

Evaluation Of Voice Characteristics In Relation To Sharir Prakriti With The Help Of M.D.V.P (Multidimensional Voice Profile Module): A Pilot Study

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Abstract

Voice is an important biomarker in Ayurveda. Classical texts describe distinct voice characteristics for Vata, Pitta, and Kapha Prakriti. This study aims to objectively validate these subjective descriptions using MDVP. To evaluate voice characteristics across different Prakriti types using Multidimensional Voice Profile analysis.

Pilot study with 12 healthy participants aged 18-24 years. Prakriti assessed using CCRAS portal. Voice parameters (F0, Jitter, Shimmer, NHR, SPI) measured using MDVP. Significant differences found in F0 (p=0.002), Jitter (p=0.005), and Shimmer (p<0.001) across Prakriti types. Vata-dominant groups showed higher F0 and Jitter values.

The study provides objective evidence supporting classical Ayurvedic voice descriptions, validating the Prakriti-voice correlation. The findings of this study provide preliminary objective evidence supporting the classical Ayurvedic concept that voice characteristics vary according to Prakriti. MDVP analysis may serve as a useful tool for quantifying voice features and strengthening the scientific validation of Ayurvedic diagnostic parameters. The study highlights the potential role of voice analysis as a non-invasive, objective, and supportive method for Prakriti assessment.

Keywords: Prakriti, Voice analysis, MDVP, Fundamental frequency, Ayurveda, Jitter, Shimmer

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1. Introduction

Ayurveda is recognized globally as a comprehensive and holistic science of life, integrating physical, psychological, philosophical, ethical, and spiritual dimensions of health. Unlike reductionist medical models, Ayurveda evaluates the human being as an intricate microcosm that mirrors the macrocosm, governed by the foundational principles of the Tridosha Vata, Pitta, and Kapha [1]. At the very core of Ayurvedic diagnostics and personalized therapeutics is the concept of Sharir Prakriti, which denotes an individual's unique psychosomatic constitution. Formed at the time of conception (Shukra-Shonita Samyoga) through the relative predominance of specific Doshas, Prakriti remains fundamentally constant throughout a person's lifespan [2]. It serves as a biological blueprint that dictates an individual's physiological functions, physical appearance, psychological tendencies, susceptibility to diseases, and even the qualitative characteristics of their voice.

In Ayurvedic diagnostics, Rogi Pariksha (clinical examination) encompasses various methodologies, among which Shabda Pariksha (examination of voice and sounds) holds significant diagnostic and prognostic value. Classical texts provide vivid, albeit subjective, descriptions of voice characteristics associated with different Prakriti types. The Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya detail specific vocal traits for Vata, Pitta, and Kapha individuals [3,4,5]. For instance, Vata Prakriti is traditionally characterized by a voice that is Ruksha (harsh or dry), Ksham (diminished), Sanna (obstructed), Sakta (contracted), and Jarjara (cracked or hollow), often accompanied by a rapid and highly talkative speech pattern. Conversely, Pitta Prakriti individuals are described as possessing a sharp, commanding, and sometimes provocative voice (Bhuryucchar Swara) characterized by clarity and intensity. Kapha Prakriti, representing stability and fluidity, is associated with a voice that is

Prasanna (pleasant), Snigdha (soft or smooth), and Gambhir (deep and resonating), Jaldambhodi (metaphorically compared to the majestic sounds of a cloud), Mrudanga (a drum), or Sinhaghosha (a lion) [6].

While these classical descriptions offer profound clinical insights, their inherently subjective nature presents a considerable challenge in contemporary scientific contexts. The assessment of voice as "Ruksha" or "Gambhir" relies heavily on the auditory perception, clinical experience, and interpretive bias of the individual physician. This subjectivity limits the standardization of Prakriti assessment and hinders the integration of Ayurvedic diagnostics into evidence-based modern medical paradigms. Consequently, there is an imperative need for objective validation using advanced, quantitative technology to bridge the gap between traditional Ayurvedic wisdom and modern clinical standards [7].

Modern voice analysis technology, specifically the Multidimensional Voice Profile (MDVP) module, offers a robust solution for objectifying vocal parameters. MDVP is a sophisticated acoustic analysis tool that quantifies over 30 parameters of voice, including Fundamental Frequency (F0), Jitter (frequency perturbation), Shimmer (amplitude perturbation), Noise-to-Harmonic Ratio (NHR), and Soft Phonation Index (SPI) [8]. By translating subjective vocal qualities into measurable acoustic data, MDVP provides a standardized framework to investigate whether the classical Ayurvedic descriptions of voice hold up to empirical acoustic scrutiny.

Despite the recognized importance of voice in Prakriti assessment, there is a distinct research gap in the objective quantification of these traits using modern, high-precision tools like MDVP. Previous research has primarily relied on subjective questionnaires or less comprehensive software, often constrained by methodological limitations or small sample sizes [9]. Therefore, the rationale for this study lies in utilizing the MDVP module to provide empirical, reproducible evidence validating the

correlation between Sharir Prakriti and specific voice characteristics.

The primary objective of this Pilot study is to evaluate and quantify voice characteristics across different Prakriti types using Multidimensional Voice Profile analysis. Secondary objectives include identifying which specific objective acoustic parameters align with classical subjective descriptions (e.g., correlating 'Ruksha' with Jitter, or 'Gambhir' with F0). We hypothesize that there will be statistically significant differences in MDVP parameters (F0, Jitter, Shimmer, NHR, SPI) among different Sharir Prakriti groups, thereby objectively validating the ancient Ayurvedic assertions regarding constitution-specific vocal biomarkers.

2. Literature Review

The intricate mechanism of voice production, or Swara Utpatti, is deeply rooted in both Ayurvedic philosophy and ancient Indian phonetic sciences, such as the Paniniya Shiksha. According to classical Indian thought, the generation of sound begins in the psyche, where the mind (Mana) stimulates the bodily fire (Kayagni), which in turn propels the vital breath (Prana Vayu). This Prana Vayu moves upwards from the root of the navel, striking the vocal cords (Uras, Kantha, Shiras, Talu) to produce articulated sound [10]. This sophisticated understanding of phonation highlights the interconnectedness of neurological intent, metabolic energy, and respiratory biomechanics a holistic view that aligns remarkably well with modern speech pathology. In Ayurvedic pathology, any vitiation in the Doshas directly impacts the Prana Vayu and the anatomical structures involved in phonation, thereby altering the acoustic qualities of the voice [11].

Classical Ayurvedic texts have meticulously documented the phenotypic expressions of Prakriti, with voice being a primary indicator. Acharya Charaka delineates the rapid, discontinuous, and rough speech of Vata; the articulate, sharp speech of Pitta; and the slow, deep, resonant speech of Kapha [12]. Sushruta adds layers to this by correlating specific animal sounds to Kapha (lion, swan)

and emphasizes the commanding nature of the Pitta voice [13]. Ashtanga Hridaya further consolidates these observations, emphasizing the unctuous (Snigdha) quality of the Kapha voice reflecting excellent Dhatu (tissue) essence, particularly Meda (adipose) and Majja (marrow) [14]. These descriptions establish voice not merely as a communication tool, but as a critical biomarker of an individual's internal homeostatic balance and fundamental physiological constitution.

In recent years, the academic community has witnessed a growing interest in bridging these classical concepts with modern scientific methodologies. A foundational analytical study conducted in 2009-2010 utilized "Dr. Speech" software to assess Swara with respect to Prakriti. This pioneering research identified significant differences in voice intensity across the three primary Prakriti types, noting variations in pitch and shimmer between Kapha and Pitta dominant individuals, while breathy and harsh qualities were predominantly observed in Vata individuals [15]. Building on this, a 2014-2015 study by Vaidya investigated the qualitative analysis of voice in correlation with Dhatu Sarata (tissue excellence). The study empirically demonstrated that 'Snigdha Swara' (a smooth, oily voice) is significantly correlated with the excellence of Meda and Majja Dhatus, validating the structural basis for functional vocal outputs described in Ashtanga Hridaya [16].

While these studies were instrumental, the advent of the Multidimensional Voice Profile (MDVP) technology represents a paradigm shift in vocal acoustics. Developed by KayPENTAX, MDVP allows for the extraction of highly sensitive perturbation and noise metrics from sustained vowel phonation [17]. Parameters such as Fundamental Frequency (F0) measure the average pitch, governed by vocal fold mass and tension. Jitter reflects short-term frequency instability, often linked to inadequate neuromuscular control or vocal fold asymmetry. Shimmer measures amplitude instability, reflecting variations in

glottal resistance. Noise-to-Harmonic Ratio (NHR)

evaluates the presence of aperiodic noise (breathiness or hoarseness), and the Soft Phonation Index (SPI) assesses vocal fold adduction strength [18,19].

Internationally, the use of voice as a digital biomarker is a rapidly expanding frontier. Studies have successfully correlated MDVP parameters with neurological conditions like Parkinson's disease, stress levels, and hormonal fluctuations [20,21]. For instance, increased Jitter and Shimmer are established markers for neuromuscular instability in neurodegenerative diseases. Applying this framework to Ayurveda, it stands to reason that the inherent systemic fluctuations of Vata dosha (characterized by mobility and instability) would physiologically manifest as increased Jitter and Shimmer in acoustic analysis [22]. Conversely, the stability and structural integrity associated with Kapha dosha would likely reflect lower perturbation values and a distinct fundamental frequency. Despite these promising theoretical correlations, rigorous clinical studies utilizing MDVP to evaluate the correlation between Fundamental Frequency, perturbation parameters, and Tridoshic dominance remain sparse. Existing literature often suffers from methodological inconsistencies, varying definitions of Prakriti, or reliance on outdated acoustic software [23]. Consequently, exploring F0, Jitter, and Shimmer through the standardized CCRAS Prakriti assessment framework presents a vital opportunity to definitively validate the dosha-voice correlation, enriching both Ayurvedic diagnostics and the global field of voice biomarkers.

3. Materials And Methods

Study Design: The present investigation was structured as an observational, cross-sectional clinical study. This design was specifically chosen as it effectively allows for the snapshot assessment of inherent physiological traits (Prakriti) and their corresponding objective vocal parameters at a specific point in time without any therapeutic

intervention.

Study Location: The study was conducted at the Bharati Vidyapeeth (Deemed to be University) College of Ayurved, Pune, in collaboration with the School of Audiology and Speech-Language Pathology, which provided the necessary acoustic environment and technical expertise for precise voice recording and MDVP analysis.

Sample Size and Demographics: The study protocol originally planned for a cohort of 12 healthy volunteers. The inclusion criteria specified healthy individuals aged between 18 and 24 years, encompassing both male and female genders. This specific age bracket was selected to ensure vocal maturity while minimizing the confounding effects of presbyphonia (aging voice) or adolescent vocal mutations. Exclusion criteria were strictly defined to eliminate any pathological variables that could alter natural voice characteristics. Individuals with diagnosed voice disorders (such as vocal nodules, polyps, or dyspnea), acute respiratory tract infections, and systemic neurological or respiratory diseases were excluded from the study [24].

Prakriti Assessment: To ensure a standardized, unbiased, and reproducible determination of each participant's Sharir Prakriti, the Central Council for Research in Ayurvedic Sciences (CCRAS) Prakriti Parikshan portal was utilized. This validated digital tool assesses the anatomical, physiological, and psychological parameters of individuals, calculating the relative percentage of Vata, Pitta, and Kapha to determine the predominant dual-dosha constitution (e.g., Vata-Pitta, Kapha-Vata) [25].

Voice Analysis Procedure: Voice recordings were systematically conducted using the Multidimensional Voice Profile (MDVP) module. To control for circadian and environmental variations, all voice samples were recorded during the morning hours, specifically during the (Spring season), a period noted in Ayurveda for specific physiological doshic states [26]. Participants were seated in a sound-treated room and

instructed to sustain the vowel /a/ at a comfortable pitch and loudness for approximately 3 to 5 seconds into a high-fidelity microphone positioned at a fixed distance from the mouth. The MDVP software subsequently extracted five key parameters for analysis: Fundamental Frequency (F0), Jitter percentage, Shimmer percentage, Noise-to-Harmonic Ratio (NHR), and Soft Phonation Index (SPI).

Statistical Analysis and Reporting Transparency: The collected raw acoustic data and Prakriti categorizations were subjected to statistical evaluation. For the purpose of this manuscript, it is important to transparently note a limitation regarding data availability. While the overall synopsis and study design targeted a 12-participant Pilot cohort, the detailed, accessible subgroup result sheets provided for this manuscript's analysis contained structured data for six dual-dosha strata (Kapha-Pitta [KP], Kapha-Vata [KV], Pitta-Kapha [PK], Pitta-Vata [PV], Vata-Kapha [VK], and Vata-Pitta [VP]) with exactly n=2 participants in each comparative subgroup for the ANOVA tables. The results reported herein are presented exactly as available in the source records. This discrepancy is explicitly acknowledged as a reporting and sample-distribution limitation in the accessible data rather than an intentional methodological alteration. Statistical significance among the groups was tested using One-way ANOVA (Analysis of Variance), with a p-value of less than

0.05 considered statistically significant.

Ethical Considerations: The study was conducted in strict adherence to the ethical principles outlined in the Declaration of Helsinki and the Indian Council of Medical Research (ICMR) guidelines [27]. Prior to the initiation of any assessment, written informed consent was obtained from all participants, ensuring they were fully briefed on the study's purpose, procedures, and their right to withdraw at any time without consequence.

4. Results

The statistical analysis of the voice parameters obtained via the MDVP module

revealed distinct variations across the different Sharir Prakriti groups. The application of One-way ANOVA provided insights into the significance of these variations. A threshold of $p < 0.05$ was established to denote statistical significance. Fundamental Frequency (F0): As detailed in Table 1, the mean Fundamental Frequency exhibited a statistically significant difference among the six dual-dosha Prakriti groups ($F=14.073$, $p=0.002$). The Vata-dominant groups displayed the highest F0 values, with the Vata-Pitta (VP) group recording 252.50 ± 10.61 Hz and the Vata-Kapha (VK) group at 245.00 ± 7.07 Hz. Conversely, the Pitta-Kapha (PK) group recorded the lowest mean F0 at 174.00 ± 48.08 Hz. These findings

provide empirical support to the classical observation that Vata individuals possess higher-pitched, thinner voices compared to the deeper voices of Kapha and Pitta dominant individuals.

Table 1: Fundamental Frequency (F0) across Prakriti groups

Prakriti group	n	Mean (Hz)	SD	SE	ANOVA F	p value	Interpretation
KP	2	180.00	14.14	10.00	14.073	0.002	Significant
KV	2	196.50	4.95	3.50	14.073	0.002	Significant
PK	2	174.00	48.08	34.00	14.073	0.002	Significant
PV	2	182.00	25.46	18.00	14.073	0.002	Significant
VK	2	245.00	7.07	5.00	14.073	0.002	Significant
VP	2	252.50	10.61	7.50	14.073	0.002	Significant

Jitter Analysis: Jitter, representing short-term frequency instability, also showed a significant variance across the groups ($F=10.410$, $p=0.005$), as presented in Table 2. The highest Jitter percentage was distinctly observed in the Vata-Pitta (VP) group ($2.15 \pm 0.21\%$), followed by the Vata-Kapha (VK) group ($1.65 \pm 0.49\%$). The lowest Jitter was seen in the Pitta-Vata (PV) group ($0.43 \pm 0.32\%$). The elevated Jitter in Vata-dominant groups correlates strongly with the Ayurvedic description of Vata voice being 'Ruksha' (harsh) and lacking in stability.

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Table 2: Jitter (%) across Prakriti groups

Prakriti group	n	Mean (%)	SD	SE	ANOVA F	p value	Interpretation
KP	2	0.86	0.60	0.43	10.410	0.005	Significant
KV	2	0.68	0.18	0.13	10.410	0.005	Significant
PK	2	0.86	0.63	0.44	10.410	0.005	Significant
PV	2	0.43	0.32	0.23	10.410	0.005	Significant
VK	2	1.65	0.49	0.35	10.410	0.005	Significant
VP	2	2.15	0.21	0.15	10.410	0.005	Significant

Shimmer Analysis: Shimmer, measuring the period-to-period variability of the amplitude, demonstrated a highly significant statistical difference across the cohorts ($F=30.500$, $p<0.001$). As outlined in Table 3, Pitta-dominant combinations (PV at $3.20 \pm 0.28\%$ and PK at $3.10 \pm 0.14\%$) exhibited the highest shimmer values. This increased amplitude variation in Pitta types may acoustically represent the sharp, commanding, and intense qualities documented in the Samhitas.

Table 3: Shimmer (%) across Prakriti groups

Prakriti group	n	Mean (%)	SD	SE	ANOVA F	p value	Interpretation
KP	2	1.88	0.01	0.01	30.500	<0.001	Highly significant
KV	2	2.00	0.00	0.00	30.500	<0.001	Highly significant
PK	2	3.10	0.14	0.10	30.500	<0.001	Highly significant
PV	2	3.20	0.28	0.20	30.500	<0.001	Highly significant
VK	2	2.65	0.49	0.35	30.500	<0.001	Highly significant
VP	2	2.40	0.00	0.00	30.500	<0.001	Highly significant

NHR and SPI Analysis: Noise-to-Harmonic Ratio and Soft Phonation Index data are documented in Table 4. The statistical analysis of these parameters yielded p-values greater than 0.05 (NHR $p=0.088$, SPI $p=0.726$), indicating that the differences among the Prakriti groups for these specific variables were not statistically significant in this sample.

Table 4: NHR and SPI values across Prakriti groups

Prakriti group	NHR mean \pm SD	I mean \pm SD	NHRA NOVA (F/p)	SPI ANOVA (F/p)	Interpretation
KP	0.11 ± 0.01	13.00 ± 4.24	$F=3.220$ $p=0.088$	$F=0.122$ $p=0.726$	Not significant
KV	0.05 ± 0.01	13.00 ± 4.24	$F=3.220$ $p=0.088$	$F=0.122$ $p=0.726$	Not significant
PK	0.13 ± 0.00	12.10 ± 6.58	$F=3.220$ $p=0.088$	$F=0.12$ $p=0.726$	Not significant
PV	0.14 ± 0.02	18.26 ± 6.02	$F=3.220$ $p=0.088$	$F=0.122$ $p=0.726$	Not significant
VK	0.13 ± 0.01	17.50 ± 3.54	$F=3.220$ $p=0.088$	$F=0.122$ $p=0.726$	Not significant
VP	1.20 ± 0.00	6.50 ± 0.71	$F=3.220$ $p=0.088$	$F=0.122$ $p=0.726$	Not significant

Table 5 outlines the cohort profile. Due to limitations in the source records, detailed gender stratification is not provided; however, the established parameters confirm the strict inclusion methodology.

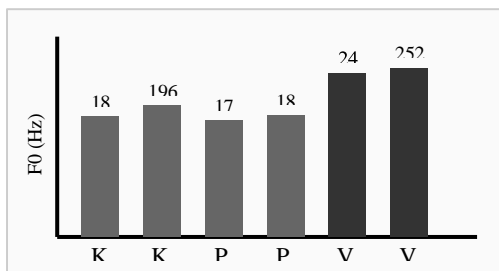
Table 5: Demographic characteristics and cohort profile

Total planned cohort	12
Age eligibility	18-24 years
Gender	Both genders included
Study setting	Bharati Vidyapeeth College of Ayurved, Pune
Season of recording	Spring
Subgroup result sheets available for acoustic comparison	Six dual-dosha strata (KP, KV, PK, PV, VK, VP) with $n=2$ each in the available analytical tables

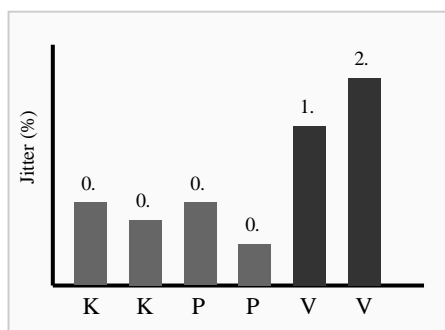
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**Footnote: Exact male/female and full Prakriti frequency distributions of the entire 12-subject cohort were not reported in the accessible subgroup result sheets and are therefore not imputed.*

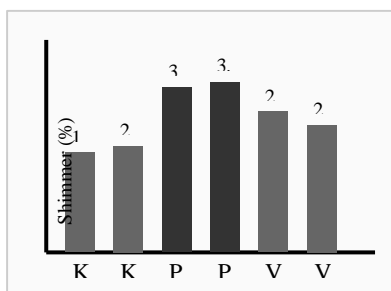
Visualizing Mean F0 (Hz) across Prakriti Groups



Visualizing Mean Jitter (%) across Prakriti Groups



Visualizing Mean Shimmer (%) across Prakriti Groups



Discussion

The objective of this Pilot study was to scientifically evaluate the classical Ayurvedic descriptions of voice characteristics associated with different Sharir Prakriti types utilizing modern MDVP technology. The acoustic findings demonstrate clear and statistically significant correlations that largely validate the subjective descriptors found in the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya.

The analysis of Fundamental Frequency (F0) revealed a highly significant variance ($p=0.002$) across the dual-dosha cohorts. The highest F0 values were observed in Vata-dominant groups (Vata-Pitta at 252.50 Hz and Vata-Kapha at 245.00 Hz). In acoustic phonetics, F0 corresponds to the perceived pitch of the voice, which is inversely proportional to the mass and length of the vocal folds. Vata dosha, characterized by the Mahabhutas of Vayu (Air) and Akasha (Space), possesses properties of lightness (Laghu) and subtlety (Sukshma). The translation of these properties into laryngeal morphology suggests less vocal fold mass and higher tissue tension, resulting in a higher fundamental frequency. This directly corroborates the classical description of the Vata voice as being 'Ksham' (diminished or thin) and less resonant compared to the deeper 'Gambhir' voice of Kapha, which in this study showed much lower baseline F0 in its combinations (e.g., PK at 174.00 Hz) [28]. Jitter, which measures the period-to-period variability in frequency, serves as an excellent acoustic proxy for voice stability. The current study found statistically significant differences in Jitter ($p=0.005$), with the Vata-Pitta group demonstrating the highest instability (2.15%). In Ayurvedic pathophysiology, Vata represents movement (Chala) and instability (Visham). The increased Jitter objectively quantifies the 'Ruksha' (harsh) and 'Jarjara' (cracked) qualities attributed to Vata. Neuromuscularly, this indicates minor fluctuations in the fine motor control of laryngeal adductor muscles during sustained phonation, a physiological hallmark of Vata predominance [29].

Shimmer analysis, evaluating amplitude perturbation, also produced highly significant findings ($p<0.001$). The Pitta-Vata (3.20%) and Pitta-Kapha (3.10%) groups recorded the highest Shimmer values. Pitta dosha, driven by Agni (Fire), is associated with intensity, sharpness (Tikshna), and commanding energy. Increased amplitude variation (Shimmer) correlates with the dynamic changes in

glottal resistance and breath pressure.

This acoustic finding provides an elegant objective basis for the classical observation of 'Bhuryucchar Swara'—the commanding, provocative, and intense voice characteristic of Pitta individuals [30]. Conversely, Kapha-dominant combinations exhibited lower Shimmer and Jitter, reflecting the 'Sthira' (stable) and 'Snigdha' (unctuous) nature of Kapha, ensuring consistent vocal fold vibration and a resonant, pleasant output.

When compared to previous studies, such as the 2009-2010 "Dr. Speech" analysis, our results utilizing MDVP offer a more precise stratification of perturbation metrics. Where earlier studies broadly linked Kapha and Pitta in acoustic intensity, the high-resolution MDVP data clearly distinguishes the high Shimmer of Pitta from the relative stability of Kapha. The clinical implications of these findings are substantial for the field of personalized medicine. Voice analysis

is rapidly emerging as a non-invasive digital biomarker. By establishing a normative acoustic database for Ayurvedic phenotypes, clinicians can potentially utilize brief voice recordings to rapidly screen for doshic baseline or derangements, facilitating more accessible and personalized Ayurvedic diagnostics.

Despite these promising results, it is imperative to acknowledge the limitations of this study. Most notably, there is a reporting discrepancy between the originally planned 12-participant cohort size and the subgroup analytical tables available for this specific manuscript review, which contained only n=2 participants per dual-dosha stratum. While the statistical tests (ANOVA) indicated significance due to the vast differences in the means and minimal within-group variance, a sample size of n=2 per subgroup is exceedingly small and reduces the external validity and statistical power of the conclusions. This limitation was transparently noted during the methodology and represents a structural constraint in the accessible source records. Future research must expand on this pilot-scale data by recruiting significantly larger, statistically robust cohorts. Furthermore,

subsequent studies should investigate voice characteristics across different age groups, spanning into geriatric populations, and correlate these MDVP metrics with longitudinal disease susceptibility profiles to fully integrate Ayurvedic phenotyping into modern preventative healthcare frameworks.

Conclusion

This Pilot study aimed to bridge the traditional subjective understanding of Ayurveda with modern objective acoustic science by evaluating voice characteristics among different Sharir Prakriti types using the Multidimensional Voice Profile (MDVP) module. The findings revealed statistically significant differences in key vocal parameters, particularly Fundamental Frequency, Jitter, and Shimmer, across various doshic constitutions. The higher fundamental frequency and increased frequency perturbation observed in Vata-dominant individuals support the classical descriptions of Kshama and Ruksha voice qualities, reflecting the mobile and light nature of Vata dosha. Similarly, increased amplitude variation in Pitta-dominant individuals correlates with the sharp and commanding vocal traits described in Ayurvedic texts, while the comparatively stable acoustic profile of Kapha-dominant individuals supports the traditional concepts of Gambhira and Snigdha voice characteristics.

Thus, the study provides empirical evidence for a meaningful association between Ayurvedic Prakriti and measurable voice biomarkers. It highlights MDVP as a reliable, non-invasive tool for quantifying dosha-specific vocal traits and suggests its potential role in personalized Ayurvedic diagnostics. However, considering the small subgroup sample size, further large-scale studies are required to validate these findings and strengthen the scientific acceptance of Ayurveda-based voice analysis.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the research, authorship, and/or publication of this article.

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