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Merukhanda Swara-Prastara in Hindustani Classical Music: Its Usefulness and Precautions in Contemporary Practice and Performance

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Abstract:
Merukhanda Swara-Prastara represents a scholarly and aesthetic method in Hindustani classical music, used to explore *swara*-patterns in creative and systematic ways. Based on the Sanskrit music treatise, *Sangitaratnakara* of *Sharngadeva* (13th Century CE), these *swara*-permutations help students and musicians expand melodic thinking, improve rhythmic clarity, and build logical structure in *raga* practice and performance. Traditionally taught through theoretical texts and oral traditions, *Merukhanda* enables students to explore different *swara*-patterns from a defined group of *swara*-s, strengthening improvisational skills and the understanding of *raga* rules.
In recent times, *Merukhanda Swara-Prastara* has gained renewed attention because of its role in enhancing creativity, voice flexibility, concentration, and mental discipline. Today it is widely practiced in Hindustani classical vocal music. However, its modern application requires careful understanding. When applied technically, it can weaken the *raga*'s *rasa* (sentiment) and *bhava* (emotion). Excessive emphasis on mathematical *swara*-permutations may hinder the emotional expression and the natural character of a *raga*. Without proper guidance from a *guru* (teacher), its overuse may distort *raga* identity. This paper explores the history, musical value, and contemporary usage of *Merukhanda Swara-Prastara*. It suggests that *Merukhanda* is very useful for musical practice and for *raga* improvisation, but only when it is applied with *raga* rules and aesthetics. Through the study of musicological texts, *Guru-Shishya Parampara*, and contemporary practice and performance trends, this paper highlights both usefulness and precautions of this technique. It concludes that *Merukhanda* should enhance musical growth, not replace emotional depth and *raga* authenticity.

Keywords: *Merukhanda Swara-Prastara*, Hindustani Classical Music, *Raga* Improvisation, Musical Aesthetics, *Guru-Shishya Parampara*

Introduction:

Hindustani classical music is intricately structured upon a balance of creativity, discipline, and emotional expression. Musicians have developed various methods to understand *raga*-s more deeply, to refine improvisation, and to improve aesthetic expression. One such technique is *Merukhanda Swara-Prastara*, a systematic method of *swara*-permutations explained in musical treatises. Although it has ancient roots, its value has grown significantly in contemporary musical practice and performance.

Rooted in *Sharngadeva*'s *Sangitaratnakara*, *Merukhanda* reflects a scholarly and analytical approach to music. By re-arranging *swara*-s into sequences without repetition, music practitioners explore *raga* structures through varied melodic passages while preserving its identity. This process strengthens memory and structural awareness. Traditionally transmitted through the *Guru-Shishya Parampara*, *Merukhanda* was regarded as a method that deepened one's understanding of *raga* structure.

In modern contexts, opinions about this technique vary. Many music practitioners recognise its role in expanding creativity, improving breath control, and increasing clarity of *raga*-phrasing, while others warn against its technical application. With the rise of fast-paced performance culture, *Merukhanda* is sometimes used only as a mathematical *swara* exercise. When practiced without sensitivity to *rasa* (sentiment) and *bhava* (emotion), it becomes difficult to maintain the purity of the *raga*'s essence.

Therefore, a balanced understanding is essential. This study traces the historical origin and development of *Merukhanda*, analyses its musical value as well as its role in contemporary practice and performance. By understanding both its usefulness and limitations, students and performers can use *Merukhanda* to support creativity while preserving the aesthetic quality of *raga*-s.

1. Historical Origin and Development of *Merukhanda Swara-Prastara*

Although the term *Merukhanda* appears systematically in medieval musicological texts, its conceptual roots may be traced back to the *Samaveda*. Early Vedic chanting made use of permutation-based recitation patterns such as *udatta* (high), *anudatta* (low), and *swarita* (middle). While these were not exactly *Merukhanda*, they reflect an early awareness of melodic reordering.

Permutation concepts are further evident in ancient Indian mathematics and Sanskrit prosody. The Prosody of *Pingala* '*Chhandah-Shastra*' (c. 3rd-2nd Century BCE), a treatise of Vedic and Sanskrit Metrics with application of Vedic Mathematics, employ systematic possibilities of *laghu-guru* combinations. *Halayudha Bhatt* in his work *Mritasanjeevani* (10th Century CE) called it *Meru-Prastara* and *Bhaskaracharya* (*Bhaskara II*) in his work *Lilavati* (12th Century CE) called it *Khandameru*. This indicates that the idea of permutation was deeply rooted in Indian culture long before it became directly associated with music.

The concept of *Swara-Prastara* can be traced back to *Bharata Muni*'s *Natya-Shastra* (2nd Century CE). The concept of *kuta-tana*-s was mentioned for the first time in *Dattila Muni*'s *Dattilam* (7th Century CE) and *Matanga Muni* in his *Brihaddeshi* (7th-8th Century CE) discussed it in more detail. *Khandameru* in music was clearly described for the first time in *Sangitaratnakara* of *Sharngadeva* (13th Century CE), and later elaborated in subsequent medieval music treatises. During the medieval period, musicians of the *Dhrupad* tradition emphasised *Merukhanda*-based *swara*-patterns in *raga* development. Later, this technique was introduced into the *Khayal* style as well. *Ustad Aman Ali Khan* of the *Bhendi-Bazaar Gharana* expanded its application to *alap*, *sargam*, and *taan* patterns. *Ustad Abdul Wahid Khan* of the *Kirana Gharana* refined its use in slow-paced *raga* development. Subsequently, *Ustad Amir Khan* of the *Indore Gharana* introduced 168 (7 x 24) *Merukhanda swara*-patterns, which he believed were useful for *raga* development. The *Merukhanda* technique has predominantly persisted through oral transmission within the *Guru-Shishya Parampara*.

Today, many music institutions include *Merukhanda Swara-Prastara* as a part of their curricula. It continues to operate both theoretically and practically, demonstrating mathematical permutation of *swara*-s while offering a systematic approach to *raga* elaboration.

2. Theoretical and Mathematical Foundation of *Merukhanda Swara-Prastara*

Merukhanda stands at the intersection of music, mathematics, and aesthetics. The term derives from the Sanskrit roots: "*Meru*" (mountain, axis, or structured arrangement) and "*Khanda*" (part, segment, or fragment). Together, the term refers to the systematic fragmentation and re-arrangement of a given *swara*-set to produce ordered permutations useful for *raga* improvisation. *Merukhanda* is also known as *Merkhanda*, *Mirkhanda*, *Sumerukhanda*, and *Khandameru*.

In relation to *Merukhanda*, *Sharngadeva* in his *Sangitaratnakara* refers to two terms: *Nashta*, the method for finding out the "missing" note-series, and *Uddhista*, the method for finding out the "indicated" note-series. *Merukhanda Swara-Prastara* uses the broader mathematical logic of *swara*-permutations, in which every possible unique arrangement is derived from a selected *swara*-set.

S	R	G	M	P	D	N
1	0	0	0	0	0	0
	1	2	6	24	120	720
		4	12	48	240	1440
			18	72	360	2160
				96	480	2880
					600	3600
						4320
Khandameru						

Sharngadeva in *Sangitaratnakara* based his discussion of the *Uddhista* and *Nashta* processes through a tabular figure referred to as the *Khandameru*.

Mathematically, the formula is: ${}^{n}P_{r} = n! / (n-r)!$ (n! is n-factorial); where n = total number of *swara*-s, and r = selected *swara*-s from within n.

Now, if the total and selected *swara*-s are the same, then n = r.

Therefore, ${}^{n}P_{n} = n! / (n-n)! = n! / 0! = n!$ (since 0! = 1)

Examples:

${}^{1}P_{1} = 1! = 1$

${}^{2}P_{2} = 2! = 2 \times 1 = 2$

${}^{3}P_{3} = 3! = 3 \times 2 \times 1 = 6$

${}^{4}P_{4} = 4! = 4 \times 3 \times 2 \times 1 = 24$

${}^{5}P_{5} = 5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$

${}^{6}P_{6} = 6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$

${}^{7}P_{7} = 7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$

Although *Merukhanda* is a mathematical technique, its aesthetic dimension is equally profound. The application of *Merukhanda* within the raga context enhances aesthetic creativity, allowing mathematical technique to transform into musical expression.

3. Usefulness and Educational Significance of *Merukhanda Swara-Prastara*

In Hindustani classical music, *Merukhanda Swara-Prastara* has been valued for both practice and performance. Its usefulness and educational significance can be understood in the following ways:

3.1 Development of *Swara* Perfection: The systematic practice of *Merukhanda* plays a significant role

in developing *swara* perfection among students. By presenting *swara*-permutations, it enables students to explore each *swara* in depth. Continuous practice of these structured *swara*-patterns enhances clarity in *swara* rendering. Over time, students develop a strong command over individual *swara*-s, ensuring stability and confidence during performances.

3.2 Enhancement of *Laya* and *Tala* Control: *Merukhanda* practice contributes substantially to the development of *laya* awareness and *tala* discipline. Since its patterns are often practiced within a fixed rhythmic framework, students learn to maintain rhythmic accuracy while executing complex *swara*-permutations. This approach strengthens control over *laya*, improves rhythmic alignment, and helps achieve balance in *tala*-cycle during *raga* elaboration. As a result, performers become more rhythmically strong and expressive.

3.3 Foundation for *Raga* Improvisation: *Merukhanda* trains the mind to think creatively within a structured musical framework. By working with a fixed set of *swara*-s, students gradually learn how to expand melodic ideas without violating the essential rules of a *raga*. This systematic process cultivates an understanding of *raga* rules and encourages disciplined improvisation. Consequently, students acquire the ability to elaborate a *raga* logically while preserving its purity.

3.4 Intellectual and Analytical Training: The logical and mathematical framework inherent in *Merukhanda* strengthens a student's intellectual and analytical abilities. Engaging with complex *swara*-permutations enhances memory and concentration. It also improves the capacity to visualise melodic patterns and anticipate musical progression. These cognitive skills are necessary for advanced musical learning and allow students to approach *raga* improvisation with clarity and confidence.

3.5 Bridge Between Theory and Practice: *Merukhanda* serves as an effective connection between theoretical knowledge and practical performance. Concepts such as *swara* placement, sequence, and rhythmic alignment, which are often studied theoretically, become experientially understood through practice. This integration allows students to internalise theoretical principles and apply them during *raga* practice and performance.

3.6 Preservation of Traditional Method of Teaching: The practice of *Merukhanda* plays an important role in preserving the traditional learning methods of Hindustani classical music. Rooted in the *Guru-Shishya Parampara*, it reflects a systematic approach to musical training. Despite changes in contemporary music education, *Merukhanda* practice supports advanced vocal training.

3.7 Support for *Alap*, *Sargam*, and *Taan* Development: For advanced students, *Merukhanda* provides a strong foundation for the development of well-structured *alap*, intricate *sargam* passages, and complex *taan* and *bol-taan* patterns. The clarity and control gained through *Merukhanda* practice enable students to execute elaborate improvisations with confidence. It enhances fluency, rhythmic control, and aesthetic balance, contributing significantly to refined performance.

Merukhanda Swara-Prastara is a comprehensive educational tool that nurtures discipline, creativity, and musical intelligence, making it highly significant in the systematic practice of Hindustani classical music.

4. Application of *Merukhanda Swara-Prastara* in Performance

Merukhanda Swara-Prastara has a significant and practical role in actual performance. When applied thoughtfully, it enhances both creativity and discipline in music performance. Its main applications in performance are as follows:

4.1 Structured *Alap-Vistar* Development: *Merukhanda* plays an important role in the systematic development of *alap-vistar*. By employing *raga*-specific *swara*-sets, a performer is able to expand

melodic patterns gradually and logically. This step-by-step approach ensures that the *alap* unfolds in a controlled manner, maintaining both *raga* discipline and aesthetic balance. As a result, the progression of the *raga* becomes aesthetically engaging.

4.2 Development of *Sargam*, *Taan*, and *Bol-Taan* Patterns: *Merukhanda* provides a strong and reliable framework for the creation of well-defined *sargam*, *taan*, and *bol-taan* patterns. The logical and sequential arrangement of *swara*-s promotes clarity of expression and smooth melodic movement. With practice, performers develop the ability to create intricate *swara*-patterns, ensuring that technical complexity does not compromise musical beauty.

4.3 Control over *Laya* and *Tala*: The application of *Merukhanda swara*-patterns within a fixed *tala* significantly enhances rhythmic discipline. Practicing these patterns strengthens the performer's control over *laya* and improves accuracy in *tala* execution. As a result, this rhythmic stability allows the performer to improvise with confidence while remaining grounded within the *tala* structure, resulting in balanced and controlled improvisation.

4.4 Expansion of Creative and Aesthetic Possibilities: *Merukhanda* promotes the development of melodic patterns using a limited set of *swara*-s. This structured approach enhances aesthetic sensitivity and allows the performer to explore different melodic possibilities without deviating from the *raga* rules. Consequently, musical expression becomes creative and aesthetically refined.

4.5 Consistency and Confidence in Performance: Regular practice of *Merukhanda* builds consistency and confidence in performance. As performers gain greater command over *swara*-s and their various patterns, they develop the ability to create spontaneous and engaging musical creativity. This confidence enhances overall *raga* development, allowing musicians to perform with clarity and expressive depth.

The application of *Merukhanda Swara-Prastara* in performance supports systematic improvisation, strengthens *swara* and *laya* control, and enriches the aesthetic quality of music performance.

5. Precautions and Limitations of *Merukhanda Swara-Prastara* Practice

Merukhanda Swara-Prastara practice requires certain precautions, and it also has some limitations. Proper understanding of the following aspects is necessary to maintain balanced musical expression:

5.1 Maintaining *Raga* Rules: During the practice and application of *Merukhanda*, strict adherence to the fundamental rules of *raga* is essential. The selection and permutation of *swara*-s must always remain within the melodic framework of *raga*. Artistic use of *swara*-patterns should not disturb the *raga*'s *shuddha*, *vikrita*, *anuvadi*, and *vivadi swara*-s, nor should it violate the *raga*'s characteristic phrases (*pakad*) or melodic movements (*chalan*). When *Merukhanda* is practiced with a conscious awareness of the *raga*'s identity and emotional essence, it enhances refinement, clarity, and depth in performance. However, neglecting *raga* rules and favouring technical complexity can weaken the *raga*'s authenticity.

5.2 Avoidance of Technical Performance: Overemphasis on technical application of *Merukhanda swara*-patterns can decrease the aesthetic sensitivity of the performance. When the focus shifts primarily to technical display, musical spontaneity can be lost. Performers must ensure that *Merukhanda* does not become a mere technical exercise aimed at creating superficial brilliance. Instead, it should be integrated into the musical performance aesthetically.

5.3 Balanced Use of *Laya*: Practicing *Merukhanda* at very fast tempos without control can compromise *swara* clarity and tonal purity. Uncontrolled fast tempos may lead to blurred articulation and loss of aesthetic balance. Therefore, a gradual and disciplined progression in tempo is essential. Mastery on slow and medium *laya*-s ensures accuracy, stability, and musical flow that enable the performer to maintain

control over the tempos without sacrificing the aesthetic quality.

5.4 Limited Aesthetic Appeal if Overused: While *Merukhanda* is an effective technique to enhance technical command, its excessive use in the performance can reduce aesthetic depth. Continuous execution of *swara*-permutations may overshadow the expressive aspects of *raga* development. Thus, it should be applied selectively in the performance. A thoughtful balance between technique and emotion is necessary to preserve aesthetic balance.

5.5 Requirement of Proper Guidance: *Merukhanda* practice demands a clear conceptual understanding and systematic training under the guidance of an experienced *guru* (teacher). Without proper instruction, students may develop incorrect *swara*-patterns, faulty *laya* control, or inappropriate application within *raga* structures. Such misunderstandings can hinder musical growth and distort the intended purpose of *Merukhanda*. Authentic guidance ensures that technical exercises are aligned with aesthetic principles and traditional frameworks in *raga* performance.

5.6 Not a Substitute for Aesthetic Training: *Merukhanda* should be viewed as a supportive technical method. Fundamental aspects such as *rasa* (sentiment), *bhava* (emotion), voice culture, and *raga* elaboration remain central to musical excellence. *Merukhanda* enhances these qualities only when practiced alongside comprehensive aesthetic and *gharana*-based training.

5.7 Mental Fatigue and Excessive Thinking: Since *Merukhanda* involves intricate *swara*-permutations and sustained mental engagement, excessive focus on its intellectual aspect may lead to mental fatigue. Overthinking during performance can disrupt the natural musical flow and reduce spontaneity. The performer may become overly conscious of structure, thereby distancing themselves from aesthetic expression. To avoid this, *Merukhanda* must be internalised through practice so that its application becomes effortless and musically instinctive.

Merukhanda Swara-Prastara is most effective when practiced with awareness. Recognising its limitations and following necessary precautions improves musical ability while preserving the aesthetic essence of musical performance.

6. Modern Adaptations and Educational Approaches of *Merukhanda Swara-Prastara*

Merukhanda Swara-Prastara has been adapted to suit contemporary teaching methods and performance requirements. The following adaptations have enhanced its relevance in both theoretical and practical music education:

6.1 Integration into Modern Curricula: In modern music education, *Merukhanda* has been systematically incorporated into the curricula of music institutions. Structured *swara*-exercises are designed according to different stages of learning, ranging from basic *swara* familiarity to advanced improvisational practice. This graded approach ensures that students develop technical competence progressively.

6.2 Use of Notation and Visual Aids: Modern learning methods make extensive use of written notation, charts, and visual diagrams to explain *swara*-permutations involved in *Merukhanda* practice. These aids help students clearly understand complex *swara*-patterns and their sequential logic. Visual representation supports memory and provides a structured framework for systematic practice.

6.3 *Raga*-Specific Application: Modern teaching methodologies emphasise the application of *Merukhanda* within specific *raga*-s rather than treating it as a technical exercise. By aligning *swara*-permutations with *raga* rules, students learn to apply *Merukhanda* without compromising the aesthetic integrity of *raga*. This approach ensures musical authenticity and expressive relevance.

6.4 Technology-Based Learning: The use of technology has significantly influenced the teaching and learning of *Merukhanda*. Audio recordings, digital learning platforms, and practice applications enable students to observe accuracy in *swara*, *raga*, *laya*, and *tala*. These tools also support independent practice, allowing students to refine their skills outside the traditional classroom environment.

6.5 Balanced Emphasis on Aesthetics: Modern teaching approaches focus on aesthetics alongside technical practice. *Merukhanda* is presented as a supportive and preparatory tool. Students are guided to use it selectively and judiciously, ensuring that technical proficiency enhances musical expression, creativity, and emotional depth instead of overshadowing them.

Modern adaptations of *Merukhanda Swara-Prastara* have broadened its educational scope. By merging traditional and contemporary teaching methods, it continues to serve as an effective approach for systematic learning and creative development in Hindustani classical music.

Conclusion:

Merukhanda Swara-Prastara is significant in Hindustani classical music as both a learning technique and a creative method. Its practice is useful to understand *swara* movements and expand *raga* improvisations. With *swara*-permutation exercises, students expand their musical imagination and build confidence in developing a *raga*. Learning this technique patiently and with proper guidance from a *guru* (teacher) result in improved vocal flexibility and rhythmic balance. Thus, *Merukhanda* remains valuable not only as a technical practice but also as a means to improve musical understanding.

However, the modern performance culture has introduced new concerns. Many students view *Merukhanda* as a scholarly approach and mathematical practice without understanding its musical purpose. Overshadowing the *raga*'s *rasa* (sentiment) and *bhava* (emotion) produces performances that are technically impressive but aesthetically weak. This problem grows when *Merukhanda* is used without proper guidance from an experienced *guru* (teacher) who understands *raga* rules and aesthetic values. Hence, thoughtful supervision and conscious application are necessary.

This study suggests that *Merukhanda* should be treated as a supportive technique rather than the prime focus of performance. It is useful in both practice and performance, but should never replace the *raga*'s aesthetic expression. Its real value is to harmonise logical clarity with aesthetics and emotional insight. When musicians balance imagination and emotion, their music becomes richer.

Merukhanda, in the contemporary musical context, should be practiced with respect to aesthetic values. If applied carefully, it can enhance creativity and enrich performance while maintaining the traditional purity of Hindustani classical music.

Bibliography:

1. Ghosh, M. (1951). *The Natyashastra ascribed to Bharata-Muni*. (Volume 2). Asiatic Society of Bengal.
2. Jairazbhoy, N. A. (1961). *Svaraprastara in North Indian Classical Music*. Bulletin of the School of Oriental and African Studies (Vol. 24, Part 2). University of London.
3. Bandoypadhyaya, S. (1970). *The Music of India: A Popular Handbook of Hindustani Music*. D. B. Taraporevala Sons & Co. Private Ltd.
4. Lath, M. (1978). *A Study of Dattilam: A Treatise on the Sacred Music of Ancient India*. Impex India.
5. Sharma, P. L. (1992). *Brihaddeshi of Shri Matanga Muni*. (Vol. I). Indira Gandhi National Centre for the Arts and Motilal Banarsidass Publishers Pvt. Ltd.

6. Ross, T. W. (1993). *Forgotten Patterns: Mirkhand and Amir Khan*. Asian Music (Vol. 24, No. 2, pp. 89-109). University of Texas Press.
7. Patwardhan, K. S., Naimpally, S. A. & Singh, S. L. (2001). *Lilavati of Bhaskaracharya: A Treatise of Mathematics of Vedic Tradition*. Motilal Banarsidass Publishers Private Limited.
8. Raja, D. (2009). *Khayal Vocalism: Continuity within change*. D.K. Printworld Pvt. Ltd.
9. Raja, D. S. (2012). *Hindustani Music Today*. D.K. Printworld Pvt. Ltd.
10. Shringy, R. K. & Sharma, P. L. (2013). *Sangitaratnakara of Sharngadeva*. (Vol. I). Munshiram Manoharlal Publishers Pvt. Ltd.
11. Raja, D. S. (2015). *The Ragas-ness of Ragas: Ragas Beyond the Grammar*. D.K. Printworld Pvt. Ltd.
12. Raja, D. (2015). *Hindustani Music: A tradition in transition*. D.K. Printworld Pvt. Ltd.
13. Wade, B. C. (2016). *Khyal: Creativity within North India's Classical Music Tradition*. Munshiram Manoharlal Publishers Pvt. Ltd.
14. Jani, R. (2018). *Merukhand: Svara Permutations*. (Volume 1). CreateSpace Independent Publishing Platform.
15. Dvivedi, K. D. & Singh, S. L. (2019). *The Prosody of Pingala: A Treatise of Vedic and Sanskrit Metrics with applications of Vedic Mathematics*. Vishwavidyalaya Prakashan.
16. Thakur, O. (2019). *Sangeetanjali*. (Vol - V). Pilgrims Publishing.
17. Deshmukh, M. S. (2019). *Khandmeru Swarprastar Sadhana*. Vijay Prakashan.
18. Raja, D. S. (2019). *The Musician and His Art: Essays on Hindustani Music*. D.K. Printworld Pvt. Ltd.
19. Halai, C. M. (2022). *Meru Prastaar: The Wonder World of Indian Mathematics*. Garuda Prakashan Pvt. Ltd.
20. Das, S. (2022). *Merukhanda in Hindustani Classical Music at a Glance*. Sangeet Galaxy (Vol. 11, Issue-2, pp. 307-315). ISSN: 2319-9695.

Webliography:

1. Blogger.com. (2014). *Significance of "Merukhand" abhyaasa*. https://shambhavidas.blogspot.com
2. Blogger.com. (2016). *Merukhand Technique :: Theory*. https://ptvijaybakshi.blogspot.com
3. Blogger.com. (2016). *Merukhand :: Practical Application*. https://ptvijaybakshi.blogspot.com
4. UrmiMusic. (2020). *Merukhand*. https://www.urmimusic.com
5. Indian Music Forums. (2025). *Unveiling Ustad Amir Khan's fabled list of 168 melodic patterns*. https://forum.chandrakantha.com