

Immediate Effect of Primal Reflex Release Technique on Heart Rate Variability in Chronic Neck Pain: A Case Report

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ABSTRACT

Primal reflex release technique (PRRT) is a paradigm shift in the treatment of pain which follows the principle of rebooting the autonomous nervous system (ANS), by down regulating the upgraded sympathetic component of ANS in a variety of pain syndromes. To check the effect of PRRT on chronic neck pain, a case study was done using Heart Rate Variability (HRV) and Visual Analogue Scale (VAS) as outcome measures. After conducting the one minute nociceptive exam for startle reflex, indication of the upgraded Sympathetic Nervous System (SNS), a single session of PRRT was carried out on a 24 year old female patient with chronic neck pain having a VAS score of 7 on activity and that of 5 on rest. Pre and post treatment HRV analysis was done using frequency domain and time domain parameters. Post PRRT treatment, an improvement in VAS scale with a score of 4 on activity and that of 3 on rest was seen. HRV showed a decrease in HFnu (26.7 vs 24.5), RMSSD (63.553 vs 59.216), SDNN (28.58 vs 34.82) and PNN50 (48.3 vs 42.5) which refers to decreased parasympathetic activity, and increased LFnu (73.3 vs 75.5) which indicates increased sympathetic activity. This was the first study evaluating the effect of PRRT with HRV. Further research needs to be conducted to validate HRV findings in chronic pain patients undergoing PRRT using a large sample size and interval based assessment of HRV.

Key words: Neck Pain, Primal reflex release technique, Startle Reflex, Heart Rate Variability.

INTRODUCTION

In response to any mechanical or emotional stimulus, there is a response from the autonomous nervous system (ANS) in our body. As a result of stimulation of the sympathetic component of the autonomic nervous system (SANS), there is an alteration of heart rate, respiratory rate, muscle circulation, etc. [1, 2] As a result of which there is an increased allostatic load which in turn will lead to up gradation of SANS and down gradation of parasympathetic components of the autonomous nervous system (PANS) in

order to maintain the homeostasis.[1, 2] Sustained increased allostatic load converts the acute pain into chronic one and keeps the pain component ongoing.[2] In any chronic pain, the upgraded sympathetic nervous system is characterized by hyper arousal state in terms of positive startle reflex. The positive startle reflex is the withdrawal of the particular area when exposed to non-noxious stimulus and is elicited by one minute nociceptive exam.[3,5,6]

Heart Rate Variability (HRV) is assessed by using time domain and

frequency domain parameters. In time domain method the time between two successive normal QRS complex is taken from the continuous ECG for the said time interval. The N-N interval that is normal to normal interval signifies the interval between two consecutive QRS complexes.^[4]

In short term recordings, the distribution of power and the central frequency of low frequency and high frequency may vary in relation to modulation in ANS.^[4]

Primal reflex release technique (PRRT) is a novel concept to treat pain by following the concept of rebooting the ANS. It is an advanced form of manual technique which focuses on the down regulation of SANS.^[3] Hence, the present study was conducted to study the immediate effect of primal reflex release technique on heart rate variability in a chronic neck pain patient.

CASE REPORT

A 24 year old female with chronic neck pain was selected for the study. She was having pain with a Visual Analogue Scale (VAS) score of 7 on activity and that of 5 at rest. Her startle reflex was elicited by one minute nociceptive exam at left 11th and 12th ribs. Since HRV was one of the outcome measures, pretreatment short term HRV was recorded on RMS Polyrite machine with the patient in supine position. Patient was made to relax and feel comfortable prior to assessment. Time domain and frequency domain parameters of HRV were analyzed with Fast Fourier Transformation (FFT).

Following this, one session of PRRT was given to the patient in a supine lying position over the neck region for 2 minutes.

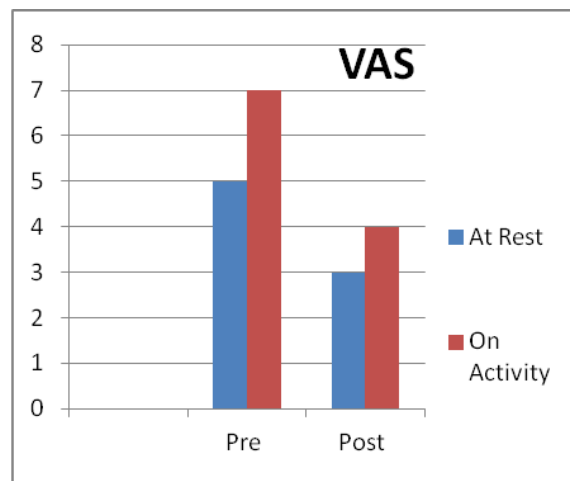
Post treatment outcome measures i.e. VAS and HRV were reassessed immediately after the session. An improvement was seen in VAS scale post treatment with VAS score of 4 on activity and that of 3 on rest. Post PRRT, HRV showed a decrease in parasympathetic-related time and frequency domain indices including high frequency power in normalised unit (HFnu, 26.7 vs 24.5), root mean square of successive differences between normal heartbeats (RMSSD, 63.553 vs 59.216), and percentage of successive RR intervals that differ by more than 50ms (pNN50, 48.3 vs 42.5), and an increased low frequency in normalised unit (LFnu, 73.3-75.5) which is a sympathetic marker.

Tables and Legends:

Table Number 1:

VAS	Pre	Post
At Rest	5	3
On Activity	7	4

VAS score for Pain at rest and on Activity
VAS : Visual Analogue Scale



Graph Number 1

Table Number 2:

RMSSD		SDNN		pNN50(%)	
PRE	POST	PRE	POST	PRE	POST
24.35	22.173	28.582	34.825	2.8	2.2

HRV Analysis For Time Domain Parameters.

RMSSD: The root mean square of Successive differences between normal heartbeats.

SDNN: Standard deviation of normal to normal RR intervals.

Pnn50: The Fraction of consecutive NN intervals that differ by more than 50 ms.

Table Number 3:

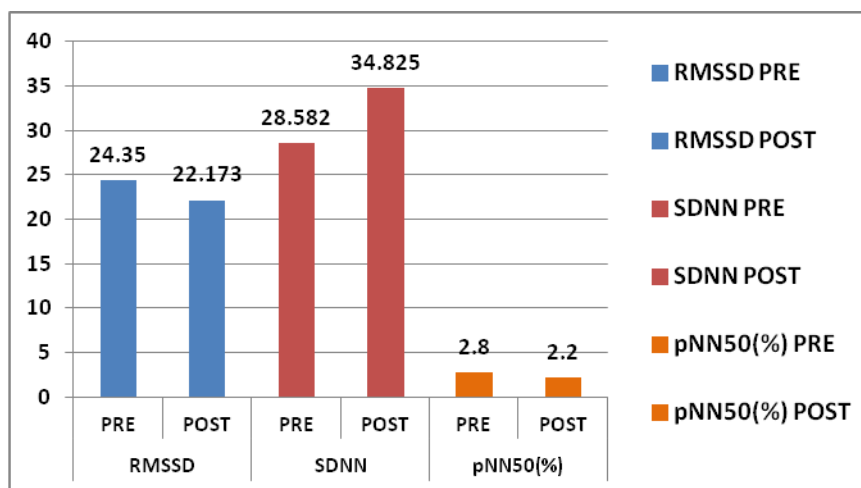
FFT	LFnu	HFnu
Pre	47.4	28.9
Post	71.6	28.9

HRV Analysis For Frequency Domain Parameters

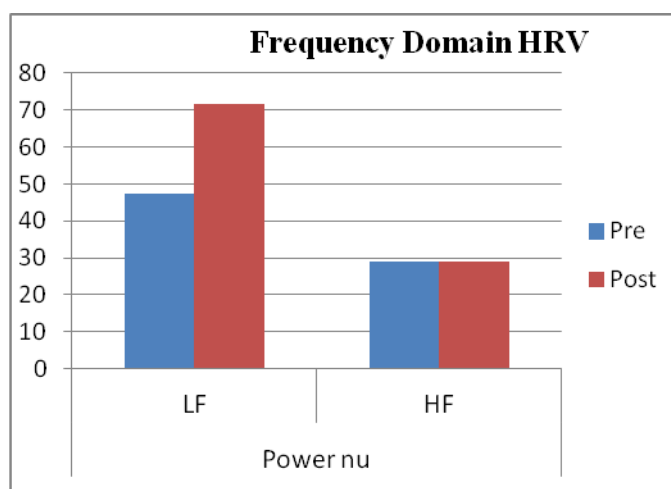
FFT : Fast Fourier Transform

LF : Low Frequency

HF: High Frequency



Graph Number 2



Graph Number 3

DISCUSSION

The purpose of this study was simply to introduce a new technique into the realm of the treatment of chronic neck pain. In the present case study, the results indicate that performing a single treatment of PRRT led to a meaningful, immediate reduction in pain (VAS 5 to 3 at rest and 7 to 4 on activity as shown in table number 1 and graph number 1). Bethany L. Hansberger et al (2015) concluded in their case series that PRRT decreases pain in plantar fasciitis patients.^[5] Also, Valerie F. Stevenson et al (2018) proved that there is a significant pain reduction immediately after PRRT session and subjects remained functionally pain free after two weeks.^[6]

This was the first study conducted evaluating the relation between HRV and PRRT. HRV is used as a quantitative measure of the ANS. In the present case

study, we have assessed the immediate effect on short term HRV in a chronic neck pain patient. Our results showed an increased sympathetic activity and decreased parasympathetic activity. *This could be the result of external stimulus given to the neck area.* These findings can be supported by the article by Junichiyo Hayano et al (2019). The present study focused on the immediate effect of PRRT on HRV, so the readings obtained were only at one point in time. Lu Wang et al (2013) concluded in their study that HRV taken on intervals before and after intervention can give accurate findings.

CONCLUSION

Pain is significantly decreased after one session of PRRT. Sustainability of the effect on pain post PRRT can be derived by

conducting more studies having large sample size and more sessions of PRRT.

HRV is influenced by PRRT. Future research should direct efforts in analyzing the sustained effect of PRRT with the help of interval based assessment of HRV in a larger sample.

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