



ORIGINAL RESEARCH ARTICLE- CLINICAL RESEARCH

STUDY OF *JATHARAGNI* (DIGESTIVE FIRE) COMPUTED THROUGH *NADI PARIKSHAN* USING *NADI TARANGINI* AS PER *RUTUS* (SEASONS) QUOTED IN THE *AYURVEDA* TEXTS.: AN OBSERVATIONAL STUDY

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ABSTRACT

Background: The world is one holistic entity where everyone is viewed in relation to the surrounding environment. The direction of the sun's movement makes the season-wise different periods and has effects on our body, mind and circadian rhythms in terms of our daily work, food habits, digestion, and metabolism. Ayurveda, the ancient science of wisdom, provides answers for these effects and influence on our health through rutucharya (seasonal regimen). **Objectives:** to study the correlations between jatharagni, ahar (food) and rutucharya for different prakritis (body constitution). **Materials and methods:** We used nadi parikshan (pulse based examination), one of the most popular methods of ashtavidha pariksha (eight fold clinical examination). We observed jatharagni (digestive fire) computed through Nadi Tarangini[1,2] (a commercial wrist nadi recording system) throughout the year and further studied it as per the rutus described in Ayurveda. **Results:** For 25437 subjects, we found the digestive jatharagni to be low in the monsoon, high in the winter, and also have dominance with vishamagni (irregular fire), tikshnagni (strong/sharp fire) and mandagni (weak/less fire) for vata, pitta and kapha prakritis respectively. **Conclusion:** We emphasised the evidence and importance of jatharagni in rutucharya to avoid lifestyle oriented disorders.

Keywords: nadi parikshan, jatharagni, rutucharya, Nadi Tarangini

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INTRODUCTION

Every entity of the universe is formed with the combination of *panchmahabhuta* (five basic elements in this universe): *prithvi* (earth), *aap* (water), *tejas* (fire), *vayu* (air) and *aakash* (ether)^[3]. The three *dosha* (VPK) collectively known as *tridosha*, have a specific relationship with these five elements. In other words, every entity, living or non-living, is *panchabhautik* (made up of five basic elements) and has properties of these *doshas*. It is said that *kapha* is the creator, *pitta* is the transformer and *vata* is the destructor in nature. The body constitutes of *tridosha* (three humours), *saptadhatu* (seven tissues) and *trimala* (three excretas)^[4]. And they have their traits/ properties which show particular actions and effects on human beings according to *prakruti*, age, seasons, geographical areas, and food.

Jatharagni is very important as it is responsible for digestion and nourishment (also under-nourishment) of *tridosha*, *saptadhatu*, *trimala* and *sharir bala* (body strength)^[5]. Out of *panchmahabhuta*, *tej* is present in *jatharagni* and *grahani* (duodenum) is its site. It is placed behind *nabhi* (umbilicus). The *samana vayu* (one of the five subtypes of *vata dosha*) and *pachak pitta* (one of the five subtypes of *pitta dosha*) work together for the digestion of food, and then the absorption and circulation of the digested food (also known as

rasa dhatu). It is carried further by *vyana vayu* (one of the five subtypes of *vata dosha*). The excretion of *mala* through intestines is done by *apaana vayu* (one of the five subtypes of *vata dosha*)^[6]. Note that the balanced hunger, digestion, and circulation of *rasa dhatu* and nourishment of all further *dhatu*s is possible only when the *jatharagni* is in the balanced state^[7]. Imbalanced *jatharagni* is the cause of many disorders and diseases (especially with the changed lifestyle of the 21st century).

Effect of *rutu* and *prahar* on *dosha*: Every season is dominated with some *dosha* and its properties (called as *guna*). *Vata dosha* accumulates in *Greeshma rutu* (a part of summer season) and increases in *Varshaa rutu* (a part of rainy season), *pitta dosha* increases in *Sharad rutu* (a part of autumn season) and *kapha dosha* accumulates in *Shishir rutu* (a part of spring season) and increases in *Vasant rutu* (a part of spring season)^[8]. Further, during the day also there are cycles of 4 hours in which each *dosha* plays a significant role. From 6 am to 10 am in the morning (also 6 pm to 10 pm at night) *kapha dosha* shows dominance; from 10 am to 2 pm in the afternoon (also 10 pm to 2 am at night) *pitta dosha* shows dominance; and from 2 pm to 6 pm in the evening (also 2 am to 6 am in the morning) *vata dosha* shows dominance^[9]. The combination of such environmental

dominance plays a significant role in our daily actions and reactions.

Types of jatharagni: The balanced state of *jatharagni* is known as *samaagni* (balanced fire) which ensures complete digestion of the food ingested at the proper time without any irregularity^[9]. Its activity is neither too intense nor too weak. It is just appropriate and therefore, is ideal too. When it is not balanced, it is of one of the three forms: *tikshangi*, *vishamagni* or *mandagni*^[10,19]. Few of the symptoms of imbalanced *jatharagni* are *arochak* (anorexia), *kshudanash* (loss of appetite), *arasdanyata* (tastelessness), *apachan* (indigestion), *chardi* (vomiting), *hrullas* (nausea), *atisar* (diarrhea), and *malavashambha* (constipation). The imbalance is caused typically due to imbalanced or vitiated *pitta*, *vata* and *kapha* dosha. This may further lead to vitiation of *maanasa bhaav* (mind) and *saadhak pitta* (one of the five subtypes of *pitta dosha*) showing irritability, anger, hyper thinking, nervousness, or depression.

Rutucharya: We eat every day according to our likings and habits. However, *Ayurveda* specifies *rutucharya* and *dinacharya* (daily regimen) considering the effects of *ritu*, month, time on our body and to make sure the food is digested in the most efficient way for the full nourishment of body and mind. The whole year is divided into *aadaan kaal* (period

which takes away body energy/ strength) and *visharga kaal* (period which provides energy/strength to body)^[11]. In *aadaan kaal*, the sun is very strong, it absorbs all moisture from the earth. So the *tikshna* (sharp), *ushna* (hot), and *ruksha* (dry) *gunas* increase in our body. Also, the *sharir bala* reduces gradually. So, we can say there is in general poor nourishment of *dhatu* and *jatharagni* during this time frame. On the contrary, *visarg kaal* is predominant of the moon and so mild and *sheet* (cold), *snigdha guna* (moist/unctuous) increases in our body. We get energy from nature which in general increases our *jatharagni* and *bala* (strength) too. In fact, *jatharagni* is usually the lowest in *Greeshma ritu* and *Varsha ritu*^[12].

Agnimandya (less digestive fire) in Varsha ritu: *Chaturmas* is a holy period of four months from *Ashadh shukla ekadashi* to *Kartiki shukla ekadashi* according to *hindu* calendar. Usually, it coincides with the monsoon season / *Varsha ritu*. This is the period when *agni* is the lowest^[13]. So it has a significance since ancient times about *laghu aahar* (less calorie diet) during these 4 months.

MATERIALS AND METHODS:

Study design: Multi-centric retrospective observational study

Study sample: across India

Sample size: 25437

Plan of study:

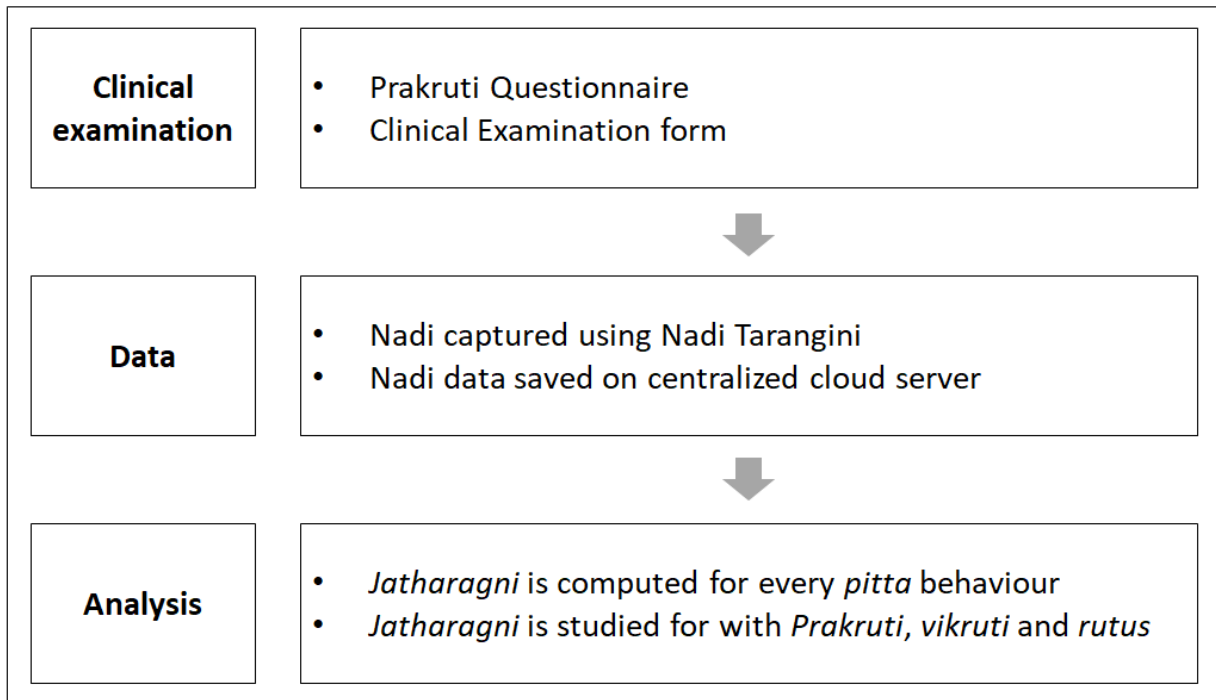


Figure 1. Steps involved in our research methodology for each of our subjects of the study.

Details of each of the above steps are explained below in this section:

We used an innovative product called *Nadi Tarangini*^[1,2] in our study which records *tridosha* (VPK) pressure waves of a subject in real time and saves for the further analysis. It

uses hardware with three pressure sensors to record the pulse on the wrist at *vata*, *pitta* and *kapha* locations, mimicking the way an *Ayurvedic vaidya* (doctor) takes *nadi* manually. *Nadi Tarangini*'s methodology is shown in figure 2.



Figure 2. The product Nadi Tarangini mimics the methodology using three pressure sensors which are used at the three locations to record nadi data in real time.

The product Nadi Tarangini is in the market since March 2017. More than 275 Ayurvedic doctors are using Nadi Tarangini across India in their clinics, hospitals, colleges and camps. When Nadi Tarangini is used for a patient's visit, a 10-page report card is generated. The nadi data and its associated report card are stored on the centralized cloud server. We studied the nadi data and reports collected on the server throughout a complete year to showcase, for the first time, through data, why the ancient method of *rutucharya* has a scientific basis.

In this study, we observed data of 25437 subjects collected on the centralized server by our associated *Ayurvedic* doctors at their clinics, hospitals, colleges or camps across India throughout a year. These are different subjects of different geographical areas, ages, genders, cultures, *prakritis* across India. The criteria for the selection of the subjects were as follows:

Inclusion Criteria:

- Subjects of age from 18 to 50 years
- Both male and female

- Healthy as well as unhealthy subjects with minor symptoms

Exclusion Criteria:

- Subjects of age lesser than 18 years or more than 50 years
- Hospitalised patients with life supports
- Psychotic patients on medicines
- Pregnant ladies
- Patients on corticosteroid medications
- Individuals on sleep medication
- Those with comorbid conditions, chronic debilitating disorders

For every subject, the *prakruti* was computed using a questionnaire-based method (refer to Supplement B). Accordingly, out of the total 25437 subjects, 6486 subjects were of *vata prakruti*, 15633 subjects were of *pitta prakruti* and 3318 subjects were of *kapha prakruti*. After *prakruti*, every subject's medical information was noted down (refer to Supplement A) and also nadi data was recorded for 1 minute using Nadi Tarangini. The data at each of the VPK locations is saved on the server. Typical nadi data is shown in Figure 3.

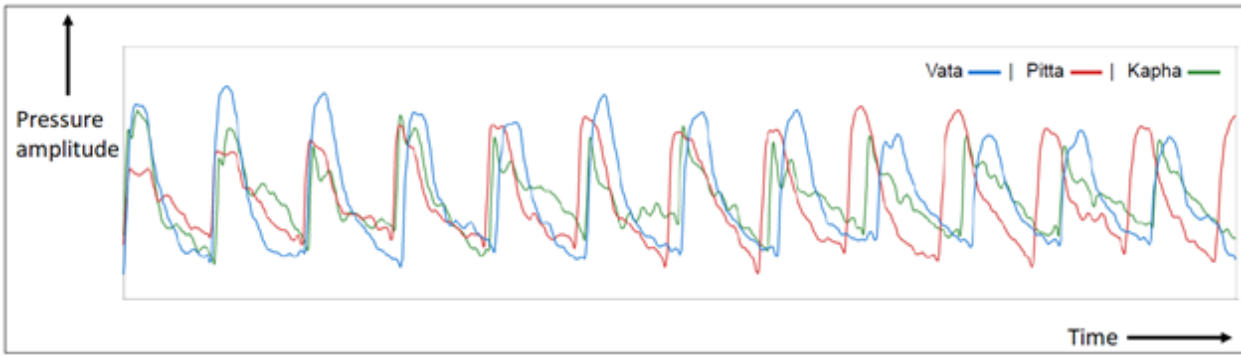


Figure 3. Sample *nadi* data of 10 seconds long recorded at VPK locations on wrist using Nadi Tarangini. The three colors blue, red and green respectively represent data collected at *vata*, *pitta* and *kapha* locations.

Computation of *vikruti* and *jatharagni*: From the stored *nadi* data at the server, the *vikruti* (imbalanced state) and *jatharagni* of each subject was computed. The *vikruti* is computed on the server as *vata*, *pitta* or *kapha* when the subject's stored *nadi* data has variations in the frequencies and amplitudes as per movement of snake (*sarpa gati*), frog (*manduka gati*) and swan (*hansa gati*). Further, we computer *jatharagni* as the energy of the *manduka gati* (jumping movement as a

frog) behavior^[15]. The output was calibrated for *jatharagni* (and other *nadi gunas*) with the help of associated *Ayurveda vaidyas*. Based on the calibration, each subject's *jatharagni* is assigned a value between 0% (lowest) to 100% (highest), where value between 0% to 30% indicates low *jatharagni*, between 40% to 60% indicates normal *jatharagni* and value between 70% to 100% indicates high *jatharagni*.

Table 1. Prakruti questionnaire

| Question | Answer for <i>vata</i> | Answer for <i>pitta</i> | Answer for <i>kapha</i> |
|----------|------------------------|-------------------------|-------------------------|
| Built | Lean | Medium | Heavy |

| Movements | Fast | Medium | Slow |
|------------------|---------------------------|---|--|
| Skin | Dry (white line visible) | Soft (line appears only for a fraction of second) | Oily (no white line) |
| Teeth | Small, crooked | Medium | Big, evenly distributed |
| Appetite | Irregular on various days | Hungry after 4 hours | Hungry after 6 hours, not much food needed even at night |
| Thurst | Varies | More than 4 glasses | Less than 4 glasses |
| Stools | Hard | Smooth | Sticky |
| Exercise stamina | < 20 minutes | > 45 minutes | 20 to 45 minutes |
| Memory | Variable | Long memory | Medium memory |
| Temperament | Restless | Angry | Calm |
| Sleep | Disturbed sleep | Sound sleep - less than 7 hours | Sound sleep - more than 7 hours |
| Interest | Travelling | Sports | Art |
| Talk | You prefer speaking | You prefer being to the | You prefer speaking less |

| | | | |
|-------|---------------------|--------------------------------------|----------------------------|
| | more | point | |
| Sweat | Unpredictable sweat | I usually sweat more and I smell bad | I usually don't sweat much |

RESULTS AND DISCUSSION:

In this section, we discuss the results we observed in the *jatharagni* parameter in all

25437 subjects when studied throughout the year.

Result 1: Observations in *jatharagni* considering *vikruti* of subjects and months:

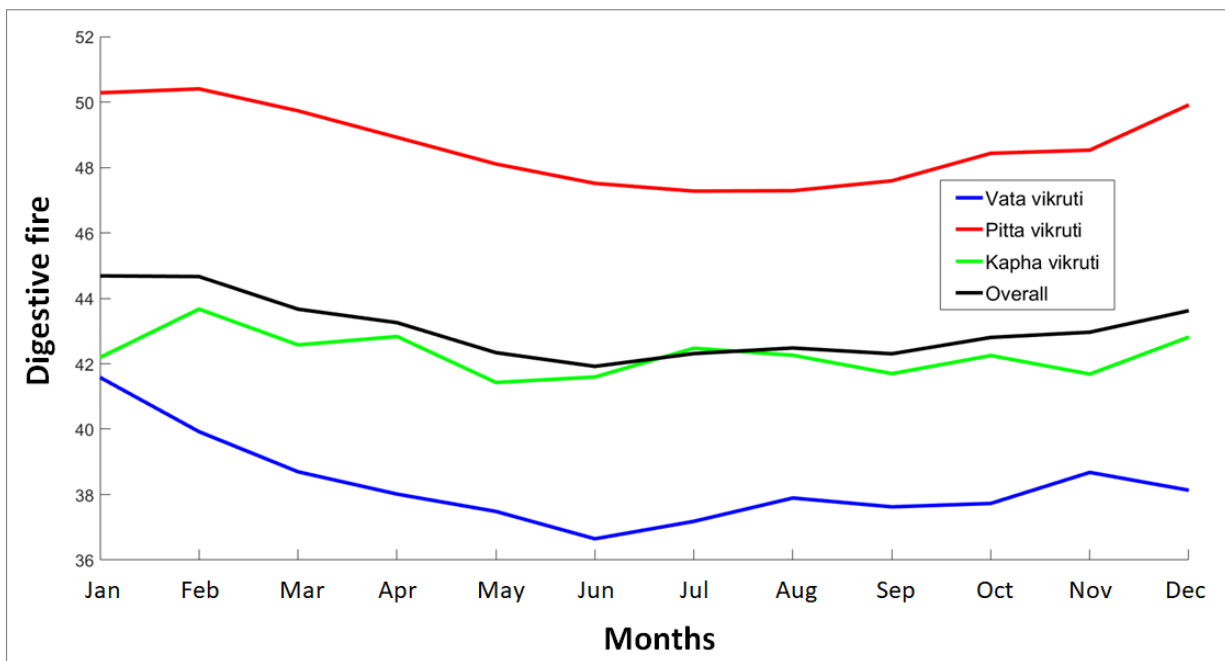


Figure 4. Variations in the *jatharagni* (digestive fire) over 12 months. Black, blue, red and green colors indicate respectively the averaged trends of *jatharagni* for subjects of *vata*, *pitta* and *kapha vikruti*.

It can be observed that in the month of January, the average of *jatharagni* of subjects of *pitta* prakruti collected at the centralized server is 50.2. In the month of February, the average is 50.4. Note that these subjects in both the months are different (very few can be

repeated subjects). And you can note the similar average numbers for remaining months as well as other *prakrutis vata* (blue line) and *kapha* (green line). When the *jatharagni* of all the subjects of all *prakrutis* is averaged, we get the black line in Figure 4. Therefore, the

observations stated further are very relevant, as they consider all genders, ages, cultures, geographical areas and so on.

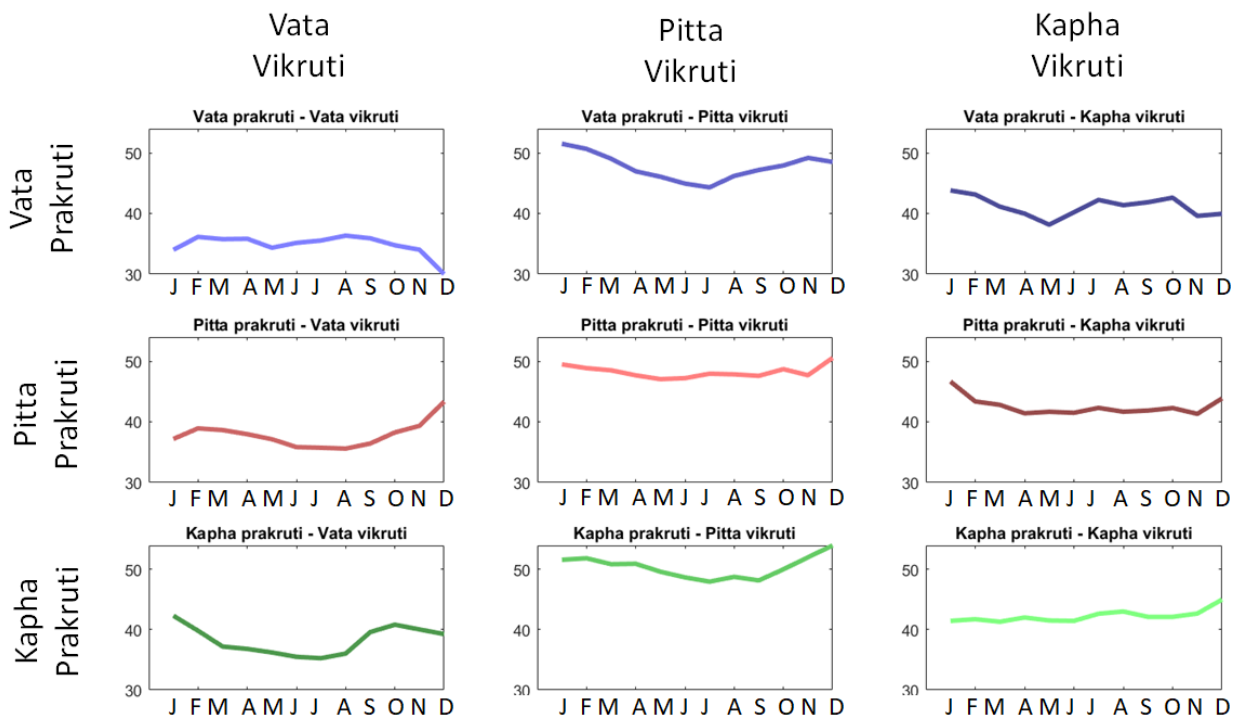
Firstly, we observed that:

- The overall trend (black line) for all the 25437 subjects shows higher digestive fire in the winter season^[12]. The jatharagni starts in the negative direction with the start of summer and remains low throughout the rainy season^[13].
- When we correlate with different *rutus* of *hindu* calendar, we can observe that the values of *jatharagni* are higher in *Hemant rutu* and *Shishir rutu* and lower in *Greeshma rutu* and *Varsha rutu*.

- The agni is moderate in *Vasant rutu* and *Sharad rutu*.

These all data-based observations are aligned with the traditional texts^[13]. It can be thus be matched with the observation that the food recipes prescribed in *Hemant rutu* and *Shishir rutu* have higher calories, as the fire to digest is high in these rutus^[16]. Similarly, the food recipes prescribed in *Greeshma rutu* are more liquid diet, *madhur*(sweet) *rasa*, ghee is advised to reduce the dryness, heat and enhance the agni ^[20]. In *Varsha rutu laghu* (light)/ low calories, *amla* (sour) *rasa*, old grains and *snigdha* food is advised.^[17,21]. In other rutus, the foods are having moderate calories to burn.

Results 2: Observations in *jatharagni* considering *prakruti*, *vikruti* and months:



x-axis: Months, y-axis: Digestive fire

Figure 5. Variations in the digestion fire over 12 months considering the combinations of *prakruti* and *vikruti* of the subjects. Every sub-figure is a combination of a corresponding *prakruti* and *vikruti*. The x-axis and y-axis is every sub-figure is 12 months and *jatharagni* respectively.

When the results are plotted considering both *prakruti* and *vikruti*, following trends were observed which matched with the traditional texts^[10,19].

- The first row (*vata prakruti*) has more fluctuations throughout the graph, which is connected with *vishamagni*. In fact, the values for the combination of *vata prakruti* and *vata vikruti* have the highest fluctuations.
- The values in the second row (*pitta prakruti*) are slightly higher than the respective first and third rows (*vata and kapha prakruti*). It matches with the traditional texts that *pitta prakruti* typically has an association with *tikshnagni*. In fact, the values for the combination of *pitta prakruti* and *pitta vikruti* are the highest.
- The values in third row (*kapha prakruti*) have least fluctuations and have lower values than second row (*pitta prakruti*). *Kapha prakruti* is usually associated with *mandagni*. In fact, the values for the combination of *kapha prakruti* and *kapha vikruti* are the lowest and without much fluctuations.

CONCLUSION: There are thousands of observations and rules noted down in *Ayurveda*. It is thus termed as the “science of life”. However, many rules are not followed today by most of common people, because most rules are not backed by today’s language of data based reasonings. In this study, for the first time, we showed that the rules provided in the traditional texts for digestive fire and its relevance with *rutucharya* including *aahar* (with respect to calories) matches with the trends observed in the data collected throughout the year.

Through data-based approach, we showed the digestive *jatharagni* is low in the monsoon (*Varsha rutu*), so it is surely advisable to have *laghu aahar* or low calorie diet on those days. On the contrary, the *jatharagni* is observed to be high in the winter (*Hemant rutu* and *Shishir rutu*), so high calorie diet can be easily consumed in those days. We also observed that the subjects with *vata, pitta* and *kapha* dosha were dominated with *vishamagni, tikshnagni* and *mandagni* respectively.

This is the first study of this kind, and can be repeated for healthy people, of different age groups and also of other geographical regions of India and the world to see whether it

matches with the rules books of the local cuisine.

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