



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPA)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

EFFICACY OF KETAKI SARKARA SYRUP IN THE MANAGEMENT OF KRUMI (WORM INFESTATION) IN CHILDREN: AN OPEN-LABELLED RANDOMIZED CONTROLLED CLINICAL STUDY PROTOCOL

YADAV M^{1*}, ARUN RAJ G R² AND MOKINDAN R¹

1: PG Scholar, Department of Kaumarabhritya, Parul Institute of Ayurved and Research, Parul University, Ishwarpura, Vadodara, Gujarat – 391760, India

2: Professor & HOD, Department of Kaumarabhritya, Parul Institute of Ayurved and Research, Parul University, Ishwarpura, Vadodara, Gujarat – 391760, India

*Corresponding Author: Dr. Mohit Yadav: E Mail: mohityadav20998@gmail.com

Received 5th Jan. 2026; Revised 6th Feb. 2026; Accepted 20th May 2026; Available online 1st Oct. 2026

<https://doi.org/10.31032/IJBPA/2026/15.10.10541>

ABSTRACT

Background: *Krumi Roga*, or worm infestation, is a common issue in children that harms their digestion, nutrition, growth, and overall health. *Ayurveda* supports a thorough approach to managing *Krumi* by emphasizing *Apakarshana*, which is the removal of worms, *Prakriti Vighatana*, the elimination of the favorable internal environment, and restoring *Agni*. *Ketaki Sarkara*, a traditional remedy mentioned in *Arogya Raksha Kalpadruma*, is suggested for treating *Krumi*; however, its effectiveness has not been adequately proven through controlled studies. **Objectives:** To evaluate and compare the clinical efficacy of *Ketaki Sarkara* syrup with Wormicid Plus syrup in the management of *Krumi Roga* in children. **Methods:** This open-label, randomized comparative clinical trial will include 100 children aged 5–10 years diagnosed with *Krumi Roga*. Participants will be randomly divided into two groups of 50 each. Group A will receive *Ketaki Sarkara* syrup, and Group B will receive Wormicid Plus syrup for 14 days. Clinical outcomes will be assessed using *Guda Kandu*, *Agnimandhya*, *Udarashoola*, *Vibandha*, and *Vidbheda*, along with stool microscopic examination at baseline and after treatment. Data will be recorded systematically and analyzed statistically. **Results:** The therapeutic effectiveness will be evaluated based on the decrease in clinical symptoms and the clearance of pathology, with a comparison made between *Ketaki Sarkara* syrup and Wormicid Plus syrup. **Conclusion:** The study aims to scientifically validate *Ketaki Sarkara* syrup for treating *Krumi Roga* in

children, supporting its safety, palatability, effectiveness, and wider adoption as an *Ayurvedic* pediatric therapy.

Keywords: *Ketaki Sarkara*, *Wormicid plus syrup*, *Krumi Roga*, *Helminthiasis*

1. INTRODUCTION:

In *Ayurveda*, the word *Krumi* is used as broad sense for all worms and microorganisms from the perspective of modern science. Concept of *Krumi* is not new, its description has been found since the *Vedic* period. The visible or invisible, i.e., macro or micro-organisms that affect the living & nonliving things of the biosphere are described in *Ayurvedic* literature. All four *Vedas*, namely the *Samaveda*, *Yajurveda*, and *Atharvaveda*. The three *Vedas* all have descriptions of *Krumi* and *Krumiroga*, with the exception of *Samaveda* outlined the term "*Krumi*" has a wide range of meanings. The *Atharvaveda*, however, has more information about *Krumis*. We may claim that the presence of bacteria in the environment has been very clearly indicated since the *Atharvaveda* mentions the existence of *Krumi* in trees, rivers, mountains, and living things that cause different diseases. Several other varieties of *Krumis* can affect the eyes, nose, and teeth. Different *Krumi* varieties and their unique names, such as *Rakshasa*, *Pisacha*, and *Yatudhanas*, have also been utilised in diverse contexts. *Vedic* literature also refers to visible-invisible and pathogenic-nonpathogenic creatures. There are numerous references to *Krumi* (worms or

parasites) in ancient Indian literature, including the *Rigveda*, *Atharvaveda*, *Shatapatha Brahmana*, *Taittiriya Upanishad*, *Aranyaka*, *Chandogya Upanishad*, *Vishnu Purana*, *Vayu Purana*, and *Bhagavata Purana*. In *Vedic* literature, various terms such as *Krumi*, *Rakshasa*, *Pishacha*, *Bhuta*, *Apsara*, and others have been used to describe different types of *Krumi*.

Classification of *Krumi*: *Charaka*, *Madhava*, *Sharngadhara*, and *Vagbhata* have described: 2 types of *Bahya Krumi* (external parasites), 18 types of *Abhyantara Krumi* (internal parasites) A total of 20 types of *Krumi* [1-5]. *Sushruta*, on the other hand, has described only 20 types of *Abhyantara Krumi*, with no mention of *Bahya Krumi* [6]. According to *Charaka*, there are two types of *Bahya Krumi* (external parasites): *Yuka* (lice) and *Pipalika* (ants). These parasites are found in areas such as the hair, eyelashes, skin, and clothing. *Charaka* further classifies *Abhyantara Krumi* (internal parasites) based on their origin into *Kaphaja*, *Purishaja*, and *Raktaja* types: *Kaphaja Krumi* originate from *Kapha* and include varieties such as *Antarada*, *Udarda*, *Hridayachara*, *Churu*, *Darbhapuspa*, *Saugandhika*, and *Mahadguda*. These

worms primarily reside in the *Amashaya* (stomach) and spread upwards and downwards from that location. *Purishaja Krumi* arise from fecal matter and include *Kakeruka*, *Makeruka*, *Sausurada*, *Sasulaka*, and *Leliha*. These are located in the *Pakvashaya* (large intestine) and tend to spread towards the anus and also upwards to the *Amashaya*. *Raktaja Krumi* originate from blood and includes *Kesada*, *Lomada*, *Lomadwipa*, *Saurasa*, *Audumbara*, and *Jantumata*. These parasites are found in the *Raktavahini* (blood vessels) and *Dhamanis* (arterial channels) [7]. The common causative factors (*Nidana*) for *Krumi Roga* (worm infestation) include *Ajirna Bhojana* (eating before complete digestion of the previous meal), regular intake of foods with *Madhura* (sweet) and *Amla* (sour) tastes, excessive consumption of liquid substances (*Drava*), jaggery (*Guda*), and *Viruddha Bhojana* (incompatible food combinations). In addition to dietary causes, certain physical factors like daytime sleep (*Diwaswapna*) and excessive physical exertion (*Vyayama*) are also listed as contributing factors [8]. In *Krumi Roga*, all three *Doshas* are involved, but *Kapha* and *Pitta* are predominantly vitiated. The affected *Dhatus* (bodily tissues) include *Rasa* (plasma), *Rakta* (blood), and *Mamsa* (muscle tissue). The main *Strotas* (channels) involved are the *Rasavaha* (plasma-carrying), *Raktavaha* (blood-carrying),

Annavaha (digestive), and *Purishavaha* (fecal) channels. In the 10th chapter of *Arogya Raksha Kalpadruma*, under *Krumiroga Chikitsa*, the 9th shloka mentions a formulation called *Ketaki Sarakara* [9]. This formulation is known to possess antihelminthic properties, which can help in reducing the signs and symptoms associated with *Krumi Roga* (worm infestation).

Worm infestation is more common in preschool and early school-age children [10]. Parents and doctors both ignore helminthiasis since the symptoms are mild until the infection is serious. Once the condition worsens, mature eggs may enter or dwell in any system, including the brain, heart, and lungs, where they may manifest major consequences. It has been noted that it adversely affects children's performance in a variety of day-to-day activities, including academic performance [11]. It is difficult to treat and cure infestations once they develop and become complicated, unless they display the problems. Worm infestations in children have been responsible for worsening the growth and development in millions of children around the world. Worm infestations in children are also found to have deleterious effects on nutritional status, mental status and intelligence, leading to poor social and 5 scholastic performance when compared with healthy peers [11].

2. STUDY DESIGN AND SETTINGS

This study will use a randomized, controlled, parallel-group clinical design. The research will take place in the

Outpatient Department (OPD) and Inpatient Department (IPD). Participants will be recruited through a simple random sampling method. The proposed study plan is mentioned in **Figure 1**.

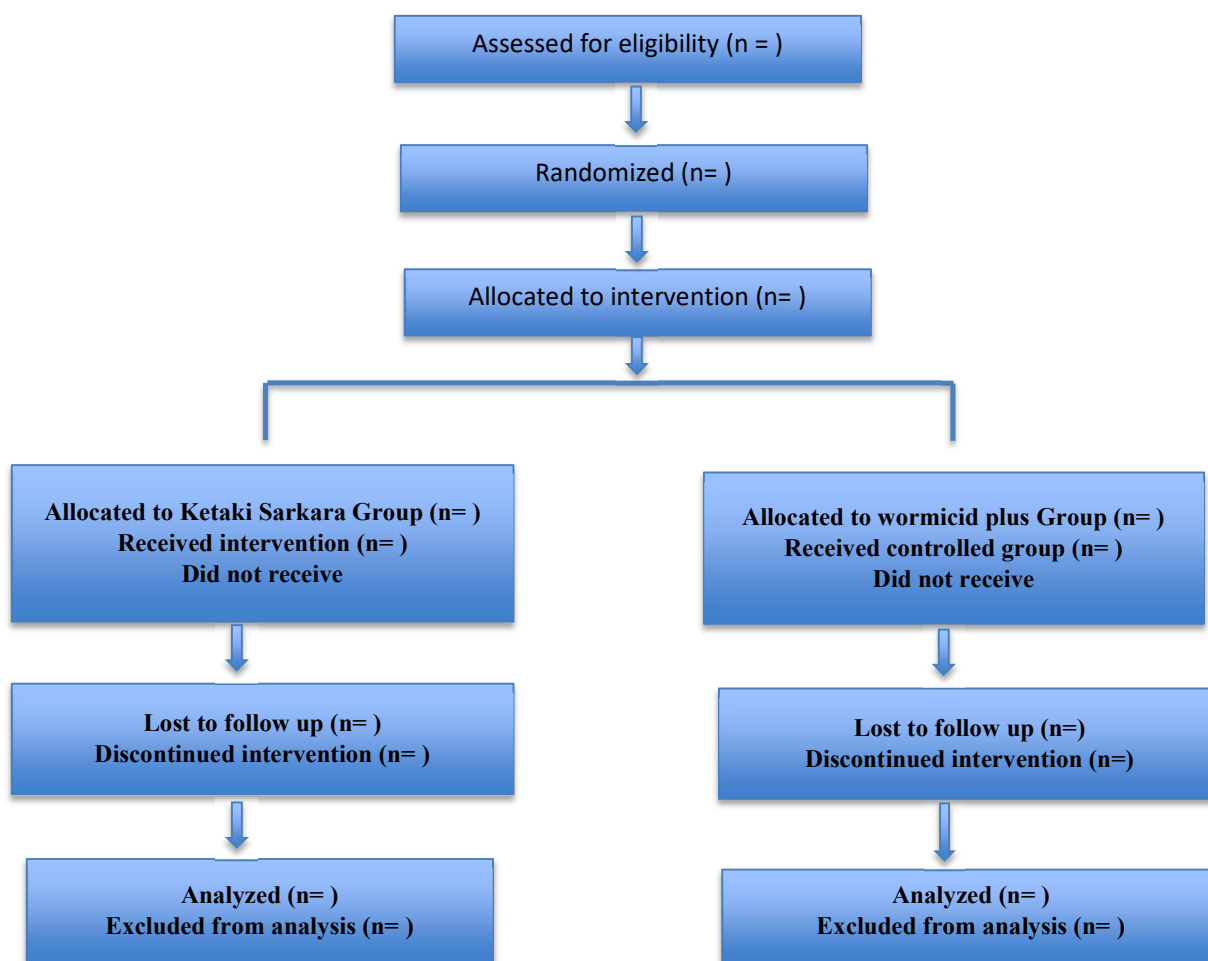


Figure 1: Study Plan

3. ELIGIBILITY CRITERIA:

Inclusion criteria: Children of either sex belonging to the age group of 5 to 10 years who present with clinical features suggestive of *Krumi Roga*, such as *Guda Kandu*, *Agnimandhya*, *Udarashoola*, *Vibandha* or *Vidbheda*, and who fulfil the diagnostic criteria confirmed by positive

stool microscopic examination demonstrating helminth eggs or larvae, will be included in the study. Only those children whose parents or legal guardians are willing to allow participation and provide written informed consent after understanding the nature and purpose of the study will be registered for the trial.

Exclusion criteria: Children presenting with acute clinical conditions such as severe abdominal pain, severe diarrhoea, persistent or severe vomiting, or fever exceeding 100°F will be excluded from the study. Children with congenital gastrointestinal anomalies such as intestinal obstruction will not be considered. Patients diagnosed with intestinal complications, including appendicitis, acute abdomen, pyloric stenosis, or Meckel's diverticulum, will be excluded. Additionally, children suffering from severe malnutrition or any serious systemic illness that may interfere with the assessment of the intervention will not be included in the study.

4. INTERVENTIONS

The study involves two groups. Group A will receive *Ketaki Sarkara syrup*, administered orally at a dose of 5-10ml as per weight twice daily with lukewarm water, while Group B will receive Wormicid plus syrup at the same dosage. The intervention will be administered for a specified duration of 2 weeks.

5. OUTCOME MEASURES

The outcome measures for the research study included both subjective and objective parameters. The primary outcome of the study is to evaluate the clinical efficacy of *Ketaki Sarkara syrup* in reducing the key symptoms of *Krumi Roga* (worm infestation) in children, as compared to *Wormicid Plus syrup*. This will be assessed

through changes in the severity of classical symptoms described in Ayurvedic texts: *Guda Kandu* (itching in the anal region), *Agnimandhya* (impaired appetite), *Udarashoola* (abdominal pain), *Vibandha* (constipation), and *Vidbheda* (diarrhoea). These symptoms will be recorded before and after a 15-day treatment period using a scoring system to measure improvement.

The secondary outcomes include checking for parasitological clearance with a microscopic stool examination to see if there is a reduction or absence of helminth eggs or larvae after treatment. Additional outcomes involve assessing the safety and tolerability of the formulations by monitoring for adverse drug reactions and reporting any side effects seen during treatment. The study also aims to compare the overall effectiveness of *Ketaki Sarkara syrup* with Wormicid syrup based on combined improvements in clinical symptoms and stool examination results.

Furthermore, while not directly measured, nutritional improvements such as weight gain or better appetite may be observed through symptom relief, especially concerning *Agnimandhya*. These outcomes will help support *Ketaki Sarkara syrup* as a potentially effective and safe Ayurvedic option for treating worm infestations in children.

6. SAMPLE SIZE:

A sample size of 100 participants (50 in each group) has been calculated using the Cochran Formula – based estimation with 95% power and 5% level of significance.

7. DATA COLLECTION

Data gathering for this study will follow a structured approach using a pre-established and validated Case Record Form (CRF). After a screening process, children aged 5 to 10 years who meet the inclusion criteria will be selected from the OPD/IPD of the Kaumarabhritya department. The initial data will include demographic information, clinical history, dietary patterns, bowel habits, and relevant Ayurvedic metrics. We will document subjective clinical indicators of *Krumi Roga*, such as *Guda Kandu* (itching around the anus), *Agnimandhya* (decreased appetite), *Udarashoola* (stomach pain), *Vibandha* (difficulty passing stool), and *Vidbheda* (diarrhoea) at baseline (day 0), during the treatment phase (day 8), and after treatment (day 15) using a standardized symptom scoring system. Objective evaluations will involve microscopic stool examinations to check for helminth eggs or larvae at baseline and after treatment. We will track adherence to medication through reports from caregivers, and we will record any side effects from drugs during the study. All gathered data will be documented in the Case Record Form (CRF) and checked for accuracy and completeness at every follow-up visit before statistical analysis.

8. STATISTICAL ANALYSIS PLAN

All gathered information will be entered into Microsoft Excel and analyzed with Statistical Package for the Social Sciences (SPSS) version 25.0 or similar statistical software. A p-value of less than 0.05, with a 95% confidence interval, will show statistical significance. All statistical tests will be conducted as two-tailed. Descriptive statistics will summarize the baseline demographic and clinical characteristics of the participants. Continuous variables, such as age and stool examination parameters, will be reported as mean $\pm$ standard deviation (SD) if the distribution is normal and as median with interquartile range (IQR) if the data do not follow a normal distribution. Categorical variables, including gender and the presence or absence of helminth ova, will be represented as frequencies and percentages.

The normality of continuous data will be assessed using the Shapiro-Wilk test. To check the initial comparability between the two groups (*Ketaki Sarkara* syrup and Wormicid Plus syrup), an independent samples t-test will be used for continuous variables with a normal distribution, and the Mann-Whitney U test will be used for those that are not normally distributed. Categorical variables will be evaluated by the Chi-square test or Fisher's exact test when appropriate. For intragroup analysis,

which compares the same group before and after treatment, a paired t-test will be used for continuous variables that meet normal distribution. The Wilcoxon signed-rank test will be used for non-normally distributed data or ordinal scoring parameters, including *Guda Kandu*, *Agnimandhya*, *Udarashoola*, *Vibandha*, and *Vidbheda* severity scores.

To compare the two groups (*Ketaki Sarkara* and *Wormicid Plus*), the average change from baseline to post-treatment will be calculated for each parameter. An independent samples t-test will be applied for data that follows a normal distribution, while the Mann-Whitney U test will be used for data that does not meet parametric assumptions. The main outcome measure, which focuses on the reduction in clinical symptom severity score, will be assessed by evaluating the mean difference between the two groups.

For the parasitological evaluation, the number of children showing no helminth eggs or larvae post-treatment will be compared between the two groups using the Chi-square test. Additionally, the percentage reduction in stool positivity will be calculated.

The percentage of improvement for each participant will be assessed and classified into categories such as significant improvement (>75%), moderate improvement (50–75%), mild improvement

(25–49%), and no improvement (<25%). These categories will be analyzed between groups using the Chi-square test. To measure the treatment effect's magnitude, effect size will be calculated using Cohen's *d* for parametric data and the *r* value for non-parametric data. All participants who were randomized will be included in the intention-to-treat (ITT) analysis. Any missing data will be handled using the Last Observation Carried Forward (LOCF) method. A per-protocol analysis will also be performed, focusing on participants who completed the entire treatment plan. Adverse events will be described and compared between the two groups. The sample size of 100 participants (50 in each group) has been calculated based on 80% statistical power and a 5% significance level, assuming a moderate treatment effect between the two formulations.

9. DISCUSSION

Worm infestation, referred to as *Krumi Roga*, is a common health issue among children. This is especially true in developing countries [10, 12], where inadequate sanitation, poor nutrition, and cycles of reinfection lead to ongoing health problems [13]. *Ayurveda* thoroughly describes *Krumi Roga*, focusing not only on getting rid of worms but also on improving the internal conditions that allow them to thrive [2, 8]. This study aims to evaluate the clinical effectiveness of *Ketaki Sarkara*

syrup compared to Wormicid Plus syrup in treating *Krumi Roga* in children aged 5 to 10 years.

Ketaki Sarkara is mentioned in *Arogya Raksha Kalpadruma* under the section on *Krumi Chikitsa* [9]. It is traditionally known for its properties of *Krumighna*, *Deepana*, *Pachana*, and *Anulomana* [14]. The formulation contains ingredients like *Ketaki*, *Vidanga*, *Trikatu*, *Bhunimba*, *Palasha*, and *Abhaya*, which together show *Tikta-Katu rasa*, *Ushna virya*, and *Katu vipaka* [15]. These properties help create an unfavourable gastrointestinal environment for worms, addressing the root of the *Krumi* issue rather than just relieving symptoms [7, 8].

In this study, we will assess the effectiveness of the treatment using both subjective measures (*Guda Kandu*, *Agnimandhya*, *Udarashoola*, *Vibandha*, and *Vidbheda*) and objective measures (microscopic stool analysis). This combined approach increases the reliability of the results. Improvements in clinical symptoms align with the elimination of parasites. The reduction of perianal itching and abdominal discomfort is linked to the *Krumighna* and *Anulomana* properties of the formulation. Meanwhile, improvement in appetite will indicate restoration of *agni*, which will be essential in preventing reinfestation.

Wormicid Plus syrup serves as the control medication. It is a well-known polyherbal

formulation that includes recognized *Krumighna* herbs like *Vidanga* and *Palasha*. By comparing *Ketaki Sarkara* with Wormicid Plus, we can scientifically validate the traditional formulation against a widely used modern Ayurvedic product. The syrup form ensures a better taste, making it easier for children to take, and may enhance the absorption of its active plant components. Many past studies focused mainly on clinical symptoms and overlooked parasitological verification. By documenting both symptom relief and the decrease or elimination of helminth eggs, this study aims to address this gap. The short treatment period of 14 days, along with follow-up, allows us to assess both immediate therapeutic effects and the possibility of early recurrence. This research aims to reinforce the traditional Ayurvedic view that effective treatment of *Krumi* involves removing parasites and correcting digestive and metabolic issues. *Ketaki Sarkara* syrup, due to its *rasapanchaka* and complementary formulation, could offer a safe, effective, and child-friendly option for treating intestinal worm infestations. The findings may provide a scientific basis for the wider clinical use of *Ketaki Sarkara* and encourage further research with extended follow-up and nutritional outcome measures.

10. STRENGTHS AND LIMITATIONS:

The main benefit of this study will be its randomized, comparative, open-label design. This method will allow a scientific assessment of the traditional formulation *Ketaki Sarkara* and the well-known polyherbal medication Wormicid Plus syrup. The study will include subjective clinical indicators like *Guda Kandu*, *Agnimandhya*, *Udarashoola*, *Vibandha*, and *Vidbheda*, as well as objective assessments through stool microscopic analysis. This combination will improve the credibility and reliability of the results. The syrup will also have a better taste, making it easier for children to take. Additionally, the research will meet ethical standards. It will include informed consent, regular follow-ups, and monitoring for adverse drug reactions. This commitment will boost the clinical importance and ethical soundness of the findings. The research will have some limitations. The open-label format may introduce biases because blinding will not be possible due to the nature of the intervention. The short duration of both treatment and follow-up may limit the assessment of long-term reinfestation rates and ongoing nutritional recovery. The laboratory analysis will focus only on stool tests, omitting other nutritional or blood factors like hemoglobin or serum proteins, which could provide a better understanding of the therapy's overall effects. Furthermore, since the study will take place at a single

location with a small sample size, the findings may not be widely applicable. Future research should use a multicenter approach, extend follow-up periods, and include nutritional and immune system indicators to address these limitations.

11. FUTURE IMPLICATION

The results of this study could provide a scientific basis for using *Ketaki Sarkara* syrup to treat *Krumi Roga* in children. These findings might encourage more multicenter research with larger groups and longer follow-up periods to look into reinfestation rates and long-term effects. Future studies could also evaluate nutritional and blood-related factors to understand the broader benefits of the treatment. Additionally, pharmacological and mechanistic studies could explain how *Ketaki Sarkara* works, which would support its use in evidence-based pediatric Ayurvedic practices

12. ACKNOWLEDGEMENTS

The authors are thankful to Parul Institute of Ayurved and Research for providing institutional support and necessary facilities for this research work.

FUNDING: SELF

CONFLICT OF INTEREST: NIL

ETHICAL

APPROVAL:

PIAyR/2026/70/IEC-PIAR HR

CTRI

REGISTRATION:

CTRI/2026/02/103802

REFERENCES:

-
- [1] Tripathy BN. Charaka Samhita. Vol. 1 (Vimana Sthana). Varanasi: Chaukhamba Surbharati Publication; 2013. p. 712–713.
- [2] Gupta AD. Astanga Hridayam (Nidanasthana). Varanasi: Chaukhamba Prakashan; 2009. p. 373.
- [3] Tripathy BN. Madhava Nidana (Roga Viniscaya, Madhukosa). Vol. I. Varanasi: Chaukhamba Surbharati Prakashan; 2014. p. 300, 304–306.
- [4] Pandey DS. Sharangadhara Samhita (Purvakhanda). Varanasi: Chaukhamba Sanskrit Series Office; 1966. p. 71.
- [5] Mishra BS. Bhavaprakash (Chikitsa Prakaranam). Vol. II. Varanasi: Chaukhamba Sanskrit Sansthan; 2003. p. 94–96.
- [6] Shastri AD. Susruta Samhita. Vol. II. Varanasi: Chaukhamba Sanskrit Sansthan; 2001. p. 400.
- [7] Tripathy BN. Charaka Samhita. Vol. 1 (Vimana Sthana). Varanasi: Chaukhamba Surbharati Publication; 2013. p. 712–713.
- [8] Tripathy BN. Charaka Samhita. Vol. 1 (Vimana Sthana). Varanasi: Chaukhamba Surbharati Publication; 2013. p. 711.
- [9] Krishnan L, editor and translator. Arogya Raksha Kalpadruma. 2nd ed. Varanasi (India): Chaukhambha Orientalia; 2012. Adhyaya 10/08, p. 65.
- [10] Gamboa MI, Basualdo JA, Kozubsky L, Costas E, Cueto Rua E, Lahitte HB. Intestinal parasitic infections in children. *European Journal of Epidemiology*. 1998;14(1):55–61.
- [11] Taylor-Robinson DC, Maayan N, Soares-Weiser K, Donegan S, Garner P. Deworming drugs for soil-transmitted intestinal worms in children: effects on nutritional indicators, haemoglobin, and school performance. *Cochrane Database Syst Rev*. 2015;7:CD000371. Updated 2019;9:CD000371.
- [12] Pandya HB, Lakhani SJ, Pandit N, Hemachander SS. Prevalence and risk factors associated with intestinal parasitic infestations in the rural pediatric population of Piparia, Gujarat: A hospital-based study. *Int J Med Sci Public Health*. 2017;6(10):1498–1502.
- [13] Jia TW, Melville S, Utzinger J, King CH, Zhou XN. Soil-transmitted helminth reinfection after drug treatment: A systematic review and meta-analysis. *PLoS Negl Trop Dis*. 2012;6(5):e1621.
- [14] Murthy KR, editor and translator. Madhava Nidana. 1st ed. Varanasi
-

(India): Chaukhambha Orientalia;
1986. Adhyaya 7/13–14, p. 34.

- [15] Sharma PV. Dravyaguna Vijnana.
Vol. 2. Varanasi (India):
Chaukhambha Bharti Academy;
2015. p. 141, 275, 331, 362, 503,
506, 544, 678.