	5.94	5.09	4.13	4.55	3.17	3.64	3.14	4.82

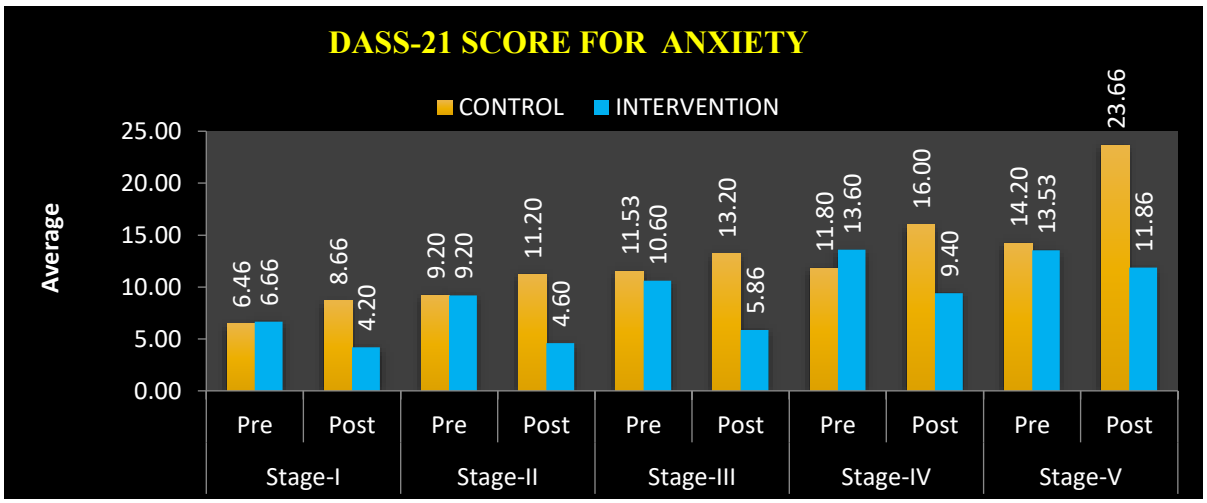
Table 1 summarises the demographic profile and anthropometric parameters of five stages of CKD patients among the control and intervention groups.



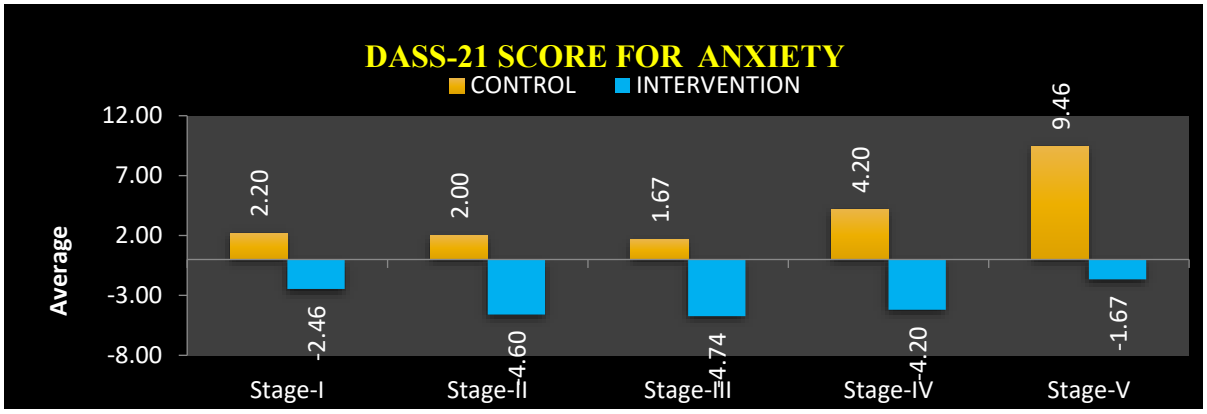
Graph No: 1. The means of the pre-and post- DASS-21 score for depression for each stage of CKD in the control and intervention groups.



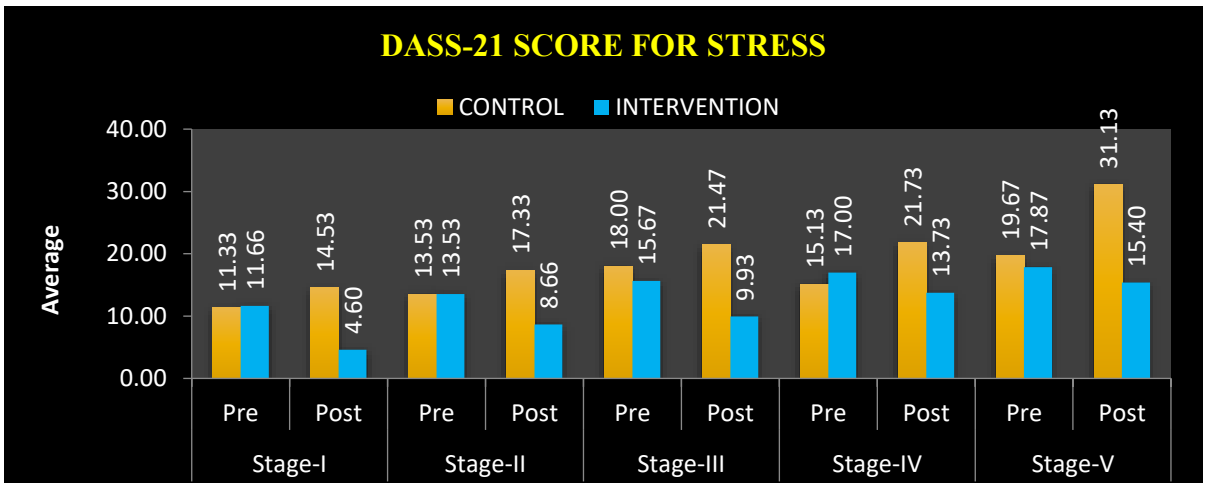
Graph No. 2. The mean differences between the post-and pre- DASS-21 score for depression for each stage of CKD in the control and intervention groups. Whereas p-value for stage-I (0.000), stage-II (0.000), stage-III (0.000), stage-IV (0.010), and stage-V (0.000).



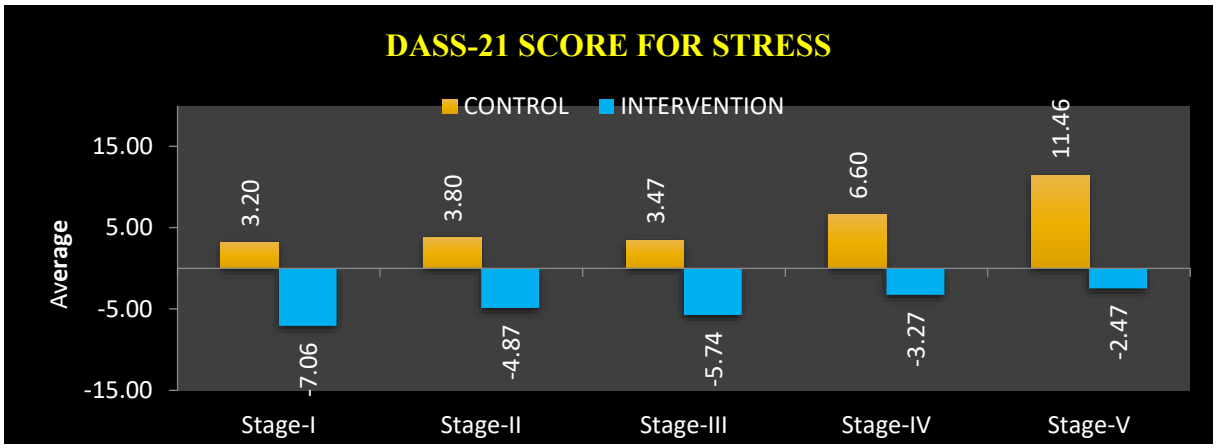
Graph No: 3. The means of the pre-and post- DASS-21 score for anxiety for each stage of CKD in the control and intervention groups.



Graph No. 4. The mean differences between the post-and pre-21 score for anxiety for each stage of CKD in the control and intervention groups. Whereas p-value for stage-I (0.000), stage-II (0.000), stage-III (0.000), stage-IV (0.010), and stage-V (0.000).



Graph No. 5. The means of the pre- and post-DASS-21 score for stress for each stage of CKD in the control and intervention groups.



Graph No: 6. The mean differences between the post-and pre-stress scores for anxiety for each stage of CKD in the control and intervention groups. Whereas p-value for stage-I (0.000), stage-II (0.000), stage-III (0.000), stage-IV (0.010), and stage-V (0.000).

Discussion

The current study's findings compared the pre- and post-mean DASS-21 score for depression, anxiety and stress of patients in the control and intervention groups at various stages of CKD. The study revealed that, although the DASS-21 score for depression, anxiety and stress did significantly

increase in the control CKD stages (I to V), on the other hand, the intervention's outcome showed that the DASS-21 depression, anxiety and stress score decreased significantly in CKD stages I to V. In the present study, it was observed that aerobic exercise improved depression, anxiety, and stress levels in the intervention group as compared with the control group. These findings are consistent with earlier studies. [21] Sharlene et al.'s study showed significant improvements in anxiety (15%) and depression (29%) in the 77 patients who completed the 12-week exercise renal rehabilitation (RR) program. [22]

Several earlier studies have shown that regular physical activity reduces symptoms of stress, anxiety, and depression. This has positive effects on both psychological and physical moods as well as overall life quality. [23-24] Frequent exercise reduces depression because it increases blood supply to the hippocampal region and promotes neuronal growth there. [25] Exercise releases beta-endorphins, which are essential for the growth of hippocampal neurons and the reduction of depression and mitigates depression by modulating growth and cortisol hormones.[26-28] Individuals who exercise aerobically are in better general condition, with more psychological and physical wellness as well as a lower overtime need for external assistance. Furthermore, it reduces the cost of medical procedures. [29]

Limitations of the study

The research, spanning six months in multiple data centres, is limited to a specific patient population, and monitoring their exercise duration proved challenging due to their usual three-day workouts at home.

Future scope of the study

The study should be conducted in multiple centres to cover a larger, specific patient area for a longer duration.

Conclusion

Aerobic exercises can improve depression, anxiety, and stress levels, making them crucial for early intervention and improving patients' quality of life. These non-pharmacological interventions are free and simple to implement, safe for this patient population if started at moderate intensity and gradually increased.

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Conflicts of interest

There are no conflicts of interest.

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