WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 15, 1581-1594. Research Article ISSN 2277–7105

PHYSICOCHEMICAL EVALUATION AND HPTLC PROFILING OF *KHARJOORADI CHURNA*

Dr. Swathi G.*[1], Dr. Sumi A.[2]

[1]Final Year Post Graduate Scholar, Department of Rasashastra and Bhaishajya Kalpana, Government Ayurveda College, Kannur, Pariyaram, Kerala.

[2]Assistant Professor, Department of Rasashastra and Bhaishajya Kalpana, Government Ayurveda College, Thiruvananthapuram, Kerala.

Article Received on 01 July 2026,
Article Revised on 22 July 2026,
Article Published on 01 Aug. 2026,

https://doi.org/10.5281/zenodo.21698871

***Corresponding Author**

Dr. Swathi G.

Final Year Post Graduate Scholar, Department of Rasashastra and Bhaishajya Kalpana, Government Ayurveda College, Kannur, Pariyaram, Kerala.

How to cite this Article: Dr. Swathi G.*[1], Dr. Sumi A.[2]. (2026). Physicochemical Evaluation And Hptlc Profiling of Kharjooradi Churna. World Journal of Pharmaceutical Research, 15(15), 1581–1594.

ABSTRACT

Background: *Kharjooradi churna* is a herbomineral preparation mentioned in *Yogaratnakara Mutrakrichra adhikara*. This study aims to assess the pharmaceutical and analytical characteristics of *Kharjooradi Churna* to establish preliminary standardization data. **Methods*:*** *Kharjooradi Churna* was prepared according to classical guidelines and evaluated for physicochemical parameters, including pH, loss on drying (LOD), water-soluble extractive value, total ash, and acid-insoluble ash, along with microbial contamination and HPTLC fingerprint profiling. **Results:** The formulation yielded a fine, light brown powder with a characteristic odour and sweet with mild pungent taste. Analysis of the formulation yielded the following results: Loss on drying (LOD): 6.46% w/w, pH :5.05, Total ash: 3.82% w/w, Acid insoluble ash: 0.06 % w/w, Water soluble extractive :32.25 % w/w, Alcohol soluble extractive: 21.18 % w/w. Total bacterial count: 30000 CFU/g, Total yeast and mould count: 400 CFU/g, with absence of specific pathogens. **Conclusion:** The study characterized the pharmaceutical and analytical parameters of *Kharjooradi Churna*, demonstrating its authenticity, purity, safety, and phytochemical profile. These findings can be used as reference standards for quality evaluation and maintaining batch-to-batch consistency.

KEYWORDS: *Kharjooradi churna*, *Mutrakrichra*, Pharmaceutical study, Analytical study,

Physicochemical parameters.

INTRODUCTION

Ayurveda, the traditional system of medicine, utilizes a wide range of dosage forms known as *Kalpanas* to achieve effective therapeutic outcomes. Among these, *Churna Kalpana* is one of the most commonly prescribed solid dosage forms. It is considered as the secondary *kalpana* of *kalka Kalpana*. In simple words, it is known as powdered medicine, in which the powder is prepared from either a single drug or a combination of drugs and is commonly used in *Ayurvedic* treatments.[1] The therapeutic efficacy of a *Churna* depends not only on the selection of authentic raw materials but also on standardized pharmaceutical processing and quality evaluation. Variations in the source of raw drugs, processing methods, particle size, moisture content, and storage conditions can influence the quality, stability, and therapeutic performance of the formulation. Therefore, establishing pharmaceutical and analytical standards is essential to ensure the quality, safety, and efficacy of Ayurvedic formulations.

Kharjooradi churna is an Ayurvedic formulation mentioned in *Yogaratnakara Mutrakrichra adhikara.* It is indicated in *Anga daha, Linga daha, Guda vankshana sukra daha, Sarkara* and *Asmari soola*.[2] The formulation contains *Kharjoora, Amalakabeeja, Pippali, Shilajatu, Ela, Madhuka, Pashanabeda, Swetha Chandana, Ervaru beeja, Dhanyaka,* and *Sarkara*. *Anupana* is *Jyeshtambu* (rice wash of *Sali*). Despite its established therapeutic applications, the formulation remains insufficiently characterized with respect to its preparation and analytical parameters.

Therefore, the present study was undertaken to prepare *Kharjooradi Churna* according to classical Ayurvedic procedures and to establish its pharmaceutical and analytical profile through physicochemical evaluation. The generated data provide baseline analytical parameters that can serve as reference standards for the identification and routine standardization of the formulation.

AIM

1. To prepare *Kharjooradi Churna* following traditional methods.
2. To analyse its physicochemical and microbial properties to establish reference parameters.

MATERIALS AND METHODS

Collection and authentication of raw drugs

Kharjooradi churna consist of 11 drugs. *Kharjoora, Amalaka beeja, Pippali, Shilajatu, Ela, Madhuka, Pashanabheda, Swetha Chandana, Ervaru beeja, Dhanyaka,* Sugar. *Pashanabheda* was purchased from Sanchomee Herboveda Pvt. Ltd. (Manikarnika Aushadhalaya) Pune. Sugar, *Dhanyaka, Ela, Ervaru, Amalaki* were purchased from local market. *Kharjura* was purchased from Ajfan dates and nuts Payyanur. All other drugs were procured from Sri Manjunath Ayurvedics Payyanur.

Study setting

1. Authentication of herbal ingredients was carried out from the Department of Dravyaguna Vijnana, Government Ayurveda College Kannur.
2. Authentication of mineral ingredients were performed from the Department of Rasashastra and Bhaishajya Kalpana, Government Ayurveda College Kannur and Sophisticated Test and Instrumentation Centre, CUSAT, Kochi.
3. Preparation of *Choorna* - Department of Rasashastra and Bhaishajya Kalpana, Government Ayurveda College, Kannur.
4. Analytical study – Department of QA and QC laboratory, Arya Vaidya Sala, Kottakkal.

Pharmaceutical study

Pharmaceutical study involves a series of steps that facilitate the conversion of raw drugs into therapeutically useful forms. Each stage of this process is significant, as the final outcome of the research largely depends on the quality of the raw materials and the accuracy of the methods used during preparation.

1. Collection of raw drugs
2. Authentication of raw materials
3. Processing of raw materials
4. Preparation of *Kharjooradi churna*

1. Collection of raw drugs

All raw materials were procured from certified cultivators under strict quality assurance measures.

2. Authentication of raw materials

According to API guidelines, the authentication of all the drugs was carried out through their

respective macroscopic and microscopic analysis. The mineral drug was subjected to SEM–EDAX and FTIR analysis.

3. Processing of raw materials

All the raw materials except *Shilajatu* and Sugar were washed properly to remove external impurities and was dried under sunlight.

a) Shodhana of *Shilajatu*[3]

Reference – *Rasatarangini*

Materials required:

Raw *Shilajatu*, *Triphala Kashaya*, hot water, steel vessels, spoon, trays, weighing balance, measuring jar, mortar and pestle.

Preparation of *Triphala Kashaya*

Triphala Kashaya should be prepared by taking an amount of *triphala* equal to the amount of *shilajthu* used for *shodhana*. So the *kashaya* preparation was done by taking 250g coarse powder of *Triphala* in a stainless vessel and by adding 2000ml (eight times) of water and it was reduced to 1/4th (500ml).

Shodhana

According to the reference in *Rasatarangini*, *Shilajathu Shodhana* was carried out by *Suryatapi* method.

250 g of *Shilajatu* was taken, crushed using a clean mortar and pestle, and then dissolved in 125 ml of *Triphala Kashaya* and 500ml of hot water. The mixture was then kept under sunlight for one *yama*. After this, it was filtered through a cotton cloth. On the following day, the filtrate was again placed under sunlight and kept undisturbed. When it is exposed to sunlight, scum was formed on the upper part of the liquid media. The formed scum was carefully collected every day by using a spoon, transferred into a tray and kept for drying. The procedure was continued until almost all scum was collected. The collected scum was dried well, powdered, and stored in an air-tight container. It took 6 days for the completion of the whole process.

Table no 1: Weight of *Shilajatu* before and after *shodhana*.

Sl no.	*Shilajatu*	Weight
1	Before *shodhana*	250 g
2	After *shodhana*	174.3g

Images of *shilajatu shodhana*

Fig. 1: Shilajatu in Triphala Kashaya medium.

Fig. 2: Formation of a thin scum layer.

Fig. 3: Well-formed scum layer.

Fig. 4: Collection of scum from the surface.

Fig. 5: Scum spread in tray for drying.

Fig. 6: Flakes of *Shodhitha Shilajatu.*

4. Preparation of *Kharjooradi churna*. – Based on the principles of *Churna Kalpana* described in *Sharangadhara Samhitha, Madhayama Khanda.*[4]

Table no. 2: Ingredients of *Kharjooradi churna*.

Sl no.	Ingredient	Botanical name	Parts used	Quantity as per reference	Quantity used
1	*Kharjoora*	*Phoenix dactilifera*	Fruit	1 part	30 g
2	*Amalaka*	*Emblica officinalis*	Seed	1 part	30 g
3	*Pippali*	*Piper longum*	Fruit	1 part	30 g
4	Purified *Shilajatu*	*Asphaltum punjabinum*	-	1 part	30 g
5	*Ela*	*Elettaria cardamomum*	Fruit	1 part	30 g
6	*Madhuka*	*Glycyrrhiza glabra*	Root	1 part	30 g
7	*Pashanabheda*	*Bergenia ligulata*	Root	1 part	30 g
8	*Swetha Chandana*	*Santalum album*	Heart wood	1 part	30 g
9	*Ervaru beeja*	*Cucumis utilissimus*	Seed	1 part	30 g
10	*Dhanyaka*	*Coriandrum sativum*	Fruit	1 part	30 g
11	*Sarkara* (sugar)	-		1 part	30 g

Images of Ingredients

Fig. 7: Kharjura.

Fig. 8: Amalaka beeja.

Fig. 9: Pippali.

Fig. 10: Shilajatu.

Fig. 11: Ela.

Fig. 12: Madhuka.

Fig. 13: Pashanabheda.

Fig. 14: Swetha Chandana.

Fig. 15: Ervaru beeja.

Fig. 16: Dhanyaka.

Fig. 17: Sita.

Requirements

Weighing balance, Mixer grinder, Sieve with sieve number 85, Spoon, steel vessels, storage bottles, Knife.

Procedure

- All the drugs except *Shilajatu* and sugar were washed well and was dried under shade.
- *Swetha Chandana* was cut into small pieces before powdering.
- *Shilajatu shodhana* was done as per *Rasatarangini* reference before powdering.
- All the drugs were separately powdered using a mixer grinder to obtain a fine and uniform powder.
- The powdered materials were then individually passed through sieve number 85 to ensure uniform particle size and to remove any coarse particles.
- After sieving, 30 g of each powdered drug was accurately weighed and kept separately.
- Subsequently, the weighed powders were thoroughly mixed together in proper proportions to obtain a homogeneous mixture.
- The mixing process was carried out carefully to ensure uniform distribution of all the ingredients throughout the formulation.

- Total 330 g of *churna* was prepared, which was collected and stored in dry air tight container for further analysis and evaluation.

Fig.18 Sieving of churna.

Fig.19 Churna obtained after sieving.

Fig.20 Mixing of churna.

Fig.21 Kharjooradi churna.

Analytical study

The analytical parameters like Loss on drying, Total ash, Acid insoluble ash, pH value, Water soluble extractive, Microbial analysis, Instrumental analysis - HPTLC were done.

OBSERVATION AND RESULTS

Table no. 3: Organoleptic characters of *Kharjooradi churna.*

Sl no.	Characters	Observed
1	Colour	Light brown
2	Odour	Characteristic
3	Taste	Sweet with mild pungent
4	Consistency	Fine powder with smooth texture

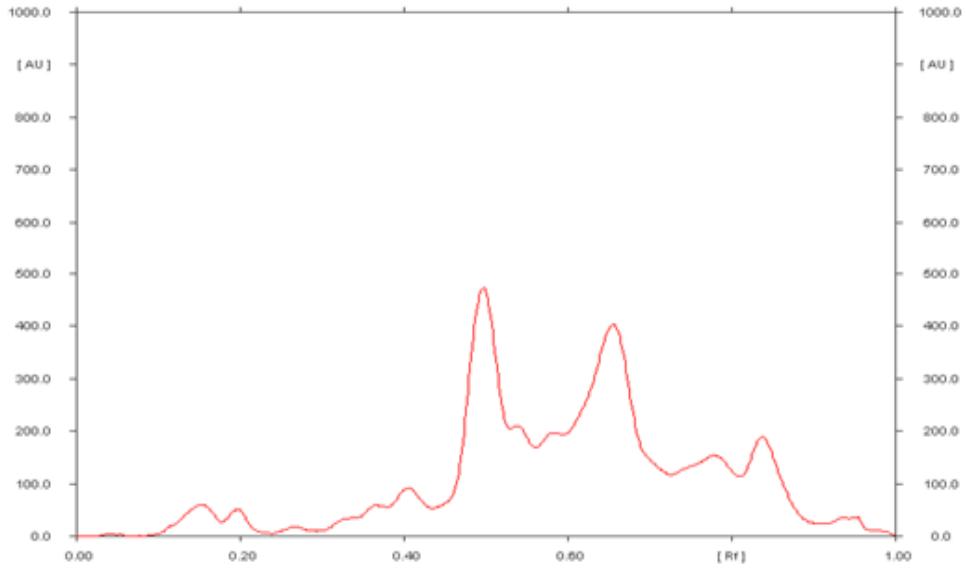
Table no. 4: Physico chemical parameters of *Kharjooradi churna.*

Sl no.	Test Parameters	Unit	Result
1	Loss on drying	% w/w	6.46
2	pH	-	5.05
3	Total ash	% w/w	3.82
4	Acid insoluble ash	% w/w	0.06
5	Water soluble extractive	% w/w	32.25
6	Alcohol soluble extractive	% w/w	21.18

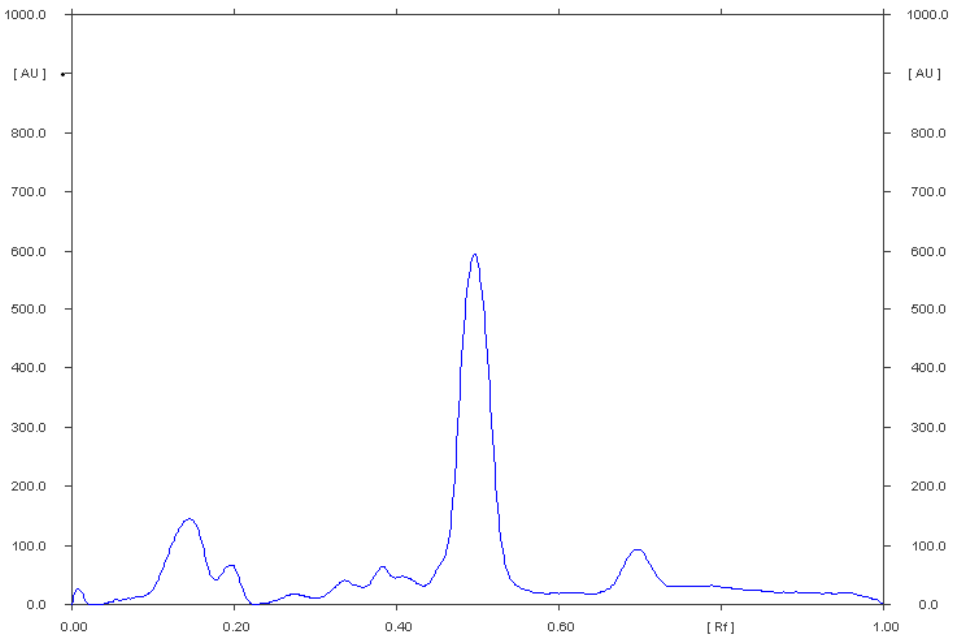
Table no. 5: Microbial analysis.

Sl no.	Test parameter	Unit	Result	Standard
1	Total bacterial count	cfu/g	30000	NMT 100000
2	Total yeast and mould count	cfu/g	400	NMT 1000
3	*Escherichia coli*	-	Absent	Should be absent in 1g
4	*Salmonella typhi*	-	Absent	Should be absent in 10g
5	*Pseudomonas aeruginosa*	-	Absent	Should be absent in 1g
6	*Staphylococcus aureus*	-	Absent	Should be absent in 1g

HPTLC Analysis of *Kharjooradi churna*

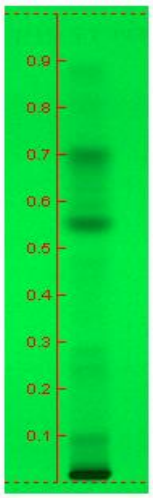


Graph 1: Overview graph of *Kharjooradi churna* sample at 254nm.



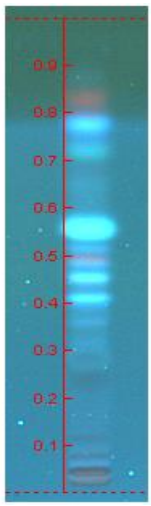
Graph 2: Overview graph of *Kharjooradi churna* sample at 366nm.

TLC plate views of *Kharjooradi churna* sample



At 254 nm

Fig. 22



At 366nm

Fig. 23

Table 6: Rf value and area % of the *churna* at 254nm.

Peak No.	Rf value	Area (AU)	% Area (AU)
1	0.15	2248.2	2.76
2	0.20	1235.1	1.52
3	0.26	461.2	0.57
4	0.36	2376.2	2.92
5	0.41	3113.2	3.83
6	0.50	18663.0	22.94
7	0.54	4664.7	5.73
8	0.58	4898.4	6.02
9	0.66	25399.3	31.22
10	0.78	9032.8	11.10
11	0.84	7771.2	9.55
12	0.94	751.6	0.94
13	0.95	729.5	0.90

Total no. of Peak – 13

Total Area – 81344.4 (AU)

Table 7: Rf value and area% of the *churna* at 366nm.

Peak No.	Rf value	Area (AU)	% Area (AU)
1	0.01	195.6	0.47
2	0.14	6085.5	14.49
3	0.20	1516.5	3.61
4	0.27	541.0	1.29
5	0.34	1243.0	2.96
6	0.38	1534.3	3.65
7	0.41	1160.8	2.76
8	0.50	23082.1	54.96

9	0.70	4254.7	10.13
10	0.79	1773.4	4.23
11	0.95	608.6	1.45

Total no. of Peak – 11

Total Area – 41995.5 (AU)

DISCUSSION

Kharjooradi Churna was prepared according to a standardized procedure to maintain the authenticity, purity, and quality of the formulation. All raw materials were obtained from certified cultivators and underwent proper authentication as per the standards of the Ayurvedic Pharmacopoeia of India.[5] *Shilajatu* underwent *shodhana* before powdering to ensure its suitability for formulation.

Shodhana of *Shilajatu* (*Suryatapi* Method)

In the present study, *shodhana* was carried out according to the reference of *Rasatarangini* using the *Suryatapi* method, which employs sunlight as a mild and controlled source of energy.

Observations during *Shodhana*

During the *shodhana* process, *Shilajatu* dissolved to form a dark brown to black solution. Insoluble impurities gradually settled at the bottom, while exposure to sunlight resulted in the gradual evaporation of water. A scum-like layer of purified *Shilajatu* formed on the surface, with its formation being more prominent during the initial days and decreasing progressively. The collected scum was initially soft and sticky but became hard and brittle after drying. No abnormal odour or discoloration was observed throughout the process, and purification was continued until minimal or no further scum formation occurred.

Outcome of *Shodhana*

The final product obtained after drying was relatively pure, fine, and suitable for therapeutic use. The reduction in weight after *shodhana* reflects the removal of impurities and concentration of the active component. The duration of 8 days indicates that the process is time-dependent and requires careful observation and consistency.

Standardized Preparation of *Kharjooradi Churna*

After authentication all drugs were cleaned, dried under shade and then packed separately in ziplock bags. Due to the sticky and fibrous nature of *Kharjura*, it was difficult to obtain a fine

powder. This difficulty was minimized by repeated drying before grinding. Extreme care was taken during the entire study to prevent contamination and fungal infestation. Steel utensils were used for both *shilajatu shodhana* and preparation of *churna*. The previously dried drugs, along with sugar and *Shilajatu*, were powdered separately and passed through sieve No. 85 to obtain a fine powder of uniform particle size. The reduced particle size increases surface area, facilitating faster dissolution, improved absorption and enhanced bioavailability.[6] The powders were stored separately in ziplock bags. *Kharjooradi churna* was prepared after mixing equal quantity of all the ingredient *churna*s. Each *churna* was added and mixed thoroughly to form a homogenous mixture. This was stored in an air tight plastic container and sent for analytical evaluation.

Organoleptic and Physicochemical Characterization

Kharjooradi churna was light brown in colour with a characteristic odour and sweet taste with mild pungency. The fine powder consistency ensures uniformity, facilitating better absorption and dosing accuracy.

Loss on drying of *Kharjooradi churna* was found to be 6.46 % w/w which indicates moisture content of the formulation.

pH of *Kharjooradi churna* was found to be 5.05 which is slightly acidic. pH plays a crucial role as it affects the solubility, stability, and biological compatibility of a drug. The pH also influences how drugs pass through biological membranes, highlighting its significance in drug delivery. Moreover, variations in pH across different regions of the body can be utilized for targeted drug delivery.

The total ash value serves as an important parameter for assessing the purity and authenticity of the sample. Total ash value of the sample was 3.82% w/w.

Acid insoluble ash in the sample was found to be 0.06 % w/w which indicates less adulteration. A lower acid-insoluble ash value also suggests higher bioavailability of the formulation.

Extractive values represent the quantity of active constituents obtained from a given amount of plant material when extracted with respective solvent. A lower value compared to standard value indicate presence of exhausted material. Water soluble extractive in the *churna* was 32.25 % w/w.

Alcohol soluble extractive was 21.18% w/w. The alcohol-soluble extractive value reflects the amount of constituents in a drug that are soluble in alcohol, which may include compounds responsible for therapeutic effects.

Microbial analysis

Microbial analysis is essential for evaluating the safety, effectiveness, and overall quality of herbal formulations. The microbiological evaluation of the sample shows that all parameters are within pharmacopoeial limits. The total bacterial count was found to be 30,000 CFU/g, and the total yeast and mould count was 400 CFU/g, both of which are within the permissible range. Additionally, no pathogenic organisms such as *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* were detected.

HPTLC Profiling

HPTLC analysis of *Kharjooradi Churna* generated a characteristic chromatographic fingerprint, indicating the presence of multiple constituents. At 254 nm, the chromatogram showed 13 peaks (Rf 0.15–0.95), with the major peak at Rf 0.66 (31.22%), followed by Rf 0.50 (22.94%) and Rf 0.78 (11.10%). The total peak area was 81344.4 AU, which demonstrates the quantitative distribution of compounds at this wavelength. At 366 nm, 11 peaks (Rf 0.01–0.95) were observed, with the highest area at Rf 0.50 (54.96%), followed by Rf 0.14 (14.49%) and Rf 0.70 (10.13%). The total peak area at this wavelength was 41995.5 AU, which is comparatively lower than the total area recorded at 254 nm.

TLC plate visualization under both wavelengths revealed distinct spots at different Rf values, confirming the presence of multiple constituents. The HPTLC fingerprint can serve as a reference for the identification, quality assessment, and batch-to-batch consistency of the formulation.

Further characterization of the detected constituents by LC–MS or NMR, along with evaluation of their biological activities, would provide deeper insight into the formulation.

Limitations and Future Directions

- Constituent-wise profiling of individual ingredients was not performed, limiting comparative evaluation of their contributions to the formulation.
- Quantification of Active Constituents.

CONCLUSION

The present study provides a comprehensive pharmaceutical and analytical evaluation of *Kharjooradi Churna*, including physicochemical, microbiological, and HPTLC analyses, to establish its quality characteristics.

The major findings of the study include

- The physicochemical profile reflected the quality and purity of *Kharjooradi Churna.*
- Microbial counts were within permissible limits, with no specific pathogens detected.
- HPTLC fingerprinting established a characteristic chromatographic profile for standardization.

The findings of this study provide baseline data for the standardization and quality control of *Kharjooradi Churna* and support future research on this classical Ayurvedic formulation. Further studies involving phytochemical characterization, mechanism of action, in vivo evaluation, toxicity assessment, and clinical trials are recommended to further validate its therapeutic applications.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Quality Assurance Department and Quality Control Laboratory of Arya Vaidya Sala, Kottakkal for carrying out the analytical studies for this research work.

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