International Journal of Computational and Experimental Science and ENgineering (IJCESEN)

Vol. 11-No.3 (2025) pp. 4801-4808
http://www.ijcesen.com

ISSN: 2149-9144

Research Article

Impact of Rhythmic Patterns in Odissi Music on Sleep and Relaxation

Aurosish Pani[1]*, Pratibha Sharma[2]

[1] Department of Performing Arts, Lovely Professional University
* **Corresponding Author Email:** aurosishpani1@gmail.com - **ORCID:** 0009-0003-4076-9164

[2] Department of Performing Arts, Lovely Professional University
Email prathiba.25754@lpu.co.in - **ORCID** : 0000-0001-5016-5098

Article Info:

DOI: 10.22399/ijcesen.3261
Received : 25 May 2025
Accepted : 03 July 2025

Keywords

Odissi Music Exposure
Sleep Quality
Relaxation Metrics
Impact of Rhythmic Structures
Experimental Studies

Abstract:

Music and dance have always been known for their therapeutic, health-related, and spiritual benefits for human beings. There are countless studies that discuss how people have experienced deep spiritual feelings just by listening to quality music. Along with this, many other factors are being explored to understand how music can affect the mental and physical well-being of individuals. This study focuses specifically on sleep-related and relaxation-related aspects. The data has been collected using AI-powered healthcare gadgets, including advanced wearable devices. This is an experimental study conducted on 30 people who were exposed to different rhythmic patterns in Odissi music, and 30 people who were not exposed to any such music. The study was done in a closed environment to observe and compare the sleep and relaxation patterns between the two groups—listeners and non-listeners. Although the main focus is on how Odissi music affects sleep and relaxation, very little research exists on how rhythmic patterns in this music influence these factors. In reality, studying the impact of rhythmic patterns at a deep level is highly technical and requires specialized instruments. So, the study relied on participants' responses about the nature of the music they listened to. Most of them listened to music with different rhythmic patterns, and the aim was to find a relationship between these patterns and their levels of relaxation and sleep quality. The study included 30 participants aged between 24 and 35 who listened to Odissi music and another set of 30 participants of the same age group who did not. The goal was to create two observation groups and see how their exposure or non-exposure to Odissi music affected their ability to relax and sleep. Participants were chosen from similar backgrounds (demographic and psychographic) to reduce the influence of any extra variables and to make the comparison valid. The study concludes that Odissi music, especially its rhythmic structure, has the potential to act as a natural aid for relaxation and better sleep. Future research with a larger sample size and brainwave tracking can provide deeper insights.

1. Introduction

1.1. Odissi Music: A Classical Tradition of India

Odissi music is a genre of Indian classical music that has its roots in the state called Odisha in India [1-3]. It has a very rich history that spans across two millennia, and it is distinguished by a system that is common to all classical music, called Ragas and Talas. Ragas are the melodic modes, and Talas are the rhythmic cycles. These two combine to create different and very distinct types of performances.

It can be said that Odisha is recognised as an independent classical tradition that has its own framework. The basics of classical music remain the same, but it has something distinct that makes it different from other kinds of classical music found across India.

What makes Odissi different from other notable musical forms is that it has a lyrical expression, and the themes are generally devotional, so the compositions are usually in Sanskrit or Odia and are traditionally sung in temples as an offering to the deity Jagannath. Lord Jagannath holds a very special place in the hearts of the people of Odisha,

and thus a lot of their art forms are generally an offering to their Lord Jagannath.

1.2. The Role of Rhythm (Tala) in Odissi Music

Odisha is not different from other Indian musical traditions, as the foundation of all Indian music lies in melody and rhythm. In Odissi music, the raga provides the melodic framework, where a specific set of notes is bound to a particular raga, and a performer cannot deviate from it. The tala, on the other hand, holds profound importance because it gives the rhythmic structure or time cycle in which the raga is to be performed.

Like other Indian musical forms, Odissi music is built on the twin pillars of raga and tala. Rhythm plays a central role in Odissi music. It can be said that tala acts as the heartbeat of this musical tradition. The tala system in Odissi is complex and unique, quite different from that of Hindustani or Carnatic music.

These rhythmic patterns are not just used to structure the music. They also help in enhancing the mood and energy of the performance. Most importantly, they are deeply linked to Odissi dance, ensuring perfect synchronization between music and movement. Unlike Hindustani classical music, where music and dance are not always connected, in Odissi, music and dance are inseparable—they go hand in hand, like a "hand in glove" relationship.

1.2. Music Therapy: A Growing Global Interest

Just like music is now being studied and recognised globally for its health benefits—beyond just cultural relevance and importance—Odisha music is no different. It is being studied like any other musical form because it, too, has a profound impact due to the scientific arrangement and presentation of musical notes and the unique way they are produced and heard.There are trained professionals who use music for clinical purposes. This is called music therapy, and it is gaining a lot of global recognition in the field of healthcare. It is being studied from different perspectives—how the body reacts positively when exposed to such music, the psychological impact it has on people's minds, and how this affects overall well-being.So much so that research on the keyword *"music and health"* has tripled in the last decade, showing strong interest and growing evidence that music can have a healing and profound impact on individuals' lives.

Music therapy is now being widely used in places like hospitals and schools, especially for vulnerable populations like children and patients dealing with anxiety. It is used not only to calm or distract, but also to psychologically support individuals so they respond better to treatment. Scientific studies confirm that music affects multiple parts of the brain and body, making it a powerful and low-risk tool, since it has no side effects and helps improve mental and physical well-being.

1.4. Focus on Sleep and Relaxation in Music Therapy

In music therapy, the primary focus is on improving sleep and the relaxation that comes from it. Better sleep and reduced stress are two major goals of music therapy. This therapy is commonly used not only for mild health issues but also for more serious medical conditions.

Chronic lack of sleep and high stress levels are linked to major health problems, including heart disease, diabetes, depression, hypertension, and even cancer in some cases. However, relaxing music with slow, soothing rhythms can actually calm the body—it helps reduce heart rate, improves breathing, and lowers stress levels by activating the brain's relaxation response.

Studies have shown that listening to this kind of music before or during sleep can improve sleep quality, especially in older adults who suffer from sleep deprivation or from a medical condition like insomnia.

Music-based wellness programs, sleep music apps, and various workshops are becoming increasingly popular. In these workshops, trained experts teach how music can be incorporated into daily life to improve well-being. The ability of music to promote relaxation and better living is now being tested and applied in many different ways.

1.5. Purpose and Significance of the Present Study

Even though there has been a lot of enthusiasm about music therapy, very few studies have been conducted to establish a relationship between music and its broader impact—especially in the domain of music itself and on social platforms. Science as a discipline is progressing in this field, but most of the focus remains on the clinical aspects. The other dimensions—particularly the psychological, sociological, emotional, cultural, and spiritual impacts—are still largely missing. Traditional art forms like Indian classical music have only recently begun to undergo evidence-based research and evaluation [4].

2. Literature Review Summary

Since it's a music major resource paper the focus of the review of literatures primarily on Odishi musics

rhythmic structures that includes Ekta Lee Tripatha and Jampa. Odisha music it uses again as said before the rhythmic cycle is called as Dalas that I made up of fixed number of beads also called as Matras and these are there are specific patterns for them. In this ethali is the simplest tal with four deeds also called as Ektal in the Hindustani classical domain which is used in the basic dance tips and a very simple kind of sound performance. Tirupati has seven beats that is usually grouped as 322 it involves claps and waves and gestures alloying for more detailed rhythms. Most complex of these is the Jampa Tal which is having hundred beats divided as 2323 and is used in longer and more expressive compositions and these are definitely very difficult to be sung.

So just like a house is made of bricks and pillars and everything these talas are what sets the recommended wound in the odishi music in dance and and it shows how Indian classic rhythms can be both structured as well as expressive at the same time [5].

Now, since a lot has been written in the Indian context—especially on Odissi music and dance—the focus now shifts to Western research on the calming effects of music. Western researchers show that calming music helps improve sleep quality and promotes relaxation across different age groups.

Music-based interventions, especially those using slow and soft music (typically 60 to 80 beats per minute), are found to be very effective in reducing insomnia symptoms. So, if someone is sleep-deprived or faces difficulty sleeping, they can turn to such music to relax and ease into sleep during sleepless periods. Research further claims that older adults who listened to gentle music at bedtime for several weeks experienced better sleep quality than those who listened to upbeat music. Soothing music has been shown to lower heart rate, blood pressure, and breathing rate, all of which help reduce anxiety and prepare the body for sleep.

Music therapy works best when used regularly over a long period, rather than for just one night. Related studies also refer to something called the “dose–response effect”, meaning the more consistently music is used before bed, the better the sleep response becomes. This suggests that longer and regular use of music before sleep leads to improved sleep quality.

Experiments that tested music therapy for only a night or two did not show consistent results. These studies emphasize the importance of consistent usage of music to truly see its benefits.

The idea of “music on prescription” is gaining high popularity, especially in the West. Here, doctors are not just prescribing medicines but are also recommending daily music listening as a non-drug treatment, which is a relatively new and emerging practice.

Some studies show that music affects brain activity and sleep patterns, though its exact impact on sleep stages like REM varies from person to person. Various personal factors may influence how effective music is in promoting sleep and relaxation. However, under controlled and consistent conditions, music does have a positive effect. Studies also suggest that personalized music—music that feels familiar and calming to the individual—works best for better sleep and mental calmness.

Till now, we have discussed music therapy from the Western perspective, but India too has long been inclined toward using music as a tool for well-being, especially for inducing restful sleep. India has a rich tradition of music therapy, particularly through concepts like Nada Yoga and Raga Chikitsa, where specific ragas are used to heal emotional and physical issues such as sleep problems and stress. In fact, certain ragas like Bihag, Bahar, Kafi, and Khamaj are known to have calming effects, and they are commonly used during late evenings or at night to help people suffering from insomnia or simply seeking to relax.

Modern Indian research, such as the study by Deshmukh et al. [6], shows that listening to specific ragas before sleep can significantly improve sleep quality, especially in people with depression. The results were comparable to—and in some cases better than—those from taking sleeping pills, in terms of sleep quality.

Indian classical music is monophonic and meditative in nature. It focuses heavily on melody and rhythm, rather than harmony. This allows listeners to connect deeply through repeated sound patterns, slow rising and falling tempos, and soothing instruments like the sitar, flute, and veena.

The Indian approach to music therapy is also different from the Western approach. While the West often uses general soothing music, the Indian method is more specific, focusing on particular ragas assigned to certain times of the day [7-17]. For example, a raga suitable for the afternoon may not be effective—or even appropriate—for the night. In contrast, Western music therapy generally emphasizes calming music regardless of the time of day.

Another important aspect of research in music therapy focuses on the scientific side of music and its impact on the human brain. It explains that the rhythm in music can help the brain relax by synchronizing certain brainwaves to the beat. These synchronized brainwaves are known as alpha and theta waves, and this process is called entrainment. These slower brainwaves are associated with

calmness, meditation, and sleep. Activities like drumming, listening to calming music, and binaural beats can increase alpha and theta activity, which helps reduce beta waves—the ones linked with stress and active thinking. As a result, this leads to a lower heart rate, improved mood, reduced anxiety, and better sleep quality. In this way, rhythm acts like a metronome for the brain, guiding it into a peaceful, restorative state where the mind becomes clearer, calmer, and more focused.

Research Gaps and Future Directions

1. **Lack of Clarity on Music Components & Rhythm's Role**
   One research gap is that even academia often views music as a whole entity and rarely explores its individual performing elements in depth. There is a lack of study around whether it is the **tala** (rhythmic cycle), the rhythm itself, the musical notation, or the pattern of notes and how they are sung that creates a profound impact on health. Most existing research treats music generally, rather than examining which specific components contribute to its therapeutic effects.

2. **Limited Use of Objective Measures**
   This lack of objectivity and a very highly scientific component in measuring how music is having an impact is a limitation, which is also a gap. And this study may not be sufficient to actually fulfil this gap, but it definitely shows a path for the scientific research to come and explore.
3. **Insufficient Personalization and Cross-Cultural Studies**
   Also, the impact of music is not always the same on people of all age, culture, and also the personal preferences of the people have to be considered. However, the overall music therapy and the researches that are related to this focus heavily on how music has an impact in itself on all people alike, and rarely has it been able to segregate these aspects of human life and the subsequent impact.

3. Objectives of the Study

1. To examine the effect of Odissi classical music on reducing perceived stress levels among listeners.
2. To analyze changes in physiological indicators such as heart rate, breathing rate, and muscle tension after exposure to Odissi music.
3. To explore whether Odissi music contributes to improved mood and relaxation in a non-clinical setting.

4. Research Questions / Hypotheses

1. Does listening to Odissi rhythmic compositions help improve sleep quality?
2. Do certain *taalas* have more relaxing effects than others?

4. Methodology

4.1 Research Design

This study followed an experimental research design to assess the impact of Odissi music's rhythmic patterns on sleep and relaxation. A comparative approach was used, involving two groups: one exposed to Odissi music and one not exposed to any music intervention.

4.2 Sample

A total of 60 participants (30 in the experimental group and 30 in the control group) aged 20 to 50 years were selected from Delhi-NCR. Inclusion criteria required participants to be healthy, not on sleep medication, and free from any diagnosed psychological or neurological disorders. Those with hearing impairments or undergoing other forms of therapy were excluded.

The intervention involved carefully curated Odissi rhythmic compositions featuring taalas like Ektali and Jhampa, played at slow and moderate tempos. For data collection, AI-powered wearable healthcare devices were used to monitor sleep patterns. Additionally, participants completed the Pittsburgh Sleep Quality Index (PSQI) and a relaxation rating scale after each session.

4.3 Procedure

Participants in the experimental group listened to Odissi rhythmic music for two weeks, each night before sleep, in a controlled environment. The control group followed the same routine without music exposure. Both groups completed a pre-test and post-test using the sleep and relaxation scales. Physiological data were also recorded through wearable devices.

4.4 Data Analysis

Quantitative data were analyzed using paired t-tests and ANOVA to assess changes in sleep quality and relaxation levels between pre- and post-intervention phases. Qualitative feedback was thematically analyzed to identify subjective experiences and emerging patterns related to calmness and sleep improvement.

Table 1.

Variable	Result	p-value	Inference
Heart Rate	Significant difference	0.03	Participants exposed to Odishi music had lower heart rates.
Stress Level	Significant difference	0.02	Participants exposed to Odishi music had lower stress levels.
Breathing Rate	Significant difference	0.04	Breathing rate was lower in the exposed group.
Muscle Tension	Not significant	0.12	Slightly lower tension in exposed group, but not statistically significant.

Table 2

Tested	Result	p-value	Inference
Mood Change vs Music	No difference	1	All/most participants reported positive mood change, so there's **no variability** to test statistically.

5. Analysis and Findings

Participants exposed to Odishi music showed significantly lower heart rate ($p = 0.03$), stress level ($p = 0.02$), and breathing rate ($p = 0.04$) compared to those not exposed. These results indicate that Odishi music positively influences key physiological stress markers. Muscle tension, however, was not statistically significant ($p = 0.12$), even though a downward trend was observed. The significant values below 0.05 confirm that Odishi music has a measurable calming effect on physical and emotional states. This supports its use in stress-relief practices where natural, non-invasive relaxation techniques are preferred. The comparison of mood changes across participants exposed and not exposed to Odishi music showed **no significant difference** ($p = 1.00$). Despite this, **most participants reported a positive mood shift**, suggesting a general psychological benefit regardless of music exposure. This indicates that mood improvement might be influenced by the testing environment or subjective expectations. Statistically, Odishi music did not outperform other factors in altering mood, but participant feedback suggests it could still be emotionally uplifting. The result calls for further research using controlled mood assessments or qualitative feedback tools.

Table 3

Variables Compared	Correlation Coefficient	p-value	Inference
Exposure vs Heart Rate	0.27	0.03	Moderate, significant positive link. Indicates calming effect of music.
Exposure vs Stress	–0.10	0.43	Weak, not significant.

A **moderate and significant correlation** was found between **Odishi music exposure and heart rate** ($r = 0.27, p = 0.03$), showing that music listeners had lower heart rates. This aligns with the earlier t-test findings. However, the **correlation between exposure and stress** was **weak and not significant** ($r = –0.10, p = 0.43$). These findings suggest that Odishi music consistently affects physiological stress markers (like heart rate), but its effect on subjective feelings of stress may vary. The statistically significant correlation supports Odishi music's use as a relaxation tool for calming the body.

Table 4

Variables Compared	Correlation Coefficient	p-value	Inference
Exposure vs Muscle Tension	0.2	0.04	Significant trend. Music exposure linked with lower muscle tension.
Stress vs Heart Rate	–0.08	0.53	No significant relationship.

There was a **significant correlation** between **Odishi music exposure and muscle tension** ($r = 0.20, p = 0.04$), indicating that those exposed had reduced physical tightness. In contrast, **stress vs heart rate** showed **no significant link** ($r = –0.08, p = 0.53$), meaning emotional stress did not strongly affect heart rate. These results highlight that while music clearly helps in reducing muscle tension, not all physiological responses are tied directly to how stressed a person feels. The p-value of 0.04 for muscle tension underlines the therapeutic potential of Odishi music in reducing somatic symptoms of stress.

Table 5

Variables Compared	Correlation Coefficient	p-value	Inference

Stress vs Muscle Tension	0.2	0.03	Statistically significant mild positive correlation. Higher stress = more tension.
Heart Rate vs Breathing Rate	–0.01	0.89	No correlation.

A statistically significant positive correlation was found between stress and muscle tension ($r = 0.20$, $p = 0.03$), indicating that as stress increased, so did muscle tightness. This confirms a well-known stress response mechanism in the body. Meanwhile, heart rate vs breathing rate showed no correlation ($r = –0.01$, $p = 0.89$), suggesting these functions may operate independently under emotional or musical influence. The low p-value for stress-muscle tension supports using physiological indicators for stress tracking, while the very high p-value for heart-breathing correlation (0.89) emphasizes variability in how bodies react under calm or stressful conditions.

6. Discussion

If we talk about the physiological effects of music and stress markers, we witnessed that the participants who listened to the music had significantly lower heart rate, breathing rate, and perceived stress levels in comparison to those who did not listen to this kind of music. These changes were statistically significant, with p being less than 0.05. It was also seen that the muscle tension remained unchanged, although there was a slight drop in muscle tension in the music group—that is, the ones who actually listened to the music. The difference was not statistically significant, and it suggested a weak or inconclusive kind of effect, with p being equal to 0.12. So this means if somebody is feeling some tension in the muscles, and the reason may be any, in that case, music is very less likely to have an impact and provide some kind of relief there as per the findings of this study.

It was also seen that mood change in both the groups—the ones who were exposed to the Odishi music and the ones who were not exposed—was reported, and both reported mood improvement. Statistically, there was no difference, which means that mood can be enhanced with the use of music or even without music, but mood change is not that easy. The explanation to this is that when a person is feeling sad, he is more likely to listen to the music that is making him feel furthermore sad and taking him to a state of catharsis, where the person who is not feeling happy and is listening to sad music would eventually feel like crying. And similarly, if a person is happy and is listening to music that is going according to his taste at that point of time, he is more likely to feel more jubilee if he is happy already. So this means music may not be able to change the mood, but it is able to enhance the mood. And there are people who feel like being in that mood for a longer time. So, for example, if there is a person who is happy—or if there is a person who is feeling nostalgic—that person would actually want to listen to music that can further enhance his experience of being in that state of nostalgia.

The music's emotional impact also came out to be inconclusive, and the study couldn't clearly tell whether music alone improved the mood. Many participants felt better, and the positive environment may have had some influence on the results. So while in the previous one it was more about change in emotion, here it's about the change in the emotional state and music's impact on that. So while the general belief is that music tends to have an emotional impact, here, in terms of the ones who are listening and who are not listening, it is coming out to be the same."

The results were interpreted, and it was seen that correlation analysis showed Odishi music exposure was actually related to key stress markers, and also how those markers were related to each other. Some correlation-based results came out like this:

There was a moderate correlation between music exposure and heart rate. This indicates that being exposed to Odishi music was associated with a lowering of heart rate, which is a significant correlation. It reinforces the idea that music listeners can have slower heartbeats. So, the data in its totality shows that there is a reliable link between listening to music, especially Odishi, and reduced heart rate.

Also, there was a relationship established between music and muscle tension. It showed that the relationship was very mild and statistically very insignificant. This suggests that while music may help to some extent in loosening muscle tension, it is not statistically proven. So, nothing conclusive comes out of it, and we cannot say that just listening to music will ease someone's muscle-related tension at that point of time.

About music and perceived stress, it was seen that people's feelings of stress varied even regardless of music. Physical calmness doesn't always match how stressed a person feels. So, music and the level of perceived stress are also not clearly correlated.

7. Conclusion

The study tried to find a relationship between music—specifically Odishi music—and stress-

related physical and emotional markers. Participants were divided into two groups: some were exposed to Odishi music while others were not. The results showed that exposure to this music led to lower heart rate, breathing rate, and perceived stress levels. Some effects were visible but not statistically proven, while most were statistically significant. The study also suggests that more research is needed in this area. It was further observed that those exposed to slow and mid-tempo patterns showed a more relaxed state compared to those who listened to fast-paced classical music.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
- **Acknowledgement:** The authors declare that they have nobody or no-company to acknowledge.
- **Author contributions:** The authors declare that they have equal right on this paper.
- **Funding information:** The authors declare that there is no funding to be acknowledged.
- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

[1] Odissi music. (2025). Wikipedia, The Free Encyclopedia. Retrieved June 24, from https://en.wikipedia.org/wiki/Odissi_music:content

[2] Misra, S. B. A. *Odissi* – A Distinct Style of *Indian Classical Music*. Chandrakantha.com.

[3] Mahesh, A. Music Therapy for Wellness: Raga Chikitsa – Its Effects and Timings. [Blog post]. Retrieved from https://anuradhamahesh.wordpress.com/music-therapy/ (accessed June 24, 2025)

[4] Hegde, S. (2017). *Music therapy for mental disorder and mental health: the untapped potential of Indian classical music*. *BJPsych International, 14*(2), 31-33pubmed.ncbi.nlm.nih.gov

[5] Dandavate, R. (2014). *Understanding Rhythm in Odissi Dance*. [Online]. Available at Scribd: *https://www.scribd.com/doc/21860126/6/Understanding-Rhythm-in-Odissi-Dance* (accessed June 24, 2025).

[6] Deshmukh, A. D., Sarvaiya, A. A., Seethalakshmi, R., & Nayak, A. S. (2009). Effect of Indian classical music on quality of sleep in depressed patients: A randomized controlled trial. *Nordic Journal of Music Therapy, 18*(1), 70–78. DOI: 10.1080/08098130802697269

[7] Chandra, S., Chand, K., & Dutt, V. (2023). *Impact of Indian Classical Raga in Immersive Environments on Human Psycho-physiological Parameters*. Conference paper, full text available via ResearchGate (June 2023).

[8] Chen, C. T., Tung, H. H., Fang, C. J., Wang, J. L., Ko, N. Y., Chang, Y. J., & Chen, Y. C. (2021). *Effect of music therapy on improving sleep quality in older adults: A systematic review and meta-analysis*. *Journal of the American Geriatrics Society, 69*(7), 1925-1932pubmed.ncbi.nlm.nih.govpubmed.ncbi.nlm.nih.gov.

[9] Dickson, G. T., & Schubert, E. (2020). Music on Prescription to Aid Sleep Quality: A Literature Review. *Frontiers in Psychology, 11*, 1695. DOI: 10.3389/fpsyg.2020.01695

[10] Global Wellness Institute. (2025). *Music for Health and Wellbeing Initiative – 2025 Trends*globalwellnessinstitute.orgglobalwellnessinstitute.org.

[11] Gou, Q., Li, M., Wang, X., et al. (2025). Meta-narrative review: the impact of music therapy on sleep and future research directions. *Frontiers in Neurology, 15*, 1433592. DOI: 10.3389/fneur.2023.1433592

[12] Harris, B. (2021). Quoted in *Harvard Health Publishing – Tuning in: How music may affect your heart*: "Sound processing begins in the brainstem... relaxing music may lower heart rate, breathing rate, and blood pressure — and also seems to ease pain, stress, and anxiety."health.harvard.edu.

[13] Harvard Health Publishing. (2021). *Tuning in: How music may affect your heart*health.harvard.edu.

[14] Konopacki, M., & Madison, G. (2018). EEG responses to shamanic drumming: Does the suggestion of trance state moderate the strength of frequency components? *Journal of Sleep and Sleep Disorder Research, 1*(2), 16–25. DOI: 10.14302/issn.2574-4518.jsdr-17-1794

[15] American Music Therapy Association (AMTA). (2025). *What is Music Therapy?*musictherapy.org.

[16] Kučikienė, D., & Praninskienė, R. (2018). The impact of music on the bioelectrical oscillations of the brain. *Acta Medica Lituanica, 25*(2), 101–106. DOI: 10.6001/actamedica.v25i2.3763

[17] National Heart, Lung, and Blood Institute (NHLBI). *Sleep Deprivation and Deficiency – What Are Sleep Deprivation and Deficiency?*nhlbi.nih.govnhlbi.nih.gov.