Journal of Ayurveda & Holistic Medicine

https://jahm.co.in

eISSN-2321-1563

Cross Sectional Study

DETERMINING GEO-ECOLOGICAL PARAMETERS FOR DESIGNING *DESHA* WISE MAP OF BELAGAVI DISTRICT AND ASSESSMENT OF *PRAKRITI* PREDOMINANCE – A CROSS-SECTIONAL STUDY

[1*]VINOD S. GURAV, [2]B. S. PRASAD, [3]P. T. HANAMGOND, [4]SURAJ MESNE

ABSTRACT :

Introduction: In clinical practice, *Bhumi Desha*, or a person's geographical territory or habitat, aids in diagnosing, treating, and predicting a patient's condition as well as determining their *Prakriti*, or body constitution. The criteria used for evaluating *Bhumi Desha* (geographical land) in the classics were too general and are not used in modern practice. Due to the diverse ecosystem of the Belagavi district, the regions must be accurately identified and mapped into distinct geographical areas. **Methods**: The best *Bhumi Desha* (geographical land) was determined by a cross-sectional study, which included *Sadharana Desha* (mixed land), *Anupa Desha* (wet fields), and *Jangala Desha* (dry lands). The Google Earth tool was then used to map these geo-geographical places into different *Bhumi Desha* based on the parameters that were collected. To assess the *pradhana prakriti,* around 4767 participants were selected by a random sampling method (lottery method) from 15 distinct geo-geographic regions of the Belagavi district. **Results**: There were 10.91% wet land, 21.86% mixed land, and 67.22% dry land was found. **Discussion**: It was found that there is a significant association between '*Desha*' (geographical land) and '*Prakriti*' (body constitution) (P-value < 0.001) at a 5% level of significance. *Vata pradhana prakriti* people were more prevalent in dry areas, *Kapha pradhana prakriti* people were more prevalent in wet/damp areas, and *Samadhatuja prakriti* people were more prevalent in *Sadharana Desha*. **Conclusion**: The goal of this study was to examine the person's Primary *prakriti* and *Desha* characteristics. The *Bhumi desha*-wise map that was created showed each of the three categories of *Dehsa.* The results of the current study showed a significant relationship between *Desha* and *Prakriti,* with a P-value of less than 0.001.

KEYWORDS: *Desha (geographical land), Prakriti* (body constitution), Mapping, Cross-sectional study

RECEIVED ON:
25-04-2025

REVISED ON:
13-05-2025,19-05-2025

ACCEPTED ON:
11-06-2025

Access This Article Online:

Quick Response Code:

Website Link:

https://jahm.co.in

DOI Link:

https://doi.org/10.70066/jahm.v13i5.1831

Corresponding Author Email:

drgurav99@gmail.com

CITE THIS ARTICLE AS

Vinod S. Gurav, B. S. Prasad, P. T. Hanamgond, Suraj Mesne. Determining geo-ecological parameters for designing *Desha* wise map of Belagavi district and assessment of *Prakriti* predominance – A cross-sectional study. *J of Ayurveda and Hol Med (JAHM).* 2025;13(5):29-38.

1. INTRODUCTION

Background: It is widely known that health diverges by geography. Across countries, within countries, and even within local geographies, people with better and worse health tend to cluster in different locations. These geographical or tropical diseases have persisted over time and are universal.[1,2] The term 'clinical geology' has been useful in restoring the reality of the dispersion of various illnesses in different topographical areas.[3,4] Ayurveda elaborates *Jangala Desha* (dry land), *Anupa Desha* (wet land), and *Sadharana Desha* (mixed land) as the types of *geographical land* found in classics according to their particular features and ecological status.[5, 6, 7, 8] *Bhumi Desha* (geographical land/ *habitat)* influences the constitution of predominance of *dosha* in the formation of *Prakriti* (body constitution) during conception, which in turn influences the manifestation and cause of diseases, and also the response to treatment in an individual. The knowledge of *Bhumi Desha* (geographical land/ habitat) forms one amongst the concepts of examination,[9] that every individual should be analysed for *Desha* and *Prakriti* while determining the curability, prognosis, and scheduling treatment. As indicated by the 2011 Census of India, the Belagavi region had a population of 4,779,661 across a space of 13,415 square kilometers. The locality lies between 15°00‟ and 17°00‟ north latitudes and between 74°00‟ and 75°30‟ east longitudes. The area is separated into three Agro-climatic zones, viz, “Northern dry zone”- *Maidan region*, “Northern transitional zone”- *Semi-Malnad,* and “Hilly zone” - *Malnad region*, which is a hilly region. [10-11]

OBJECTIVES:

1. Development of geo-ecological assessment parameters for demarcating different *Bhumi Desha*
2. Designing a *Desha*-wise map of Belagavi District
3. To study *Prakriti* predominance in different *Bhumi Desha* of Belagavi District.

2. METHODS:

Study Design:

Finding the criteria for evaluating the various *Bhumi Desha* of Belagavi and the frequency of *pradhana prakriti* in them was the goal of this cross-sectional study (survey). A thorough literature search and consultation with two internal and external experts using a 5-point Likert scale were used to prepare the necessary questionnaire, which included structured assessment parameters for geographical land and a standard questionnaire [12] for assessing body constitution.

Settings:

A pre-designed and semi-structured research data sheet was prepared by considering the maximum specification of particular *Bhumi Desha* explained in the classics (for example, vegetation, mud type, nature of water sources, temperature, and humidity). A total of 30 different geographical regions of predominance having a particular type of *Bhumi Desha* were visited personally, along with geologists. Final assessment parameters (Table no.1) were developed, and the Belagavi district was identified into different types of *Bhumi Deshas,* mainly based on the type of vegetation. Later, by taking the high-resolution Google Earth Application (Version 9.145.0.3 open-source licenses), around 108 places

were identified as *Jangala Desha*, 41 were as *Anupa Desha,* and 107 were as *Sadharana Desha.* In this way, a total of 256 different types of *Bhumi Desha* were identified and included for the present study. The QGIS version 3.18.1 was used for the sampling locations maps and *Desha-wise* maps (Figure no.1a and 1b), of these different types of *Bhumi Desha* and demarked by using different symbols (such as dots, triangles, and stars), colors (brown, yellow, and light blue) respectively. 15 different geo-geographic regions of the Belagavi district were selected by the Random sampling method (Lottery method) by choosing 5 regions from each *Bhumi Desha*. The relevant standard Questionnaire proforma was used for the assessment of *Prakriti* of 4767 subjects, and the interrelation between *Bhumi Desha* and *Prakriti Pradhanata* was assessed. (Table No-1, Figure 1a and 1b)

Table No. 1 Final Assessment Parameters of *Bhumi Desha* in Belagavi:

Sl.no	**Assessment parameters**	***Jangala***	***Anupa***	***Sadharana***
Characters Per 100 sq. meters				
A.	Vegetation			
	1. Prickly floras	>50%	< 10%	10 to 50%
	2. Tall vegetation	<20%	>80%	20 to 80%
	3. Bushes	>30%	<10%	10 - 40%
B.	Others			
	2. No of Trees Per 100 Sq. Meters	Scarce <150 (thorny trees)	Dense forest >250 (big trees)	Up to 200 (mixed, medium-sized)
	3. Water source (Bore-Wells, Wells, And Rivers)	<2 water bodies	>5 Water Bodies with a good amount of water	2-5 moderate amounts of water
	4. Colour of Mud	Black & Ash	Brown & Red	Black, Brown & Mixed Colour
	5. Agricultural land/crops	Jawar/Sajje Bajara/Maize	Paddy/Rice	Sugar cane /Tobacco/Groundnut

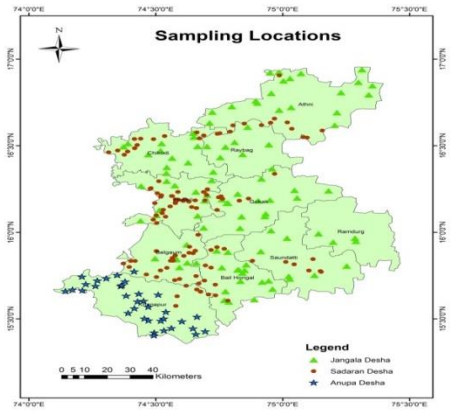

Figure no 1a: Location Map

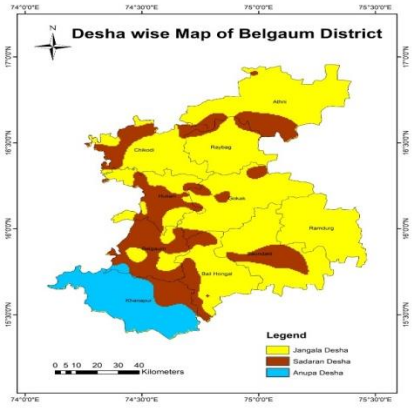

Figure no 1b: *Desha-wise* Map

Participants:

The study was carried out in different parts of the Belagavi District using a systematic sampling method. 4767 subjects who fulfilled the inclusion criteria gave their informed consent and were selected for the present study.

Inclusion Criteria: Apparently Healthy volunteers**,** Permanent residence of the study area**,** either gender**,** age group between 18 to 60 years, were involved.

Exclusion Criteria:

Pregnant and lactating women**,** subjects having any acute or chronic illness**,** physically disabled and deformed subjects were excluded.

Variables: The study subjects were provided all of the information and data required for the survey. We followed the inclusive and exclusive criteria for the present study. Hence no variables found.

Data Source and Measurement:

Questionnaire for Assessment of *Prakriti*:

All individuals were examined according to the criteria mentioned in the classics. They were assessed with the help of relevant standard proforma and the required questionnaire was prepared after an extensive literature search and in consultation with the two internal and external experts using 5-point Likert scale respectively.

Components of the questionnaire: The questionnaire consisted of two components: 1. Anthropometric measurements: It consists of height, weight, and Body Mass Index. 2. Body measurements: It consists of nature of skin texture, reactiveness on pinch and exposure to sunlight, hair texture, the color of hair, hair distribution, baldness, premature greying of hair, sweat type and odor, crepitation, appetite, sleep pattern, tolerance, appearance, common morbidity along with present health condition. Also, the subjects were assessed for prominent veins and tendons, number of moles, cracked heel and palm, frequency of fever, cold, and number of children.

The individual has 60% or more than 60% factors of one *Dosha,* which is considered the same *Dosha Pradhana Prakriti.* Then samples were divided according to *Dosha Pradhana Prakriti* as *Vata Pradhana Prakriti, Pitta Pradhana Prakriti,* and *Kapha Pradhana Prakriti.*

Collection of Data:

The subjects were collected from the 15 different geo-geographic regions of the Belagavi district, and data were collected.

Bias:

Because the study was cross-sectional and the participants were aware of the assessment parameters, neither the participants nor the researchers were biased.

Sample Size:

The sample size was calculated from the formula $n = 4pq / d^2$. Where, n = Sample size; p = Percentage of Subjects, q = (100-p), d = Relative error in the estimation of p. Based on the outcome of the *Prakriti* predominance of previous data with relative risk not more than 10%; i.e., not exceeding 10% (d-3%) error of a proportion, the sample size is 4727. Around 4767 sample size has been determined from 15 different geo-geographic regions of the Belagavi district as per the standard sample size calculation per village method.

Sampling Method:

The random sample technique (lottery method) was used to choose 15 distinct geo-geographic regions within the different *Bhumi Deshas* of the Belagavi district. Every n^{th} dwelling in a village was appraised for its *Pradhana Prakriti* using a systematic sampling technique. Using the usual sample size calculation per village approach, a sample size of about 4767 was determined from the study area of the Belagavi district.

Interview method:

The *Prakriti* assessment was carried out through Face-to-face interviews with respondents belonging to 15 different geo-geographic regions of the Belagavi district. The subjects were thanked for their active participation in the study.

Statistical Methods: R - Statistical software version 3.5 was used in the analysis of the data. The data on geographical land and body constitution was collected as per the proforma. The data was analyzed by 'Pearson Chi-square test of independence, the One-way ANOVA test, and Bonferroni corrected t-tests. Using the chi-square test of independence, a significant association between *'Desha' (*geographical land) and *'Prakriti' (*body constitution) was assessed at (P-value < 0.001) at a 5% level of significance. Further investigation using pairwise chi-square tests with Bonferroni correction as post-hoc analysis done to revealed that the distribution of *Prakriti (*body constitution) was significantly different between *Desha (*geographical land). There was no missing data found in the present study.

3. RESULTS:

Demographic Data:

I. Frequency:

In the present study, there were 1039 respondents (22%) from wet land, 2277 respondents (48%) with dry land, and 1451 respondents (30%) with mixed land were assessed for their *Pradhana Prakriti.*

Table No. 2: Frequency of Samples

Sl.No	TYPES OF *DESHA*	Frequency	Per cent	Valid Percentage	Cumulative Per cent
1	*Jangala*	2277	47.8	47.8	47.8
2	*Anupa*	1039	21.8	21.8	69.6
3	*Sadharana*	1451	30.4	30.4	100.0
	Total	**4767**	100.0	100.0	

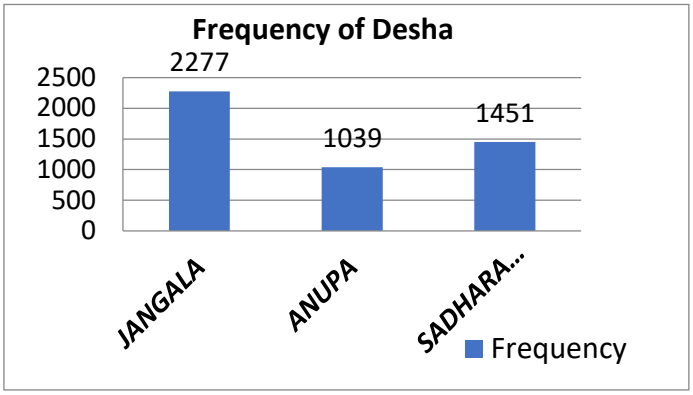

Figure No. 2: Frequency of Samples (n = 4767)

2. Participant:

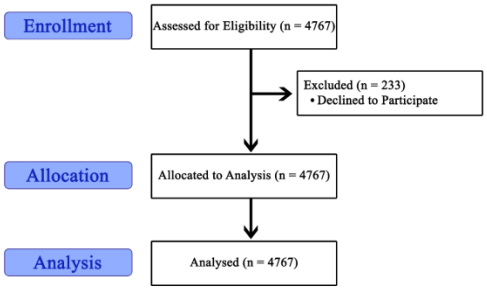

Figure No. 3: Participants CONSORT Diagram

3. Age: The maximum subjects, i.e., 22.6%, was found in the age group above 56 years. 45% in the age group of 26-30 years, 12.3% in the age group between 36-40

years, and the minimum subjects, i.e., 8% from the 51-55 years age group.

4. Occupation: The maximum number of subjects, i.e., 41%, were housewives, followed by 31% of agricultures and 7% of business.

5. Education: The maximum number of subjects, i.e., 39% (1867), was found educated up to Secondary level, followed by 34% (1643) up to Primary level. The minimum number of subjects, i.e., 1% (30), was found post graduated followed by 7% (310) up to Degree level.

6. Sex Ratio: The maximum number, i.e., 58%, was of females, followed by 42% of males.

II. Anthropometric data:

1. Association of Body Mass Index with *Desha*: The maximum number of subjects i.e. 79% of dry land followed by 64.3% of mixed land has found Normal Body Mass Index. 28% and 10.2% of the subject of wet land have found overweight and obese respectively.

Table No. 3: Distribution of Body Mass Index according to *Desha*

Body Mass Index	**Total**	***Jangala***		***Anupa***		***Sadharana***	
		No	**%**	**No**	**%**	**No**	**%**
Below Normal (<17.5)	351	178	7.8%	94	9.0%	79	5.4%
Normal BMI (17.5-24.5)	3279	1798	79.0%	548	52.7%	933	64.3%
Overweight BMI (24.9-29.9)	890	267	11.7%	291	28.0%	332	22.9%
Obese (>30)	247	34	1.5%	106	10.2%	107	7.4%
Total	**4767**						

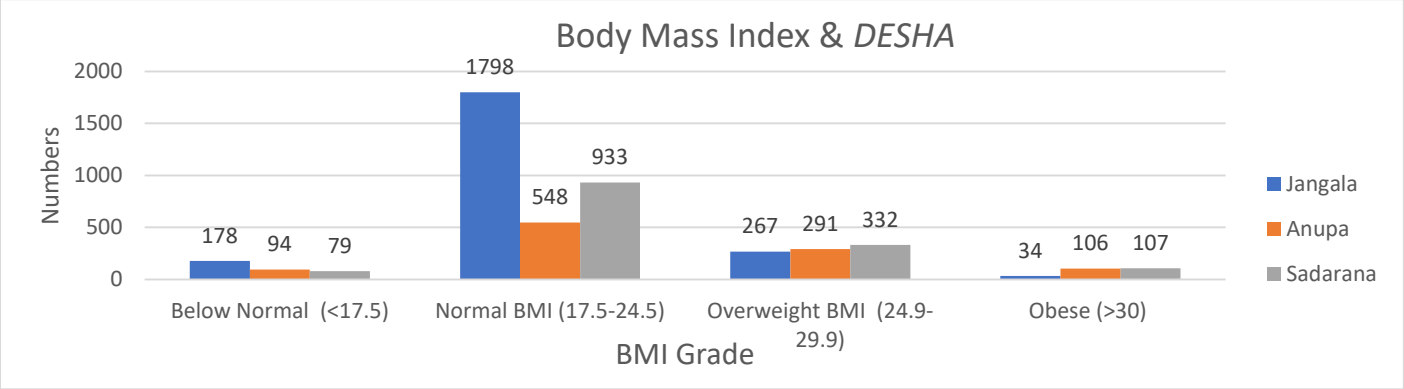

Figure No. 4: Distribution of Body Mass Index according to *Desha*

III. Outcome and Obtained Results: Association of *Desha* with *Pradhana Prakriti*:

Table No. 4: Dominant *Prakriti* and *Desha*

Desha	**Prakriti**				**d.f.**	**Chi-square statistic**	**P-value**
	Kaphadhikya	*Pittaadkhiya*	*Vatadikya*	*Samadhatuja*			
Anpua	569	95	326	49	6	2046.8	< 0.001
Jangala	141	213	1723	91			
Sadharana	182	339	489	441			

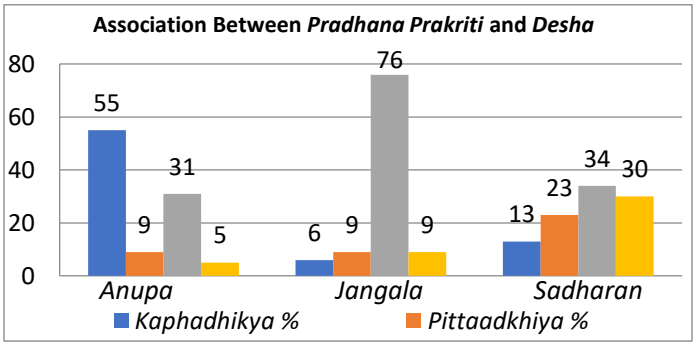

Figure No. 5: Association between *Pradhanan Prakriti* and *Desha*

Using the chi-square test of independence, it was found that there is a significant association between '*Desha*' (geographical land) and '*Prakriti*' (body constitution) (P-value < 0.001) at the 5% level of significance. Further investigation using pairwise Chi-square tests with Bonferroni correction as post-hoc analysis reveals that the distribution of body constitution is significantly different between 'dry land' and 'mixed land' (Chi-square statistic = 843.7, P-value < 0.001), wet land and mixed land (Chi-square statistic = 631.94, P-value < 0.001) as well as 'wet land and 'dry land' (Chi-square statistic = 994.02, P-value < 0.001) at 5% level of significance. (Table No. 2)

4. DISCUSSION:

The study divided regions based on climate using a semi-structured research data sheet. Thirty zones were observed in person, and the Belagavi district was divided into three land types based on plant type: *Sadharana Desha, Anupa Desha, and Jangala Desha.*

During field visits, Ayurveda literature and geo-biological conditions were analysed to identify geographical land similarities, and referral criteria were developed to define *Bhumi Desha* globally on the base of mainly type of vegetation, mud, rain fall ratio, crops, stone types, animals, etc.

Vegetation: *Desha,* or geographical land, is classified into three types [13] viz, *Jangala Desha,* which is dry/arid land, which is tropical and dry land of A & B kinds of Köppen–Geiger and Twertha. Marshy areas are known as *Anupa Desha* and *Sadharana Desha*, which combine the two types. Köppen founded the system based on the idea that plants thrive in specific environments. Water bodies and marine plants develop together with Aerenchyma channels that let air into the rooting zone, which are characteristics of wet areas. There were more than 200 huge, towering trees among the more than 250 plantations that were seen in damp soil. There were fewer than 150 plantations on arid soil with prickly, short-lived trees.

Rainfall ratio: The rainfall ratio in *Anupa Desha* ranges from 1859mm to 503mm, with an average of 761mm. *Anupa Desha* has over 5 water bodies and rivers with good water logging, while *Jangala Desha* has fewer than 2 water bodies and 2-3 water bodies with minimal logging.

Mud: *Jangala Desha* (the northeastern portion of Belagavi district) had whitish, blackish, and ash- colour mud, whereas *Anupa Desha* (the southwest parts of the district) had red mud. The mud present in *Sadharana desha* was brown and black. It has been described in classics as *Anupa Desha as Tamra Bhumi, Jangala Desha as Dhusara Bhumi, and Sadharana Desha as Nanavarna Bhumi*.

Crops: *Anupa desha* (southwest regions of Belagavi regions) had a large concentration of paddy/rice; *Jangala Desha* (the northeastern portion of Belagavi district) had maize, jawar, and sajje; and *Sadharana Desha* had wheat, barley, and sugar cane. These lands are comparable to those described in the classics as *Sadharana Desha* represented *Godhooma, Jangala Desha* represented *Yava, Vrihi, Mudga, Anupa Desha* represented *Shali Dhanya.*

The overall percentage distribution of *Desha* is as follows: It was determined that there was 67.22% dry land, 21.86% mixed land, and 10.91% wet land. At the 5% level of significance, the study revealed a substantial correlation between *Prakriti* (body constitution) and *Desha* (geographic land) (P-value < 0.001). The higher the proportion of *Vata pradhana prakriti* was found in dry land, *Kapha pradhanan prakriti* in wet land and *Samdhatuja prakriti* in mixed land.

Similarly, the Study of Rohra Priya (2015) et al, in her study reveals that the *Prakriti* of every individual also depends on the geographical pattern. In dry land, the maximum subjects found were of *Vata pradhana prakriti,* and in wet land, the maximum subjects found were of *Kapha pradhan prakriti.* Similarly, the study of Harish Rotti (2014) et al. [14] States that each *Desha* has one or another element dominating in it, and such *Desha* normally has an affinity towards the respective *Dosha* and, intern *Prakriti.* For example, water (*Jala Mahabhuta*) is dominant in wet/marshy land, naturally affects *Kapha Dosha,* and in turn shows high results of *Kapha prakriti* person. In this study, the author showed 43.3% of *Kapha prakriti* in wet land, followed by 52.3% *Vata prakriti* in dry land, and hence the results were confirmed to Ayurvedic concepts.

The present research was carried out across the entire Belagavi District, which experiences a range of climatic conditions. All recognized variations of geographical areas were incorporated into the proposed *Bhumi Desha*-wise map for the Belagavi District, yet *Jangala Desha* is believed to be the most prevalent among the three. Traditionally, medication should be administered based on the geographical region. A person benefits from remedies derived from their native land. The *Doshas* that become imbalanced in a specific geographical area tend to become less severe and easier to treat when they are encountered in a different region. For instance, *Doshas* that are concentrated in wet areas may become less potent when they occur in dry regions, similarly to the crocodile (Nakra) is strong in water but becomes weak upon leaving it.

Limitation of Study: The current study is limited to only Belagavi District. For Future research it can be recommended to other district and parts of state and country.

Interpretation of the Research: The geographical land or habitat (*Bhumi Desha*) is essential in clinical practice

for determining curability, prognosis, and treatment, as well as for understanding an individual's *Prakriti,* or body constitution. A careful examination of vegetation, soil, plants, water sources, animals, and birds was consistently conducted to monitor changes in *Bhumi* type.

Generalizability: The formulated geo-ecological parameters have assisted in defining the various *Bhumi-Desha* of Belagavi district according to traditional texts and have also facilitated the mapping of Belagavi district based on *Desha* classification. The evaluation of *Prakriti* supports the validation of the *Desha* and *Prakriti* concepts. Geo-ecological parameters, along with the Google Earth application, can be utilized to categorize land in the Belagavi district into *Jangala Desha*, *Anupa Desha*, and *Sadharana Desha*, as an example. The assessment parameters established serve as a reference standard for demarcating Bhumi Desha worldwide.

5. CONCLUSION: This was a unique study conducted in *the* Belagavi district*. Bhumi Desha* wise map created was shown all three types of *Desha viz,* 10.91% as wet land, 21.86% as mixed land, and 67.22% as dry land. In Present study there was a significant relationship between *Desha* and *Prakriti,* with a P-value of less than 0.001. *Vata pradhana prakriti* was seen in *Jangala Desha, Kapha Pradhana Prakriti* in *Anupa Desha*, and *Samdhatuja Prakriti* in *Sadharana Desha.*

Authors details:

[1*]Professor, Affiliated to KAHER, Belagavi, Department of Kriya Sharira, KLE Academy of Higher Education and Research, Deemed to be University, Shri BMK Ayurveda Mahavidyalaya, Shahpur, Belagavi, Karnataka, India.

[2]Professor and President Board of Ayurveda NCISM New Delhi

[3]Professor and Head, Department of Geology, Govindram Seksaria Science College (GSS) college, Belagavi, Karnataka, India. Affiliated with Rani Channamma University, Belagavi.

[4]Professor, Department of Geology, Govindram Seksaria Science College (GSS) college, Belagavi, Karnataka, India. Affiliated with Rani Channamma University, Belagavi.

Authors Contribution:

Conceptualization and clinical management: Dr. VSG, Dr. BSP

Data collection and literature search: Dr. VSG

Writing – original draft: Dr. VSG

Reviewing & editing: Dr. VSG, Dr. BSP

Approval of final manuscript: All authors.

Acknowledgements:

Dr. Suhas Kumar Shetty, Principal, KLE Academy of Higher Education and Research, Deemed to be University, Shri BMK Ayurveda Mahavidyalaya, Shahpur, Belagavi, Karnataka, India.; and Dr. P. T. Hanamgond Professor and Head, Department of Geology, GSS, College Belagavi, for providing the facilities.

Conflict of Interest: None

Source of Support: None

Informed consent – Written informed consent from the patients was taken for the conduct of the study and for any scientific publication.

Conflict of interest – None

Additional Information:

Authors can order reprints (print copies) of their articles by visiting: **https://www.akinik.com/products/2281/journal-of-ayurveda-and-holistic-medicine-jahm**

Publisher's Note:

Atreya Ayurveda Publications remains neutral with regard to jurisdictional claims in published maps, institutional affiliations, and territorial designations. The publisher does not take any position concerning legal status of countries, territories, or borders shown on maps or mentioned in institutional affiliations.

REFERENCES:

1. Clare Bambra, Katherine E. Smith, Jamie Pearce, Scaling up: The politics of health and place, Social Science & Medicine, 2019 232: 36-42, https://doi.org/10.1016/j.socscimed.2019.04.036
2. Godara S K: Rogi Pariksha – As Per Ayurveda and Modern Science. International Ayurvedic Medical Journal 2018

6/8:1737-1744. Available from: http://www.iamj.in/posts/images/upload/1737_1744.pdf.

3. Esmaeili P, Moshiri R, Geographical Factors in Medicine and Human Settlements JO - Journal of Applied Sciences VL - 11/2:212-218. *https://doi.org/*10.3923/jas.2011.212.218
4. Cluver, E. H. "The Influence of Geographical Factors on Human Health: Illustrated Lecture delivered before the SA Geographical Society." *South African Geographical Journal* 1919, 3.1: 49-55. https://doi.org/10.1080/03736245.1919.11882209
5. Murthy K.R.S (editor); Astanga Samgraha with sarvangasundara of Arun data, Ayurveda Rasayana Hemadri, Sutra sthana, chapter 1, verse no. 24. Varanasi; Chaukhambha Vishwabharati; 2005; 16.
6. Bramhanand Tripathi (editor); Charaka Samhita, Caraka Chandrika Hindi commentary Vimana sthana Sutrasthan, chapter 1, verse no. 21/5. 3rd edition, Varanasi; Chaukhamba Surabharati Prakashana; 1994; 664.
7. Pandit. Kashinath Shashtri (editor); Charaka Samhita, by vidyotini Hindi commentary, Kalpa sthan, chapter no 1, verse no. 8. 2nd edition, Varanasi; Chaukhamba Bharati Academy; 1998: 792-793.
8. Bramhanand Tripathi (editor); Charaka Samhita, by caraka Chandrika Hindi commentary Vimana sthana, chapter no. 8, verse no. 92. 3rd edition, Varanasi; Chaukhamba Surabharati Prakashana; 1994:757.
9. Bramhanand Tripathi (editor); Charaka Samhita, by caraka Chandrika Hindi commentary Vimana sthana, chapter no 8, verse no. 84-85. 3rd edition, Varanasi; Chaukhamba Surabharati Prakashana; 1994:754-755.
10. Vijaykumar M Devappa et al. 'Study of Rainfall Trends And Variability, A Case Study Of BELAGAVI District'; IJCESR 2017 4/6:62-63 Available from https://troindia.in/journal/ijcesr/vol4iss6/60-68.
11. Amrutha Rani H R et.al, 'Study of Rainfall Trends and Variability for BELAGAVI District' IJRET, May 2014 03/06:148-155. Available from http://www.ijret.org; https://doi.org/10.15623/IJRET.2014.0318024.
12. Bhalerao, S., Deshpande, T. & Thatte, U. Prakriti (Ayurvedic concept of constitution) and variations in platelet aggregation. BMC Complement Altern Med 12, 248 (2012). https://doi.org/10.1186/1472-6882-12-248 .
13. Bhavana KR, Shreevastha. Medical Geography in Charaka Samhita. Ayu 2014; 35:371-7. Available from DOI:10.4103/0974 8520.158984.
14. Haritha Chandran, Chetan M, Yaligar MG, Arun Raj GR. The concept of bhumi desha: Healthy and diseased perspective. Int. J. Res. Ayurveda Pharm. 2014; 5(4):558-560 http://dx.doi.org/10.7897/2277-4343.054112.