

Effectiveness of Personalized Aerobic Exercise Program in Adults Suffering from Persistent Concussion Symptoms: A Case Series

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PURPOSE / OBJECTIVES

Concussion symptoms have been shown to be non-specific (1). Even commonly endorsed symptoms typically ascribed to the brain, such as brain fog and issues with concentration have been reported after whiplash injuries (2). As such, clinicians are better able to manage patients when a standardized clinical exam is performed to sub-type the driver(s) of symptoms. Aerobic exercise has shown to be a possibly effective means to manage this population (3); however, the optimal training prescription is unclear.

METHOD

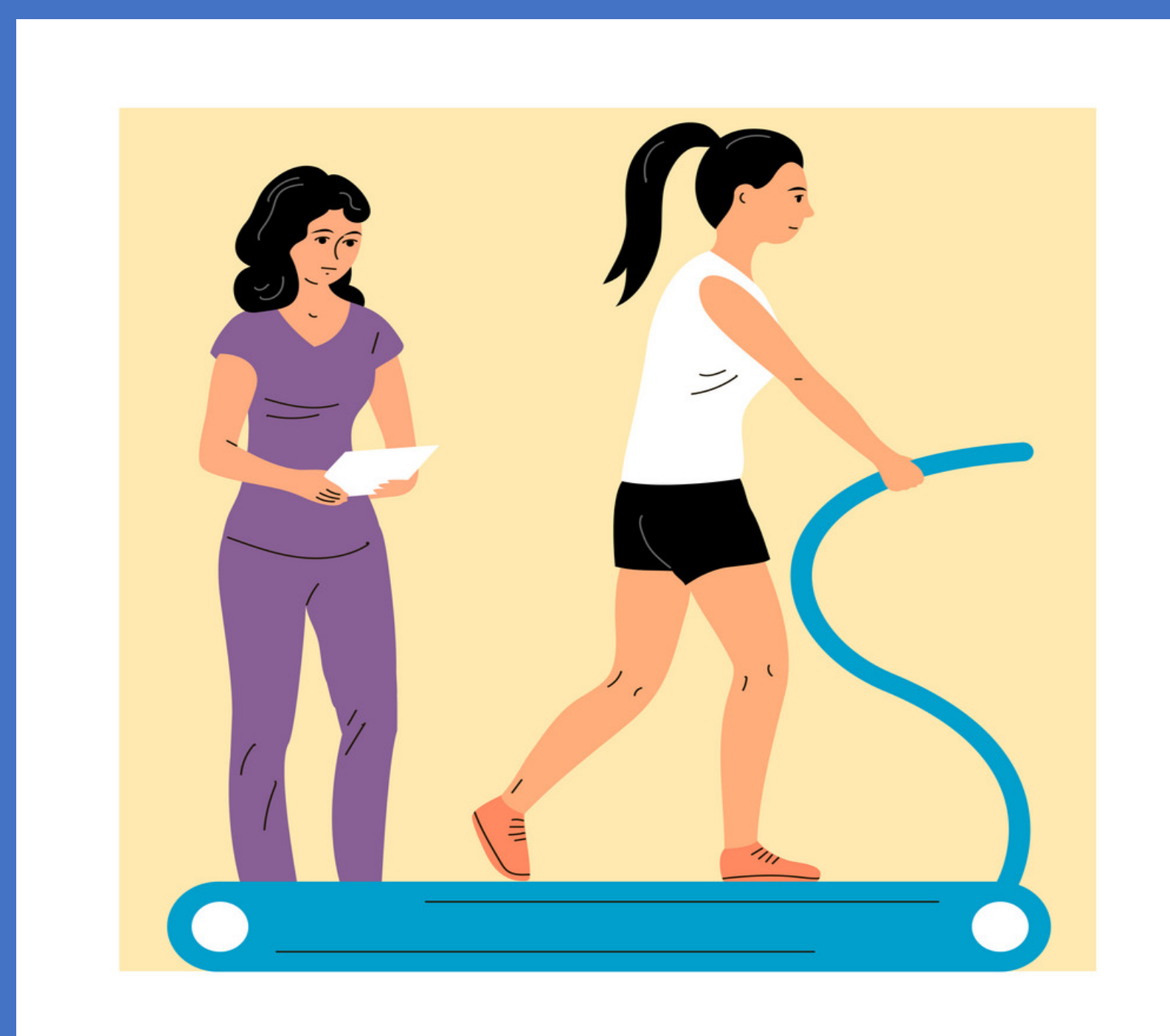
Five patients who presented to KITE Clinics/UHN for persistent concussion symptoms following non-response to previous physical rehabilitation were assessed via standardized exam. As part of the exam, an exercise stress test was performed to find patients' aerobic threshold and prescribe exercise. Patients underwent 6 weeks of care at a frequency of twice per week. The primary outcome was the Rivermead Postconcussion Questionnaire (RPQ) 3. The secondary outcomes were the RPQ-13, the outcome of the Buffalo Concussion Treadmill test (BCTT) and the Patient Health Questionnaire (PHQ-9). **A minimal clinically important difference (MCID) for RPQ-3 was a 2-point change (4).**

RESULTS

Table 1. Baseline Participant Demographics

Variables	Subjects (n=5)
Mean age (SD)	44.6 (12.7)
Sex (female / male)	4 / 1
Time since injury, months (SD)	3.5 (2)
Average number of months of prior therapy (SD)	2.6 (1.3)

If *exercise* is medicine, what is the optimal training dose?



High number of exercise *non-responders* when *intensity* is not sufficient (5).
85-90% symptom threshold aerobic training lead to clinically meaningful changes in those who did not respond to previous rehabilitation

RESULTS

Table 2. Baseline Exam findings

Subjects	Baseline RPQ3 / RPQ13	Baseline PHQ-9	BCTT result (heart rate at failure)
Participant 1	8 / 21	17	133 BPM
Participant 2	8 / 38	25	152 BPM
Participant 3	7 / 31	8	125 BPM
Participant 4	8 / 33	18	156 BPM
Participant 5	8 / 34	9	129 BPM
Average (SD)	7.8 (0.4) / 31.4 (6.3)	15.4 (7.0)	139 BPM (14)

Table 3. 6-week reassessment outcomes

Subjects	RPQ3 / RPQ13	RPQ 3/ 13 score change from baseline	PHQ-9
Participant 1	2 / 15	-6 / -6	5
Participant 2	4 / 23	-4 / -15	5
Participant 3	2 / 14	-5 / -17	4
Participant 4	3 / 13	-5 / -20	5
Participant 5	5 / 25	-3 / -9	10
Average (SD)	3.2 (1.3) / 18 (5.5)	-4.6 (1.1) / -13.4 (5.7)	5.8 (2.3)

CONCLUSIONS

The results provide insight into the effectiveness of personalized aerobic exercise in alleviating persistent concussion symptoms in those who previously had no response to rehabilitation, which included symptom limited aerobic exercise.

