



Siddha Oral Rehydration Therapy (SiORT)-Thayirchundi Chooranam, A Herbo mineral Formulation

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ABSTRACT:

The Siddha System of medicine, originating from southern India, offers holistic healthcare through unique formulations and philosophies. One such formulation is Thayirchundi chooranam (TCC), an herbo-mineral preparation containing Panchalavanam (five salts), dried ginger, and curd. TCC is traditionally used for diarrhoea, a widespread acute condition causing significant morbidity and mortality, especially in children, due to electrolyte imbalances from fecal water and electrolyte loss

Oral rehydration therapy remains the primary treatment for diarrhoea, utilizing WHO-recommended Oral Rehydration Salts (ORS) comprising sodium chloride, potassium chloride, trisodium citrate, and glucose. A physiochemical study of TCC confirms the presence of glucose. To the best of our knowledge, there were no reports available for the elemental composition of TCC. Hence the present study aimed to analyse the elements present in TCC by using ICP-OES. The results revealed the presence of 11.1% sodium, 2.2% potassium, and trace amounts of iron, magnesium, copper, and zinc. These findings support the potential development of Siddha Oral Rehydration Therapy (SiORT), leveraging TCC's elemental profile for a ready-to-use oral rehydration solution.

KEYWORDS: SiORT, Siddha ORS, Thayirchundi chooranam, rehydration salts, Diarrhoea

INTRODUCTION:

Siddha System of Medicine, the holistic healthcare system of southern India has been useful to humankind in the prevention and treatment of diseases with its unique formulations and philosophy. One such formulation is Thayirchundi chooranam (TCC), of herbo mineral origin containing Panchalavanam, dried ginger and curd indicated for diarrhea^[1]. Diarrhoea is a universal acute disease, usually associated with faecal loss of water and electrolytes such as sodium, and potassium along with other elements, which is the most common cause of dehydration and electrolyte imbalances^[2]. While Oral rehydration is still the first line of treatment for dehydration. Comprehensive treatment of Diarrhoea includes reducing fluid loss, repairing of intestinal wall to restore normal absorptive functions, and restoring a healthy gut microbiome^[2,3]. The loss of sodium, chloride, bicarbonate, and potassium, from the gastrointestinal system and water can surpass the kidney's compensatory abilities, leading to imbalances in electrolytes and acid-base levels. Commercially available Oral Rehydration Salts, based on the recommendation of WHO consist of Sodium chloride, Potassium chloride, Trisodium citrate and Glucose^[4]. Previous physiochemical study of TCC confirms the presence of glucose^[5]. To the best of our knowledge, there were no reports available for the elemental composition of TCC. Hence the present study aimed to analyse and quantify the elements present in TCC by using ICP-OES as an initial effort to acknowledge the use of TCC in the management of dehydration in Diarrhoea.

MATERIALS AND METHODS:

Thayir Chundi Chooranam comprises of Panchalavanam namely *Indhuppu* (naturally occurring sodium chloride), *Kalluppu* (*Himalayan black salt*), *Kariuppu* (Sea salt), *Pooneru* (Trona) and *Valayaluppu* (synthetic salt) along with *Zingiber officinale* Root dried and sour curd.

TCC was purchased from Impcops Brand and analysed for elemental composition at Animal and Mineral Origin Drug Laboratory, Siddha Central Research Institute, Arumbakkam, Chennai.

Analysis of trace elements in Thayirchundi choornam by ICP-OES

Agilent ICP-OES 5100 VDV instrument was used with the following operation conditions: an RF power of 1.2 kW, a plasma gas flow rate of 12 L min⁻¹, and a nebulizer gas flow rate of 0.70 L min⁻¹. The samples were introduced into the plasma using a nebulizer and spray chamber for the analysis.

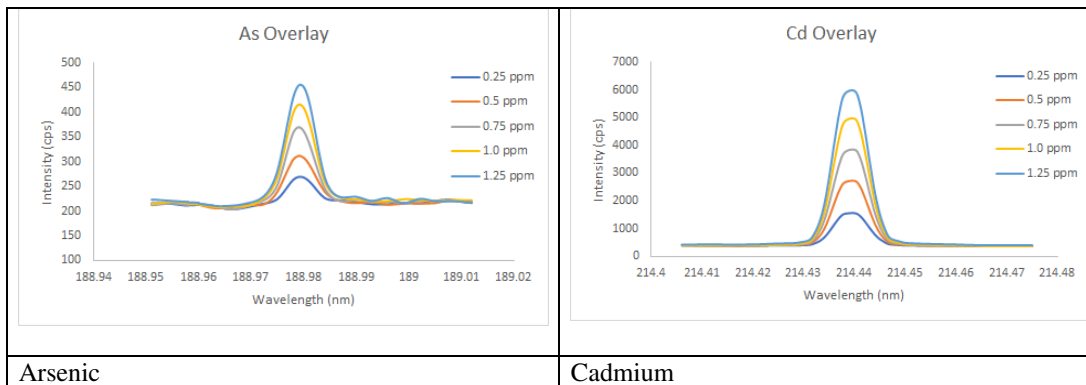
About 20 mg of sample was taken into the Teflon microwave digestion vessel and 1 mL of ultrapure nitric acid was added to digest for about 45 minutes using Anton Paar microwave digestion unit. After that the sample was made up to a 50 mL standard measuring flask. The calibration standard solution was prepared from 0.25 µg/mL to 10 µg/mL by using ultrapure nitric acid and blank also.

RESULTS AND DISCUSSION:

Results revealed the presence of Sodium 11.1% (w/w), Potassium 2.2% (w/w), Calcium 0.693% (w/w) and trace elements like Iron, Magnesium, Copper, and Zinc in TCC. Heavy metals like Arsenic, Mercury, Cadmium, and Lead were below detectable limit. (Table 1)

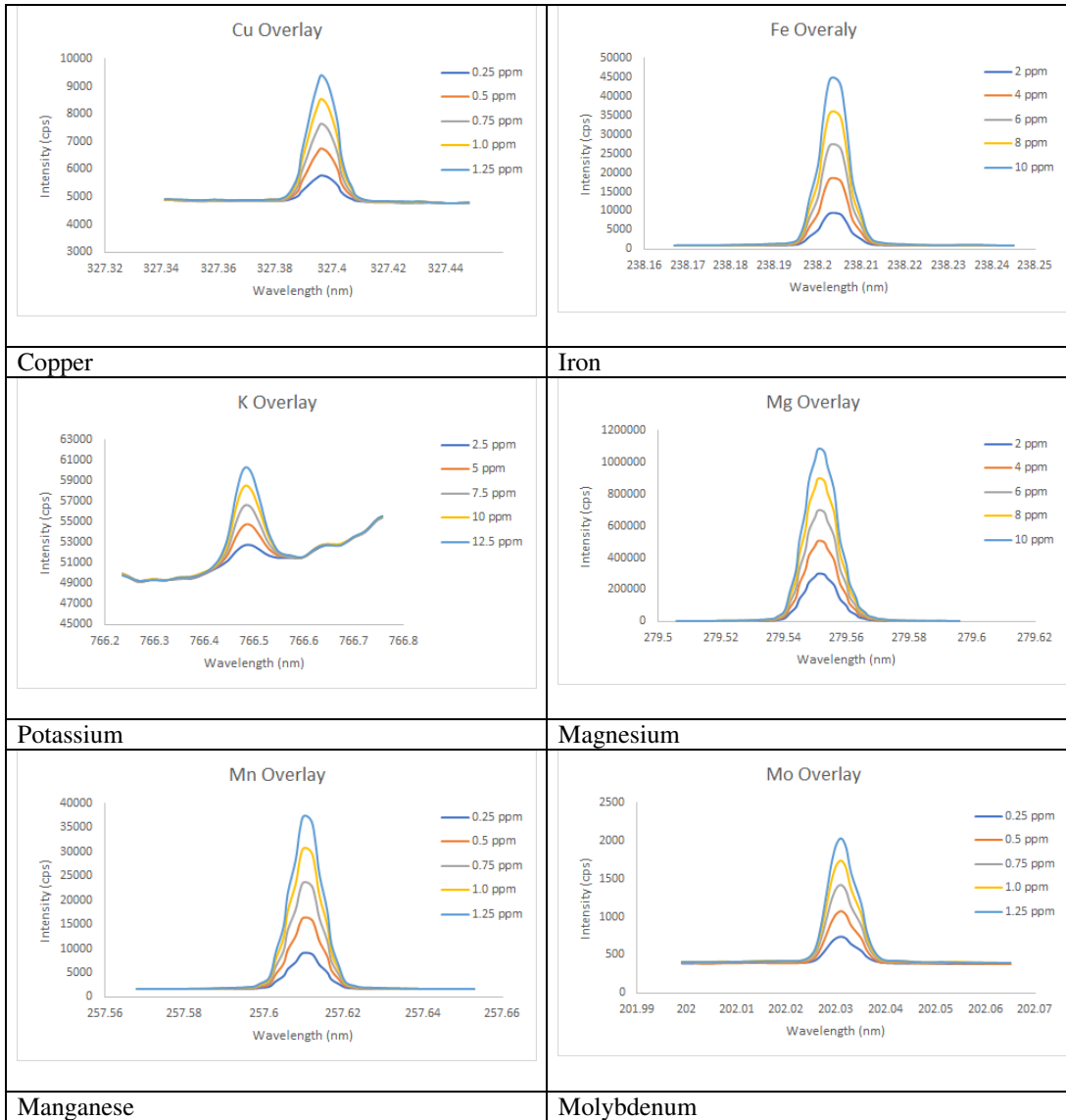
Elements	Thair Churanam	Chundi Thair Churanam [Duplicate]	Average Value
As	BDL	BDL	BDL
Cd	BDL	BDL	BDL
Cu	10.73 ppm	38.87 ppm	24.8 ppm
Fe	0.127 %	0.132 %	0.129 %
K	2.223 %	2.231 %	2.227 %
Mg	0.268 %	0.272 %	0.27 %
Mn	141.28 ppm	138.02 ppm	139.65 ppm
Mo	BDL	BDL	BDL
Pb	BDL	BDL	BDL
Zn	19.21 ppm	11.6 ppm	15.4 ppm
Ca	0.687 %	0.7 %	0.693 %
Na	10.978 %	11.247 %	11.11 %
Hg	BDL	BDL	BDL

Table I : Analytical report of trace elements of Thayir Chundi Chooranam by ICP-OES
 BDL – Below Detection Limit; ppm – parts / million; [%]- Percentage



Arsenic

Cadmium



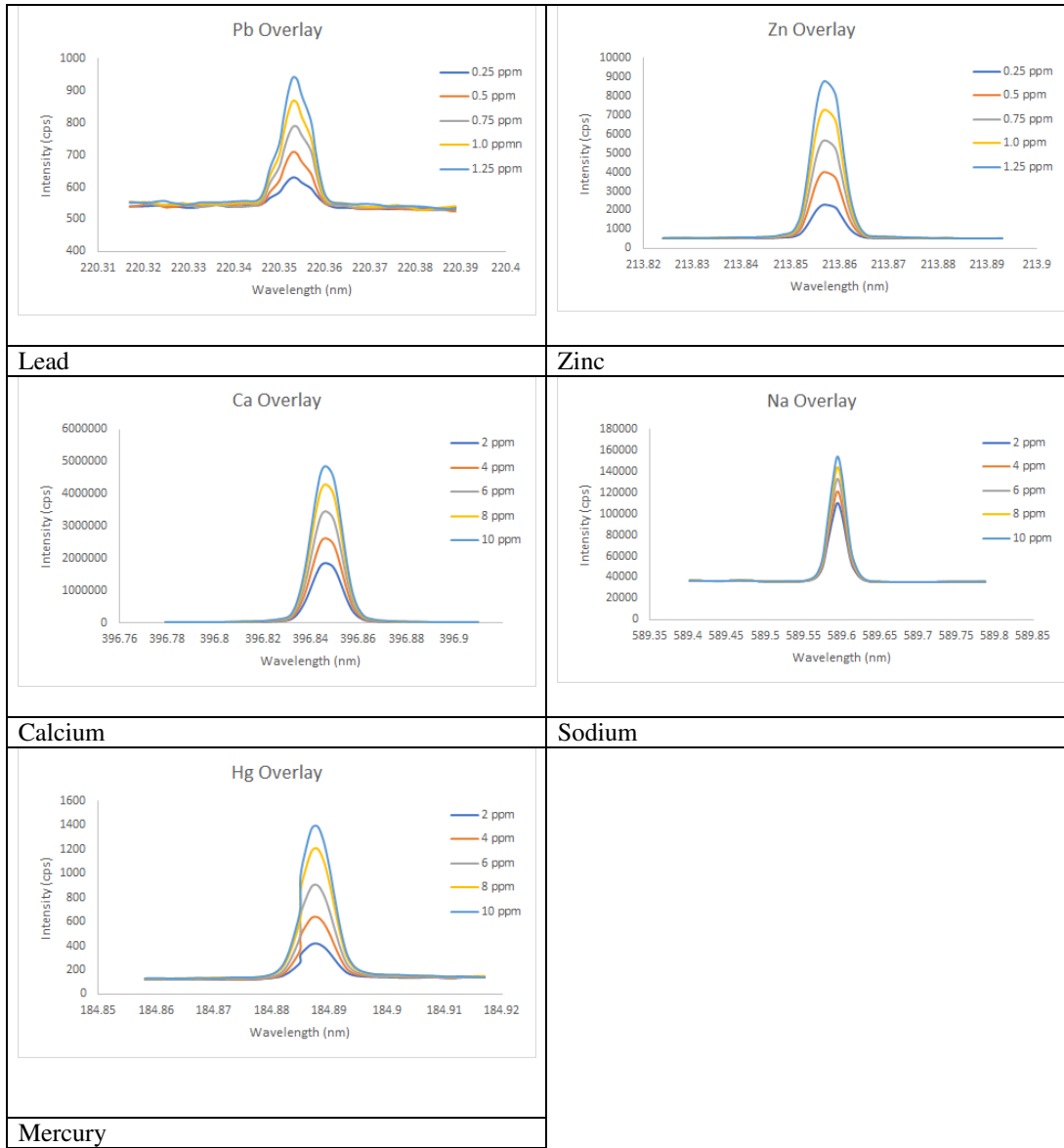
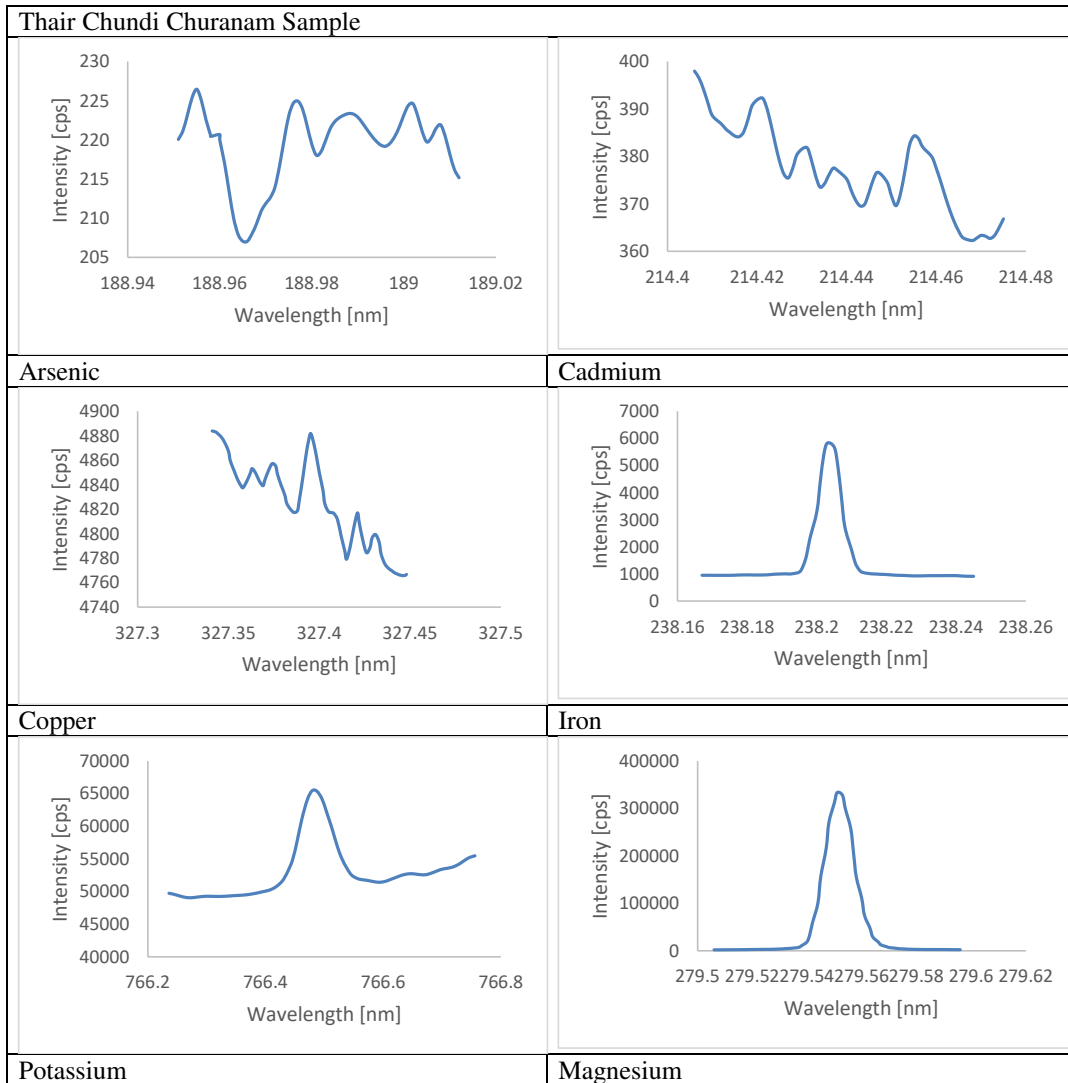


Figure I-Overlaid Graphs of Standard Solutions:

The Figure I shows the Overlaid Graphs of Standard Solutions

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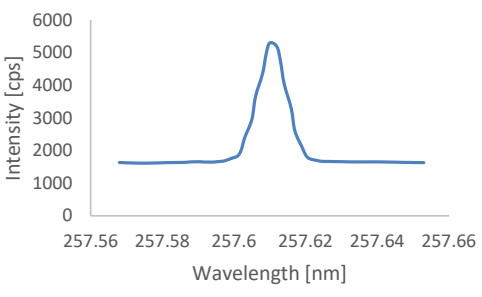
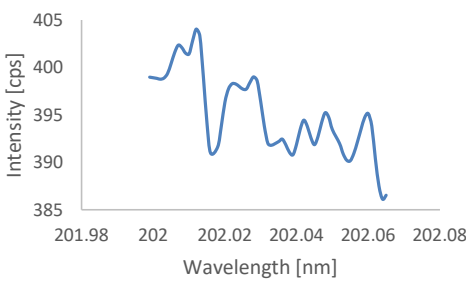
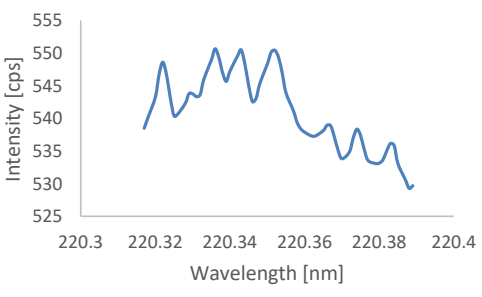
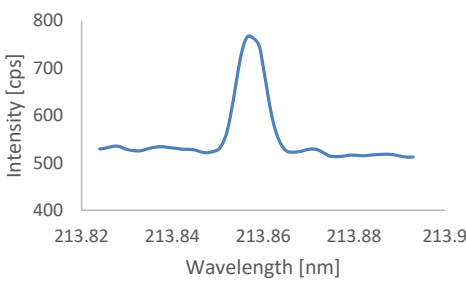
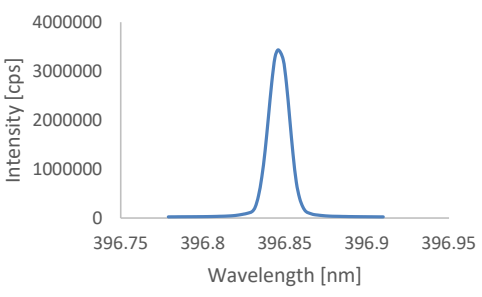
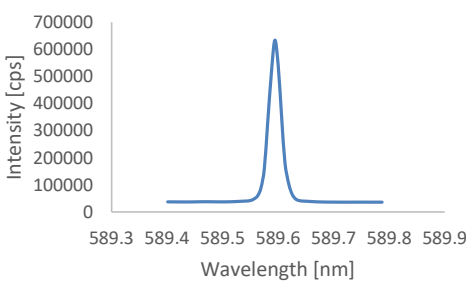
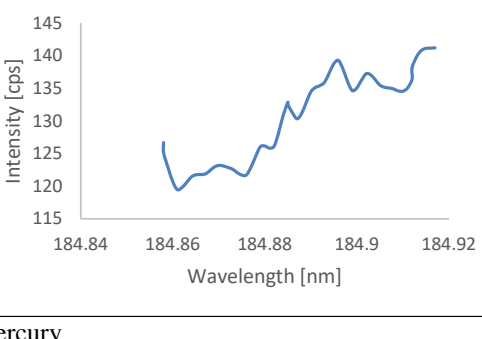
 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>	 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>
<p>Manganese</p>	<p>Molybdenum</p>
 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>	 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>
<p>Lead</p>	<p>Zinc</p>
 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>	 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>
<p>Calcium</p>	<p>Sodium</p>
 <p>Intensity [cps]</p> <p>Wavelength [nm]</p>	
<p>Mercury</p>	

Figure II-Overlaid graphs of elements in TCC

Figure II shows the Overlaid graphs of elements in TCC

Sodium is the cornerstone of any ORS preparation to quench the fluid loss with water reabsorption. However, a simple solution of water and sodium is futile due to the impaired absorption of Na⁺ by the intestinal wall during diarrhoeal episodes. Disruption in sodium absorption impedes water absorption as well. Conversely, excessive intestinal sodium levels exacerbate diarrhoea by promoting increased water secretion^[6,7]. Thereby and addition of glucose leads to sodium-glucose co-transport. Unlike Sodium, potassium is not conserved as effectively though renal compensatory mechanisms. Hence addressing the loss of potassium will aid in alleviating muscular weakness, lethargy and anorexia^[6]. The Calcium –Sensing Receptor activation is an upcoming inclusive anti-diarrheal mechanism that is anti-secretory and pro-absorptive while being anti-motility and anti-inflammatory. It uses Calcium and certain amino acids as a primary activator^[8]. Trace elements like Copper, Zinc, and Iron act as co-factors and activators of many enzymes^[9]. In diarrhoeal diseases, loss of zinc is known to cause decreased absorption of water and electrolyte and supplementation of zinc helped in reducing the duration of diarrhoea.^[10]

A physicochemical analysis of TCC revealed water-soluble extractive to be 46.3% which indicates the presence of sugar, acid, and inorganic compounds^[5]. It is suggested that the source of Glucose in TCC is dried *Zingiber Officinale* [ZO] with respect to studies on the monosaccharide composition of *Zingiber Officinale* which reported the presence of glucose to be (97.3%) and galactose (2.7%) in *Zingiber officinale* extract. The study also found that hot water extract of ZO improved diarrhoea symptoms, reduced weight loss, and decreased their water intake in mice with Antibiotic Associated Diarrhoea (AAD). Moreover, the levels of antimicrobial peptides like lysozyme and α -defensin-1 increased with ZO extract treatment. The amount of claudin-1, a protein essential for intestinal cell adhesion, also increased. Furthermore, ZO extract boosted levels of short-chain fatty acids such as acetic and butyric acid in the intestines, which were depleted due to AAD^[11]. Sour curd in TCC refers to cultured and fermented milk. The probiotic capacity of such processed curd has been shown to possess fifteen lactic acid bacterial species. It is important to note that all the species were resistant to antimicrobials, pancreatin and bile salts for 3 hours indicating strong probiotic ability. The mechanisms by which probiotics combat include competitive exclusion of pathogens for binding sites and nutrients, pH reduction in the gut environment with bacteriocin production, and enhancement of mucus production that fosters beneficial interactions among commensal organisms^[12]. Lactobacilli and bifidobacteria produce short-chain fatty acids that regulate cell growth, support epithelial function, and inhibit urease-producing strains, thereby preserving gut barrier integrity^[13].

CONCLUSION:

Based on the profiling of trace elements in *Thayirchundi Chooranam*, it is concluded that the study drug *Thayirchundi Chooranam* can be used as Siddha Oral Rehydration Therapy (SiORT), a ready-to-use novel oral rehydration solution covering all the aspects of comprehensive treatment in the management of dehydration and treatment of diarrhoea.

Further studies like the characterisation of *Lactobacilli* species, quantification of the established elements and clinical studies have to be conducted to confirm its clinical effectiveness

REFERENCES:

1. Kuppusamy Mudhaliar KN, Uthamarayan KS. Siddha Vaithiya Thirattu. 3rd ed. Department of Indian Medicine and Homeopathy; 2008. 219–220 p.
2. Semrad CE. Approach to the Patient with Diarrhea and Malabsorption. *Goldmans Cecil Med.* 2012;895–913.
3. Oral rehydration salts [Internet]. [cited 2024 Jul 12]. Available from: <https://www.who.int/publications/i/item/WHO-FCH-CAH-06.1>
4. Keerthana R, Visweswaran S, Muthukumar NJ, Banumathi V. Phytochemical and Physicochemical Analysis of Thayir Chundi Choornam a Siddha Herbo-Mineral Formulation. 12.
5. Semrad CE. Approach to the Patient with Diarrhea and Malabsorption. *Goldmans Cecil Med.* 2012;895–913.
6. Pawlowski SW, Warren CA, Guerrant R. Diagnosis and Treatment of Acute or Persistent Diarrhea. *Gastroenterology.* 2009 May;136(6):1874–86.
7. Diarrhoea [Internet]. [cited 2024 Jul 12]. Available from: <https://www.who.int/health-topics/diarrhoea>
8. WHO_FCH_CAH_06.1.pdf [Internet]. [cited 2024 Jul 12]. Available from: https://iris.who.int/bitstream/handle/10665/69227/WHO_FCH_CAH_06.1.pdf?sequence=1
9. Oral Rehydration Therapy ORT - How Oral Rehydration Therapy - ORT Works - Rehydration Project [Internet]. [cited 2024 Jul 9]. Available from: <http://www.rehydrate.org/ors/ort-how-it-works.htm>
10. Do C, Evans GJ, DeAguero J, Escobar GP, Lin HC, Wagner B. Dysnatremia in Gastrointestinal Disorders. *Front Med.* 2022 May 13;9:892265.
11. Cheng SX. Calcium-sensing receptor: A new target for therapy of diarrhea. *World J Gastroenterol.* 2016 Mar 7;22(9):2711–24.
12. Ruz M, Solomons NW. Mineral Excretion during Acute, Dehydrating Diarrhea Treated with Oral Rehydration Therapy. *Pediatr Res.* 1990 Feb;27(2):170–5.
13. Qadir MI, Arshad A, Ahmad B. Zinc: Role in the management of diarrhea and cholera. *World J Clin Cases WJCC.* 2013 Jul 16;1(4):140–2.
14. Ma Z jie, Wang H jun, Ma X jing, Li Y, Yang H jun, Li H, et al. Modulation of gut microbiota and intestinal barrier function during alleviation of antibiotic-associated diarrhea with *Rhizoma Zingiber officinale* (Ginger) extract. *Food Funct.* 2020 Dec 17;11(12):10839–51.
15. Balamurugan R, Chandragunasekaran AS, Chellappan G, Rajaram K, Ramamoorthi G, Ramakrishna BS. Probiotic potential of lactic acid bacteria present in home made curd in southern India. *Indian J Med Res.* 2014 Sep;140(3):345–55.
16. Isolauri E. Probiotics for infectious diarrhoea. *Gut.* 2003 Mar;52(3):436–7.