

Effect of Blood Flow Restriction Training (BFRT) on Sleep Deprivation and Quality of Life in Restless Leg Syndrome: A Case Study

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ABSTRACT

TITLE: Effect of blood flow restriction training (BFRT) on sleep deprivation and quality of life in restless leg syndrome – A case study

BACKGROUND AND PURPOSE: To see the effect of blood flow restriction training (BFRT) on sleep deprivation and quality of life in restless leg syndrome.

MATERIAL AND METHOD: A 22-year-old female was considered for this research purpose. The subject was taken for the study's conduction and given the intervention protocol. The protocol was 28 days long and the subject was asked to perform the exercises 6 times in a week, for about 2 times in a day. A total of 3 sets were performed for almost all the exercises with 20 repetitions in the first set, 15 repetitions in the second set, and 10 repetitions in the third set. Pre and Post results were recorded based on outcome measures such as RLS-QOL, PSQI, and SQS.

DESIGN: A case study involving pre- and post-intervention readings.

RESULT: The study found that blood flow restriction training (BFRT) can lessen RLS symptoms, enhance sleep quality, extend sleep duration, and enhance quality of life.

CONCLUSION: Through this study, we can conclude that the effect of Blood flow restriction training (BFRT) on RLS patients can improve symptoms of RLS, better sleep quality, increase sleep timing, and improve quality of life. The Pre & Post reading value of RLSQOL on day 0 was 67, and on 28, it was 39. The pre- and post-reading value of PSQI on day 0 was 17 and on day 28 it was 07. And Pre & Post reading value of SQS on day 0 was 62 and on day 28 it was 44. As suggested by the study it would improve the symptoms of RLS along with better sleep quality, along with ease of living.

KEYWORDS: Blood flow restriction Training (BFRT), Pittsburgh Sleep Quality Index (PSQI), restless leg syndrome (RLS), Restless Legs Syndrome Quality of Life Questionnaire (RLSQOL), Sleep Quality Scale (SQS)

1. INTRODUCTION

A Swedish Neurologist Karl coined the “restless leg syndrome” (RLS) called Axel-Ekbom in 1945, also known as Ekbom Disease. It is a sensorimotor neurological disorder with the core stone of urgent demand of moving the legs with disagreeable leg sensations frequently during sleep hours. RLS is a condition of

uneasy feeling with an uncontrollable urge to move legs.¹ The prevalence of RLS in the general population ranges between 5% and 8.8% .² RLS has higher risk in females and older people. RLS is most commonly related to iron deficiency.³ Restless legs syndrome manifests as an overwhelming urge to move the body to relieve uncomfortable sensations, primarily when resting, sitting, or sleeping.⁴

Blood Flow Restriction Training (BFRT) is a technique that combines low-intensity exercise with blood flow occlusion that produces similar results to high-intensity training.⁵ It has been used in the gym setting for some time but it is gaining popularity in clinical settings. It involves the application of a pneumatic cuff (tourniquet) proximally to the muscle being trained to stimulate muscular adaptations that improve muscular mass and strength.⁶ It can be applied to either the upper or lower limb. The cuff is then inflated to a specific pressure to obtain partial arterial and complete venous occlusion.⁷ Blood flow restriction cuff pressure prescription methods: A standard pressure (used for all patients) e.g. 180 mmHg.⁸

2. METHODOLOGY:

The subject for this study was recruited from My Physio Multispecialty Clinic, Jaipur, Rajasthan. The Participant was instructed to sign a written consent before participating in the study. The participant was taken for the study's conduction and given the intervention protocol.

Intervention protocol consists of interventions performed twice daily, six days a week. It includes hamstring stretching for 30 seconds (10 repetitions, 1 set), quadriceps stretching for 15 seconds (10 repetitions, 1 set), heel drag (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), ankle toe pump (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), straight leg raise for 10 seconds (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), hamstring curl (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), static quadriceps for 10 seconds (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), wall leg press for 10 seconds (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), heel raise for 10 seconds (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), squats (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets), and lunges (1st set: 20 reps, 2nd set: 15 reps, 3rd set: 10 reps, 3 sets).

Table 1: Intervention Protocol for BFRT Training

Intervention	Hold Duration	Repetitions	Sets	Frequency Days/Week
Hamstring Stretching	30 sec	10	1	6 Twice/day
Quadriceps Stretching	15 sec	10	1	6 Twice/day
Heel Drag	-	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Ankle Toe Pump	-	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Straight Leg Raise	10 sec	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Hamstring Curl	-	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Static Quadriceps	10 sec	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Wall Leg Press	10 sec	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Heel Raise	10 sec	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day

Squats	-	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day
Lunges	-	1st set: 20, 2nd set: 15, 3rd set: 10	3	6 Twice/day

3. RESULT:

The result was evaluated based on outcome measure:

1. Restless Legs Syndrome Quality of Life Questionnaire (RLSQOL)
2. Sleep Quality Scale (SQS)
3. Pittsburgh Sleep Quality Index (PSQI)

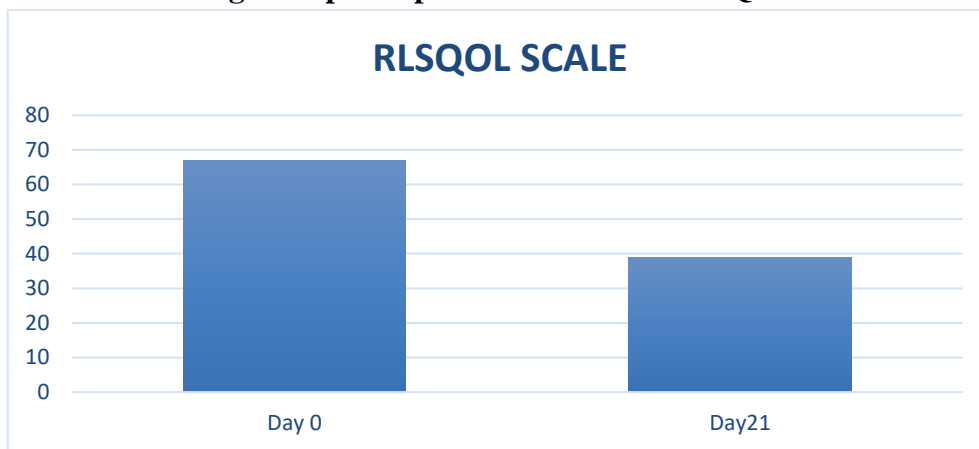
1. Restless Legs Syndrome Quality of Life Questionnaire (RLSQOL):

The RLSQOL is an 18-item scale initially designed to assess the quality of life in patients with restless legs syndrome. In this scale assessment of how RLS impacts daily activity, morning and evening activity, concentration, sexual activity, and work over the previous 4 weeks. 13 are scored on a 5-point scale which can be transformed to a 0-100 score, lower scores indicating worse quality of life. The remainder items are recorded as either a numerical value or a dichotomous response.

Table 2: Pre & Post Test Score for RLSQOL

Outcome Measure	Day - 0	Day - 21
RLSQOL	67	39

Figure1: pre & post-test score for RLSQOL



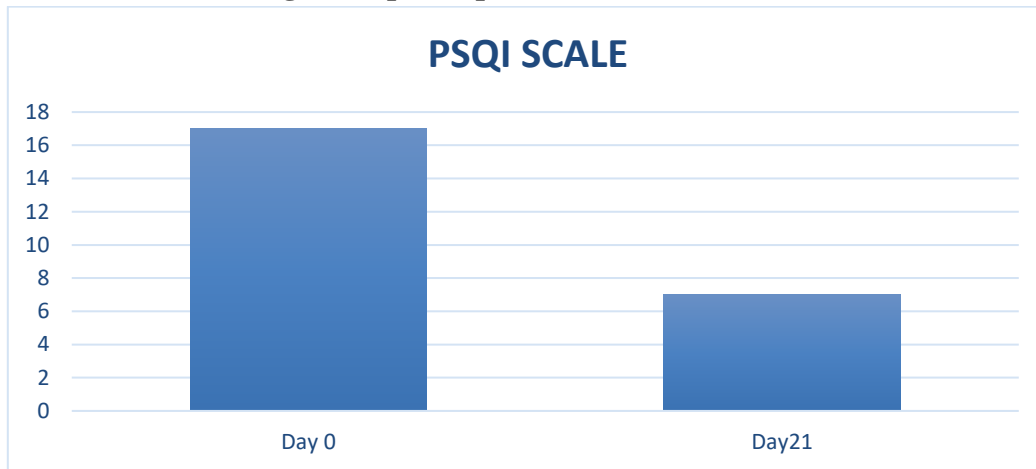
2. Pittsburgh Sleep Quality Index (PSQI):

This questionnaire consists of 19 self-reported items belonging to one of seven subcategories: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The questionnaire consists of a combination of open-ended questions. Respondents are asked to indicate how frequently they have experienced certain sleep difficulties over the past month and to rate their overall sleep quality. Scores range from 0 to 21, with higher scores indicating more acute sleep disturbances.

Table 3: Pre & Post Test Score PSQI

Outcome Measure	Day - 0	Day - 21
PSQI	17	07

Figure 2: pre & post-test score for PSQI



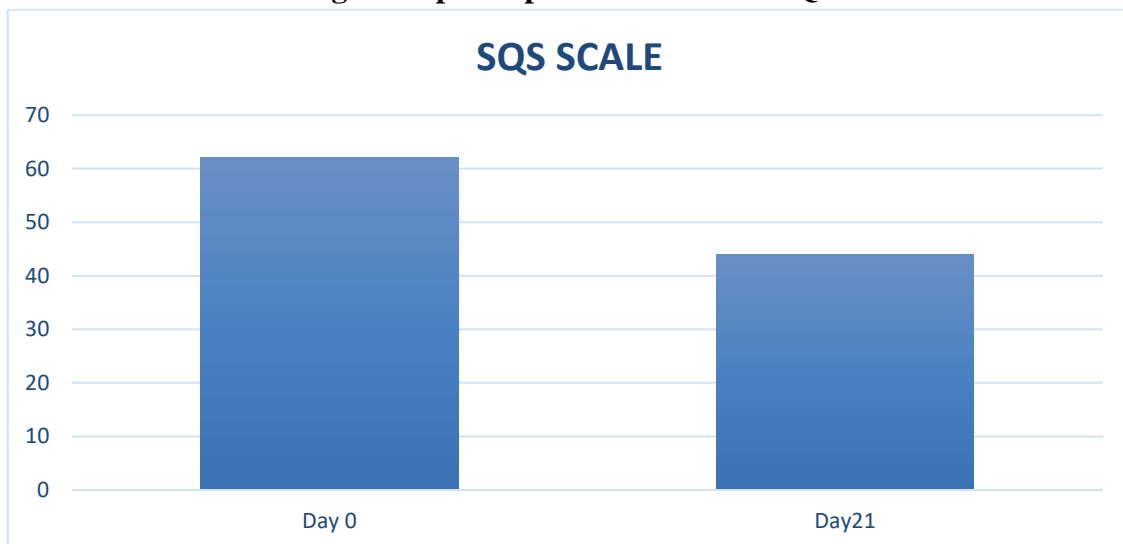
3. Sleep Quality Scale (SQS):

This questionnaire Consists of 28 items, the SQS evaluates six domains of sleep quality: daytime symptoms, restoration after sleep, problems initiating and maintaining sleep, difficulty waking, and sleep satisfaction. Using a four-point, Likert-type scale, respondents indicate how frequently they exhibit (0 = few, 1 = sometimes, 2 = often, and 3 = almost always). Total scores can range from 0 to 84, with higher scores denoting more acute sleep problems.

Table 4: Pre- and post-score SQS

Outcome Measure	Day - 0	Day - 21
SQS	62	44

Figure 3: pre & post-test score for SQS



4. DISCUSSION:

The purpose of the discussion that follows is to clarify the conclusions drawn from this study's findings and observations in the context of the supporting data. The goal of the current study was to determine how sleep deprivation and quality of life in patients with restless leg syndrome were affected by blood flow

restriction training (BFRT). According to the outcome measure, the pre-and post-results were recorded. The post-treatment results were shown to be better than the pre-treatment values, making the study significant. Also, the study found that blood flow restriction training (BFRT) can lessen RLS symptoms, enhance sleep quality, extend sleep duration, and enhance quality of life.

This study has been supported by some evidence that has been found in the literature proving that the blood flow restriction technique has an impact on RLS. The studies performed by Peter C. Douris et al in 2020¹⁶ on a single subject determine the effects of BFR-LIRT on a recreationally active person with PD in regards to function, strength, restless leg syndrome (RLS), and safety. A single subject, A-B-A design was utilized, each phase lasted 6 weeks. Outcome measures included: 30-second sit-to-stand; timed Up and Go (TUG); RLS Questionnaire; 3-RM of Cybex Leg Press (LP); Leg Curl (LC); and Leg Extension (LE) measured every 3 weeks for 18 weeks. The intervention phase B, (weeks 6–12) included four lower extremity resistance exercises (LP, LC, LE, calf presses on the LP) with the addition of BFR. The two-standard deviation band method was used to determine significance. All outcome measures except the TUG improved significantly by the end of the intervention phase. The combination of BFR with LIRT safely leads to an increase in lower extremity strength and function in a person with PD, while decreasing their RLS (improvement from moderate to mild symptoms) resulting in a better quality of life for the participant.

5. CONCLUSION:

This study concludes that adding BFRT along with conventional protocol significantly improves symptoms of RLS, improves sleep quality, increases sleep timing, and improves quality of life. This study could provide an insight in designing a treatment protocol for RLS.

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