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Exploring The Effectiveness Of Janda's Approach And Global Postural Re-Education In Managing Lower Cross Syndrome With Non-Specific Low Back Pain: A Narrative Review

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Abstract

Background: *Lower cross syndrome (LCS) is defined by weakness in the abdominals and gluteal maximus along with tightness in the lumbar extensors and hip flexors resulting in biomechanical imbalances with mechanical stress on joints contributing to non-specific low back pain (NSLBP). Various interventions like sciatic nerve neurodynamics sustained natural apophyseal glides (SNAGs), Brugger's Exercise, Janda's approach and global postural re-education (GPR) are mentioned in literature for LCS with or without NSLBP.*

Aim: *To compare the effectiveness of various interventions, explore gaps and identify most effective available management of LCS in NSLBP patients.*

Methods: *A search was conducted on several databases including PubMed, Scopus, CINAHL, and Google Scholar by using MeSH terms and Boolean operators: "lower cross syndrome," "Non-Specific Low Back Pain," "Janda's Approach," and "Global Postural Re-education" identified 657 articles. Using Population, Intervention, Comparison, and Outcome (PICO) eligibility criteria 12 studies published in English between 2014 to 2024 focussing on LCS management were included and narratively analysed for key findings, gaps and outcomes like pain relief, postural correction, functional disability and quality of life. Current narrative review focuses on a broad overview of existing literature without a formal quality assessment.*

Results: *Among all interventions, Janda's Approach and GPR gave more promising results when LCS was paired with NSLBP. Janda's Approach is based on correcting dysfunctional movement patterns, while GPR focuses on restoring postural alignment.*

Conclusion: *Both, Janda's Approach and GPR are effective strategies for LCS. However, direct comparison is limited. Further comparative research is required to establish most effective management available for guiding clinical decision making.*

Implications: *Janda's Approach and GPR corrects muscular imbalances, improving outcomes in postural dysfunctions and offering comprehensive management for NSLBP.*

Keywords: *Global Postural Re-education, Janda's approach, Lower cross syndrome, Non-Specific Low Back Pain*

INTRODUCTION

Low back pain refers to pain or an unpleasant sensation between 12th rib and gluteal folds with or without leg pain. Non-Specific Low Back Pain (NSLBP) refers to low back pain without any identifiable underlying pathology and accounts for about 80-90% of all low back pain cases globally [1]. Pain present for less than 6 weeks can be classified as acute, between 6-12 weeks as subacute and for more than 12 weeks as chronic. It can seriously impact the functions of daily life of an individual [2]. NSLBP is prevalent particularly in adolescents, especially in the third decade of life [3].

Lower Cross Syndrome (LCS), also known as pelvic cross syndrome is a biomechanical muscular imbalance condition with weakness of phasic muscles of body like abdominal muscles and gluteal muscles along with the tightness of postural muscles of body like hip flexors and low back extensors leading to a formation of cross pattern of tightness and weakness around pelvis. It is found to be prevalent 21% in

school going children between 11–15 years [4], 12.1% in children between 9-12 years [5], 23.9% in professional Indian jockeys [6], housemaids in between 30–50 years [7] and more in females as compared to males, between 21-27 years in asymptomatic individuals [8]. Specific postural changes associated with LCS are anterior pelvic tilt, increased lumbar lordosis and knee hyperextension [9].

Vladimir Janda, in 1979 first described the crossed-syndromes and found, muscle imbalances are systematic and predictable, involving the entire body. According to him, the relative quantity of strength or length of a muscle between an agonist and antagonistis known as muscle balance. Muscle imbalances occur as a consequence of some adaptation or dysfunction and when it impairs function, leading to unbalanced biomechanical joint stresses which are a stepping stone for dysfunction and eventually, body adapts and modifies its movement patterns compensate for dysfunction ultimately giving rise to the biomechanical muscular imbalance conditions [10]. It is assumed that increased lumbar lordosis causes an extra mechanical stress on the lumbar joints and soft tissues contributing to NSLBP. Furthermore, LCS may leads to long term postural errors leading to movement dysfunctions and accounting for approximately 85% of NSLBP [11],[12],[13].

Various physiotherapeutic approaches have gained attention for managing LCS like back school approach, core strengthening, Janda's approach, sciatic nerve neurodynamic sustained natural apophyseal glides (SNAGs) and global postural re-education (GPR), among which Janda's approach and GPR are used to treat LCS present with NSLBP. In view of the above, this narrative review aims to evaluate effectiveness of various interventions, explores gaps in the current literature and identifies the most effective available management of LCS in NSLBP subgroup. By doing so, it seeks to guide physiotherapists in optimizing rehabilitation strategies for patients with LCS and NSLBP.

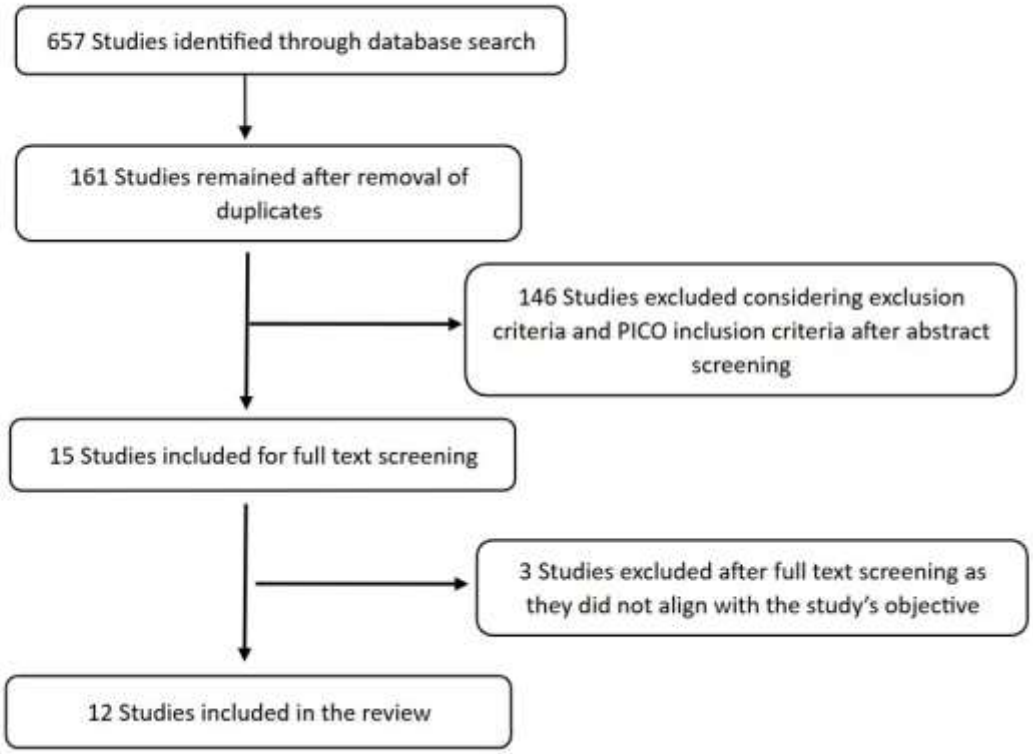
METHODS

An extensive survey of literature was conducted on the databases of PubMed, Scopus, CINAHL, Google Scholar with appropriate MeSH terms such as "lower cross syndrome", "Non-Specific Low Back Pain.", "Janda's Approach" and "Global Postural Re-education" according to the database, with the use of Boolean operators between 2014 to 2024 yielded 657 articles, out of which 161 remained after removing duplicates. 146 studies focusing on treatments other than physiotherapy interventions like pharmacology, prevalence studies, reviews, case studies and articles published in languages other than English were excluded from the review. Using Population, Intervention, Comparison, and Outcome (PICO) eligibility criteria (Table 1), 15 articles including randomized controlled trial (RCT), quasi experimental studies, interventional studies and cross-sectional studies were selected after abstract screening. At last, 12 articles were included in the review after full text screening, data extracted to summarize findings and narratively analysed focusing on treatment trends and gaps in literature (Flowchart 1). Current narrative review does not include a formal quality assessment, instead focuses on providing a broad overview of the existing literature.

Table 1: PICO Eligibility criteria

Criterion	**Description**
Participants	Patients with LCS with or without NSLBP
Intervention	Janda's approach and GPR
Control	Other physiotherapy treatments
Outcome measures	Pain relief, postural correction, functional disability improvement and quality of life

Flowchart 1: Study selection process



RESULT

Table 2: A summary of the main characteristics of the study is as follows

S.No	Author	Study type and duration	Age group & Sample size	Variables	Description of Intervention	Result
1.	Kage and Putti, 2015 [14]	RCT, 10 sessions	40 participants between 18-60 years age (Both male and females)	1-Visual Analogue Scale (VAS) 2-Index of Lumbar lordosis (LLI) 3-MMT abdominals and gluteal muscles 4-Sit and Reach Test 5-Thomas test with inclinometer	A-Control group protocol: 1-Short wave diathermy (SWD), 500 watt, 27.33MHz, 15 minutes 2- 8 Core stability exercises, 20 repetitions, 8 seconds hold. B-Interventional group protocol: 1-SWD same as group A 2-Core stability exercises same as group A 3- Iliopsoas, rectus femoris and erector spinae stretching 4-Abdominals, gluteal muscles strengthening, 10 repetitions, 3 sets	A significant difference was observed between both the groups in VAS, index of lumbar lordosis, abdominal strength, gluteal strength, iliopsoas, rectus femoris and erector spinae muscle length ($p<0.05$)
2.	Guastala et al, 2016 [15]	RCT conducted for 12	39 patients between 40-59	1-Sit and reach test 2-Rolland-Morris	A: GPR group (n=21): 3 postures/ session hold for 15 minutes each	Both GPR and Iso stretching showed significant improvement

		sessions, twice/ week	years (Both male and female)	Questionnaire 3-VAS	B: Isostretching group (n=18): 9 postures, hold for 9 breaths each with rest of 60 seconds in every three cycles	(p=0.0001) but when both groups were compared, significant results were not seen (p=0.192).
3.	Kale et al, 2020 [11]	RCT conducted for 2 weeks, 5 session /week	41 children with age 11-15 years (19 girls and 22 boys)	1-Manual muscle testing (MMT) of abdominal muscles and gluteal muscles 2-Thomas test	Warm-up exercise 1-Hip flexor stretching, 30 seconds hold, 3 repetitions, both sides 2-Lumbar extensor stretching, 30 seconds holds, 3 repetitions 3-Abdominal curl-ups with hands by the side of body, 10 repetitions, 2 sets Progressing with arms crossed on chest and further with both hands behind head 4-Bridging, 10 seconds hold, 10 repetitions, 2 sets 5-Home programme: Lunges 10 seconds hold, 10 repetitions, 2 sets each side; Abdominal curl-ups, 10 repetitions, 2 sets; Bridging 10 seconds hold, 10 repetitions, 2 sets.	Significant increase in abdominal muscles and gluteal muscles strength ($p<0.0001$) with significant reduction in hip flexor tightness noted ($p<0.0001$).
4.	Tank and Shukla, 2020 [16]	Interventional study conducted for 2 weeks, 6 days/ week	34 patients between age 25-40 years (Both male and females)	1-Numeric Pain Rating Scale (NPRS) 2- Modified Oswestry Disability Index (MODI)	A-control group protocol: 1-Heat pack, 20 minutes 2-Prone press up exercise 3-Exercises for core stability 4-Ergonomic corrections B-Intervention group protocol: 1-Stretching for erector spinae and back extensor muscles 2-Iliopsoas and rectus femoris stretching 3-Strengthening for abdominals	NPRS and MODI improved in both the groups ($p<0.05$) but they improved more in interventional group ($p<0.05$)

5.	Pradeep, Heggannavar and Metgud, 2020 [17]	RCT conducted for 6 consecutive days with 45 minutes/session.	42 patients between age 18-30 years (Both male and females)	1-Pressure algometer for erector spinae and quadratus lumborum 2- Flexible ruler 3-Modified Thomas test with goniometer 4-Finger to floor test 5-MODI	A: Control group (n=21): 1-Hot moist pack, 15 min 2-Back extensors and hip flexors stretching 3-Abdominal muscles and hip extensors strengthening, 10 repetitions – curl ups, side bridging, hip extension in quadruped position and hip abduction in side lying position. B: Interventional group (n=21): Everything of control group along with neurodynamic SNAGS	A significant improvement in all outcome measure was noted in both the groups ($p<0.05$). Significant changes seen more in experimental group ($p<0.0001$) except degree of lumbar lordosis ($P = 0.78$) and MODI ($P = 0.27$).
6.	Rajalaxmi et al, 2020 [18]	Experimental study with pre – post type	30 patients between 20-30 years (Both male and females)	1-VAS 2-SF-12 scale 3- Thomas test with goniometer	A: Janda's approach: Sensorimotor training with total treatment duration of 30 minutes. 1-Static phase: TheraBand for perturbation and weight shifting 2-Dynamic Phase: TheraBand use with kicking, back kicking, anterior kicking and lateral kicking. 3-Functional phase: Spinal Stabilization exercises and half stepping exercise. B: Bruegger's exercise group: every 20-30 minutes, once/twice with 30-60 seconds hold.	Janda's approach group showed more significant improvement in all outcomes as compared to Bruegger's exercise group.
7.	Alyarnezhad and Majalan, 2021 [19]	Quasi-experimental study conducted for 8 weeks, 3 sessions/ week, each for 60 minutes.	45 female students between age 19-25 years	1-New York Posture Rating tool 2- Flexible ruler For LCS screening	Group A: Exercise training given intermittently Group B: Exercise training given simultaneously Group C:Control group All groups had 15 patients each and were given corrective exercises for LCS	Significant difference was observed in groups when training was given intermittently and control group ($p=0.30$), Significant difference was not observed between simultaneous training group and control group ($p=0.68$).

8.	Khan et al, 2022 [20]	RCT conducted for 4 weeks, 3 sessions/ week	58 patients (Both male and females)	1-NPRS 2-ODI 3-Thomas test with goniometer and inclinometer	A-Stretching Technique: 15 seconds stretch with 5 seconds rest interval, 5 repetitions. B- Muscle Energy Technique (MET): 25% of maximum voluntary contraction for 10 seconds, 5 seconds rest followed by 30 seconds stretch, 5 repetitions. Both received: 1-Moist heat pack prior to treatment for 10 minutes	Both the groups showed significant difference ($p<0.05$) in pre and post NPRS, ODI and Thomas test but there was no significant difference between post stretching and post MET groups ($p>0.05$)
11.	Kumar, 2022 [21]	RCT, conducted for 5 weeks, 3 times/ week	239 patients (Both male and females)	1-PAR-Q for screening before group division 2-NPRS 3-MODI 4-Finger to floor test	A:GPR group (n=116): 2 or 3 postures, held for 15-20 minutes each. B:Motor Control Exercise (MCE) group (n=123): 1-Crook lying abdominal hollowing, progress to sitting and quadruped 2- Activation of multifidus in prone, progress to sitting and in neural position 3-Bridging in supine, progress to prone and lateral bridging. 4-Lower limb abduction 5-Knee and hip extension in Crook lying 6-Leg cycling 7-Sitting knee raises on gym ball 8-Abdominal slide 9-Lying trunk curl with leg lift 10-Basic superman	GPR group reduced pain, ODI and higher flexibility as compared to the MCE group ($p < 0.001$).
9.	Gairola et al, 2023 [9]	Cross-sectional study conducted for 4 months	30 subjects between 21-31years age (13 males and 17 females)	1-ODI 2-NPRS	Subjects diagnosed with LCS from various health care centres were asked to fill demographic details, ODI and NPRS.	40% subjects had moderate disability and 40% had severe disability and 7% had mild disability. 60% had severe pain on NPRS and 37% had moderate pain on NPRS.

10.	Mehta and Sharma, 2024 [22]	RCT - single-blinded conducted for 2 weeks, 3 times/ week.	200 patients between 20-40 years (Both male and females).	1-NPRS 2-MODI 3-LLI 4- Hand held dynamometer for Abdominal and gluteal muscles strength. 5-Modified Schober's Test 6-Modified Thomas test with goniometer	A1: Specific treatment for posterior LCS: stretching and William's training protocol – 1-Stretching of Iliopsoas, 15 seconds hold, 3 repetitions 2-Stretching of Erector Spine, 15 seconds hold, 3 repetitions 3-Pelvic tilting exercise, 30 seconds hold, 10 repetitions 4-Single Knee to chest, 10 seconds hold, 10 repetitions 5-Partial sit up, 10 seconds hold, 10 repetitions In 2nd week, 1 and 2 Progress to 30 seconds hold, 3 repetitions, 3 sets. And 3, 4 and 5 Progress to 10 seconds hold, 10 repetitions, 3 sets. A2: Specific management in anterior LCS: 1-Curl-ups, 10 seconds hold, 10 repetitions 2-Diagonal curl-ups, 10 seconds hold,10 repetitions 3-Standing leg lifts with Trunk support, 10 seconds hold, 10 repetitions 4-Quadruped Leg Lifts, 10 seconds hold, 10 repetitions 5-Superman exercise, 10 seconds hold,10 repetitions In 2nd week, all exercises Progress to 3 sets. B1: generalized treatment protocol for posterior LCS B2: generalized treatment protocol for anterior LCS B1 and B2 followed: 1-Static Abdominals, 10 seconds hold, 10 repetitions 2-Static glutei, 10 seconds hold, 10 repetitions 3-Bridging, 10 seconds hold, 10 repetitions 4-Double knee-to-chest, 10 seconds hold, 10 repetitions	Improvement was observed in all groups and all parameters ($p<0.01$). A1 group showed the greatest reductions in pain, disability, iliopsoas tightness, back extensor tightness. A2 group showed highest improvements in abdominal and gluteal muscular strength.

					5-Prone press ups, 10 seconds hold, 10 repetitions. In 2nd week, all exercises Progress to 3 sets.	
11.	Kandil et al, 2024 [23]	Prospective pre and post-test, single-blind RCT conducted for 15 sessions, twice weekly	50 patients between 25-40 years (Both male and females)	1-clinometer (digital smartphone application to measure anterior pelvic tilting) 2-Flexible ruler 3-Modified Thomas test VAS 4-ODI	A: GPR with conventional therapy: 3 types of postures, holding for 15-20 minutes along with conventional therapy. B: Conventional Therapy: 1-Bridging, 8-12 repetitions 2-Double knee to chest, 15-30 seconds hold, 2-4 repetitions. 3-Backward bending, 10 repetitions 4-Curlups, 8-12 repetitions 5-Alternate arm and leg, 10-30 seconds hold, 8-12 repetitions 6- Hip flexor stretch, 15-30 seconds hold, 2-4 repetitions 7-Pelvic tilts, 8-12 repetitions.	A significantly lower anterior pelvic tilting (p=0.0001) was seen in GPR group along with lower lumbar lordosis (p=0.0001), lower VAS (p=0.0001) and improvement in functional disability (p=0.0001) when compared with the control group.

Abbreviations: Manual muscle testing: MMT, Randomised Control Trial: RCT, Numeric Pain Rating Scale: NPRS, Modified Oswestry Disability Index: MODI, Oswestry Disability Index: ODI, Visual Analogue Scale: VAS, Index of Lumbar lordosis: LLI, Short wave diathermy: SWD, Muscle Energy Technique: MET, Motor Control Exercise: MCE.

DISCUSSION

Janda's approach:

The basic concept of Janda's approach is based on the assumption that both Central nervous system (CNS) and musculoskeletal system are interdependent. According to Janda, characteristic pattern of muscle weakness and tightness are consistent throughout whole muscular system and muscle imbalance is considered as a contributing factor for chronic pain syndromes [9]. Tight muscles are more readily activated during various patterns of impaired movements and are one third stronger than muscles prone to inhibition.

Janda's treatment approach is structured into three phases: firstly, peripheral structures are normalized through postural and ergonomic instruction. Secondly muscle length is restored before strength is regained in order to reestablish muscle equilibrium, a process which conforms to Sherrington's law of reciprocal inhibition which posits that a tight antagonist muscle can reflexively suppress its opposite weak agonist muscle. Thirdly movement coordination is enhanced through sensory motor training [14].

Janda's approach demonstrated significant effectiveness for both children [11] and adults [14], resulting in improved postural alignment achieved by normalising lordosis curvature, enhancing abdominal and gluteal muscles strength and improving flexibility in tightened hip flexors and lumbar extensors. In adults with NSLBP, it decreased pain and improved functional disability [16]. Another study demonstrated that training intermittently than simultaneously was more effective in improving LCS [19]. Using MET instead of stretching in the Janda's approach would also be an equally effective treatment, as demonstrated by a RCT [20]. Janda's Approach when compared with Bruegger's exercise yielded better results [18].

GPR:

GPR, originated in 1980s by French Professor Philippe Souchard, is now used as a therapeutic treatment in conditions like NSLBP, neck pain, postural impairments and ankylosing spondylitis. It is derived from the three basic concepts: Individuality, Causality and Globality [24]. Individuality refers to studying the individual and not rely only on set standardized protocols. Causality addresses to treat the root cause of pain, eliminating the confounding effects of compensatory movement mechanisms and preventing relapse. Globality focused on treating the patient holistically, eliminating all the compensations and structural adjustments that results from primary problem.

GPR have eight therapeutic postures, which allows micro-adjustments in complete globality without compensations. Patient maintains these postures actively for a particular amount of time as they elongate muscles and reduce excessive muscle tone, ultimately aiming to alleviate pain and prevent relapse [25]. The postures for a specific patient are chosen after a careful postural and biomechanical evaluation. The postures chosen in various studies for LCS and for NSBP are aimed to stretch the entire anterior muscular chain of body and strengthen the entire posterior muscular chain of body, based on the concept that in LCS, posterior muscle chain is prone to weakness and anterior chain prone to tightness.

Recent studies showed that GPR in comparison to the conventional physiotherapy has proved to be significantly effective in treating adults with LCS having NSBP by improving lumbar lordosis by a decrease in anterior pelvic tilt, improving pain and hip flexors flexibility with a reduction in functional disability [23]. When GPR was compared with MCE [21] as well as iso stretching exercises [15] in patients with NSBP, it demonstrated to be a more efficacious.

Other interventions:

In addition to Janda's approach and GPR, ergonomic modifications, conventional physiotherapy incorporating core strengthening exercises, William's protocol, Bruegger's exercise, sciatic nerve neurodynamic SNAGs, MCE and isostretching exercises have demonstrated improvements in LCS as well as in NSBP. These interventions often complimented Janda's approach and GPR leading to think about the efficiency that clinicians would get incorporating these interventions along with Janda's approach and GPR in clinical settings.

Wiliam back exercises teach people to avoid lumbar extension which worsens low back pain improving lumbar flexion and strengthening gluteal and abdominal muscles [26]. Sciatic nerve neurodynamic SNAGs are a type of manual therapy technique which helps to restore the optimal mechanics of sciatic nerve as well as influencing the non-neuronal structures aiding in pain management [17]. Bruegger's exercise, developed by Swiss neurologist, targets the strengthening of those muscles which become weak due to prolonged sitting postures [18]. MCE are based on perception that impair control and coordination of spine muscles are seen in people with NSBP displaying a delayed onset activation of deep spinal muscles, hence, they focus on the stimulation of deep spinal muscles like multifidus and transverse abdominis [21]. Isostretching exercises emphasizes the strengthening of deep muscles by isometric contractions which stimulates awareness in individuals of a good physical and postural control and is used as an effective treatment in various conditions like gait and balance improvement, hamstring flexibility, posterior chain muscle strengthening, shoulder impingement, mastectomy and thoracic kyphosis [15].

Strengths and Limitations of the review:

This narrative review offers a focused synthesis of literature using PICO criteria and MeSH terms to guide article selection adding a structure and clinical relevance to the review process. The categorization of findings under distinct subheadings, it offers the clear and organised evaluation of current evidence. The review highlights distinct mechanisms and benefits of both interventions – Janda's approach and GPR, as well as finding other approaches available for the management of NSLBP in LCS sub-group. However, as a narrative review, it lacks formal quality appraisal or risk of bias assessments. The limited number of included studies and absence of large-scale comparative trails reduce the generalizability of findings. Future research should aim to address these gaps for developing standardized, evidence-based protocols.

CONCLUSION

Among all interventions, Janda's approach as well as GPR represents two effective, yet distinct strategies demonstrating potential in reducing pain, improving posture, and enhancing functional outcomes. Janda's approach was studied more in the management of LCS and is based on correcting dysfunctional movement patterns and restoring muscle normal length, while GPR adopts a holistic view, targeting postural imbalances via working on muscular chain patterns and was used more in the management of NSBP. However, the current literature lacks high-quality, large-scale studies for the management of LCS along with NSBP in patients. There is a need for further comparative research to establish most effective management available to guide clinical decision making and establishing standardized protocols. Future researches should focus on developing multimodal strategies that combine the strengths of Janda's approach, GPR and other interventions for enhancing patient care.

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