



Comparing the therapeutic effects of two Iranian musical modes with standard treatment in acute sciatica pain: a pilot study

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ABSTRACT

Sciatica is a term that describes radiating pain to the lower extremities. The beneficial effects of music therapy and music medicine on various diseases have been studied and proven in different studies. We designed this study to evaluate the therapeutic effects of two Iranian musical modes on Sciatica pain and disability alleviation. This pilot study was a Randomized Controlled Trial (RCT) with three parallel arms. 30 patients with acute sciatica participated in this study and were randomly assigned to three groups. The intervention groups listened to the musical pieces of Iranian “Navā” and “Rāst-Panjgāh” musical modes (Dastgāh) played before sleep for ten consecutive nights. The control group received the conventional treatment. We compared the findings between the three groups on the tenth day. The primary outcome was pain intensity (Visual Analog Scale (VAS)). Functional status (Roland-Morris Disability Questionnaire) and amount of painkiller use were secondary outcomes. The reduction in pain intensity ($P < 0.001$) and disability ($P < 0.001$) in the Navā group was significantly more than the control group, while the patients in the Rāst-Panjgāh group had no significant difference from the control group. Comparison between the three groups for Analgesic dose reduction showed no significant difference. The present study is the first to assess music medicine’s effects on sciatica in Iran. This study’s results showed that using Navā music as a supplement to pharmacologic treatment significantly reduced the pain and disability caused by acute sciatica in the participants. Navā music’s effects on sciatica pain were more than that of the Rāst-Panjgāh, while there was no significant difference between these two groups in disability reduction. We hope to gather data on the potential of traditional Iranian music in music therapy.

Keywords: *Low back pain, Music therapy, Music Medicine, Sciatica*

INTRODUCTION

Sciatica or sciatic nerve-induced pain refers to shooting pains in the leg caused by inflammation or compression of the lumbosacral nerve roots, often accompanied by back pain, weakness and decreased muscle strength, numbness and reflex disorders on the same side of the affected leg [1, 2]. In addition to severe pain, sciatica affects a person's social life by creating functional limitations [1]. Sciatica is a common ailment. In some reports, the prevalence of lower back-related leg pain in the primary care setting has been between 48 to 74 per cent [3]. Approximately 90% of sciatica cases suffer from disc herniation which causes pressure and impingement on nerve roots or the spinal cord. Other causes of sciatica are spinal canal or foraminal stenosis, tumours, and cysts [2]. Most known causes of the first sciatica episode are lifestyle-related and preventable (smoking, obesity, occupational factors) and show the significance of prevention. The non-modifiable risk factors of sciatica include age, gender and social class [4].

Treatment of Sciatica is a challenging issue. Although the treatment should be patient-centred and coordinated with clinical guidelines, in most patients, the presence of pain and symptoms of sciatica and the lack of skills to deal with it, as well as the absence of funding and support, make it difficult for patients to manage sciatica [5]. Depending on its severity, conventional medicine's non-pharmaceutical treatments for back pain and sciatica include various types of physical therapy, special sports exercises, massage, acupuncture, laser therapy, biofeedback, and yoga. Analgesics such as nonsteroidal and steroidal anti-inflammatories, muscle relaxants, opioids, and extraforaminal steroid injections are administered in case of inadequate response to the abovementioned therapies [6, 7].

Patients with severe or progressive nerve damage are indicated for surgery, and elective surgery is recommended for patients still symptomatic despite receiving conservative treatment for more than 6 weeks [8, 9].

The American Music Therapy Association (AMTA) defines music therapy (MT) as "the clinical and evidence-based use of music interventions to accomplish individualised goals

within a therapeutic relationship by a certified individual who has completed an approved music therapy program." Meanwhile, Music medicine is often used by healthcare professionals not trained in music therapy [10]. Music medicine is considered a safe, inexpensive, and effective non-pharmacological and anxiolytic agent that reduces regular pharmacological sedative doses due to its effect on anxiety, depression, and pain perception [11,12].

Music therapy has been suggested as an alternative treatment for various diseases, including depression, dementia, paediatric autism, insomnia, and pain relief [13,14].

However, based on the authors' search results, a limited number of studies investigated music's effect on sciatica pain. And in this field, no study has been done to evaluate the impact of Iranian music on Sciatica.

The present study is a music medicine study conducted to compare the therapeutic effects of two Iranian musical Dastgāh (the Navā and the Rāst-Panjgāh) with the acute sciatica conventional treatment.

Contemporary Iranian music is based on twelve modal systems, including seven "Dastgāh-ha" and five "Āvāz-ha". In the past, traditional Iranian music followed the maqam modal systems, which has evolved into the current system over time. Each Dastgāh is formed around a nuclear mode called Darāmad and consists of several "Gūsheh-ha", partial melodies usually compatible with the Dastgāh's pattern. The arrangement of Gūsheh-ha in all the 12 modes as transmitted by an authorized master is called "Radif" [15]. Mirzā Abdullāh's Radif is one of the oldest and famous narrations of Radif used in this study [16].

In his ancient music treatise, Abd-al-Rahman Sayf Qaznavi lists the Navā musical maqam as an effective treatment for sciatica [17]. The Navā maqam has evolved through the ages into the contemporary Navā musical Dastgāh; however, the original intervals are preserved, and thus the researchers chose it for their purpose [16,18].

The Rāst-Panjgāh Dastgāh, chosen as the second musical intervention, has fewer Gūsheh-ha and is less frequently used in Iranian music compared to others [16,19].

MATERIALS AND METHODS

Study design

This study is a pilot randomised controlled trial with three parallel arms at the Hazrat Rasoul Akram hospital and Behesht Traditional Persian medicine (TPM) outpatient clinic in Tehran, Iran. To maintain the quality of reporting, the CONSORT 2010 Statement was used: Extension to Randomised Pilot and Feasibility Trials guideline [20]. This study was conducted between 2021 and 2022.

Participants

In a randomised clinical trial, 30 patients aged 18 to 65 with moderate to severe sciatica or radicular back pain (VAS \leq 4) and a confirmed diagnosis by a neurosurgeon were recruited. After obtaining informed consent, the demographic characteristics of the patients were recorded. The daily consumption of analgesics was recorded, and patients' pain intensity with the Visual Analogue Scale (VAS) and the pain intensity and disability were evaluated using the Roland-Morris disability questionnaire. Then the patients were randomly assigned to three groups A, B or C.

Other inclusion criteria included: pain onset of less than one month (continuous or intermittent), no indication for lumbar spine surgery, no hearing problems, no history of seizures and brain lesions aggravated by sound (reflex epilepsy), proficiency in Persian language and more than two weeks since the last change in the type and dose of conventional medicine.

Exclusion criteria included: History of previous surgery on the lumbar spine, occurrence of symptoms of cauda equina syndrome (numbness and weakness of both legs, pain in the anal area, numbness of the perineum, paralysis of the sphincters). The presence of back pains with specific causes such as fracture, cancer, systemic inflammation and rheumatology diseases, infection and severe degenerative changes led to the exclusion of the candidates. The other exclusion criteria were the occurrence of symptoms during the treatment requiring more investigation and intervention, such as diseases of other organs, pregnancy, and history of corticosteroid or opioid use in the last six weeks. Also, cases whose illness worsened during the study or did not wish to cooperate and those who

did not listen to music for three nights or more were excluded from the study.

Interventions

In addition to receiving conventional treatment, the recruits in group A listened to the Rāst-Panjgāh piece for 5 minutes for 10 nights before sleep (around ten o'clock at night). Group B participants listened to a piece of music from the Navā for 5 minutes for 10 nights before bed (around ten o'clock at night) and received conventional treatment. The group C participants only received conventional treatment.

All three groups received routine treatment, including partial rest at home, warm compresses, and 250 mg naproxen tablets (from one to four tablets per day, depending on the severity of the pain). Group A and B participants listened to their respective pieces of music using the hands-free devices provided by the research team. The loudness of the playing piece was at the discretion of the patient. The participants were told that if they wished, they could listen to the music assigned to their respective group at the designated time (before going to sleep) up to two more times. During the 10 days period, the researchers contacted the patients followed their progress and replied to any questions.

After 10 days, pain intensity and disability with the VAS scale and Roland-Morris questionnaire and their analgesics consumption amount were evaluated in all groups.

The parts of the Navā and Rāst-Panjgāh were performed in Mirzā Abdullāh's radif with a Setar (both pieces were played with a single instrument). Master Ali Asghar Bayani (A renowned setar player) performed both pieces. From Mirzā Abdullāh's radif, for the Navā piece, the parts of Chahār-Mezrāb, Darāmad-e-aval, Darāmad-e-dovvom, Kereshme and for the Rāst-Panjgāh piece the parts of Darāmad-e-rāst, Darāmad-e-dovvom (Zang-e-shotor), zangule-ye-saghir and zangule-ye-kabir were played [16].

Outcomes

The primary outcome measure was a Visual Analog Scale (VAS) of 0-10. 0 indicates a state without pain; 10 shows the most severe pain possible. Each number from 0 to 10 is distributed in a line 1 cm apart, and the patient could mark the intensity of pain felt when filling out the

VAS. The VAS was applied at baseline and on the tenth day [21].

The secondary outcome was disability due to back pain measured by the Roland Morris Disability Questionnaire (RMDQ). This questionnaire comprises 24 statements about the person's perceptions of their back pain and associated disability. There are items on physical ability/activity (15), sleep/rest (3), psychosocial (2), household management (2), eating (1) and pain frequency (1). Scores range from 0 (no disability) to 24 (maximal disability). Each item could be checked if it applied to a patient for that day, leading to a total score obtained by counting the number of checked items [22,23]. The participants completed the questionnaire on their first and tenth day.

Another secondary outcome was the amount of painkiller use at baseline and tenth day of the study.

Sample size

The total sample size for this pilot study was 30 participants divided into three groups of 10.

Randomisation and blinding

The participants were randomly divided into three groups. Randomisation was done by the Block Randomisation method using blocks of 3 and 6. The assessor was blinded to the treatment allocation. Due to the nature of the interventions,

it was impossible to blind the therapists or patients.

The duration of both pieces was similar, and the same performer played both pieces with the same instrument. However, blinding was impossible because most participants and their families are familiar with Iranian music and can distinguish them.

Analytical methods

SPSS software (version 26) was used for statistical analysis. The data were described with the mean and standard deviation for quantitative variables and the frequency of qualitative variables. Data analysis was done by the "Intention to treat" method; the Kruskal-Wallis test was used to compare age, pain, disability and painkiller consumption between the three groups. Mann-Whitney U test was used for pairwise comparisons. Gender comparison between the three groups was made with the Chi-square test. A statistically significant level of less than 5% was considered for the primary outcome.

RESULT

Of 48 potential candidates, 30 met the inclusion criteria and enrolled on the study. One of the group B participants exited the study due to the mandatory night shifts and inability to follow this study's instructions. Figure 1 shows the CONSORT flowchart used to recruit the participants.

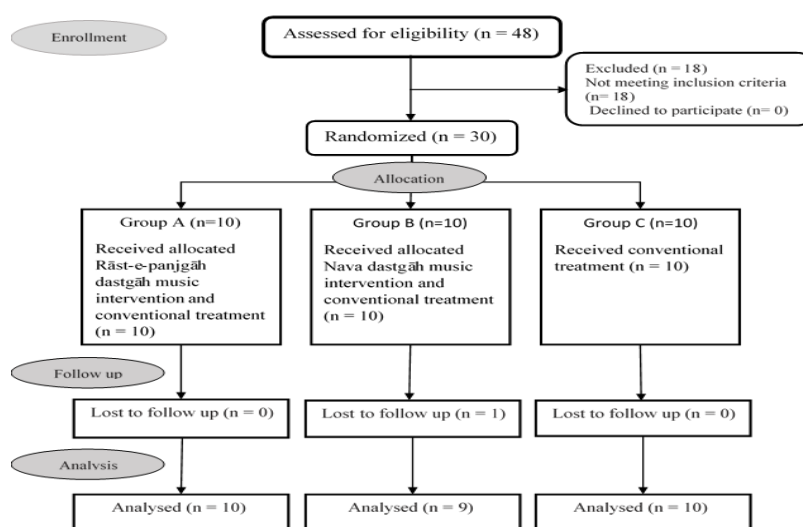


FIGURE 1: The CONSORT flow chart diagram.

The mean \pm standard deviation of the age was 43.66 ± 10.66 years. Female participants were 19 (63.3%). There was no significant difference between the three groups regarding age ($p=0.865$) and sex ($p=0.366$).

There was no significant difference between the three groups in terms of pain intensity and

patients' disability at the beginning of the study, while the consumption of analgesics in the control group was significantly more than the other two groups ($p=0.001$). Table 1 shows pain and disability scores and daily analgesics doses before and after the intervention.

TABLE 1: Pain, disability and pain killer dosage in each group at baseline and after interventions

	groups	Baseline (mean \pm SD)	After 10 nights (mean \pm SD)	Percentage of changes (mean \pm SD)	P value*	P value**	P value***
Pain (VAS score)	A	5.5 \pm 1.43	4.6 \pm 2.31	18.58 \pm 25.9	0.002	0.28	0.028
	B	6.5 \pm 1.18	3.66 \pm 1.5	45.37 \pm 13.98		<0.001	
	C	6.6 \pm 1.17	6.2 \pm 0.63	4.01 \pm 15.37			
Disability (RMDQ score)	A	9.2 \pm 4.31	7.2 \pm 5.09	25.55 \pm 30.08	0.003	0.353	0.079
	B	12.7 \pm 3.56	6.33 \pm 2	51.37 \pm 9.94		<0.001	
	C	12 \pm 2.49	11.5 \pm 2.41	3.81 \pm 9.23			
Pain killer (number/day)	A	0.71 \pm 1.25	0.6 \pm 1.26	10 \pm 31.6	0.813	0.739	0.661
	B	0.3 \pm 0.67	0 \pm 0	22.22 \pm 44.09		0.905	
	C	1.8 \pm 0.78	1.6 \pm 0.84	11.66 \pm 38.53			

SD: standard deviation, VAS: visual analogue scale, RMDQ: Roland Morris disability questionnaire

* comparison between three groups with the Kruskal Wallis test,

** comparison between each group with the control group with the Mann-Whitney U test,

*** comparison between groups A and B with the Mann-Whitney U test

According to Table 1, the reduction in pain intensity ($P<0.001$) and disability ($P<0.001$) in the Navā group was significantly more than the

control group, while the patients in the Rāst-Panjgāh group had no significant difference from the control group. Moreover, Pain reduction in the Navā group was more significant than in the Rāst-Panjgāh group ($p=0.028$). Comparison between the three groups for Analgesic dose reduction showed no significant difference.

Figure 2 shows pain, disability, and painkiller dose changes in the three groups.

VAS: visual analogue scale, RMDQ: Roland Morris disability questionnaire

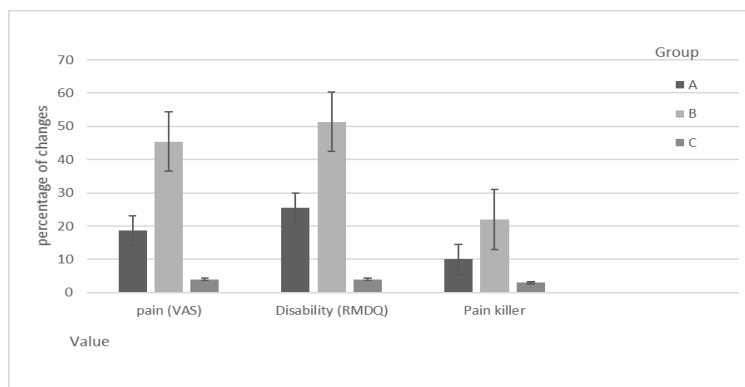


FIGURE 2: Percentage of changes in pain and disability severity and painkiller dosage

DISCUSSION

The present study is the first to assess music medicine's effects on sciatica in Iran. This study's result shows that using Navā musical piece as a supplement to pharmacologic treatment significantly reduced the pain and disability caused by acute sciatica in the participants. Navā music's effects on sciatica pain were more than that of the Rāst-Panjgāh, while there was no significant difference between these two groups in disability reduction. Moreover, there were no statistically significant differences in pain and disability findings between Rāst- Panjgāh and the control (routine treatment) groups.

As the Dastgāh's music used in this study are studied for the first time, and there are no similar studies in which two different music pieces were compared, the authors compared the results with other studies which assessed different types of music on sciatica patients.

Kullich et al. divided 65 patients with low back pain into two groups. The intervention group underwent standardised physical therapy accompanied by music and instructions for relaxation once a day for three weeks (with CD and headphones). The control group received only routine treatment (without music). The patients' follow-up after ten days and after three weeks showed that the patient's pain score (assessed by VAS scale) on the tenth day ($p < 0.001$) and the twenty-first day ($p < 0.00001$) and the patients' disability (assessed by with Roland-Morris questionnaire) on the 10th day ($p < 0.005$), and on the 21st day ($p < 0.00002$) in the intervention group had improved better than the control group's patients. Also, evaluating patients' sleep with the Pittsburgh scale showed that music therapy reduced the patients' sleep disorders [24].

Guétin et al. performed a study on 65 low back patients in a rehabilitation centre. They divided the recruits into two groups. The intervention group received standardised physical therapy (physiotherapy, balneotherapy, and physical exercises) for 12 days, accompanied by music (four 20-minute long sessions from the first to fifth days after admission). The control group received only standardised physical therapy. The patients' pain scores (assessed with the VA scale), disability (assessed with the Oswestry index), and anxiety and depression were

evaluated and compared before and after music listening on days 1, 5, and 12. The results showed that music significantly reduces the severity of disability, anxiety and depression levels ($p < 0.01$) [25].

Furthermore, music therapy had an immediate effect on pain intensity ($p < 0.001$) (assessed by VAS performed before and after music therapy), despite its ineffectiveness in chronic pain. These results confirm the effectiveness of music's positive effects on chronic low back pain. The researcher concluded that music could be a helpful complementary treatment for chronic pain and the accompanying anxiety and depression [25].

The sample size in the present study was smaller than the studies of Kullich et al. and Guétin et al. This study did not examine the effects of music on sleep disorders, anxiety and depression. However, in terms of the effectiveness of music on improving sciatica pain, the present study's results are consistent with the findings of studies by Kullich et al. and Guétin et al. Instead of the ailment's chronic setting, music therapy's effects on acute low back pain were studied. Furthermore, the results of this study showed that the type of chosen music could affect the results, as the Navā piece proved to be more effective in pain and disability reduction compared to the Rāst-Panjgāh.

In a prospective cohort study, Nees et al. looked at the effectiveness of different pain relief methods from the patient's point of view in people with chronic low back pain. The usefulness of each treatment method from the patient's point of view was measured by a questionnaire designed from 1 (unhelpful) to 6 (extremely useful). This study lasted for three weeks, during which 276 patients, five days a week and five hours a day, chose the following treatments and at the end of the study period, they completed the above questionnaire regarding the usefulness of the provided treatment. The treatment methods presented in this study included: individual and group physiotherapy, water therapy, exercise therapy, psychotherapy, music therapy, biofeedback, relaxation therapy and spine health education. According to the participating patients, individual physiotherapy was the most helpful treatment and music therapy, with a score of $(3/02 \pm 1/47)$, was evaluated as somewhat beneficial. The frequency

of music therapy in this study was once a week for one hour, which was performed live, which differs from the present study. Moreover, the study assessed chronic low back pain [26].

All of the participants in this study received 250 mg of naproxen. Naproxen is a nonsteroidal anti-inflammatory drug (NSAID) used to treat and relieve pain, muscle spasms, and inflammatory diseases. The results of some studies have shown that the effectiveness of NSAIDs to reduce sciatica pain is comparable to placebo [27,28].

LIMITATIONS

One of the limitations of the present study was not considering people's taste in choosing the type of music, which the authors recommend considering in future study designs. The small sample size was another limitation of the present study, and the authors recommend conducting studies with a larger sample size to determine the effectiveness of different Iranian music subtypes on pain. Another limitation was the lack of blinding, which is inevitable in some study settings. The Covid pandemic during the study was another limiting factor because of the limitations posed by social distancing mandates.

CONCLUSION

The present study's findings showed that the music of the Navā, along with routine treatment, has a higher effectiveness in improving pain and reducing the disability of patients with acute sciatica compared to standard therapy alone. The mentioned combination reduces pain better than Rāst-Panjgāh-based music. Also, the effect of Rāst-Panjgāh music on the pain and disability of these patients was not different from the control group. The amount of analgesic consumption did not change significantly in the three groups.

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Statement of Ethics

This study was approved under the code: IR.IUMS.rec.1401.205 by the Iran University of Medical Sciences Medical Ethics Committee. Before beginning the study, the study's aims

were explained to the eligible recruits. The written consent of all who agreed to participate was obtained using the Voluntary Informed Consent Form. The participants were informed that any information collected will only be used in the present study and kept strictly confidential.

CONFLICT OF INTERESTS

The authors had no conflicting interests with the present study.

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