

# A scoping review on the tools for assessment of Agni and its derangements including *Grahani dosha*

## Review Article

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### Abstract

**Objective:** The purpose of this study was to review and analyze the tools available for the assessment of Agni and its derangements, including *grahani dosha*. **Methods:** A review of the published literature was conducted online using PubMed, Science Direct, and Google scholar. The keywords for the search included, "Agni," "Agni Bala," "Agni vaishamya," "Grahani dosha", "Assessment tool", and "Questionnaire". The initial search retrieved 37 articles, of which seven were screened, classified, and coded for further analysis including their content, methodology as well as utility in clinical practice. **Results:** The review discovered four tools aimed at assessing Agni and three for diagnosing *grahani roga*. All were different with regards to the domains assessed, mode of administration, and methodologies in which they were developed. Only two of the tools for Agni assessment were prepared following proper methodology including the evaluation for their reliability and validity. The absence of a gold standard against which these tools can be corroborated is a major drawback, because of which these tools were neither subjected to stringent scientific validation nor evaluated for their clinical utility. **Conclusion:** None of the tools available for review could be deemed best at accurately detecting Agni and its dysfunctions. Two of the tools were developed adopting proper methodology, however, the feasibility of these in a clinical scenario has to be established with further studies. Additionally, there was no tool directed at assessing *grahani dosha* in specific disease states, which necessitates further research to develop and validate tools, especially in specific disorders.

**Key Words:** Ayurvedic diagnosis, Agni, *Grahanidosha*, Assessment tool, Diagnostic tool, Questionnaire.

### Introduction

The digestive system has been the area of prime focus within the *fundamental concepts of Ayurveda* and has also recently been recognized by modern science as an integral factor for physical and mental well-being(1). In Ayurveda, the functions of digestion and metabolism are explicated through the concept of *Agni*. The term *Agni* collectively represents the mechanisms responsible for metabolic functions in the body, including the aspects of digestion, assimilation, and transformation(2). Based on the level of action, *Agni* is classified into 13 viz. seven *Dhatwagni*, five *Bhutagni*, and one *Jataragni*. Among these, the *Jataragni* located in the *koshta* (GI tract) is considered the prime one, which in turn nourishes and regulates the other subtypes.

Normal functioning of the *Agni*, along with the homeostasis of the three doshas (functional units) *Vatha*, *Pitha*, and *Kapha*, and seven *Dhathus* (seven types of tissues) are deemed prerequisites for Health (3).

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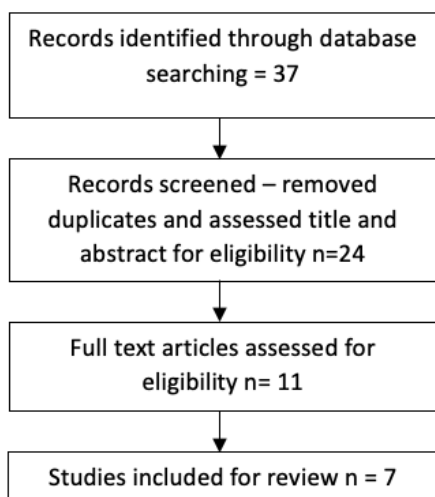
The ayurvedic theory of disease pathogenesis largely relies on this concept, wherein any etiology triggering a disturbance in the Agni leads to further anomalies in the digestive process, culminating in various disease states. The dysfunctional states of Agni are collectively represented by the umbrella term of "*Grahani dosha*" (4) and are sub-classified into three main subtypes namely *Vishamagni* (irregular), *Teekshnagni* (overactive), and *Mandagni* (impaired), based on their *dosha* predominance and resultant clinical manifestations. They are associated with an abnormalcy of *Vata*, *Pitta*, and *Kapha dosha* respectively(5). Moreover, the process of therapeutic planning in Ayurveda relies on correcting the underlying Agni dysfunction, rendering its assessment an integral part of the patient examination. However, most of the parameters for the agni assessment are subjective in nature which in turn can bring about lack of consensus among the practitioners. In the field of research, most of the clinical studies employ generic tools, developed based on references from classical textbooks of Ayurveda and are not properly subjected for scientific validation. Yet, there were efforts from various researchers, to develop and validate a practical and reliable tool to assess Agni and its abnormalities, in various clinical settings. This review looks at the availability of such validated tools in the published literature and analyzes their merits and demerits.

## Methodology

A search for the published literature was conducted in online databases PubMed, Science direct and Google scholar. The keywords used for the search were "Agni," "Agnibala," "Agni vaishamya", "Grahani dosha", "Assessment tool" and "Questionnaire". The initial search retrieved 37 articles, which were then screened with regards to the use of diagnostic tools or questionnaires directed at assessing *Agni* or *grahani dosha*. Articles that did not entail the assessment of *Agni* or *grahani dosha*, as well as those with poorly explicated objectives and methodology have been excluded. Also, In the case of *grahani dosha*, since none of the listed articles were exclusively dealing with tool development or validation, those with clinical trials on *grahani*, which involved a tool for the assessment of the disease were included in this review. Accordingly, 11 articles were screened for further analysis, of which 7 were selected for qualitative analysis, based on their content and relevance.

The selected articles were then subjected for qualitative analysis with regards to the methodology adopted, type of the tool, the clinical spectrum that is assessed, sampling method, and study population. The articles that dealt with tool development were also analyzed in terms of their assessment of psychometric properties and clinical utility. Further, selected *Ayurvedic* classical textbooks were also reviewed for comparison of the tools with regards to their agreement to the *ayurvedic* principles of *Agni* and *grahani* assessment. The results are further summarised in the form of tables as well as narratives and discussed regarding the advantages and disadvantages of each tool, including implications for clinical practice and the need for further research in this regard.

Fig – 1: Showing the review process



## Results and analysis

The selected articles were initially coded into two categories, with category A comprising tools aimed at assessment of *Agni* and the second group G, with tools for assessing *grahani dosha / roga*. The chronology of the articles has been arranged based on their published dates.

Table – 1: Showing tools selected for the review

Code no	Tool	Intended purpose
A1	Assessment of <i>Agni</i> and <i>koshta</i> – Patil et al (6)	Assessment of <i>Agni</i> and <i>koshta</i>
A2	Questionnaire to assess <i>Jataragni</i> – Eswaran et al (7)	Assessment of <i>Agni</i>
A3	Self-assessment tool to estimate <i>Agnibala</i> – Aparna Singh et al (8)	Assessment of <i>Agnibala</i>
A4	<i>Agni</i> assessment scale - Khagen Basumatary, Chumi Bhatta (9)	Assessment of <i>Agni</i> and its dysfunctional states
G1	Tool for <i>grahani roga</i> - Alpesh P. Sorathiya et al(10)	Assessment of <i>grahani roga</i>
G2	<i>Grahani</i> tool - Mallikarjun, Channabasavanna B. M. (11)	Assessment of <i>grahani</i>
G3	Tool for <i>grahani roga</i> - Mamta Saini et al(12)	Assessment of <i>grahani roga</i>

### Tools related to the assessment of *Agni*

**A1:** The tool for assessing *Agni* developed by Patil et al. is a physician-administered one and uses a scoring system in which the total score of 20 is divided into four subcategories as “*Abhyavaharanashakti*” (capacity to eat), “*Ruchi aaharakale*” (timely desire for food), “*Jaranashakti*” (capacity to digest) and “*Vata mutra purisha retasam mukti*” (normal bowel and bladder movements). To assess the *Agnibala*, a specific amount of ghee has to be administered, following which observation is made about the time taken for digestion as well as specific symptoms of digestion. This form of assessment gives an overall score for the *Agnibala* and does not provide information about its three dysfunctional states.

Table 2 - Showing the tool by Patil et al.

Parameter	Scoring
<i>Abhyavaharana Sakthi</i> – capacity of food intake	6 points
<i>Jarana Sakthi</i> – capacity to digest the food	6 points
<i>Ruchi ahara kale</i> – timely desire for food	4 points
<i>Vata Mutra Purisha Retasam Mukti</i> - normal bowel and bladder movements	4 points

The methodological rigor with which the tool was developed or the population in which this tool was tested were not explicated in the article. Also, the need for administration of ghee renders this tool a cumbersome one to be used in routine clinical practice as the individual has to be kept under clinical observation for a stipulated period. Other confounding factors like the characteristic feature of the ghee that is used with regards to its source as well as the mode of preparation can also have an impact on the results. There are also no data available regarding the validity and reliability measures of this tool.

**A2:** The second tool was the one developed by Eswaran et al., which takes into consideration the different forms of *Agni* dysfunction such as *Vishamagni*, *Tikshnagni*, *Mandagni*, and *Samagni*. The items for assessment were generated from different classical textbooks of Ayurveda and arranged into a closed-ended Likert scale with 5 choices for each question. This physician administered tool has a total of 64 questions directed at assessing the various types of *Agni*, including *Vishamagni* (14 items), *Tikshnagni* (13 items), *Mandagni* (13 items), and *Samagni* (24 items). The questionnaire was administered to 500 individuals, half of them healthy as well as half unhealthy (definition unclear) subjects. The tool was further subjected to assessment of psychometric properties including content validation, internal consistency, and factor analysis. The Cronbach's alpha was reported to be 0.916 which indicated good reliability and the factor analysis for correlating the relationship between different variables applying the KMO coefficient showed the value of 0.804 suggesting good construct validity of the tool. Despite following a more rigorous methodology compared to A1, the tool does not explicitly demonstrate the specific questions intended at measuring the respective subtype of the *Agni* and also lacks clarity with regards to how individuals are classified based on the scores obtained. Also, the higher number of questions in the tool makes it laborious to be applied in the setting of routine clinical practice.

**A3:** The third tool appraised is the one developed by Aparna Singh et al., which is a self-assessment tool that takes into consideration the four functional states (*Agnibala*) of *Agni* denoted as 'regular', 'irregular', 'intense', and 'weak'. There are 11 items in the questionnaire with 4 options for each item, denoting the four functional states of *Agni* respectively. The scoring system provides provision for assessing the total score for each type of *Agni*, which further necessitates the calculation of maximum percentage scores obtained under the different categories of *Agni*. This tool has also been developed following proper methodology and was evaluated for its reliability and validity by administering it to 300 healthy volunteers of either gender belonging to the 18 to 40-year age group. With regards to validity, a one-way ANOVA demonstrated that each item in the tool is efficient in differentiating each category of *Agni*, and in the case of reliability, a Cronbach's alpha of 0.73 was obtained for the overall scale. Besides evaluating the statistical validity and reliability, the clinical utility of the tool was also evaluated by recording and correlating serum lipid parameters of all the volunteers which demonstrated significant variations in mean total cholesterol among groups with the different subtypes of

the *Agni*. However, this correlation indicates a form of convergent validity rather than the clinical utility in terms of attributes like sensitivity and specificity. Since the validation was carried out in healthy volunteers, that too university students who are well versed in comprehending the questions, applicability in the general population including patients may have to be validated further. The questionnaire is in English and may have to be translated and revalidated for specific populations. Moreover, the type of *Agni* dysfunctions may vary according to the specific disease conditions, hence the applicability shall be tested in such cases before adopting for clinical use.

**A4:** The tool developed by Khagen Basumatary and Chumi Bhatta is also a physician-rated tool, intended for assessing the *Agni* and further classifying the same into the four states of *Sama*, *Vishama*, *Teekshna*, and *Manda*. The tool lists out 31 factors to be assessed in an individual, which include both subjective and objective parameters. Most of these parameters are assessed with the help of Likert-type options, whereas a few of them are in 'yes /no' format. Further, these items are categorized into the 4 states of *Agni*, wherein the presence of more than 50 percent of the features of each type of *Agni* favors its diagnosis. The number of features listed for the *Agni* assessment is elaborate and cumbersome to administer. The questions contain Sanskrit terminologies, which may not be uniformly interpreted or administered by different practitioners, leading to poor inter-rater reliability. Also, there is confusion regarding how this scale can be applied to assess the different functional types of *Agni* as they do not appear to be mutually exclusive. Moreover, this tool does not appear to be developed with proper methodology including the assessment of its psychometric properties.

#### **Tools aimed at assessing grahani dosha/ roga:**

The search did not retrieve any tools that directly measure *grahani dosha*, however, the listed articles were clinical studies on the condition *grahani roga*. These clinical trials employed specific tools directed at assessing *grahani* and its different subtypes.

**G1:** This clinical study aimed at assessing the role of *ama* (toxic metabolites) in *grahani roga* made use of a composite tool with a total score of 100. The assessment of *grahani* was carried out by a ten-item scale generated from references in the classical ayurvedic textbooks. The scoring system was further subdivided into *rogabala* of *grahani* (50 points), *agnibala* (20 points), *dehabala* (10 points), and *chetasa bala* (20 points).



**Table 3: Showing the tool by Alpesh P. Sorathiya et. al.**

<b>RogaBala (50)</b>	<b>DehaBala (10)</b>	<b>AgniBala (20)</b>	<b>ChetasaBala (20)</b>
<p>Muhu baddha/drava Mala pravirtti 10  Udara Shoola 5  Udara Gaurava 5  Aapachana 5  Aruchi 5  Atop 4  Vidaha 4  Aalasya 4  Vistambha 4  Praseka 4</p>	<p>Bala vriddhi 6  Swara Varna Yoga 4</p>	<p>Ruchi 5  Jarana shakti 6  Abhyavaharana shakti 6  Vata Mootra Purisha  Retasam Mukti 3</p>	<p>Nidra Labho yatha kala 5  Sukhena Cha Pratibodhana 5  Vaikarika Cha Swapna  Adarshana 2  Buddhi Indriya Avyappatti 3  Mano Avyappatti 5</p>

The Sanskrit terminologies are incorporated as such and there are no specific questions for eliciting these constructs in the patient. Since there is no consensus regarding the operational definitions of these terminologies, this could lead to high variability among raters as well as patients. The tool also does not classify the grahani into subcategories based on dosha predominance or severity. This study does not seem to have adopted a rigorous methodology for developing such a tool nor has it been subjected to any type of validation or reliability assessments before administering to the patients.

**G2:** This clinical study on the efficacy of *erandamooladi vasti* (a type of medicated enema) in *grahani roga* employed a multi-item scoring system with both subjective and objective parameters to diagnose and monitor *grahani roga*. Each item is arranged in a Likert-type scoring pattern with which the presence, as well as the severity of each symptom or sign, could be assessed. Each of the subjective features of *grahani roga* was classified into five grades (0-4) whereas the objective parameters with regards to the stool were stratified into 4 grades (0-3). The severity of the disease was assessed based on the total score obtained. However, it is not clear how this scoring system was used to diagnose as well as classify the patients into different categories. Just like the previous study, here also it is not clear whether the researchers have adopted a proper methodology in the development or validation of this tool.

**G3:** This randomized trial on the effect of pathyaha employed a multi-item scoring system that included classical symptoms of *Grahani roga*, namely *Atisrishta mala* (frequency of stool), *Drava mala* (loose stool), *Ama mala* (sticky stool), *Vibaddha mala* (hard stool), *Annavidaha* (improper digestion of food), and *Chirapaka* (delayed digestion). Each item was administered in a self-assessment rating with a 4-point scoring system (0-3), the total score is used to assess the severity of the disease. Again, this scale does not classify the patients into different subtypes of *grahani* and there are no specific questions employed to elicit the above-said *lakshanas* (symptoms) in the patient so that there will not be any uniformity in the assessment among patients or the raters. This tool was also not subjected to any kind of reliability or validity assessments.

## Discussion

Ayurveda expounds a holistic and person-centric method for disease diagnosis and management, which necessitates the assessment of both subjective and objective parameters in a given patient, a process that can bring about disagreements among clinicians(13). Uniformity in the diagnostic approach can only be brought about by employing standardized and validated diagnostic tools for patient examination. As per the ayurvedic understanding, derangement in *Agni* is either a prime factor in the disease pathogenesis or may manifest as an after-effect of various disease states. The classical textbooks of Ayurveda have used several terminologies like *Grahani dosha* (14), *Agni dosha* (15), and *Agni vaishamy* (16) to represent *Agni* dysfunctions. Further, the treatment principles of Ayurveda revolve around regulating the *Agni* at various levels and also clearing up the “ama” (toxic metabolites) from the system (17). Hence, the assessment of the functional status of *Agni* forms an integral component in the patient evaluation. Accordingly, this review was aimed at identifying the tools that are intended to assess *Agni* and its dysfunctions, and analyze these in terms of methodological rigor with which they are developed, domains that are assessed, agreement to the classical references, psychometric properties including validity and reliability, and the clinical utility of these tools.

## Methodological rigor

Developing a standardized diagnostic tool is an elaborate process, involving a systematic methodology, especially in the case of Ayurveda, owing to the lack of established gold standards for disease diagnosis (18). The initial step of tool development includes a thorough literature review followed by focus group discussions involving experts and the concerned patient population. After the item generation, the tool has to be subjected for the assessment of its psychometric properties including validity and reliability, in the clinical setting in which it is intended to be used. Moreover, the developed tool or measuring instrument shall possess certain qualities to be adopted into clinical practice (19), which includes

- Content validity - Adequate for the problem intended to be measured.
- Construct validity - Reflect underlying theory or concept to be measured.

- Reliability and precision, so that the measurements are consistent.
- Feasibility - Simple and acceptable to patients and physicians.
- Sensitivity to change - Capable of measuring change through time.

The tool also has to be patient-friendly so that it is easy to be administered, with a fewer number of questions providing maximum information, and drafted in an easily comprehensible language.

On analyzing the *Agni* assessment tools available in the published domain, it is observed that only two of the above-mentioned tools viz. A2 and A3 have employed suitable methodology for tool development and also have been validated in a sufficient number of samples. Even in these two studies, there are not enough details available with regards to how the items in the questionnaires were generated. All the other tools seem to be framed based on the references from the classical textbooks, either directly adopting the Sanskrit terminologies or a translation of these into English. The methodology for developing these also does not seem to be rigorous or explicated clearly in the articles. There are also no details with regards to inputs being received either from experts or the concerned patient population for validating the same. The tools A2 and A3 are designed to be in self-administered form whereas the other five are physician-rated questionnaires. In the case of self-administered tools, it is very important to have clarity in the language and terminologies used, so that the questionnaire can be clearly and uniformly interpreted by the responders. Conducting a cognitive interview (20) of the respondents during the initial phases of item development can help in removing ambiguous questions from the tool and none of the reviewed studies mentioned conducting such an evaluation during their development. In the case of physician-administered tools, assessing for the inter-rater reliability (21) is a key component to ensure that the tool can be uniformly administered by different raters. This was also not evaluated in the above-mentioned tools.

#### **Domains assessed and agreement to classical Ayurvedic references:**

All the tools appraised in this review were developed based on the references regarding *Agni* and *grahani*, available in the classical textbooks of Ayurveda. The tools either assess the normal state of *Agni* or try to classify the patients into different subtypes of *Agni* dysfunctions. However, when framing such a tool from references in the classical textbooks, several issues need to be addressed. The first one is the operational definition of certain Sanskrit terms like *aruchi*, *anna vidaha*, *chirapaka*, etc. In the

tools that were reviewed, such terminologies are directly translated into comparable English terms, but then again, their interpretation is not uniform across studies and even in practice, the majority of physicians interpret these differently. Also, to elicit some of these factors, there may be a need for more than one question, so that the tool can be considered to be valid in assessing the intended constructs (22).

#### **Psychometric properties**

Psychometric properties refer to the validity and reliability of the measurement tool. Validity refers to the instrument's property to measure exactly what it is supposed to assess whereas reliability is its ability to reproduce the result consistently over time and space (23). There are several subtypes of these two measures which need to be evaluated depending upon the type of instrument as well as the setting in which it is intended to be administered. Among the tools reviewed in this study, A2 and A3 were subjected to evaluation of psychometric properties. The content validity was assessed in both of the studies whereas in the case of A3 the construct validity was evaluated in correlation to serum lipid levels. With regards to reliability, the internal consistency was calculated for both of these tools whereas A2 was also subjected to factor analysis.

#### **Diagnostic accuracy and clinical utility**

In the case of diagnostic tools, the ability to accurately identify the patients with the suspected disease is an important measure of its clinical utility. Sensitivity and specificity are the two basic measures indicative of the accuracy of a diagnostic test. Sensitivity demonstrates the probability of a positive test result in a patient with the disease whereas Specificity is the probability of a negative test result in a patient without the disease (24). However, for conducting studies of diagnostic test accuracy, there should be a test or procedure that can determine the true disease status of each patient, which in turn is considered as the "gold standard" (reference standard) (25). Unlike the modern biomedicine which has several parameters like histopathology, biochemical or radiological findings as to the gold standards, Ayurveda lacks such reference standards with which the newly developed tools can be compared for their accuracy. Additionally, the clinical utility of diagnostic testing is also defined as the degree to which actual use of the new tool is associated with changes in the outcome, such as preventing complications or death and restoring health (26). However, none of the reviewed tools were appraised for parameters related to the diagnostic accuracy like sensitivity, and specificity and above all, their clinical utility in specific scenarios.

**Table 4: Summarising the characteristics of the reviewed tools**

Name of the tool	Methodological rigor	Domains assessed	Rater	Psychometric properties
A1- Assessment of <i>Agni</i> and <i>koshta</i> – Patil et al	Unclear	Assessment of <i>Agni</i> and <i>koshta</i>	Physician	No data available
A2 - Questionnaire to assess <i>Jataragni</i> – Eswaran et al	Clearly elucidated	Assessment of <i>Agni</i>	Self-assessment	<ul style="list-style-type: none"> <li>· Content validity</li> <li>· Internal consistency</li> <li>· Construct validity</li> <li>· Reliability</li> </ul>
A3 - Self-assessment tool to estimate <i>Agnibala</i> – Aparna singh et al	Clearly elucidated	Assessment of <i>Agnibala</i>	Self-assessment	<ul style="list-style-type: none"> <li>· Content validity</li> <li>· Construct validity</li> <li>· Reliability</li> <li>· Clinical utility</li> </ul>
A4- <i>Agni</i> assessment scale - Khagen Basumatary, Chumi Bhatta	Unclear	Assessment of <i>Agni</i> and its dysfunctional states	Physician	No data available
G1 - Tool for <i>grahani roga</i> - Alpesh P. Sorathiya et al	Unclear	Assessment of <i>grahani roga</i>	Physician	No data available
G2 - <i>Grahani</i> tool - Mallikarjun, Channabasavanna B. M.	Unclear	Assessment of <i>grahani</i>	Physician	No data available
G3 - Tool for <i>grahani roga</i> - Mamta Saini et al	Unclear	Assessment of <i>grahani roga</i>	Physician	No data available

## Conclusion

Assessment of *Agni* is an integral component of ayurvedic clinical examination, which further demands the use of a standardized tool to minimize the disparity in the assessment and bring uniformity. On reviewing the currently available tools, it is evident that only two of these have been developed adhering to proper methodology, including evaluation of validity and reliability. However, the clinical utility of these tools is to be established employing further scientific analysis. Hence, none of the reviewed tools could be deemed best at accurately detecting *Agni* and its dysfunctions based on parameters like diagnostic accuracy and clinical utility. Also, the review highlights the fact that there is no tool currently available for assessing *grahani* dosha in specific disease states. Thus, further research is needed to develop and validate tools for evaluating patients especially with regards to identifying the type of *grahani* dosha in selected disorders.

## Future prospects

The development of disease assessment tools in Ayurveda involves an elaborate and meticulous process, that includes both qualitative and quantitative approaches. The qualitative components of literature review, patient surveys, and focus group discussions will aid in the identification of domains to be assessed, with subsequent item generation. This is to be followed by a pilot phase that includes an evaluation of face and content validity and a cognitive interview of the intended respondents. Further, in the quantitative phase, the tool is subjected to extensive evaluation for its psychometric properties, including validity, reliability, and importantly, its clinical utility in terms of sensitivity and specificity. The issue of lack of a gold standard for assessing the concurrent validity may be addressed by evaluating the performance of the new tool against a panel diagnosis, where a group of experts evaluates the

patients simultaneously. The impact of the tool on decision-making can be assessed by clinical trials where patients are randomized into two groups, where the new tool is employed for diagnosis in the one group and the existing physician-centric diagnosis in the second group and the results analyzed and compared at the end of the study. In the case of *Agni* assessment, apart from developing a generic tool, it may also be imperative to have a disease-specific tool, because the type and characteristic features of *Agni* vaishmya can vary between different diseases. The tool shall possess the essential qualities of a good diagnostic tool that includes validity, reliability, patient-friendly, and feasibility to be incorporated in routine clinical practice.

## References

1. Steer E. A cross comparison between Ayurvedic etiology of Major Depressive Disorder and bidirectional effect of gut dysregulation. *J Ayurveda Integr Med.* 2019 Apr;10(1):59-66.
2. Agrawal AK, Yadav CR, Meena MS. Physiological aspects of *Agni*. *Ayu.* 2010 Sept;31(3):395-398.
3. Basisht G. Exploring insights towards definition and laws of health in Ayurveda: Global health perspective. *Ayu.* 2014 Aug;35(4):351-355.
4. Vaidya Jadavaji TA, editor. *Charaka Samhita of Acharya Charaka.* 5th edition. Varanasi; Chaukambha Krishnadas Academy; 2001. 518p.
5. Hari Sadasiva shastri, editor. *Ashtanga Hridaya of Vagbhata.* 1st Edition. Varanasi; Chaukhamba Sanskrit Samsthan, 2011.8p.
6. Patil VC, Baghel MS, Thakar AB. Assessment of *Agni* (digestive function) and *Koshtha* (bowel movement with special reference to *Abhyantara snehana* (internal oleation). *Ancient science of life.* 2008 Oct;28(2):26.
7. Eswaran HT, Kavita MB, TB Tripaty S. Formation and validation of questionnaire to assess *Jātharāgni*. *Ancient science of life.* 2015 Apr;34(4):203.

8. Singh A, Singh G, Patwardhan K, Gehlot S. Development, validation, and verification of a self-assessment tool to estimate Agnibala (digestive strength). *Journal of evidence-based complementary & alternative medicine*. 2017 Jan;22(1):134-40.
9. Basumatary K, Bhatta C. A Brief Study Of Agni Assessment Scale. *International Journal of Ayurveda and Pharma Research*. 2019 Jun 20:17-20.
10. Sorathiya AP, Vyas SN, Bhat PS. A clinical study on the role of ama in relation to Grahani Roga and its management by Kalingadi Ghanavati and Tryushnadi Ghrita. *Ayu*. 2010 Oct;31(4):451.
11. Channabasavanna BM. A Clinical study of Erandamooladi Niruha Basti in the management of Grahani wsr to irritable bowel syndrome. *Journal of Ayurveda and Integrated Medical Sciences*. 2017 Dec 31;2(06):21-2.
12. Saini M, Kumar AS, Kumar SK. A randomized controlled trial to assess the effect of Pathya Ahara in Grahani. *Journal of Ayurveda*. 2021 Jan 1;15(1):14.
13. Manohar PR. Clinical diagnosis in Ayurveda: Challenges and solutions. *Ancient science of life*. 2012 Apr;31(4):149.
14. Vaidya Jadavaji TA, editor. *Charaka Samhita of Acharya Charaka, 5th edition*. Varanasi; Chaukambha Krishnadas Academy; 2001. 518p.
15. Vaidya Jadavaji TA, editor. *Charaka Samhita of Acharya Charaka, 5th edition*. Varanasi; Chaukambha Krishnadas Academy; 2001. 491p.
16. Brahmananda T. *Madhava Nidana of Sri Madhavakara*, 1<sup>st</sup> Edition. Varanasi; Chaukambha Surbharati Prakashana; 2005. 540p.
17. Vaidya Jadavaji TA, editor. *Charaka Samhita of Acharya Charaka, 5th edition*. Varanasi; Chaukambha Krishnadas Academy; 2001. 189p.
18. Edavalath M, Bharathan BP. Methodology for developing and evaluating diagnostic tools in Ayurveda - A review. *J Ayurveda Integr Med*. 2021 Apr-Jun;12(2):389-397.
19. Souza A.C., Alexandre N.M., Guirardello E.D. Psychometric properties in instruments evaluation of reliability and validity. *Epidemiologia e Serviços de Saúde*. 2017; 26:649–659.
20. Castillo-Díaz M., Padilla J.L. How cognitive interviewing can provide validity evidence of the response processes to scale items. *Soc Indic Res*. 2013 Dec 1;114(3):963–975.
21. McHugh M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia medica*, 22(3), 276–282.
22. Streiner DL, Norman GR, Cairney J. *Health measurement scales: a practical guide to their development and use*. 2<sup>nd</sup> Edition. USA; Oxford University Press; 2015. 38-67p.
23. Bolarinwa O.A. Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Niger Postgrad Med J*. 2015 Oct 1;22(4):195.
24. Fitzpatrick R., Davey C., Buxton M.J., Jones D.R. Evaluating patient-based outcome measures for use in clinical trials. *Health Technol Assess*. 1998;2(14)
25. Weinstein S, Obuchowski NA, Lieber ML. Clinical evaluation of diagnostic tests. *AJR Am J Roentgenol*. 2005;184(1):14-19.
26. Bossuyt PM, Reitsma JB, Linnet K, Moons KG. Beyond diagnostic accuracy: the clinical utility of diagnostic tests. *Clinical chemistry*. 2012 Dec 1;58(12):1636-43.

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