

Variation in Symptom Severity Among Different *Prakriti* in Patients of *Sandhigata Vata*: An Observational Study

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Abstract

Background: *Sandhigata Vata* is a frequently encountered *Vata-vyadhi* characterized by joint pain, stiffness, and impairment of movement^{1,2}. Classical Ayurvedic literature recognizes *Vata Prakriti* as a predisposing factor for degenerative disorders³; however, this explanation alone does not adequately account for the selective occurrence, moderate-stage presentation, and variability in clinical expression commonly observed in practice.

Objective: To evaluate *Prakriti*-wise clinical phenotypes and severity patterns in *Sandhigata Vata*, to assess associated systemic *Vata* features, and to interpret these findings through the lens of preventive failure and emerging genetic perspectives.

Materials and Methods: A combined conceptual and observational clinical study was conducted. Classical Ayurvedic texts describing *Sandhigata Vata*, *Vata-vyadhi*, *Asthi*, *Sandhi*, and *Deha Prakriti* were reviewed. An observational assessment was carried out on 130 patients diagnosed with *Sandhigata Vata*.⁴ Demographic parameters, *Deha Prakriti*, systemic indicators of *Vata*, and graded clinical features were documented and analyzed descriptively.

Result : The present observational study was conducted on 130 patients to evaluate the relationship between *Deha Prakriti* and the severity of *Sandhigata Vata*. The majority of patients were females and belonged to the elderly age group, with *Vata*-dominant constitutions forming the major proportion of the study population. Systemic features suggestive of generalized *Vata* aggravation such as *Krura Koshta*, *Alpa Kshudha*, *Anidra*, and *Rukshata* were commonly observed. Statistical analysis revealed significant association between *Deha Prakriti* and important clinical manifestations including *Sandhishula*, *Akunchana-Prasarana Vedana*, *Sthambha*, *Sandhi Atopa*, *Sparsha Asahyta* and Change in Structure/Alignment ($p < 0.05$). However, parameters such as *Sandhishotha*, *Hanti Sandhi Gati*, *Sandhi Vishlesha*, and *Vata Purna Druti Sparsha* did not show statistically significant association. Assessment of overall disease severity demonstrated significant variation among different *Prakriti* groups. Kruskal-Wallis test showed highly significant differences in total severity scores among *Deha Prakriti* types ($p < 0.001$), while Chi-square analysis also confirmed a significant association between *Deha Prakriti* and severity categories ($p = 0.006$). The findings suggest that *Deha Prakriti* significantly influences both the clinical presentation and overall severity of *Sandhigata Vata*.

Conclusion: *Sandhigata Vata* appears to be a *Prakriti*-modulated, function-dominant disorder shaped by constitutional vulnerability, lifestyle factors, and preventive neglect rather than aging (*Jara*) alone. Incorporation of *Prakriti* assessment into preventive strategies may allow earlier intervention and attenuation of disease progression.

Keywords: *Deha Prakriti*, *Sandhigata Vata*, Clinical Phenotype, Preventive Ayurveda, Ayurgenomics

How to cite this article: Joshi K, Ratre G, Singh S, Ritu, Shukla RK, Gendre SK. Variation in Symptom Severity Among Different *Prakriti* in Patients of *Sandhigata Vata*: An Observational Study. Int J Drug Deliv Technol. 2026;16(55s): 1256-1261. DOI: 10.25258/ijddt.16.55s.129

Introduction

Sandhigata Vata is described in Ayurvedic classics as a condition resulting from the localization of aggravated *Vata* within *Sandhi*, leading to pain (*Shoola*), stiffness (*Stambha*), crepitus (*Atopa*), and restriction of movement.⁶ Clinically, it corresponds to degenerative joint disorders and represents a major cause of functional disability, particularly among middle-aged and elderly populations.

Although aging (*Jara*) is traditionally acknowledged as an important etiological factor, clinical experience suggests that joint degeneration does not occur uniformly across individuals of similar age⁷. Ayurveda explains this selective vulnerability through the doctrine of *Deha Prakriti*, the innate constitutional makeup established at conception⁸. Classical texts emphasize that *Prakriti* governs disease susceptibility, clinical expression, and prognosis.⁹ Despite this, contemporary discourse often oversimplifies the concept by stating that individuals with *Vata Prakriti* are predisposed to *Sandhigata Vata*, without further analytical exploration.¹⁰

Parallel developments in modern biomedical science reveal that degenerative joint disorders are polygenic and multifactorial in nature.¹¹ Variations in genes associated with cartilage matrix integrity, collagen synthesis, inflammatory mediators, and oxidative stress regulation influence susceptibility and disease progression.¹² Key genetic associations reported in osteoarthritis include polymorphisms in *GDF5*, *COL2A1*, *ACAN*, and inflammatory pathway genes, which affect cartilage resilience, repair mechanisms, and joint biomechanics^{13,14}. The emerging discipline of Ayurgenomics¹⁵ provides evidence that Ayurvedic *Prakriti* types demonstrate distinct genomic and gene-expression profiles, offering a biological foundation for constitutional phenotypes described in Ayurveda.

Within this integrative framework, *Sandhigata Vata* may be viewed as the outcome of interactions between genetic susceptibility, constitutional *Prakriti*, lifestyle practices, and aging. The present study aims to move beyond conventional susceptibility narratives and to analyze *Sandhigata Vata* as a *Prakriti*-based clinical phenotype characterized by specific severity patterns, systemic involvement, and preventable progression.

Materials and Methods

Study Design : A conceptual and observational clinical study.

Conceptual Component : Classical Ayurvedic references pertaining to *Sandhigata Vata*, *Vata-vyadhi*, *Asthi-dhatu*, *Sandhi*, and *Deha Prakriti* were reviewed to establish theoretical correlations relevant to disease pathogenesis and progression.

Observational Component

Study Population : A total of 130 patients clinically diagnosed with *Sandhigata Vata* and attending the outpatient department of an Ayurvedic teaching hospital were included in the study.

Inclusion Criteria

- Patients aged 40 years to 70 years.
- Presence of classical clinical features of *Sandhigata Vata*

Exclusion Criteria

- Inflammatory and autoimmune joint disorders
- Traumatic joint conditions

Assessment Parameters

- **Demographic variables:** age, sex, habitat, occupation
- ***Prakriti* assessment:** based on classical physical, physiological, and psychological traits.(CCRAS *Prakriti* Assessment Proforma)
- **Systemic features:** *Kshudha*, *Koshtha*, *Mala*, *Mutra*, *Nidra*, *Manovritti*
- **Clinical severity:** Graded assessment of symptoms of Sandhivata i.e. *Sandhishula*(Pain), *Sandhishotha*(Swelling), *Stambha*(Stiffness), *Atopa*(crepitus), *Akunchana-Prasarana Vedana*, *Hanti Sandhigati*, *Sparsha Asahyata* (Tenderness), *Sandhi Vishlesha*, and *Vata-purna-druti-sparsha*, Change in structure/Alignment, Impact of Symptoms.

Statistical Analysis (Methodology)

The data obtained from the observational study were systematically compiled and analyzed using appropriate statistical methods to assess the relationship between **Deha Prakriti and the severity of Sandhigata Vata**. Descriptive statistics were used to summarize demographic characteristics, constitutional profile, and clinical manifestations of the study participants. Categorical variables were expressed in terms of **frequency (N) and percentage (%)**.

To assess the association between **Deha Prakriti and individual clinical manifestations of Sandhigata Vata**, the **Chi-square (χ^2) test of association** was applied. The clinical parameters analyzed included *Sandhishula*(Pain), *Sandhishotha*(Swelling),

Stambha(Stiffness), *Atopa*(crepitus), *Akunchana-Prasarana Vedana*, *Hanti Sandhigati*, *Sparsha Asahyata* (Tenderness), *Sandhi Vishlesha*, and *Vata-purna-druti-sparsha*, Change in structure/Alignment, Impact of Symptoms. For assessment of overall disease severity, a **composite total severity score** was calculated by summing the individual scores of all 11 clinical parameters for each participant. Since the total severity score represented ordinal and non-normally distributed data, comparison of overall severity among different Deha Prakriti groups was performed using the **Kruskal-Wallis test**, which is a non-parametric statistical test suitable for comparison among more than two independent groups. For supportive categorical analysis, the total severity scores were categorized into **mild, moderate, and severe groups** based on score distribution, and association with Deha Prakriti was evaluated using the **Chi-square test**. The level of statistical significance was considered at $p < 0.05$.

Observations and Results

Table 1. Demographic and Lifestyle Profile of Patients with *Sandhigata Vata*

Parameter	Category	Percentage (%)
Age	41–50 years	13.1
	51–60 years	37.7
	61–70 years	42.3
Sex	Female	64.6
	Male	35.4
Habitat	Urban	80.0
	Rural	20.0
Occupation	Housewife	43.8
	Service	33.1
	Others	23.1

The study population predominantly comprised elderly females residing in urban areas. Occupational patterns reflected repetitive physical strain or prolonged sedentary activity, suggesting a lifestyle-*Prakriti* mismatch.

Table 2. Distribution of *Deha Prakriti*

<i>Prakriti</i> Type	Percentage (%)
<i>Vata</i> Pradhana (VP/VK/VPK)	~65
<i>Pitta</i> -associated	~25
<i>Kapha</i> Pradhana	~10

Vata-dominant constitutions formed the majority, whereas *Kapha* dominance appeared to exert a protective or delaying influence on disease manifestation.

Table 3. Systemic *Vata* Indicators Observed in *Sandhigata Vata* Patients

Systemic Feature	Percentage (%)	Clinical Significance
<i>Krura</i>	35.4	Generalized <i>Vata</i>

<i>Koshtha</i>		predominance
<i>Alpa Kshudha</i>	35.3	Reduced digestive stability
<i>Anidra</i>	36.9	Nervous system involvement
<i>Rukshata</i>	28.5	<i>Dhatu</i> -level dryness

These findings suggest that *Sandhigata Vata* represents a systemic *Vata* disorder with joint manifestation rather than isolated *Sandhi* pathology.

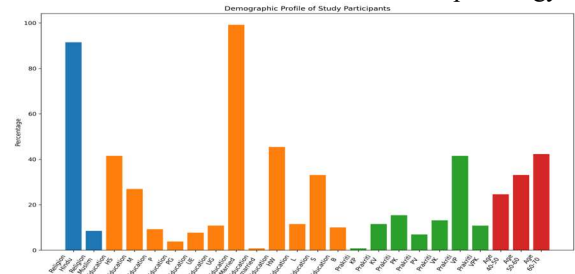
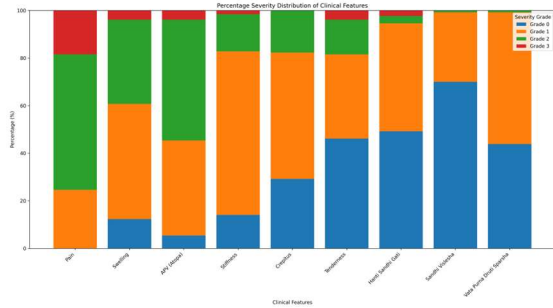


Table 4. Severity Grading of Clinical Features of *Sandhigata Vata*

Clinical Feature	Grade 0	Grade 1	Grade 2	Grade 3
Sandhishula (Pain)	0	32	74	24
Sandhishotha (Swelling)	16	63	46	5
Akunchana Prasarana Vedana (APV)	7	52	66	5
Sthambha (Stiffness)	18	88	20	2
Sandhi Atopa (Crepitus)	38	69	23	0
Sparsha Asahyata (Tenderness)	60	46	19	5
Hanti Sandhi Gati	64	59	4	3
Sandhi Vislesha	91	38	1	0
Vata Purna Druti Sparsha	57	72	1	0

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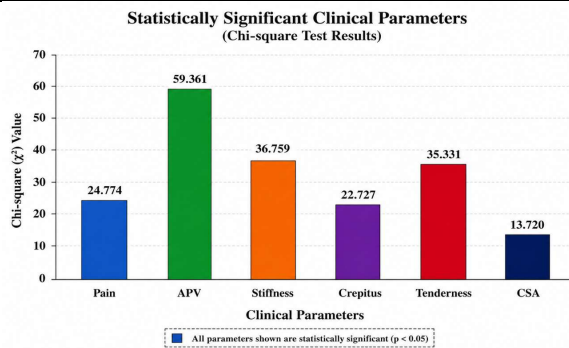


A clear predominance of moderate functional symptoms with minimal severe structural involvement was observed.

Inferential statistical analysis

1) Symptom-wise association table

Clinical Parameter	Chi-square (χ^2)	p-value	Interpretation
Pain	24.774	0.016	Significant
Swelling	21.858	0.238	Not significant
APV	59.361	<0.001	Highly significant
Stiffness	36.759	0.046	Significant
Crepitus	22.727	0.030	Significant
Tenderness	35.331	0.009	Significant
Hanti Sandhi Gati	12.939	0.795	Not significant
Sandhi Vislesha	18.681	0.097	Not significant
Vata Purna Druti Sparsha	10.212	0.597	Not significant
CSA	13.720	0.033	Significant
Impact Score	15.895	0.600	Not significant

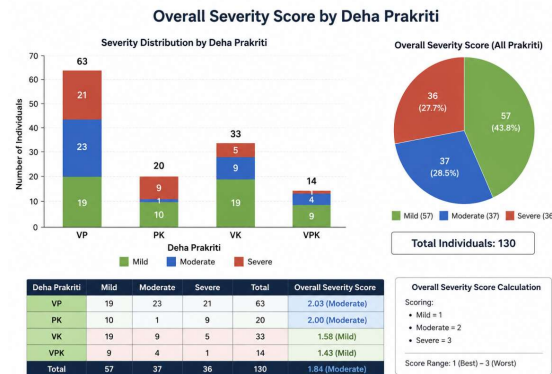


2) Overall severity score by Deha Prakriti

Deha Prakriti	Mild	Moderate	Severe	Total
VP	19	23	21	63
PK	10	1	9	20
VK	19	9	5	33
VPK	9	4	1	14
Total	57	37	36	130

Total 57 37
 Chi-square (χ^2) = 17.83
 Degrees of freedom = 6
 p = 0.006

A statistically significant association was observed between **Deha Prakriti and overall severity of Sandhigata Vata (p = 0.006)**, indicating that constitutional type influences the overall disease severity.



To assess the association between **Deha Prakriti and individual clinical manifestations of Sandhigata Vata**, Chi-square analysis was performed. The analysis demonstrated statistically significant association between Deha Prakriti and **Pain ($\chi^2 = 24.774, p = 0.016$)**, **Akunchana Prasarana Vedana ($\chi^2 = 59.361, p < 0.001$)**, **Stiffness ($\chi^2 = 36.759, p = 0.046$)**, **Crepitus ($\chi^2 = 22.727, p = 0.030$)**, **Tenderness ($\chi^2 = 35.331, p = 0.009$)**, and **Change in Structure/Alignment (CSA) ($\chi^2 = 13.720, p = 0.033$)**, indicating significant variation in these clinical manifestations among different constitutional groups.

However, **Swelling ($\chi^2 = 21.858, p = 0.238$)**, **Hanti Sandhi Gati ($\chi^2 = 12.939, p = 0.795$)**, **Sandhi Vishlesha ($\chi^2 = 18.681, p = 0.097$)**, **Vata Purna Druti Sparsha ($\chi^2 = 10.212, p = 0.597$)**, and **Impact Score ($\chi^2 = 15.895, p = 0.600$)** did not demonstrate statistically significant association with Deha Prakriti.

For evaluation of overall disease severity, a composite total severity score was calculated by summing the scores of all 11 clinical parameters. The total severity score ranged from 4 to 21, with a mean of 10.62 ± 4.01 and a median of 10. Comparison of total severity scores among different Deha Prakriti groups using the **Kruskal-Wallis test** revealed a highly statistically significant difference (**H = 10.37, p < 0.001**), indicating that the severity of Sandhigata Vata differs significantly among constitutional types. For further supportive analysis, patients were categorized into **mild, moderate, and severe groups** based on the distribution of total severity scores. Chi-

square analysis revealed a statistically significant association between **Deha Prakriti and overall severity category** ($\chi^2 = 17.83$, $p = 0.006$).

These findings collectively support the study hypothesis that **Deha Prakriti has a significant relationship with the severity of Sandhigata Vata**, influencing both individual clinical manifestations and overall disease severity.

Discussion

The present study offers a refined understanding of *Sandhigata Vata* by integrating classical Ayurvedic principles with clinical observation and contemporary scientific perspectives. While the predisposition of *Vata Prakriti* individuals is well recognized, the findings demonstrate that *Prakriti* also modulates disease phenotype, symptom severity, and progression.

The predominance of moderate-grade symptoms suggests delayed health-seeking behavior, possibly due to normalization of early joint discomfort and inadequate awareness of *Prakriti*-oriented preventive measures. Urban lifestyle patterns, sedentary habits, and repetitive joint use appear to amplify constitutional vulnerability, particularly in *Vata*-dominant individuals.

Systemic manifestations such as *Krura Koshtha*, *Alpa Kshudha*, and *Anidra* support the concept that *Sandhigata Vata* represents a generalized *Vata* disorder with localized expression in *Sandhi*. The relative preservation of joint stability despite functional symptoms reinforces the Ayurvedic principle that functional derangement precedes structural degeneration. Despite significant pain and stiffness, approximately 95% of patients demonstrated absent to mild restriction of joint movement. Structural instability (*Sandhi Vishlesha*) and advanced degeneration were observed only in a minority, indicating predominance of functional impairment (*Cheshta-hani*) over irreversible structural damage (*Dhatu-kshaya*).

Conceptual Progression of Sandhigata Vata Prakriti (predominant *Vata*) → Lifestyle mismatch → Systemic *Vata* aggravation → Functional joint impairment → Structural degeneration (late stage).

Functional Versus Structural Involvement

Despite significant pain and stiffness, approximately 95% of patients demonstrated absent to mild restriction of joint movement. Structural instability (*Sandhi Vishlesha*) and advanced degeneration were observed only in a minority, indicating predominance of functional impairment (*Cheshta-hani*) over irreversible structural damage (*Dhatu-kshaya*).

From a modern viewpoint, genetic susceptibility to joint degeneration and emerging genomic correlates of *Prakriti* offer a plausible biological explanation for these observations. Emerging genetic evidence

supports the concept that degenerative joint disorders are influenced by inherited susceptibility. Variants in genes such as *GDF5*—involved in joint morphogenesis and cartilage maintenance—have been consistently associated with osteoarthritis risk¹⁷. Genome-wide association studies further demonstrate that osteoarthritis is a polygenic condition, with multiple loci contributing small but cumulative effects on disease development¹⁸. Additionally, low-grade inflammatory pathway genes, including cytokine-related polymorphisms, modulate pain perception and functional limitation, explaining why patients with comparable radiological changes experience different clinical severity¹⁹. These findings strongly parallel the Ayurvedic understanding of *Prakriti* as a stable phenotypic expression reflecting deeper biological predispositions. *Prakriti* may therefore be interpreted as a clinically observable phenotype reflecting deeper biological predispositions that interact with lifestyle and aging to determine disease expression.

The limited representation of pure *Kapha Prakriti* suggests a stabilizing role of *Kapha* in maintaining joint integrity, though stiffness becomes prominent when disease develops. These *Prakriti*-specific phenotypes emphasize the importance of individualized preventive and therapeutic strategies.

Conclusion

Sandhigata Vata is best conceptualized as a *Prakriti*-modulated, function-dominant disorder arising from the interaction of constitutional vulnerability, lifestyle factors, and preventive neglect rather than aging (*Jara*) alone. The frequent presentation at a moderate functional stage highlights a crucial window for early intervention. Incorporation of *Prakriti* assessment into routine preventive counseling and lifestyle modification may help delay disease onset, reduce severity, and improve quality of life.

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