



Agni: an ideal tool to assess digestion in exclusively breastfed children

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ABSTRACT

Background: The entire process of utilising energy through digestion at the level of the Gastrointestinal tract and metabolism at the level of tissues is referred to as *Agni* in Ayurveda. The examination of the status of *Agni* is very pertinent in paediatric practice because childhood is the period of maximum growth and development. Correction of the *Agni* should begin at birth because vitiation of breast milk occurs due to improper diet, lifestyle, and psychological imbalance of lactating mother. **Aim:** The objective of the study was to develop a tool to assess *jatharagni* (digestive fire) in *ksheerada* (exclusively breastfed children) based on parameters like feeding pattern, consistency of stools, and other digestive symptoms.

Materials and methods: The tool's reliability was statistically analysed based on Cronbach's alpha and the split-half method. The developed tool was tested on 100 children who visited the Well Baby Clinic, Govt. Ayurveda College, and Hospital for Women and Children, Poojappura, Thiruvananthapuram.

Results: Out of 100 samples assessed, 86 children had a normal state of *Agni* and 14 had an abnormal state of *Agni*. As a result, the tool aids in assessing digestion and metabolism in exclusively breastfed children using Ayurvedic parameters regarding *Agni*.

Keywords: Agni, Tool development, *ksheerada*, exclusively breastfed children

INTRODUCTION

Ayurveda is the science of life that gives broad dimensions to the term health, apart from its simple denotation like a state of well-being. Health is preserved by the regulation of the internal homeostasis of the body. This is influenced by the states of *Agni* (digestive fire), the doshas (bodily humor), the dhatus (tissue elements), and the malas (waste products).¹ According to Ayurveda, food is considered one of the three sub-pillars that support life.² The food should be digested properly for maintaining health, and without *Agni*, this will be impossible. Kaumarabhritya is one of the branches of Ayurveda, dealing mainly with the care of children and the treatment of childhood disorders. The nutritional aspect of a child's life is emphasised here from the first day of life.

Agni is a vital source of life, complexion, strength, health, nourishment, lustre, *ojus* (the essence of tissue elements), and energy.³ An academic or an Ayurvedic physician would never have a day in their lives where they did not contemplate this concept. According to current research,

all cells in our body undergo metabolic activities, cell division, and cell multiplication from conception until death. Biological energy is always necessary for these perpetual processes in every cell; otherwise, it would be very arduous for the organism to survive. As per Ayurveda, *Agni* provides the same biological energy.⁴ There are thirteen types of *Agni* in the body, namely, seven *Dhatwagni*, five *Bhutagni*, and one *Jatharagni*. Among these, *Jatharagni* is the prime one, nourishing all other *Agnis*.

Bhutagni is the one that is present in the five basic elements (*Panchamahabhutas*), which are considered to be the composition of all living and non-living beings.⁵ *Dhatwagni* is the digestive element found in all tissues⁶ that aids in the assimilation of food after digestion and metabolism, thereby promoting tissue growth and nourishment. The classification of the *Agni* is done based on many parameters, like position, function, strength, etc. The four states of *Agni* based on their strength, is the most applied one, namely *samaagni*, *vishamaagni*, *teekshnaagni* and *mandaagni*.⁷ *Samaagni* is the normal state of digestive capacity, which helps maintain a normal rate of digestion and metabolism, causing normal growth and development in the body. *Vishamaagni* indicates the irregular state of digestive capacity without any predisposing factors, leading to discordance of the tissue element. A person with *teekshnaagni* digests the excess quantity of ingested food within a short period of time,⁸ causing depletion (absorption) of the tissue element, and a person with *mandaagni* is in a state of *Agni* where food takes a long time to digest,⁷ irrespective of the amount of food consumed. Classical textbooks contain very few references to *Agni* in children. Hence, it is essential to discuss this topic more, as the maintenance of *Agni* requires special attention in this age group.

RELEVANCE OF ASSESSMENT OF AGNI IN EXCLUSIVELY BREASTFED CHILDREN

WHO advises women to exclusively breastfeed infants during the first six months of life to promote the best possible growth, development and health.⁹ Children are said to be of three kinds based on their diet pattern: *ksheerada* (exclusively under breast milk feeding), *ksheerannada* (consuming both milk and solid foods), and *annada* (having solid foods).¹⁰ It is thought that all *ksheerada* may have *Agni* equilibrium because they rely solely on breast milk. This may be the reason for skipping the detailed descriptions of *Agni* in exclusively breastfed children. Revalidating this idea is urgently needed because modern lifestyles increase the likelihood of breast milk vitiation and cause *Agni* imbalance in children. Dr. Shruti et al. say that more than food quality, *Agni* is superior because if the food is not digested, then no matter how much nutritional value it possesses, it cannot be utilised by the body, thus delaying the child's natural growth and development.¹¹ As far as Ayurveda is concerned, children are different from adults as they have soft and tender body structures, underdeveloped body parts and tissues, a gastro-intestinal system not fit to digest all types of food, incomplete secondary sexual characteristics, a reduced capacity to tolerate the stress of any kind, decreased strength and predominance of *kapha dosha*, indicating the drastic growth and development.¹² A child cannot explain their symptoms, so treating them is a significant challenge for the paediatrician. Even though a child's doshas, dhatus, malas, and so on are similar to an adult's, their quantity and dose of medicine are less.¹³ This concept indirectly explains that *Agni* is not very powerful in children. Medicines given without considering the strength of *Agni* will produce more bad effects. *Agni* can be interpreted in several ways and on various dimensions. There are many more aspects to it, some of which have yet to be explored. So a strong need arises to develop more tools for assessing *Agni* in children. The tool developed in the department of Kaumarabhritya effectively assessed *Agni*'s status in exclusively breastfed children.

METHODOLOGY

The objective of the study was to develop a tool in the form of a questionnaire for the assessment of *jatharagni* in exclusively breastfed children. Primary data was collected through personal interviews with expert physicians in the field, group discussions among the parents of children under the age of six months, and the treatises of Ayurveda. The first step of the tool development was the item generation in which an initial questionnaire was generated based on Literature review, group discussions and interview with subject experts. The second step was item selection and which was done by deleting, overlapping most common and frequently quoted questions.

Then the questionnaire was modified by wording each item and sequencing them based on the priority. Then the modified set of questions were prepared in Malayalam and then for better understanding it was translated back to English by language experts. The questionnaire finally obtained was administered among the consecutively selected 100 children who visited the well baby clinic of Govt. Ayurveda College, and Hospital for Women and Children in Poojappura, Thiruvananthapuram, excluding the diseased children. After the administration of the questionnaire to the sample population, the reliability of the tool was statistically analyzed based on the appropriate statistical tests.

Parameters like feeding patterns, consistency of stools, and other digestive symptoms are evaluated for the purpose of the study. The final questionnaire, thus formed after a series of steps, includes two sections. The first is for assessing the normal or abnormal state of *Agni*, and if the state of *Agni* gets diagnosed as abnormal, then the second section is for confirming which abnormal state the child possesses. The questionnaire started with the primary information regarding the child. The first section included thirteen questions, further divided into two subsections, of which the first included four questions, G1-G4 [Table 1]. Question G1 gave an idea regarding the adequacy of breast milk, and the question G2 evaluates whether the child got enough to satisfy his or her hunger through feeding. Question G3 was an investigatory process done by the examiner to evaluate the purity of breast milk. Question G4 was meant for assessing the child's weight gain. Positive answers to questions G3 and G4 were worth two points each, while the rest are worth one point each. Any negative answer in the first subsection indicates inadequacy of breast milk, inappropriate feeding of infants, the presence of vitiated breast milk, or inadequate weight gain of the child, which lead to a pathological change in *Agni's* state. The study included 100 children (under the age of six months) who visited the Well Baby Clinic,

Tool for the assessment of AGNI in exclusively breastfed children.

The first part of the tool contains the basic personal information, anthropometric data, and the basic birth history details.

Name of child : Age and sex :
 Mother's name : D.O.B :
 Address : Contact :
 Type of delivery : NVD FORCEPS VACCUM LSCS
 : Term Pre term Post term
 B.W : H/o NNJ/ NNS/ RDS etc.
 HC : Length :
 CC : Weight :
 MUAC : Heart rate :

Table 1 [Section1-Sub section 'A']

To assess the adequacy and quality of breast milk

		Yes	No
G1	When the child is breast fed from one side, whether there is dribbling of breast milk from the other side?		
G2	While feeding does the child consumes the entire milk from one side, before switching over to the next.		

G3	When the breast milk is instilled in the water, does it get completely and uniformly mixed?		
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To assess the weight gained by the infant

		Yes	No
G4	Whether the infant is gaining weight proportionately?		

The second subsection of Section 1 included nine questions (S1-S9) [Table 2], and all of which were meant for the assessment of *samagni*. Among the seven questions, one mark is given for each positive answer and zero marks for each negative answer. Question S5 and S9 deal with pathological statements where the absence of this condition leads to *samagni* in the individual, so in these two questions, negative answers carry one mark for *samagni* and positive answers carry one mark for abnormal status of the *Agni*. The thirteen questions in the first section carry a total score of fifteen, and it was assessed that if the score is greater than or equal to twelve, then the child shall be diagnosed as *samagni*. If the score is less than twelve, the child has an abnormal status of *Agni* and needs to be assessed in the second section of the questionnaire.

Table 2 [Section 1-Sub Section 'B']

		Yes	No
S1	Whether the child satisfactorily complete a single feed within 15-30 minutes?		
S2	Does the child demand feeding within a span of 1 to 3 hours?		
S3	Whether the child urinates 6-12 times or between each feed in a day?		
S4	Whether the child passes stool 2-4 times a day?		
S5	Does the child have a foul smell coming from mouth?		
S6	Whether the colour of the stool is yellow or brown?		
S7	Whether the stool of the infant is soft and semi-solid in consistency?		
S8	Whether the child sleeps for an average of 14 to 18 hours a day?		
S9	Whether the child has frequent attack of fever, cough or respiratory tract infection?		

The second section of the questionnaire included fourteen questions, the first two of which were multiple-choice. In these questions, option "a" denotes *Mandagni*, option "b" denotes *Teekshnagni*, and option "c" denotes *Vishamagni*.

SECTION II [part 1]

To assess the abnormal state of *Agni*

A1. Time interval between two feed is

- e) After 3 hours
- f) Within 1 hour
- g) Irregular pattern (sometimes within 1 hour and sometimes after 3 hours)
- h) None of the above

A2. The consistency of stool is

- e) Watery or milky stool in large quantity
- f) Normal quantity but hard stool
- g) Hard, dry stool in the form of pellets

h) None of the above

Questions from A3-A14 were yes-or-no pattern questions [Table 3]. Question A3, A4, A5, and A6 represent the assessment of *Mandagni*. The four questions (A7-A10) are for assessing *Teekshnagni*. The last set of four questions deals with the assessment of *Vishamagni*.

Table 3 [Section II-part 2]

		Yes	No
A3	Whether it is noticed that the child urinates in excess quantity (>12 times) a day?		
A4	Whether the stool of the child has excessive foul smell?		
A5	Whether the child pukes or vomits excessively after having his/her feed?		
A6	Whether the child's tongue has a white coloured coating?		
A7	Does the child sleep less than 8 hours a day?		
A8	Whether the child urinates less than 6 times a day?		
A9	Whether it is noticed that the lips and tongue of the child gets dried intermittently?		
A10	Whether it is noticed that the body temperature of the child is comparatively higher?		
A11	Does the child cries after his/her feed swirling and pressing hands and legs against the stomach?		
A12	Whether the child passes stool along with flatulence producing sound?		
A13	Whether the child has to strain while passing stool?		
A14	Whether the child cries due to pain while passing stool?		

The reliability of the tool was assessed by Cronbach's alpha and the split-half method. The final questionnaire designed was then changed to the local language with the help of a Malayalam subject expert and then again to English with the help of a language expert. The questions thus redesigned were used for the assessment of *Agni* in exclusively breastfed children.

RESULTS

The reliability of the tool was statistically analysed based on Cronbach's alpha and the split-half method, which gave positive values of 0.329 and 0.340 respectively. There were 67 female children and 33 male children among the 100 samples collected [Table 4]. 99% of the children in the sample were born as term babies [Table 5]. Only one baby was preterm, but the baby was diagnosed as *samagni*. While tabulating the type of delivery, 61 babies were born through normal vaginal delivery, whereas the remaining 39 were born through LSCS [Table 6]. Out of 100 samples assessed, 86 cases were diagnosed as *samagni*. Among the fourteen infants with an abnormal state of *Agni*, more than half were *mandagni* cases. There was only one single case of *teekshnagni* obtained from the sample. One case was diagnosed with the presence of all the three abnormal states of the *Agni* [Table 7]. The percentage of respondents for individual questions was also separately evaluated and tabulated [Table 8 to Table 11].

Table 4 [Percentage of frequency and sex distribution]

Sex	Frequency	Percent
Male	33	33.0
Female	67	67.0
Total	100	100.0

Table 5 [Percentage and frequency of term of delivery distribution]

Term/ Preterm	Frequency	Percent
Term	99	99.0
Preterm	1	1.0
Total	100	100.0

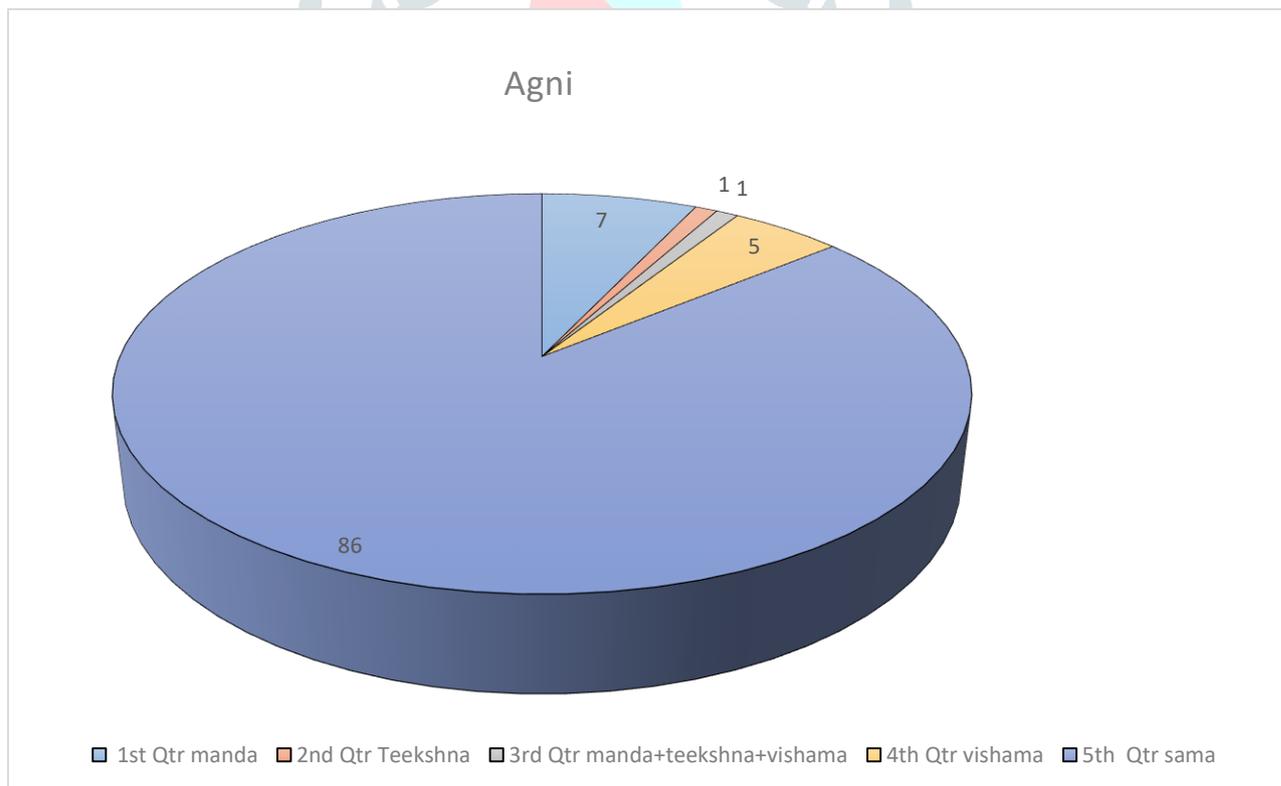
Table 6 [Percentage and frequency of type of delivery distribution]

Type of delivery	Frequency	Percent
Normal	61	61.0
LSCS	39	39.0
Total	100	100.0

Table 7 [Distribution of respondents on the basis of different state of Agni]

Different state of Agni	frequency	percent
MANDA	7	7.0
TEEKSHNA	1	1.0
MANDA+ TEEKSHNA+ VISHAMA	1	1.0
VISHAMA	5	5.0
SAMA	86	86.0
Total	100	100.0

Table 8



[Frequency and percentage distribution of respondents on the basis of responses in mandagni group]

Statements based on mandagni	Percentage of respondents
A4	21
A6	11
A2	6
A5	6
A1	2
A3	0

Table 9 [Frequency and percentage distribution of respondents on the basis of responses in *teekshnagni* group]

Statements based on teekshnagni	Percentage of respondents
A9	19
A2	13
A1	8
A7	2
A10	1
A8	0

Table 10 [Frequency and percentage distribution of respondents on the basis of responses in *vishamagni* group]

Statements based on vishamagni	Percentage of respondents
A12	33
A13	21
A11	14
A14	7
A1	6
A2	6

Table 11 [Frequency and percentage distribution of respondents on the basis of responses in *samagni* group]

Statements under <i>samagni</i>	Frequency
S3	100
G1	98
S9	98
G4	97
S6	96
G2	95
S5	95
S1	94
S8	94
G3	91
S2	84
S7	73
S4	55

CONCLUSION

Agni is a much-debated subject for Ayurvedic scholars. This results from the multi-dimensional nature of *Agni*, as described in science. Specific techniques are needed to evaluate the *Agni* status of exclusively breastfed children since they are a homogeneous group with few external interactions and underdeveloped tissues. There is an urgent need to revalidate the cognizance regarding the concept of *Agni* in exclusively breastfed children, which will aid in the diagnosis and choosing proper management for the child and the mother, as well as in the field of research. The results show that the tool developed is helpful in assessing the status of *Agni* in exclusively breastfed children. From the clinical observations it is found that the children with *samagni* were healthy, while the other groups had some difficulties regarding proper digestion and metabolism mainly due to the vitiation of

breast milk. The study was done in a small study group, and the same study needs to be assessed with a larger sample and in different geographical areas of the country. The developed tool can be incorporated into future health policies to assess children's digestion and metabolism status.

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