



CASE STUDY

Low Back Pain

INTRODUCTION

J.R. is a 64 year old male who is unemployed and has been on disability since a work-related injury in 1997. J.R. broke his back at work while leaning over to lower a 35 pound item from a truck to the floor when his back went out. He was then taken to the hospital where he was discharged to a physician who works with workers compensation patients. This doctor put multiple physical restrictions on J.R. that led him to get fired from his job in early 1998. Since then, J.R. hasn't worked and is unable to get out of bed for more than 30 minutes a day. J.R. reports he believes he has narcolepsy and chronic insomnia. Since his injury, J.R. has received 4 back surgeries for spinal fusion of L5-S1 as well as installing a pain pump implant and a spinal cord stimulator implant. The surgeries made his pain worse, with all four failing and having a staph infection on the 4th surgery. All the hardware has since been removed other than the pain pump in which he receives monthly injections and the spinal cord stimulator. J.R. was trained by a physical therapist to limit his hip mobility when walking 17 years ago. Prior to our study, he reported that any movement of turning directions or bending causes extreme pain.

GOALS

- Patient will decrease pain levels on a more consistent basis to improve sleep
- Patient will be able to get out of bed for increased periods of time leading to up to 3 hrs/day
- Patient will complete light household tasks 3x/week
- Patient will incorporate learned techniques from Karuna to participate in mindful movements throughout the work day
- Patient will reduce oral intake of pain medications

PROGRESSION

J.R. received 7 sessions total of Karunas VET following the protocol below:

- Induction
 - 8-10 minutes of predictive coding
- Graded exposure
 - Varied week by week using goal-directed modules to promote trunk rotational movements as well as trunk flexion and extension. Modules incorporated the following activities:
 - Goalkeeping,
 - target shooting,
 - Kitchen ADL scene

- Guided Audio Breathing Module

RESULTS

Overall, J.R. had decreases in pain using the Visual Analog Scale in 6 of the 7 sessions and no increase in pain in 1 session from baseline to follow-up (see table 1). In addition, J.R. had improved scores on the Brief Pain Inventory's assessment on pain interference on various domains, the Tampa Scale of Kinesiophobia (TSK), the Oswestry Low Back Pain questionnaire, the PHQ-9 and Pain Catastrophizing Scale (PCS).

- J.R. had an improvement in scores using the Brief Pain Inventory (BPI) on pain interference in the domains of **mood and walking ability** (see Table 3).
- The Tampa Scale of Kinesiophobia measures fear of movement in relation to chronic low back pain and has been used to assess other musculoskeletal conditions had a change in score from 52 to 45 from baseline to follow-up (See Table 4)
- The Oswestry Disability Index was used to measure severity of pain, areas of life affected by pain, and abilities affected by low back pain, on a 0-5 scale had a change in scores from **completely** disability (score of 49) to **severe** disability (score of 32) from baseline to follow-up. (see Table 5)
- The PHQ-9 was used to assess items related to the DSM-5 diagnostic criteria for depression, including mood, anhedonia, appetite, sleep, suicidality, guilt, concentration, and others (Kroenke, et al. 2001). Her scores also improved with a score of 20 at baseline and a score of 19 at follow-up. (see Table 6)
- The PCS measures the mechanisms which catastrophizing impacts the experience of pain. J.R. improved on all three subscales of rumination, magnification and helplessness with a total score change from 34 to 22 from baseline to follow-up.

J.R. reported, "This treatment helped me push beyond the boundaries that I have had with my pain. I would get to my level of pain and stop and with the VR exercises I could go beyond my former pain area. Additionally, I have more energy and able to do more, not a great deal but more. I have been able to cut my oral pain meds in half. Overall I found it to be a very beneficial experience and I am very thankful."

At 6 months follow-up, J.R. reported, "Before Karuna, if I turned slightly in any direction or if I bent down I would have extreme pain, but what I found was that the program helped me with breaking barriers by performing exercises in virtual reality that pushed me beyond my own limitations. I would not have had the courage to push myself the way VR pushed me. I found out I was much more flexible than I thought and I wasn't as afraid of the pain. I noticed it was very beneficial for me as I had better range of motion and I was not as concerned about the pain when I was performing movements that I know hurt me in the past because it didn't hurt. I found myself pushing further and further with each session. While in the study, I was up more around the house more than I have ever been in the last 21 years. I noticed the benefits lasted several weeks after the program. I would highly recommend this program to anyone. You have nothing to lose".

Table 1: Visual Analog Scale Pain Score Results from session to session:

Session	Pre	Post
1	6.7	5.2
2	7.6	6.4
3	6.8	6.8
4	7	5.5
5	7	5.0
6	8.5	6.4
7	6.5	5

Table 2: FABQ, Baseline and Follow-up

	Pre	Post
FABQ-Work	42	42
FABQ-Physical Activity	23	22

*FABQ measures the effects of pain on behavioral avoidance of life situations, work, and physical activities. Higher scores are indicative of higher fear-related beliefs

Table 3: BPI, Pain interference on various domains in life

Pain Interference on:	Pre	Post
General Activity	6	8
Mood	7	6
Walking Ability	4	3
Normal Work	8	9
Relationships with other people	6	10
Sleep	10	10
Enjoyment on life	7	10

*BPI assesses clinical pain. Questions are related to assessing how pain interacts with quality of life measures such as activities of daily living.

Table 4: Tampa Scale of Kinesiophobia

Pre	Post
52	45

*measures fear of movement in relation to chronic low back pain and has been used to assess other musculoskeletal conditions

Table 5: Oswestry Low Back

Pre	Post
49	32

*examines severity of pain, areas of life affected by pain, and abilities affected by pain

Table 6: PHQ-9

Pre	Post
20	19

*A depression inventory that assesses items related to the DSM-5 diagnostic criteria for depression, including mood, anhedonia, appetite, sleep, suicidality, guilt, concentration, and others

Table 7: Pain Catastrophizing Scale

Subscale	Pre	Post
Rumination	11	9
Magnification	7	3
Helplessness	16	10
Total Score	34	22

*Measures the mechanisms which catastrophizing impacts the experience of pain.

Table 8: Simulator Sickness Questionnaire

Nausea	Oculomotor
1	1

*Assesses simulator sickness in the domains of nausea and oculomotor symptoms in the context of using as simulator