

Study Of The Behavioural Plasticity In *Catla Catla*: Response To Vedic Chant

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ABSTRACT

This study investigates the behavioural adaptability of the freshwater fish *Catla catla* when exposed to the Vedic chant KRIMI NASHANA SUKTAM. The fish exhibited significant changes in behaviours such as feeding, crowding, movement, convulsions, opercular activity, shivering, lethargy, and scratching after treatment. Initially, erratic swimming and movement disruptions were observed, but the fish gradually adapted to the auditory stimulus, with stress-related behaviours like convulsions and shivering decreasing over time. Additionally, crowding and social behaviours became more pronounced. Previous research on other species, including koi carp and tilapia, similarly reported that auditory stimuli, such as music, can alter swimming patterns, feeding habits, and social interactions. These findings suggest that auditory stimuli, including Vedic chants, may act as environmental factors influencing fish behaviour, comparable to light and temperature. Although the results point to potential benefits of incorporating Vedic chants into aquaculture, further studies are needed to explore the mechanisms driving these behavioural changes and to assess the long-term effects on fish welfare.

KEY WORDS: Behaviour, *Catla catla*, Vedic chant, Krimi Nashana Suktam, Music therapy

INTRODUCTION

In aquaculture and freshwater ecosystems fishes played a critical role and *Catla catla*, an important major carp species native to the Indian subcontinent, due to its commercial value and ecological importance. Understanding the behavioral responses of *Catla catla* to various environmental stimuli is essential for optimizing aquaculture practices and improving fish welfare. While physical environmental factors such as water quality, light, and food availability have been extensively studied, the influence of auditory stimuli, particularly music, remains an underexplored area in fish behavior research. Sound plays a significant role in the natural habitat of aquatic animals. Fish have evolved to detect and respond to a wide range of auditory cues for navigation, predator avoidance, and communication. However, the impact of non-natural, human-generated sounds, such as music, on fish behavior is less well understood. Music has been identified as a stress-reducing factor in aquaculture environments, potentially promoting fish growth and health (Papoutsoglou *et al.*, 2008; Papoutsoglou *et al.*, 2007). These findings suggest that music could enhance fish welfare in intensive aquaculture settings, potentially improving overall product quality and growth rates by reducing the stress. Music listening is considered beneficial for health due to its potential stress-reducing properties (Thoma and Nater, 2011). There is a study done by Sharma, *et al.* in 2024 have found that Shiv Strotam is helpful in controlling blood pressure and pulse rate in human beings. Music, particularly traditional forms such as Indian musical chants, has long been associated with therapeutic and calming effects in human culture. The rhythmic patterns, tonal frequencies, and melodic structures of Indian chants are believed to invoke emotional and physiological responses, suggesting a potential for cross-species influence. It is reasonable to think that, like mammals, fish seek out pleasurable experiences and side-step painful ones as prompted by emotional evolution. fishes are capable to differentiate positive and negative stimuli. When given the opportunity, fishes will avoid painful experiences and see pleasurable ones (Singh and Sharma, 2023).

For the purpose of this study, we have chosen a Vedic Chant “KRIMI NASHANA SUKTAM” from Atharva Veda; a Hindu Mythology book. It is believed that, this Vedic Chant, is capable of destroying all bad Viruses and Germs attacking our Body during by seeking the nature’s power. This study aims to investigate the effects of Indian musical chant “KRIMI NASHANA SUKTAM” on the behavior of *Catla catla*. Specifically, it examines whether exposure to these chants can alter key behavioral traits such as feeding habits, movement, opercular movement, crowding, scratching, shivering, convulsion and lethargy behaviour. The use of Indian chants, which are rooted in ancient traditions and believed to have calming properties, offers a unique opportunity to explore whether auditory stimuli can positively affect fish behavior, reduce stress, and improve well-being in aquaculture settings.

Given the growing interest in environmental enrichment for improving the welfare of aquatic species, this study provides an opportunity to assess the potential role of music as a non-invasive and low-cost strategy. By analyzing the behavioral responses of *Catla catla* to Indian musical chant, this research aims to contribute to a broader understanding of how non-

physical environmental factors can influence fish behavior, potentially offering new insights into sustainable fish farming practices.

MATERIALS AND METHODS

EXPERIMENTAL MATERIAL

This study has been done at the Dept. of Zoology, KMGGPG College, Badalpur, G. B. Nagar, INDIA. We have selected freshwater fish *Catla catla* for this experiment and Vedic chant "KRIMI NASHANA SUKTAM" for the treatment.

EXPERIMENT DESIGN

For the purpose of this work, we have built two cemented water tanks of equal size for control and experiment groups and filled with freshwater (Tap water) up to one foot below the upper surface, holding approximately 2803 litres of water. The selected fish of equal size and weight were randomly allotted to the control and treatment tanks, with 15 fish in each tank. Selected fish of treatment tank were exposed to musical sounds twice daily (7:00-7:30am. And 7:00-7:30pm.) before feeding, for 30 minutes on continuous basis up to 90 days. The observations were meticulously captured using an iPhone 11 for underwater video recording, secured within a waterproof pouch. Feeding behavior was scrutinized both through direct observation and by analyzing the amounts of consumed food.

Physico-chemical characteristics of water like pH, Temp., dissolved oxygen, hardness, alkalinity and fluoride played a crucial role to maintain pleasant environment to survive fishes. We have maintained all of these parameters within tolerance limit of fishes by regular testing and changing the pond water timely as required.

OBSERVATIONS

Behavioural Parameters play an important role in study of overall impact of music on fish. How fish react to that particular music it is crucial. By this way we can have an idea to understand the connection between musical environment and fish.

Table-1: Behaviour Parameters of *Catla catla*

S. No.	BEHAVIOUR PARAMETERS	Days of treatment		
		30	60	90
1.1.	FEEDING	++	+	--
1.2.	MOVEMENT	+++	--	--
1.3.	OPERCULAR MOVEMENT	++	--	--
1.4.	CROWDING	++	+	+
1.5.	SCRATCHING	--	--	--
1.6.	SHIVERING	+	--	--
1.7.	CONVULSION	+++	--	--
1.8.	LETHARGY	--	--	++

* -- = Not observed, + = Mild, ++ = Moderate, +++ = Strong

*Fish were treated with a Vedic Chant (KRIMI NASHANA SUKTAM) everyday 60 mins. (30 mins.in morning + 30 mins. in evening)

1.1. Feeding- Feeding behaviour of treated *Catla catla* has been recorded as highly significant in the beginning of experiment but with the music exposure it has found significant and non-significant.

1.2. Movement- Treated *Catla catla* have perceived v. highly significant movements in starting of the exposure of music but very soon settled down and observed non-significant.

1.3. Opercular Movement- Opercular movement has been shown highly significant in beginning but as experiment going on they have appeared non-significant in treated *Catla catla*.

1.4. Crowding- Crowding Behaviour in *Catla catla* have noted down highly significant in early days of exposure to music than with the time get relaxed and found significant.

1.5. Scratching- Treated *Catla catla* didn't exert any scratching behaviour hence non-significant results have been found.

1.6. Shivering- In the starting of the experiment treated *Catla catla* fish have showed Shivering at significant level but calm down very soon and non-significant after that.

1.7. Convulsion- Convulsion behaviour has been reported v. highly significant when *Catla catla* fish get exposed to music but they have simmer out very fast and seemed non-significant later on.

1.8. Lethargy- Lethargy type of behaviour has been monitored in treated *Catla catla* as non-significant in beginning but as time going on it has been found highly significant.

DISCUSSION AND CONCLUSION

The study of the influence of music on aquatic life is an intriguing area of research. In particular, the exposure to "KRIMI NASHANA SUKTAM" has shown a significant impact on the behaviour of fish. Initially, treated fish exhibited highly

significant changes in their feeding behaviour, which diminished progressively by 60 days and became non-significant by 90 days. This observation contrasts with the findings of Ferno *et al.* (2009), who explored the effects of sound on the feeding behaviour of farmed salmon. Their research indicated that sound stimuli, including music, could enhance feeding activity, leading to better feed intake and growth. Despite habituation to the music over time, the feeding behaviour in this study did not decrease below the control levels, suggesting that the music did not negatively affect the fish. Instead, significant growth was observed in almost all morphometric parameters, which may be attributed to the unique effects of Vedic chanting. While the current study does not provide enough evidence to fully support this conclusion, the results are promising.

All treated fish exhibited highly significant movements and convulsions initially, which likely represent a stress response to the music. However, they quickly adapted, becoming comfortable with the auditory stimulus, and stress-related behaviours diminished. This transition from convulsions to lethargy is particularly noteworthy, as it reflects a shift in their response to music. In the early stages of treatment, opercular movements and shivering were highly significant but normalized with continued exposure.

Crowding behaviour, observed significantly at the beginning of the treatment, remained significant throughout the study. This behaviour likely reflects the natural grouping tendencies of the fish. Notably, no scratching behaviour was observed at any stage of treatment.

The fluctuations in behaviour seen at the start of the music exposure indicate a stressful state. However, the fish quickly formed a positive association with the music and became comfortable. Previous research has demonstrated that music exposure can lead to significant elevations in norepinephrine (NE) levels in chicks. Norepinephrine is known to play a key role in regulating attention and alertness in animals (Panksepp, 2002; Pankhurst, 2011). This neurotransmitter enhances alertness, arousal, and attention, suggesting that music may similarly influence brain chemistry in fish, contributing to their behavioural changes.

Research on the effects of music on animals, particularly freshwater fish, is relatively scarce. One notable study by Vasantha *et al.* (2003) investigated the impact of music on Koi carp. The results revealed that music-exposed fish displayed slow, inactive movements, often vertical in direction. During music transmission, the fish remained grouped beneath the speaker, whereas the control group, without music exposure, exhibited normal behaviors, such as playing and interacting with each other. Similarly, Kusku *et al.* (2019) observed that Koi fish initially displayed erratic swimming and scattering behavior upon the introduction of music. However, after 2-3 hours, the fish adapted and resumed normal behavior.

Another experiment, known as the Novel Tank Test (NTT), showed that fish exposed to music became more active compared to the control group. In this test, treated zebrafish spent more time in the upper zone of the tank and demonstrated higher turn angles, suggesting greater activity and reduced anxiety in the presence of music (Barcellos *et al.*, 2018).

Further research by Ferno *et al.* (2009) noted behavioral changes in salmon in response to sound stimuli, where the fish exhibited increased swimming and exploration behaviors. This suggests that auditory stimuli can influence fish activity and behavior. Booth *et al.* (2007) studied the startle response of barramundi to sudden sound stimuli, with the fish displaying rapid swimming and posture changes, highlighting their sensitivity to sudden noise. Studies by Sundararaj *et al.* (2014) and Yishuai *et al.* (2018) also found positive behavioral changes in swimming patterns and overall activity in response to music therapy in species like *Catla catla* and Japanese seabass. Ali *et al.* (2015) reported that music exposure led to altered swimming patterns, increased social interactions, and changes in feeding behaviour in *Oreochromis mossambicus* (tilapia).

Although the current research is not sufficient to definitively claim that music has a profound effect on fish behavior, the unexpected responses observed, particularly in feeding behaviour, could be linked to Vedic chants. Fish have the ability to distinguish between different sound stimuli, as noted by Booth *et al.* (2007) and Kim *et al.* (2020).

Based on these findings, it is clear that music, like temperature and light, can act as an environmental factor influencing the physiological functions of fish. The effects of music on fish behaviour appear to evolve over time, suggesting that the duration and timing of exposure are important considerations in aquaculture. Further studies are required to explore the mechanisms driving these changes and to determine the optimal conditions for utilizing music as a tool to enhance fish behaviour and welfare.

CONCLUSION

The present study has demonstrated that exposure to "KRIMI NASHANA SUKTAM" music significantly influenced the behavior of *Catla catla* fish. Initially, the treated fish exhibited pronounced behavioral changes, including heightened feeding, movement, opercular motion, crowding, and stress responses such as convulsions and shivering. However, these responses diminished over time, indicating an adaptation to the music stimulus. The transition from highly significant stress-related behaviors to non-significant responses, particularly in convulsions, shivering, and movement, suggests that the fish became more comfortable and habituated to the auditory exposure.

Crowding behavior remained significant throughout the study, reflecting the natural social tendencies of *Catla catla*. Notably, there was no observation of scratching behavior, and lethargy, which was initially non-significant, increased toward the later stages of music exposure.

The findings align with earlier research on fish and music interaction, where initial stress responses gave way to normalized behavior after acclimation. While the study does not provide conclusive evidence regarding the long-term effects of music on fish physiology, the observations indicate that music exposure, particularly Vedic chanting, may have a calming effect on aquatic species. The elevated norepinephrine levels seen in previous animal studies may also be relevant here, potentially contributing to changes in attention and behavior.

Further research is required to explore the underlying mechanisms of these behavioral shifts, the role of music as a tool for enhancing aquaculture environments, and the optimal conditions for music exposure in aquatic species.

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