Analyzing Symptomatology and Effectiveness of Ayurvedic treatment in Covid-19 during early stage of Pandemic in Government Ayurveda hospital, Delhi - A Cohort Observational Retrospective Study

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Abstract

Background and rationale- The entire human community has been gripped by Corona Virus pandemic and all the system of medicine trying their hard to manage Covid-19. Ayurveda also came forward and offered hands to curb this disease.
Aims and Objective- The aim of the study is to find the therapeutic potential of *Ayurveda* by conducting a retrospective observational study in early phase of pandemic in a government *Ayurvedic* hospital in Delhi. **Materials and Methods-** A single-center, observational study was done on 273 cases, admitted at Designated Covid Health Care Centre, New Delhi during period of 21st April 2020 and 30th June 2020. Data was retrieved through Case record files of Covid-19 patients and analyzed. All the Patients were divided into five groups on the basis of medicines (*Ayurvedic* and allopathic medicines) were given according to symptoms. **Result-** Cough (32.60%), fever (28.94%), sore throat (23.81%) and breathlessness (12.82%) were prevailing presenting symptoms in patients, out of which 17.22% had co-morbidities. *Doshik* dominance of *Vata dosha* (48.0%), *pitta dosha* (36.5%) and *kapha dosha* (15.5%) was found in symptomatology. 23% patients were managed with *Sanshamni Vati (Guduchi), Ayush Kwath (Tulsi+Dalchini+Shunthi+Marich)* only while in 61% some other medicines along with these two were required to be added according to various symptoms of respiratory, gastrointestinal and musculoskeletal systems majorly. *Yoga* and few other modalities, as per AYUSH guidelines, were given to all patients. 94.5% patients improved without developing complications and only 5.5% were referred to higher centre. No mortality and adverse effects were reported.
Conclusion- Mapping of Covid-19 showed that it is *Vatolvan, Pitta madhya, heena Kapha Sannipatik Jwara and Agantuja Jwara* in *Ayurvedic* perspective. Majority of the patients were managed effectively with *ayurvedic* medicines preferentially *Sanshamni vati, AYUSH kwath* and few of the patients were dealt with integrated approach.
Keywords: Covid-19, *Sannipatik Jwara*, Retrospective, Cohort Study, Treatment outcome.

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Introduction

The Covid-19 entered in India sweeping across the globe. Here, first case of Covid-19 was detected in Kerala, who had travel history of China. The World Health Organization declared Covid-19 as "public health emergency of international concern" on January 30, 2020 and called for collaborative efforts of all countries to prevent the rapid spread of Covid-19.[1] The Government of India has constituted the 'Interdisciplinary AYUSH Research and Development Task Force'[2] with the objectives of reducing the morbidity and mortality associated with Covid-19, which has initiated various programs to commence research and bringing modern medicine and AYUSH[3] systems together to curb this challenge. *Ayurveda*, one

of the systems among AYUSH, treats the patients by eliminating causative factors of disease and by bringing *doshas (humours)* in equilibrium state. This basic concept and theory of *Ayurveda* cover wide aspects of Covid-19 management. The Primary objective of this study is to map out the disease by analyzing symptomatology of Covid-19 patients and to elucidate effectiveness of various *Ayurvedic* medicines/strategies deployed in providing care to Covid-19 patients. The Secondary objective is to undertake subsequent rigorous prospective studies of Covid- 19.

Materials and Methods

Ethics

Before starting the study, the ethical clearance by 'Institutional Ethics Committee' (Letter no.- F5(283)/2013-Co PF(Ayurveda) 3522) has been taken.

Study Design

A single-center, retrospective observational cohort study has been conducted on laboratory (Rapid Antigen or RTPCR tests) confirmed asymptomatic, mild and moderate symptomatic Covid-19 patients, which were categorized as per Ministry of Health and Family Welfare guidelines in clinical management of Covid-19.[4,5] All these patients admitted in Designated Covid Health care Centre, New Delhi referred from other hospitals of Government of Delhi through **Chief District Medical Officer**, Central District, during period of 21st April 2020 and 30th June 2020.

Data Source

Data of total 273 cases was retrieved through Case record files which were maintained by rotational duty doctors round the clock. There were no exclusion criteria. This whole data was compiled in the excel sheet. All measures were taken to preserve the integrity and privacy of data. The subjects were assigned a study identification number. The database was secured with passwords and access was limited to selected investigators.

Variables

Demographic details, clinical symptoms, outcome (either discharged after improvement or referred) and treatment of Covid-19 patients were taken as variables for the study.

Statistical methods

Descriptive statistics were used to describe the baseline demographic data and clinical characteristics, treatment modalities and outcome in the patient. Categorical variables are presented as counts and percentages, whereas continuous variables are presented as means and standard deviations. The chi-square test was used for categorical variables. Pearson correlation test and regression analysis were also applied to the data.

Results

In present study, males constituted 63% (172) and females 37% (101). All enrolled patients were categorized into four age groups i.e. Children 3.29% (9), Adolescents 6.95% (19), Adult 82.05% (224) and Elderly 7.69% (21). Patients in adult age group were maximum. Majority of cases were Hindus and only 21 were from other communities. 95.23% belonged to Delhi and maximum patients (64%) were from Central Delhi.

Occupation of patients was categorized into 12 categories. 21.24% (58) belonged to service and sales occupations, 18% (51) each belonged to Homemaker and student category and 11.72% (32) patients were healthcare workers.

Out of total, 64% (174) patients had contact history with Covid-19 patients directly or indirectly. Co-morbidities were reported in 47 cases, out of which two third cases were suffering from Diabetes mellitus 38.30% (17) and hypertension 36.17% (16) (Table 1). Few other Co-morbidities like depression, abdominal koch's, inflammatory bowel disease and Seizure etc. were also noted in some patients. 17.02% patients had more than one co-morbid condition.

Overall 94.5% patients improved, thus discharged

according to Govt. guidelines. Exit RTPCR was done only in 11.42% (29) patients as per first discharge policy of Government,[6] rest of the patients were discharged after 10 days of hospital stay, if found afebrile during last 3 days, without exit RT-PCR reports in accordance of updated discharge policy.[7] 5.5% (15) patients referred to higher centers. Out of these, oxygen saturation of 11 patients dropped below 90% with complaint of breathlessness, and not recovered despite continuous oxygen therapy @4-5 L/min for approximately 2 hours and they required further investigation and management. Rest four patients were referred because of the aggravated symptoms related with their co-morbidities like Cardiac disease, Abdominal Koch's, Irritable Bowel Syndrome (IBS) and Depression.

The early phase of covid-19 infection usually manifests as fever, cough and other symptoms in mild form. According to some studies, period around 4th and 7th day of illness is crucial for the patients, because at this phase patients either recover or worsen due to cytokine storm.[8] Based on this pattern of illness, follow-up was done on day 4, 7 and 10 to determine the mode of recovery.

Based on clinical symptoms reported, 171 patients were symptomatic. Among all, most prevalent presenting symptoms were cough, fever, sore throat and breathlessness. Cough was observed in 32.60% (89) patient on day 1, later regressed to 6.22% (17) on day 4 and remained only in 1.83% (5), 1.46% (4) patients on day 7 and 10 respectively. 28.94% (79) patients had fever on day 1, who responded well with the treatment and only 2.19% (6), 2.9% (8) patients were found febrile on day 4 and 7 respectively. From 8th day onwards none found febrile. Sore throat was present in 23.81% (65) patients on day 1, and after 3 days of treatment it persisted only in 3.66% (10) on day 4. On day 7 and 10, this symptom remained in just 2.93% (8) and 1.10% (3) respectively. 12.82% (35) patients had breathlessness on day 1 at the time of admission. This number dropped to only 1.10% (3), 1.46% (4) on day 4 and 7 and resolved completely until 10th day of hospital stays.

Other symptoms like fatigue 10.62% (29), headache 10.26% (28), rhinorrhea/cold 6.59% (18), chest discomfort 5.49% (15), myalgia 4.40% (12), loss of appetite 2.93% (8), vomiting 2.56% (7), loss of taste 2.20% (6), diarrhoea 1.83% (5), loss of smell 1.47% (4), anxiety 1.47% (4), disturbed sleep 1.10% (3), abdominal discomfort 0.73% (2), sneezing 0.37% (1), dry mouth 0.37% (1) were also reported at the time of admission. All these symptoms alleviated gradually reduced to complete resolution by day 10 except GI symptoms like pain, burning sensation in abdomen and constipation, which persisted throughout the complete hospital stay in some patients.

At the time of admission, the mean temperature was 97.8ÚF. Twenty-six patients (9.52 %) had temperature higher than normal (>98.6°F-102.9°F). The mean oxygen saturation measured was 98%. In 97.8% patients oxygen saturation was more than 94% and was observed below 94% in only 6 patients.

In this cohort of Covid-19 patients, overall, 23 symptoms were reported among all symptomatic cases. On the basis of *doshik* (humours) dominance, 48% (196) symptoms were *Vataj*, 36.5 % (149) were *Pittaj* and 15.5% (63) were *Kaphaj* symptoms among 171 symptomatic patients on day 1 of admission. (Table 2)

A range of medicines were prescribed to the patients according to symptoms. *Sanshamni Vati* and *AYUSH Kwath* were given to all patients primarily. But it was observed that other medicines were also required to be added as various symptoms manifested during the course of disease. On the basis of medicines used, all patients were grouped into 5 categories. (Table 3)

✦ Group I- 23% (62) patients received *Sanshamni vati* and *Ayush Kwath* exclusively during entire course of treatment.

✦ Group II- 39% (107) patients received medicines which act on respiratory system as *Kasa-Shwashara* (cough & breathlessness alleviating), along with *Sanshamni Vati* and *Ayush Kwath.*

- Group III- 17% (46) patients received medicines acting on gastrointestinal system as *Deepana-Pachana* (digestive) *Vataanulomana* (Carminative), along with *Sanshamni vati* and *Ayush Kwath*.

- Group IV- 5% (14) patients received medicines acting on musculoskeletal system as *Vatahara*(analgesic) and *Shothahara* (Anti-inflammatory) along with *Sanshamni vati* and *Ayush kwath*.

- Group V- 16% (44) includes those patients who were prescribed allopathic medicines along with *Sanshamni vati* and *Ayush Kwath* (except 2 pregnant women who were already taking supplements like folic acid/iron/calcium, were given only *Sanshamni vati*).

Patients exercised *Mandookasan, Bhujangasan, Shavasana, Pranayam (Bhastrika, Bhramri, Kapalbhati and Anulom-vilom)* for an hour daily in the morning under supervision of Yoga trainer. Few other treatment modalities like *kawal/gandoosh (oil pulling), nasya (nasal oil application),* gargle, steam inhalation were also used as mentioned in the advisory.[9] Use of golden milk and regulated diet along with 'Covid appropriate behavior' like wearing n-95 masks, washing hands/sanitization and social distancing were also followed along with the therapeutic treatment, to manage Covid-19. No adverse effects or mortality was reported during period of study.

On statistical analysis of the data, Pearson correlation test was done between days and groups in respect of medicines, high positive correlation was found for fever in group III, cough and breathlessness in group II and sore throat in group I and group V. (Table 4)

Chi square analysis between the five groups was done and p value was calculated among days and groups. It was seen that p value was significant for cough(0.01) and sore throat (0.0002), whereas it was not significant in

fever (0.5) and breathlessness (0.21) (Table 5).

After regression analysis amongst groups for different symptoms R^2 and p value were calculated. It was observed maximum regression of symptoms Cough, Fever, Sore throat and Breathlessness was seen in group II. (Table 6)

Discussion

Similar to prior studies,[10,11] maximum patients were adult males. Among all admitted cases, geriatric (>60 years) and pediatric (d" 18 years) patients were 7.69% and 10.25%, respectively. They also responded well to ayurvedic treatment, which is ascertained by previous studies.[12,13] Out of 47 co-morbid patients, 68% patients also recovered well. The majority of the patients in this study were adult males with preferably sales & services job, because they are more likely to be exposed to coronavirus since they interact with the public.

As per *ayurvedic* perspective, normal *doshas* define the healthy state of an individual[14] and imbalance of three *doshas* causes the pathological conditions or disease.[15] Covid-19 is an infectious disease and it originates from an extraneous cause i.e. coronavirus. Therefore, it can be correlated with *Agantuja jwara* also (fevers of extraneous origin)[16] according to ayurvedic texts. To determine the pattern of *doshas* in the symptomatology of covid- 19, assessment of symptoms on the basis of *doshas* was done. *Vataja*[17] symptoms were predominantly found followed by *Pitta*[18] and *Kapha*[19] among all the observed symptoms. Since the clinical features of Covid-19 involves all the three *doshas* with *jwara* (fever) as the main symptom, and ratio of all *doshas* in this symptomatology concludes that Covid-19 can be considered as a type of *Sannipatik Jwara* (*Vatolvan Pitta Madhya Heena Kapha Sannipatik Jwara* as described in *Charak Samhita*).[20] Its symptoms are *jwara* (fever), *shwas* (breathlessness), *kasa* (dry cough), *pratishyaya* (rhinorrhea), *mukhshosha* (dryness of mouth), *atiparshvaruka* (chest pain)[20] as mentioned in Charak Samhita. In the present study also, Cough, fever, sore throat

and breathlessness were prevailing symptoms, which is also confirmed by US CDC[21] and other researches.[22] These symptoms implicate the involvement of respiratory system in primary pathogenesis of Covid-19. The persistence of symptoms of gastrointestinal system like constipation, pain and burning sensation in abdomen (Figure 8-11) were observed throughout the course of disease in many patients. Many patients had complaints of myalgia, backache and joint pain predominantly, which shows the involvement of musculoskeletal system also. It was also observed that many patients had complaints of depression, anxiety and dizziness.

9.52 % patients who were febrile initially have not progressed to advanced stage and improved with medication. Maximum (97.8%) patients had normal oxygen saturation at the time of admission and drop in oxygen was observed only in few cases (n=11) during course of disease. It signifies that the functional capacity of the lungs is not significantly impaired in mild to moderate Covid-19 cases. [23]Oxygen saturation of maximum patients maintained with medication and Yoga throughout course of disease.

Considering Covid-19 as *Agantuja Jwara* and type of *Sannipatik Jwara*, the protocol of *Jwara Chikitsa* needs to be followed for the management. The symptoms related to gastrointestinal system in Covid-19 explain *Heena Agnibala* (deficiency of digestive power) in the patients and in the pathogenesis of *Jwara,*[24] *Manda Jatharagni* is the main factor which manifests further symptoms . If the *Jatharagni* is *Mand*, it leads to *dhatwagni mandya* which results in various disorders and weakness of the body.[25] It can be related with multiple system involvement in severe category of Covid-19. Therefore, stabilizing *Mandagni* should be the primary objective in the management Covid-19. In the management of *Jwara*, it is clearly mentioned that when *agni* is stabilized, *bala* (innate strength of the body) and *ojas* (Host Immunity*)* are increased.[26] Host factors that initiate resistance to disease (*vyadhikcamatva* or *vyadhyutpadapratibandhakatva*) are dependent on *bala*

[27] and *oja.*[28] Strengthening the *Agni, Bala* and *Oja* would be an important therapeutic strategy for the treatment of *Jwara*. Various drugs have been described working on these trio altogether in context of *Sannipatik Jwara* in *Ayurvedic* texts and have antiviral, antipyretic, anti allergic, antimicrobial, anti-anxiolytic and immunomodulatory effects. *Sanshamnvi Vati* and *Ayush Kwath* were given to all patients primarily irrespective of dominance of symptoms. Patients, in whom other systems were not affected much, got relief with *Sanshamni vati* [29] and *Ayush Kwath* [30] only (group I). These medicines have predominantly *Jwaraghna* (antipyretic), Rasayana (Rejuvenating), Ojo-vardhak (immuno-modulator) properties. *Kantakari avleha, Vasavleha, Sitopladi Churna, Lavangadi vati, Talisadi churna* which were categorized in group II, having properties like *Kasa-Swasahara* (cough and breathlessness alleviating) combat respiratory symptoms of patients. *Chitrakadi Vati, Hingwasthak churna, Lashunadi vati, Haritaki churna, Triphla churna, Kutajghan vati, Kumaryasav, Arogyavardhni vati, Lavan bhaskar churna, Madhuyashti churna*, which were categorized in group III, having properties like *Deepana-Pachana* (digestive) and *Vatanulomana* (carminative) combat GI related symptoms of patients. *Vatahara* (analgesic) and *Shothhara* (anti-inflammatory) medicine, like *Dashmoolarishta, Ashwagandha churna, Panchguna tel*, categorized into group IV, relieved the symptoms of musculoskeletal system along with *Sanshamni Vati* and *Ayush Kwath.* Some of the patients referred from other dispensaries were already on allopathic medication, that's why they were advised to continue these medicines and categorized separately as group V. Neurological/ Psychological symptoms (*Bhram, Chinta, Avsaad)* were also observed which were chiefly resolved with *yoga* or counseling instead of per-oral treatment. The Yoga therapy (*Pranayam, Shavasan,*[31] *Mandookasan*[32] and *Bhujangasana*[33]) was effective in combating respiratory, gastrointestinal symptoms and relieved symptoms like anxiety and depression also.

The cumulative effects of all medicines and other

treatment modalities have been quite effective in preventing disease progression and alleviating the symptoms. Majority of patients with co-morbidities were managed with *Ayurvedic* medicines except those who required surgical intervention and had acute medical emergency. The outcome of this study showed that 94.5% of patients were fully improved during hospital stay but 5.5 % had to be referred to higher centre.

Conclusion

The gathered data indicate that the majority of mild Covid-19 patients in the early phase of disease were managed with *Ayurvedic* medicines and other treatment methods, including Yoga and by following 'Covid appropriate behavior'. Most of the patients recovered well and only a few patients (5.5%) were needed to be referred to the higher centre due to disease progression. This data enables us to conclude that this therapeutic strategy is effective not only in treating the disease but also for impeding the symptoms at a milder stage only. No death was reported during the period of hospital stay.

From the A*yurvedic* perspective, it may be considered as *Agantuja Jwara* and a type of *Sannipatik Jwar* (*Vatolvan Pitta Madhya Heena Kapha* type) as per *doshik* predominance based on clinical characteristics presented by the patients in this study. It is also elicited from the study that a combination of *Sanshamni Vati* and *AYUSH Kwath* may be supplemented with *ayurvedic* medicines working on the Respiratory system, Gastrointestinal system and Musculoskeletal system for productive outcomes and the medicines having properties like *Kasa-Swasahara* (cough & breathlessness alleviating), *Deepan-Pachana* (digestive), *Vatanulomana* (carminative), *Vatahar* (*a*nalgesic), *Medhya* (adaptogen) may well be used as Standard treatment guideline (STG) for management of this disease.

Based on the therapeutic strategy observed in this study, the management of Covid- 19 patients may be designed accordingly, keeping in mind the personalized treatment principle of Ayurveda (*Purushampurushamvikshyam*)

too.[34] This type of therapeutic approach could be used for further prospective randomized controlled trials of Covid-19.

Limitations of this study

1. AYUSH guidelines were followed for the management subjected to the availability of medicines in the pharmacy of hospital.

2. This is a retrospective study, so the appropriate data collection format was not intended prior to the study. The data collected was therefore extracted from available CRF and all observations were based on that data only.

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Table 1: Co-morbidities observed in patients

Co-morbidity	No. of patients	Percentage
Bronchial Asthma	4	8.5%
DM	17	36%
HTN	16	34%
Hypothyroidism	7	14%
IBS	1	2%
Valvular heart disease	1	2%
Abdominal Koch's	1	2%
No Co-morbidity	226	82% of total patients
Patient with more than one co-morbidity		
Abdominal Koch's and IBS	1	2%
Diabetes and Depression	1	2%
Diabetes and Hypertension	2	4%
Hypertension and Polycystic Kidney	2	4%
Hypertension and Hypothyroidism	1	2%
Hypothyroidism and Inguinal Hernia	1	2%
		8

Table 2: *Doshik* predominance in symptoms

Symptoms	Percentage of Symptoms	References*	Predominant *dosha*	Symptoms on Day 1 (Total no. & percentage)
Cough (*Kasa*)	32.60%	Ch.Chi.18/11-13	*Vata*	196 (48%)
Headache (*Shiroruk*)	10.26%	Ch.Su. 20/11		
Myalgia (*Angmard*)	4.40%	Ch.Chi.17/20		
Loss of taste (*Arasgyta*)	2.20%	Ch.Su. 20/11		
Loss of smell (*Ghrannash*)	1.47%	Ch.Su. 20/11		
Chest discomfort (*Uraruka*)	5.49%	Ch.Su. 20/11		
Anxiety (*Chinta*)	1.47%	Su.u.41/18		
Depression (*Avsad*)	0.00%	Ch.chi.15/61-62		
Disturbed Sleep (*Anidra*)	1.10%	Ch.Su. 20/11		

Breathlessness (*Swashkrichta*)	12.82%	Ch.chi.17/49-51		
Dry mouth (*Mukhshosha*)	0.37%	Ch.Su. 20/11		
Constipation (*Aanah*)	0.73%	Su.u.56//20		
Dizziness (*bhram*)	0.00%	Ch.Su. 20/11		
Fever (*Jwara*)	28.94%	Ch.Su. 20/14	*Pitta*	149 (36.5%)
Sore throat (*Kanthsuk*)	23.81%	Su.u.53/4		
Skin rashes (*Twakvikar*)	0.00%	Ch.Su. 20/1		
Diarrhoea(*Atisaar*)	1.83%	Su.U 39/31-32		
Abdominal discomfort (*Udarshool*)	0.73%	Ch. Chi. 15/60-61		
Sneezing (K*shawathu*)	0.37%	Su.u.39/33-34	*Kapha*	63 (15.5%)
Rhinorrhoea/cold (*pratishyay*)	6.59%	Ch.chi.15/60-70		
Vomiting (*Chardi*)	2.56%	Ch.Su. 20/11		
Fatigue (*Klam*)	10.62%	Su.U 39/25-26		
Loss of appetite (*Aruchi*)	2.93%	Ch.chi.18/18-19		
	*Books referred: ● Shastri KN, Nath G. Charak Samhita 'Vidyotini' hindi commentary, Chaukhamba Publications, 2009. ● Shastri AD. Susruta Samhita 'Ayurveda-tattva-sandipika hindi commentary, Chaukhamba Publications, 2016 Shastri HS. Astangahrdayam of Vagbhata. New Delhi: Chaukhambha Publications; 2016			

Table 3: Grouping of medicine used to manage Covid-19 patients

S.No.	Group of medicine	% of Patients	Mode of action
I	Sanshamni vati & Ayush kwath	23% (n=62)	*Jwarghan* (anti pyretic) *Rasayan (*Rejuvenating*)* *Ojo-vardhak* (immuno-modulator)
II	Sanshamni vati, Ayush kwath & medicine working on Respiratory system	39% (n=107)	*Kasa-Swasahara* (cough & breathlessness alleviating)
III	Sanshamni vati, Ayush kwath & medicine working on GIT system	17% (n=46)	*Deepana-Pachana* (digestive) and *Vatanulomana* (carminative*)*

IV	Sanshamni vati, Ayush kwath & medicine working on Musculoskeletal system	5% (n=14)	*Vatahar* (analgesic)
V	Sanshamni vati, Ayush kwath & allopathic medicine	16% (n=44)	

Table 4: Pearson correlation between symptoms and days

Symptoms	Value
Cough	-0.81
Fever	-0.85
Sore throat	-0.99
Breathlessness	-0.77

Table 5: Chi square analysis between symptoms and days and P value of the symptoms

Symptoms	P value
Cough	0.01
Fever	0.57
Sore throat	0.002
Breathlessness	0.2

Table 6: Regression analysis values between symptoms and days

Symptoms	P values	R^2
Cough	0.19	0.65
Fever	0.20	0.62
Sore throat	0.19	0.64
Breathlessness	0.22	0.59