Case report

An Observational Cross-Sectional Single Arm Trial and Perspective Study of Siddha Diagnostic Tool *Neerkuri* and *Neikuri* (Uroscopy) in Covid 19 Patients

ABSTRACT

Aim
Siddha diagnostic method *neerkuri* includes the visual observation of urine directly or by adding one drop of gingelly oil on the urine surface. The study is an effort to understand the non-invasive affordable Siddha method of identifying pathological disorders, which may be used for both diagnostic and prognostic purposes in COVID cases. The present aim is to clinically validate the effectiveness of *neerkuri-neikuri* urine tests in predicting the outcome of Covid 19 infection and also the effect of fixed Siddha treatment.
Presentation of Case
This study was conducted among ten patients with SARS-CoV2 infection admitted in Kokila Siddha Hospital and Research Centre, COVID-ward. They underwent modern tests as well as Siddha diagnostic test *neerkuri-neikuri* and the results interpreted. For adequate assessment, the entire procedure was captured in the form of video clips.
Discussion
The foundation of *neerkuri-neikuri* is one of the *Envagaithervu* (Eight-fold assessment) of Siddha diagnosis based on three humor theory, fundamental physiology and it alter with specific infection. The *neerkuri-neikuri* tests are rational criteria that are comprehensive to understand one's health and illness status based on Siddha physiopathology.
Conclusion
After the administration of the Siddha intervention, the *neerkuri-neikuri* test results also showed good improvement along the clinical symptoms and modern laboratory parameters of patient tests. The prognostic clinical findings and modern test results were also simultaneously reflected in the *neerkuri-neikuri* tests. After the completion of Siddha treatment, the *neikuri* patterns also reached single *kabha* humor in *muthu*(pearl), *vatha* humor in *aravu*(snake) and s*angu*(conch-shell) patterns from three humor state, which indicated a good prognosis.

Keywords: Neerkuri, Neikuri, Covid 19, Therayar

1. INTRODUCTION

Urine is a liquid by-product of the body that is ejected through the urethra after being secreted by the kidneys through urination. A urinalysis (often called a urine test) evaluates the visual, chemical, and microscopic features of the urine. In modern science, urinalysis has become a routine test procedure to diagnose any disease like Urinary tract infection, diabetes, kidney diseases etc., and to know the prognosis [1].

This method of examination was performed by Greek physicians as far back as 500 BC in ill patients. Medieval European physicians began performing the procedure regularly and documenting their findings. 7000 years before the time of saint *Agathiar*, the saint *Therayar* wrote about the visual quantitative and qualitative properties of urine, the *neerkuri* (visual urine analysis) and the reaction of gingelly oil on the surface of the urine, the *neikuri* (oil-urine test analysis) one of the prime diagnostic procedures in Siddha medicine. Siddha's philosophy holds that urine is composed of *appu bhutham* (water element), just like blood, semen, fat and bone marrow [2]. *Siruneerkuri Sothanai, Theraiyar Neerkuri Vaithyam* and *Sarabendrar Siddha Maruthuva Sudar* are popular manuscripts cum books that describe the findings of urine examinations for diagnostic and prognosis purposes [3] [4] [7].

Sage Theraiyar made a substantial contribution to Siddha's diagnosis and therapy methods [5]. *Neerkuri's* general observations include *Niram* (Color), *Nirai* (Density), *Naatram* (Odour), *Nurai* (Froth), and *Enjal* (Volume/time). The good or poor prognosis of numerous diseases is assessed by the neikuri test [6]. According to Siddha medicine, Covid 19 could be compared with *Kabasuram* [10].

2. AIM

To evaluate the diagnosis and prognosis of *Kabasuram* (Covid 19) using one of the Siddha diagnostic methods *Neerkuri- neikuri* analysis.

3. OBJECTIVES

3.1. Primary objective

To study the prognosis of *Kabasuram* with Siddha diagnostic methods such as *neerkuri- neikuri* and compare it with modern diagnostic methods.

3.2 Secondary objectives

Observing the changes of *neerkuri* and *neikuri* after the intake of Siddha medication and studying the different patterns of *neikuri* to compare them before and after the administration of Siddha intervention.

4. MATERIALS AND METHODS

4.1 Study Design

This is an Observational Cross-Sectional Study Single Arm Trial. The comparative study was carried out to assess the Siddha diagnostic methods like *neerkuri-neikuri* with modern diagnostic methods in Covid 19 patients.

4.2 Sample Size

Ten (10) patients with laboratory-confirmed diagnosis of coronavirus (SARS- CoV2) infection had been involved in the study. The patients were admitted to the Covid ward, Kokila Siddha Hospital and Research Centre, Madurai.

4.3 Inclusion Criteria

- All patients included in this study were diagnosed with COVID-19 based on the World Health Organization (WHO) guidelines those who had an influenza-like illness and were SARS-CoV-2 Reverse transcription-polymerase chain reaction (RT-PCR) positive in a throat swab.
- Both male and female
- belonging to age 12 years and above
- Willing to participate in the study

4.4 Exclusion Criteria

- Age below 12 years and above 70 years
- Having HT or DM, Bronchial asthma, CKD or liver diseases.
- Female patients on DUB or menstrual days during the study
- Not willing to test their urine
- Patients taking essential modern medicines for their existing illness

4.5 Procedure

At the time of admission, the selected subjects were started with siddha treatment and investigated using both modern and Siddha tests at the time of admission, every 5 days after starting Siddha intervention until they were discharged [11], [12].

4.5.1 Modern tests

RT-PCR test, CT scan (lung), FBS or PPBS or RBS, serum urea, serum creatinine and liver function test were done at the time of admission. COVID markers ferritin, LDH, D-Dimer and CRP were done for prognosis during admission and also before discharge.

4.5.2 *Neerkuri/Neikuri* test

According to *neerkuri* the *niram* is color, *nurai* is froth, *enjal* is volume/time per day, they were recorded. *Neikuri* deals with the various reactions like floating, spreading, drowning, splitting, mingling, shaping, bubbling, dips and hikes appearing, whirling, disappearing, boiling, immersion, dispersion, movement and stability of the oil drop which is instilled in the urine surface. It was carefully observed from the time of instilling to till the time it becomes disappear or no reaction. The test results obtained from *neerkuri-neikuri* were used for the interpretation of *vali, azhal and iyam* humor and their differentiation, diagnosis, good or poor prognosis and the sequel of diseases.

4.5.3 Siddha intervention

The Siddha drugs given to the patients are mentioned in Table 1.

Name	Duration	Formula	Dose & *Anupanam* (Adjuvant)
Thaleesadi churnam	5-14 days	*Agasthiyar ratnachurukkum*	1 gram with hot water, three times in a day after food
Nialvembu Kudineer	5-14 days	*Siddha vaidya thirattu*	60 ml, once in a day, before food
Vasantha kusumakaram mathirai	5-7 days	*Siddha vaidya thirattu*	100 mg, twice in a day after food
Brahmananda bairavam mathirai	5-7 days	*Siddha vaidya thirattu*	100 mg, twice in a day after food
Kasthuri karuppu	5-7 days	*Siddha vaidya thirattu*	50 mg, twice in a day after food
Adathodai manappagu	5-14 days	*Siddha vaidya thirattu*	10 ml with hot water, twice in a day after food
Swasa Kudori mathirai	5-14 days	*Siddha vaidya thirattu*	100 mg, twice in a day after food

Table 1. List of Siddha drugs

4.5.4 Diet and Siddha Drug Regimen

The following table (Table 2) consists of the diet and drug followed for the covid patients during the hospital stay.

Time	Diet and Drug
6.30 am	*Vazhalai Vaanguthal* and Yoga
7.00 am	*vedhu* (steam inhalation) and *otrada pottani* (bundle fomentation) using *Notchi* leaves
7.30 am	*Nilavembu kudineer*
8.00 am	Idiappam or Idli
8.30 pm	*Brammanantha bairava matthirai*, *Adhathodai manapagu*, *Thaleesadhi chooranam*, *Swasakudori mathirai*
10.30 am	Fruit Juice or Salad
12.00 noon	*Chukku* Decoction + *Peyan* or *Sirumalai vazhaipazham* (banana)
1.30 pm	Rice or *Karunkuruvai* or Barley *Kanji* with pepper gravey and pepper *rasam* or *panchamutti kanji* or *chukku mudichu kanji*
2.00 pm	*Vasanthakusumagaram mathirai*
3.00 pm	Vegetable Juice or Soup
5.00 pm	Paruppu sundal (boiled lentils)
6.00 pm	*Kabhasura kudineer*
7.00 pm	Idli or Utthappam (without oil)
7.30 pm	*Brammanantha bairava matthirai*, *Adhathodai manapagu*, *Thaleesadhi chooranam*, *Swasakudori mathirai*, *Kasthuri karuppu*
8.00 pm	*Thiripala churanam* or *Asta churanam* 2 gram with hot water

Table 2. Diet and Siddha Drug Regimen

5. OBSERVATION AND RESULTS

5.1. Signs and symptoms

The common signs and symptoms of cough, anorexia, mild dyspnea, malaise, fever, diarrhea, vomiting and headache were observed and noted. The common signs and symptoms before and after Siddha treatment of the patients who have been selected for the study have shown in Table 4.

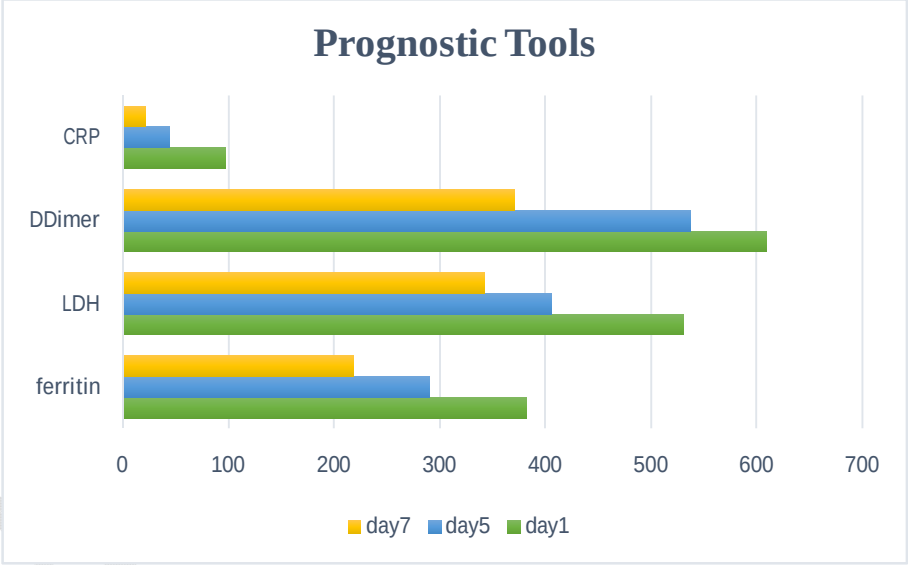
5.2. Blood Bio-chemical parameters

RT-PCR or CT-chest has been used for the initial diagnosis of Covid 19 along with biochemical tests like Ferritin, LDH, D-Dimer and CRP have also been recorded at the time of admission, every 5 days of Siddha treatment and before discharge. The test results of COVID markers in Table 3 and Figure 1 showed significant improvement of Siddha intervention.

COVID Markers	
Parameters	**(Mean±SD)**
Ferritin	382.4±191.4
LDH	531.2±146.3
D-Dimer	610.07±543.4
CRP	97.24±50.1

Table 3. COVID markers at the time of admission

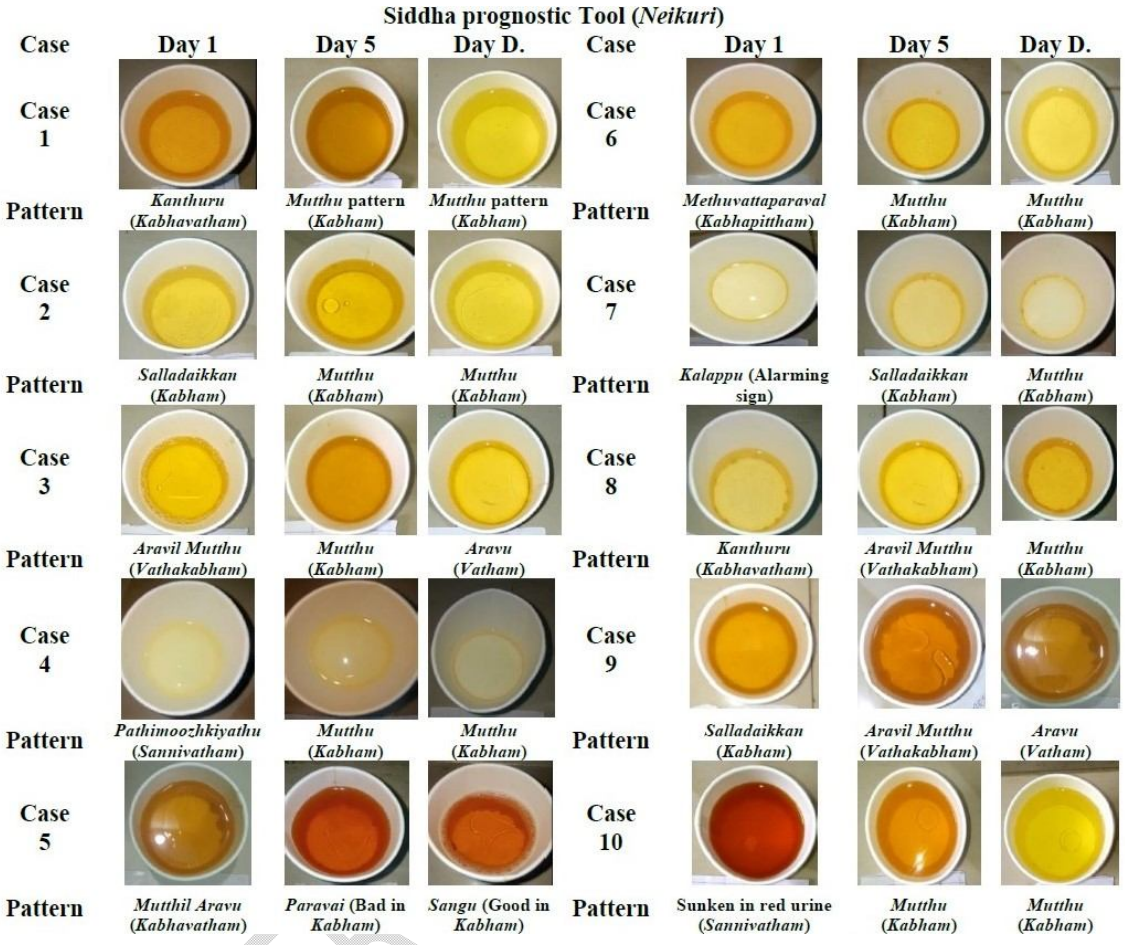
Figure 1: Modern Prognostic tools in Covid 19 patients



5.3. Siddha *neerkuri/neikuri* parameters

The urine sample was analyzed as mentioned by *Siddhar Therayar* in the text *Siruneerkuri Sothanai* [4]. In this study we could able to find *Niaram* (color), *Nurai* (froth), *Enjal* (Deficiency/Frequency) and *Satthu* (Deposits/Essence), but could not able to analyze *Edai* (Weight) and *Manam* (Odour). At the time of discharge there was no notable difference observed in the *niram* (color) except the red color urine became yellow in 2 cases (20%) before discharge. *Nurai/Satthu* (froth/sediments) showed significant reduction and *enjal* (frequency) showed some increase in frequency urination at the time of discharge. Most of the samples in *neikuri* test had *Kanthuru/Thandrikkai* (nape of the neck/Bellerica-fruit) *Salladaikan* (sieve-filter), *Moozhgiyanilai* (sunken), *Kabhakalappu* (*kabha* union) and *Methuvatta paraval* (slow spread & circle) which denoted Kabham*, Kabhavatham, Sannivatham* and *Sanni* at the time of admission. After Siddha intervention all the samples showed single *kabha* humor in *Muthu* (Pearl), *vatha* humor in *Aravu* (snake) and *Sangu* (Conch-shell) patterns which denoted good prognosis (Figure 2).

Figure 2: Siddha Prognostic tools in Covid 19 patients



5.4 Diagnostic and Prognostic Signs/Symptoms

The common signs and symptoms, the modern and Siddha diagnostic and prognostic test results before and after Siddha treatment were noted in Table 4.

Prognostic tools	Parameters		During the treatment					
			Day 1 N (%)	Day 2 N (%)	Day 3 N (%)	Day 4 N (%)	Day 5 N (%)	Dis. Day N (%)
Symptoms	Cough		70%	60%	30%	10%	10%	10%
	Anorexia		30%	30%	10%	-	-	-
	Dyspnea		50%	40%	10%	-	-	-
	Malaise		70%	50%	-	-	-	-
	Fever		40%	30%	-	-	-	-
	Diarrhea		20%	-	-	-	-	-
	Vomiting		10%	-	-	-	-	-
	Headache		20%	20%	-	-	-	-
Neerkuri	*Niram* (Color)	Yellow	60%				40%	70%
		Red	20%	-	-	-	20%	20%
		White	20%				40%	10%
	Nurai (Froth)	Present (+)	40%	-	-	-	30%	30%
		Absent (-)	60%				50%	70%

Neikuri	*Enjal* (Volume/Time)	Deficiency	80%	-	-	-	50%	10%
		Frequency	20%				50%	90%
	Satthu (Sedimentation)	Present (+)	50%	-	-	-	20%	30%
		Absent (-)	50%				80%	70%
	Kanthuru (Bellerica fruit) - *Kabhavatham*		20%		-	-	-	0%
	Salladaikkan (Sieve filter) - Severe *Kabham*		20%		-	-	-	0%
	Aravil Mutthu (Snake and Pearl) - *Vathakabham*		10%		-	-	-	0%
	Pathimoozhkiya (Half sunken) - *Sannivatham*		10%		-	-	-	0%
	Mutthil Aravu (Pearl and Snake) - *Kabhavatham*		10%		-	-	-	0%
	Methuvatta paraval (Slow spread circle) - *Kabhapittham*		10%		-	-	-	0%
	Kalappu (Mingling) - Alarming sign		10%		-	-	-	0%
	Moozhgiya nilai (Sunken) in red urine - *Sannivatham*		10%		-	-	-	0%
	Mutthu (Pearl) - *Kabham*		0%		-	-	-	70%
	Aravu (Snake) - *Vatham*		0%		-	-	-	20%
	Sangu (Conch shell) - Good prognosis in *Kabham*		0%		-	-	-	10%

[Dis. Day: Discharge Day, N: Number of cases]

Table 4: Prognosis chart in Covid 19 patients

6. DISCUSSION

6.1. Limitations

- Because this is a case series with small sample size, justification from studies with a larger sample size is required before we can design a defined diagnostic tool Siddha *neerkuri-neikuri* for COVID-19 diagnosis and efficacy treatment.
- The handling of a urine sample of the Covid patient under proper ventilation, sunlight, sterile area, disposal of the sample, collection and testing time of the sample were not followed appropriately.

6.2 Strengths

- It had been observed earlier by *neerkuri-neikuri* test earlier that the patient's condition had not worsened and had given a confidence to continue the same Siddha treatment.
- The favourable changes observed in the *neerkuri-neikuri* test had given a good hope although the delay in the test results of the modern covid markers.
- The test was cost-effective and the results were immediately known by the clinician.

6.3. Interpretation

The mean age of the study population is 57.5±10 years. At the time of admission, 70% of patients had a cough, 70% of patients had malaise, 50% of patients had dyspnea, 30% patients had anorexia, 40% patients had a fever, 20% patients had diarrhea, 20% of patients had a headache and 10% patients had vomiting. At the time of discharge, only 10% of patients had a cough and all other symptoms were completely cured.

When compared with modern prognostic tools LDH, CRP, D-Dimer and Ferritin, the patients had a positive prognosis and showed significant changes in the results before and after administration of Siddha medication as shown in Figure 1. Among 10 cases of *neerkuri* 60% had yellow, 20% had red and 20% had white color urine, meanwhile 70% had yellow, 20% had red and 10% had white at the time of discharge. The color of urine had no significant changes but red color urine was present in two cases, meanwhile *nurai* (froth), *satthu* (sedimentation) and *enjal* (frequency) showed significant changes and assured the disparity of urine from severe *kabha* and *sanni* state to other non-kabha or good prognosis state. 40% had frothy urine during admission and it had reduced into 30% during

discharge. Sediments were present in 50%, it decreased into 30% on discharge day. Parallelly, there was a very good improvement from *neikuri* patterns before and after the administration of the Siddha treatment, in which 70% patients turned into *kabham* (single humor dominant), 20% turned into *vatham* (single humor dominant) and 10% turned into good prognosis state. It showed the reduction of *kabham* and *sanni* characteristics of urine at the time of discharge after Siddha treatment.

According to Siddha pathophysiology [4], [8], at the time of admission all the patients (100%) had *kabham* dominant or mingle with other humor or found with alarming-signs of *neikuri* patterns like *Kanthuru* (nape of the neck or Bellerica fruit), *Salladaikkan* (sieve-filter), *Aravilmutthu* (snake and pearl), *Pathimoozhkiyanilai* (half-sunken), *Mutthil aravu* (pearl and snake), *Methuvattaparaval* (slow-spread and circle), *Kalappu* (mingling) and *Moozhgiyanilai* (sunken) in red-urine. Dealing with Siddha philosophy *nurai* (froth), *satthu* (sedimentation) and *enjal* (volume/times) had significantly changed and could be interpreted that the existing severe *kabha* and *sanni* conditions had changed into *kabha* or non-*kabha* or other state of good- prognosis, whereas at the time of discharge almost 90% of patients had either *kabham* or *vatham*.

7. CONCLUSION

Among COVID 19 cases *neerkur-neikuri thervu* (the urine-based Siddha diagnosis), played a positive role to confirm the diagnosis and assess the good prognosis of the disease till the modern test results awaited. The study enumerated the cost-effective Siddha diagnostic tool *neerkuri-neikuri* among the COVID patients to precede the treatment successfully. From the above finding, it has been evident that Siddha urine analysis played a major role in ruling out the prognosis of the chronic disease condition also being cost-effective and more reliable for the clinicians until the modern scientific results received.

10. ETHICAL APPROVAL

We certify that this trial has received ethical approval from Institutional Ethics Committee (IEC), Kokila Siddha Hospital and Research Centre, Madurai (IEC-03/2020 KSHRC). This case series is registered in the Clinical Trial Registry of India CTRI/2021/06/034103.

11. PATIENT CONSENT FOR PUBLICATION

We state that informed consent was taken from all the patients for this study.

13. AVAILABILITY OF DATA AND MATERIALS

Full de-identified data of the analyses are available upon request to the corresponding author.

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