

The Mean Duration of COVID-19 Found Closely Associated with the Ayurvedic Pathognomic Model Shatkriyakala (SKK): Inference of an Observational Cross-Sectional Exploratory Study

Dr Charu Sharma 1, Dr Meenakshi Sharma 2*, Dr Sisir Kumar Mandal 3, Dr Sachin Bhardwaj 4, Dr Tanuja. M Nesari 5

1. MS Obs-Gyne, Ayurveda Researcher at Department of Bioscience & Biotechnology, IIT-Bombay
2. Assistant professor, Rog nidan evum vikriti vigyan, Gangaputra Ayurvedic Medical college, Kandela
3. Professor & HoD, Rog nidan evum vikriti vigyan, Faculty of ayurveda, IMS, BHU, Varanasi
4. MD, Rog nidan evum vikriti vigyan, Entrepreneur & Researcher at Department of Bioscience & Biotechnology, IIT-Bombay
5. Professor, Director, All India Institute of Ayurveda, Delhi

Corresponding author: Dr Meenakshi Sharma, Assistant professor, Rog nidan evum vikriti vigyan, Gangaputra Ayurvedic Medical college, Kandela

Abstract: A valid measurement for Corona virus disease is needed for case definition and adopting appropriate therapeutic measures. Identification of epidemiology and etio-pathogenesis is must for case definitions. The incubation period The incubation period is the time elapsed between pathogen exposure and appearance of symptoms. It can be utilized to trace the contact history of population at high risk. Incubation, latent and generation periods may help both in understanding transmission and developing therapeutic measures. The evidenced incubation period of covid-19 infection is found to be 5.6-6.7 days. Ayurveda advocates *Shatkriyakala* pathognomic model i.e. six stage model of disease progression.

Aims and Objective: The present study focused to trace –pathological model in context of covid-19. Material and method: This study was conducted in Government ayurvedic institute, COVID testing centre, New Delhi. The tool of data collection was Questionnaire 1 & 2.

Result: We report a temporal pattern of COVID-19 pathology which corresponds to six-stages of disease progression. (*shadvidh kriyakala*).

Discussion: Assessment of relationship between the variables (Hetu-dosha and Dushya) responsible for pathogenesis temporal dynamics of covid-19 may serve as an instrument for mapping the pathogenesis.

Conclusion: Clinical staging of covid-19 can be potentially mapped by six stage classical pathological model.

Introduction: Covid-19 has emerged as a challenge as well as opportunity before medical fraternity due to certain unexplained factors associated with the morbidity. Due to the catastrophic effect of the illness on global demographics, health status and economy, its the need of hours to identify epidemiology and etiopathogeny.¹ The incubation period can be utilized to trace the contact history of population at high risk. The incubation period is the time elapsed between pathogen exposure and appearance of symptoms.² Estimates of

incubation, latent and generation periods may be utilized for case definition, tracing contact history, secondary case detection, therapeutic measures and public health programs. The evidenced incubation period of covid-19 infection is found to be 5.6-6.7 days.³ Moreover, the other factors determining the different host response to also needed to be searched. Early detection may reduce economic burden of illness, improve its prognosis and implementation of preventive and therapeutic strategies.⁴ The factors deciding infection, duration, prognosis, re-infection are important to be explored. Early detection and adaptation of appropriate measures control its spread which is desired in order to contain such highly contagious infections. Such contagious public health emergencies and their treatment are clearly explained in classics which can be utilized for both preventive and curative purposes in covid-19. Ayurveda has enough potential and possibilities to be employed both for prevention and treatment of COVID-19.⁵ Classics explain a six stage disease progression pathological model *Shat kriyakala* (SKK). *Kriya kala* (KK) is a compound expression, *Kriya* means the therapeutic measures being adopted to pacify the vitiated *doshas* and *kala* refers to stage of disease progression. Classics identify six pathognomic stages of disease progression as *Shatkriyakala* (SKK). *Kriya kala* (KK) is a compound expression, where *Kriya* means the choice to treatment used to rectify the disturbance in *Doshas*, and *Kala* refers to the stage of progression of a disease.⁶ This six stages disease progression model track the time trend of disease starting from stage of accumulation of *doshas* to development of complications. This observational study is an attempt to trace the pathological models of COVID 19 framed on the principles of *Ayurveda*. The frameworks play an instrumental role in the progression and manifestation of the disease. In this particular study the researchers are focusing on two basic models which are as follows: 1) *Shat - kriya kala* (six pathognomic stages of disease progression) 2) *Vikara vighata - bhava ; abhava* (*Nidana*, *Dosha*, *Dushya* paradigm) This phenomenon is described in terms of the *Samprapti* (pathogenesis) of the disease in each patient, comprising *Dosha*, *Dushya* and *Adhithana* components. The strength of association between *hetu* (*nidana*), *Dosha* and *dushya* components determines the fate of disease. Recent studies have reported that the severity of the disease is a function of individual immune response to the virus. The response is a function of 3 factors - *Hetu*; *Dosha*; *Dushya*. The permutation and combination of the three variables in a particular body type can give a direction to the manifestation and progression of the disease. Hence the time trend of disease and the components determining the host response to virus area of research to be focused to frame the effective therapeutic strategies against the infection.

Methods:

This study was conducted in Government ayurvedic institute, COVID testing centre, New Delhi. The duration of study was from 15 September, 2021 to 25 October 2021. A convenience sample of 75 patients of more than 20 years age visiting COVID Testing Centre of Government ayurvedic institute, New Delhi, detected COVID-19 found positive by Rapid Antigen test (RAT) for SARS COV-2 were included in the study. The current methodological design is observational cross-sectional study on covid-19 positive patients. An informed

consent was obtained from the participants. Assessment was done on the basis of Questionnaire on SKK to find the strength of *Hetu- Dosha* and *dushya* components and mean duration of six stages of disease. All Patient of both sexes age group 20-60 years confirmed with SARS-CoV-2 infection by having mild to moderate symptoms within 3 days of manifestation of symptoms having potential risk factors were included. Patients not willing to take part in the study and unconscious patients or unable to communicate the symptoms were eliminated.

Data collection

Tool for data collection –

Developed, validated and pretested interview schedule Questionnaires (1&2) having open and close ended questions (Questionnaire 1 & 2) were used for data collection. Questionnaire 1 was related to SKK and Questionnaire 2 was regarding *Hetu-Dosha-Dushya* component (HDD). Both the Questionnaires were prepared in through literature search with respect to the above-mentioned procedure. Steps of methodology were: Literature review, Relevant information extraction, Concept transformation, scoring. Each parameter was given equal scores (Minimum 0, Maximum 3) for Questionnaire-1 and minimum 0 and maximum 1 score for Questionnaire 2.

To reduce biasing, all interviews were conducted by the investigator herself. Questionnaires 1 and 2 were administered through recorded telephonic interview simultaneously on the same day.

Statistical analysis

Analysis of data was done using the standard version 26 statistical package of social science (SPSS). Number and percentage were used for describing quantitative data. Continuous variables were presented in terms of mean and standard deviation. ANOVA (analysis of variance) test was used for comparative study of different groups.

Ethical consideration

Institutional Ethics Committee permission was obtained (IEC-AIIA/2020-P 48) for conduction of trial and the Clinical Trial Registry was done (CTRI/2020/08/027494). After explaining the objective of study, informed consent was obtained from the participants. They were also clarified their rights regarding confidentiality of collected data and withhold from the study at any time without giving reasons.

Result

Demographics

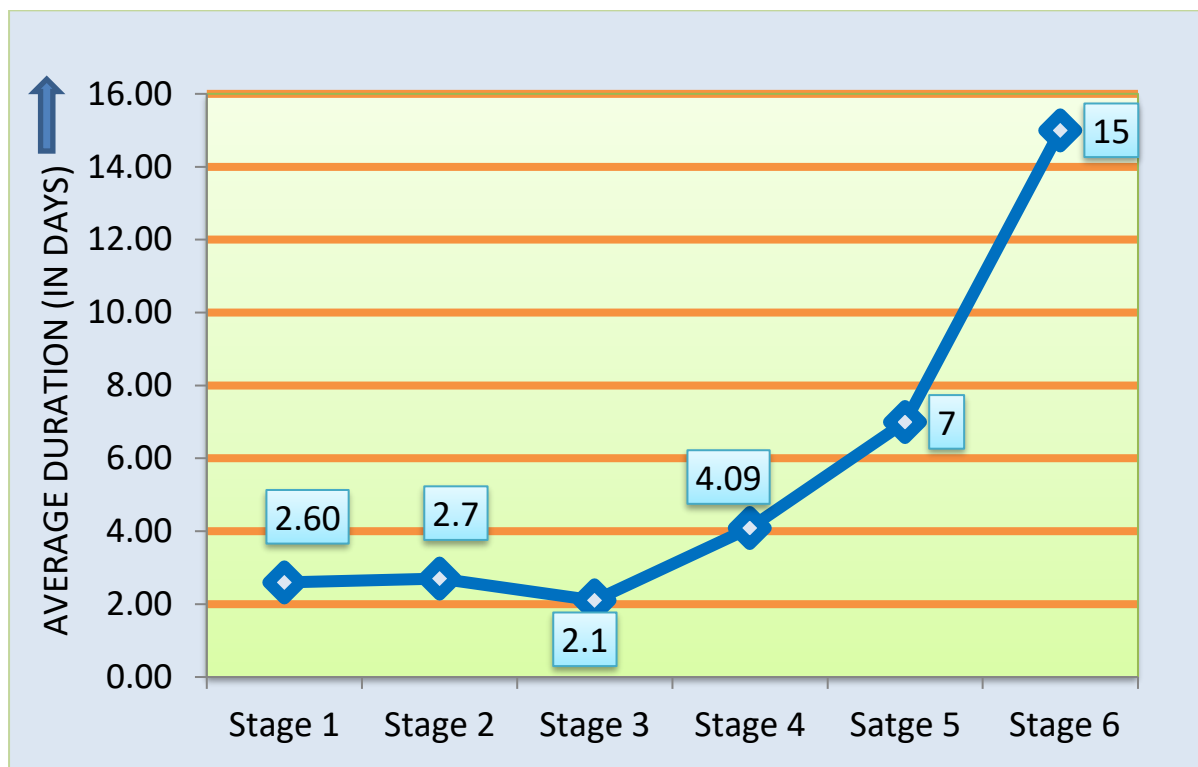
A total of 125 patients were screened as per inclusion criteria, 50 patients failed. Finally, 75 patients were recruited and analyzed in the trial for testing hypothesis. The majority of patients were administered the questionnaire on Day 2 of onset of symptoms. The mean age of the recruited subjects was 36.7(S.D =12.5), [MALE: 37.3 (12.7), Female: 34.9 (12.1)] years. Among participants 76% were male and 24% were female. 38.7% of the sample

subjects were above graduation, 8% were uneducated. It was observed that 28% of subjects were unemployed, 61.3% were shopkeepers and 10.7% service holders.

Determination of time trend of six stages : SKK component

The mean duration of *Sanchyavastha* was 1.9 days, *Prakopavastha* was 2.7 days , *prasaravastha* was 2.1 days and *Sthanasamshryavastha* was found 4.5 days and there was strong positive correlation between the different stages too. (Graph 1)

Graph 1: Average period of stages of Kriyakala in Covid-19



Assessment of Hetu-Dosha & Dushya components (H-D-D)

It was observed that 41.3% patients were taking heavy meal, 49.3% were consuming cold food items while 60% were having oily food in routine. It was also observed that 29.3% of them were found to be overeating. 36% of the participants were having stress. It was reported that 24% patients were doing excessive physical exercise, 16% having excessive sun exposure while 49.3% of the subjects were taking hot-cold items simultaneously. However, 33.3% were having anxiety and 22.7% patients in- grief (due to loss of someone or depression).

Dosha and Dushya component

Among the total patients recruited, low grade Fever (<103° F) was observed in 77.6% patients and Onset of fever was simultaneous in whole body in 46.7% patients. 12% patients specified the origin of fever that was from head and neck region. No specific taste of mouth was found in 50% patients, while 24% were having *Kashaya* (astringent) & 22.7% were having *Katu* (pungent) taste. It was seen that 46% patients were having gastrointestinal

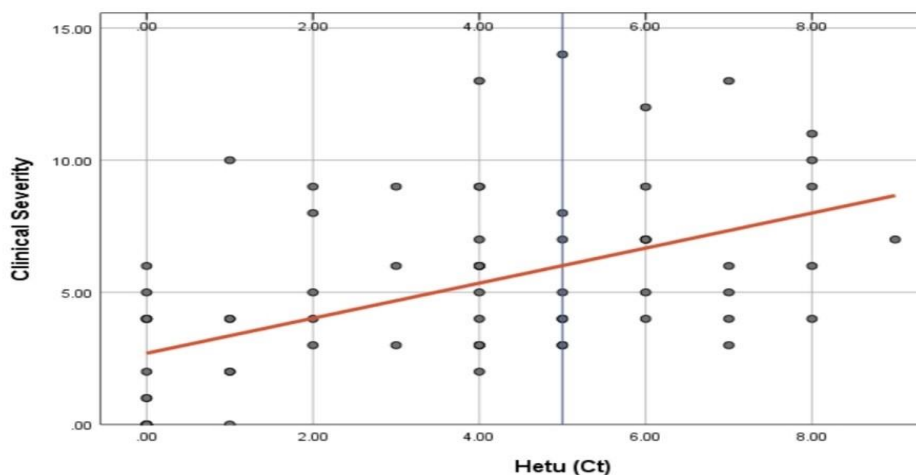
symptoms and loss of appetite was the main symptoms present in 26.7% subjects. Of the patients, 40% were reported liking for hot things in eatables.

Clinical severity

The most common symptoms were fever, Fatigue, body ache, cough, cold, anorexia, loss of smell. Among all the most common symptom was fever, while nausea, discoloration, congestion and diarrhoea respectively were experienced by least number of patients respectively. Out of 75, 10.7% were asymptomatic, 40% had mild symptoms, 49.3% moderate and 12% among them were having co-morbidity (Diabetes mellitus/Hypertension or chronic illness).

The correlation of *Hetu* component with clinical severity

The correlation of Hetu component (Ct) with clinical severity was significant ($r = 0.526$, $p \leq 0.0001$). The highest correlation was found to be with C8 (intake of cold food habit after taking hot food) and C5(stress) which was followed by C3 (intake of oily food/ junk in excess) . The least correlation was observed with C6 (indulgence in excessive physical activity) ($r=0.098, p>0.05$) and followed by C10 (suffered from grief) ($r=0.158, p>0.05$). (Graph 2)

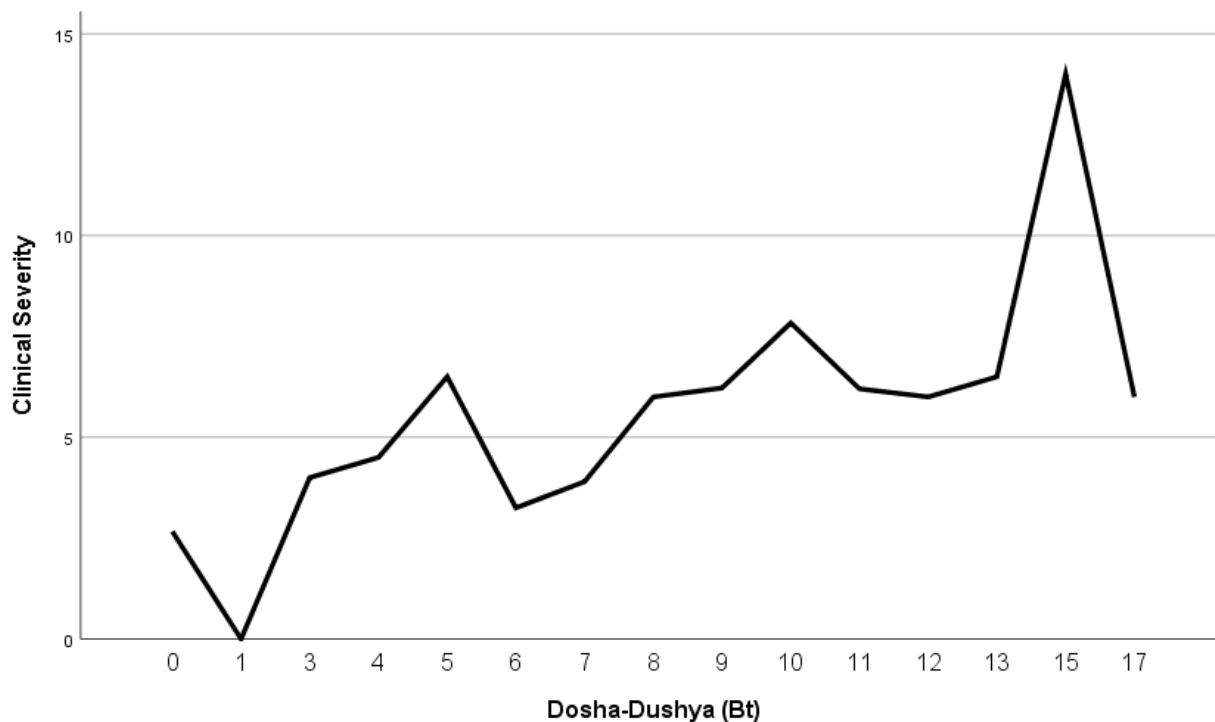


Graph 2 : Correlation between clinical severity and Hetu (Ct) and clinical severity

The correlation of *Dosha* and *Dushya* component (Bt) with clinical severity

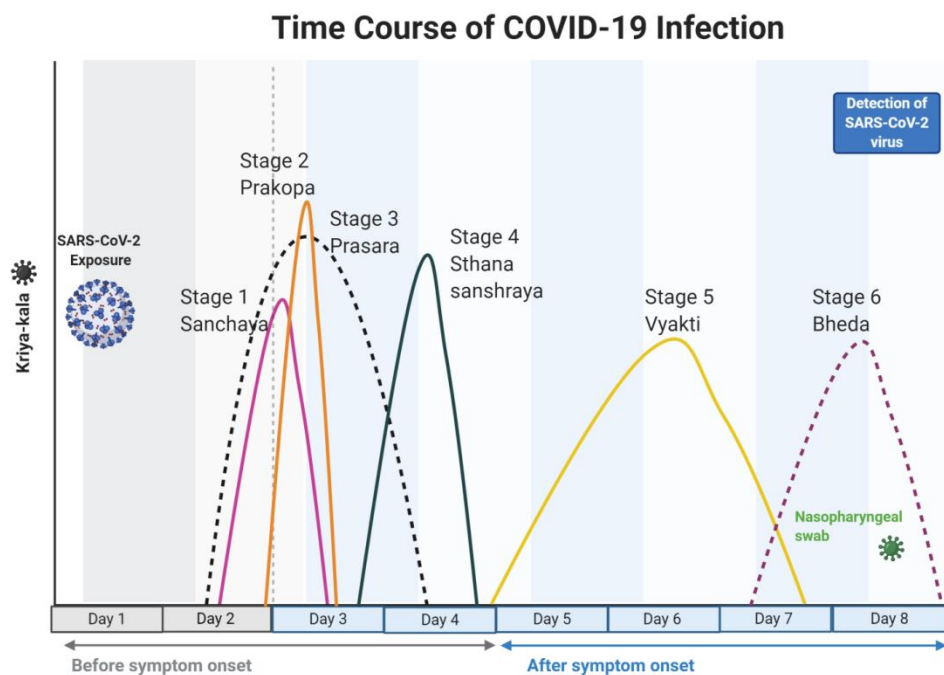
A positive correlation was found between *Dosha-Dushya* (Bt) and clinical severity ($r=0.545, p \leq 0.0001$). Highest was found with B6 (involvement of Gastrointestinal symptoms like anorexia) ($r=0.585, p \leq 0.0001$), followed by B2 (low grade fever) ($r=0.438, p \leq 0.0001$) components. The weak correlation between *Dosha* and *Dushya* found in B4 component (discoloration of body parts) component. (Graph 3)

Graph 3 : Correlation of clinical severity with *Dosha-Dushya* (Bt)



Discussion

The study deals with pathological models of the disease , along with investigating into the factors leading to disease. The assessment of relationship between the variables mentioned, the temporal dynamics of COVID-19 in terms of pathogenesis , epidemiological tenants including Host Susceptibility & Environment are being discussed. We report a temporal pattern of COVID-19 pathology which corresponds to six-stages of disease progression. (*shadvidh kriyakala*) Variations between individuals in terms of the temporal pattern is a function of multiple factors involved. The chapter deals with mapping of temporal dynamism of the disease as found in the subjects. (Graphic 1)



Graphic 1 : Showing time courses of covid-19 infection

Sanchaya, the first stage of *Kriyakala* is concerned with the accumulation of *Doshas* due to variable etiological factors. The weighted mean was calculated to determine this period of stage 1, which was found to be 2.59 days.

Vata Sanchaya symptoms : *Stabdhapoornakoshtata* (stiffness and completeness in abdomen), *Pitta Sanchaya Lakshana*: *Pitavabhasata* (Yellowishness of the body part), *Mando ushamta* (slight decrease in body temperature), *Kapha Sanchaya Lakshana*: *Anganam gauravta* (Heaviness in body parts), *Alasyam* (lassitude). *Prakopavastha* i.e. second stage of *Kriyakala* includes- *Vata Prakopa Lakshana* : *Koshta toda* (Pain in abdomen), *sancharana* (movement of *Vata* in *Mahasrotasa*), *Pitta Prakopa Lakshana* : *Amlika* (Sour eructations), *Pipasa* (excessive thirst), *Paridaha* (burning sensation all over the body). and *Kapha Prakopa Lakshana*: *Annadwesa* (Dislike to food), *Hridyotkleda* (Excessive salivation in mouth). The frequencies were found in 14,12,7,29,12,30 and 18 subjects respectively. The weighted mean was calculated to determine this period of stage 2, which was found to be 2.7 days. The weighted mean of stage 4, which was 4.09 days.

Prasara Lakshana The weighted mean was calculated to determine this period of stage 3, which was found to be 2.116 days. Bodyache with lassitude symptom which were found in 19, 2, 27 and 40 subjects respectively.

Conclusion

Clinical Staging of COVID-19 Disease based on Pathological Pathways: Coronavirus disease 2019 (COVID-19) is a complex disease with clinical phases of progression. Disease staging is a method for measuring the progression and severity of an illness using pathophysiological criteria. Hence, we postulated an integrative clinicopathological staging

and synthesizes the underlying mechanism and subsequent involvement of dosha-dushya-srotas. Validation of pathological models is a preliminary work to further formulate the clinical guidelines based on same. Precise therapeutic interventions can be modelled based on the time-line pathologies and public preventive measures can be based on the factors modifying onset and progression of the disease.

Mapping of Disease - Signatures of Srotas-Dosha-Dhatu : The disease can be potentially mapped on factors determining the state of disease. It is a function of hetu (etiology) , dosha and dushya (dhatu & srotas). In this study, there was predominant dosha involvement of vata-pitta and vitiation of rasa-vaha srotas vitiation along with sveda-vaha srotas could be found. This further demands a probation into validating the sub principles of pathogenesis identified during the course of statistical analysis.

Conflict of interest: None

Financial support: The funding for trial was done by All India Institute of Ayurveda.

References

- [1] International Monetary Fund A crisis like no other, an uncertain recovery. <https://www.imf.org/en/Publications/WEO/Issues/2020/06/24/WEOUNupdateJune2020>
- [2] Han Liu, Shuai Wang, Siqi Yang, Sean X. Luo, Jing Jie, Shucheng Hua, Liping Peng, Jingjing Luo, Lei Song, Dan Li. "Characteristics of the severe acute respiratory syndrome coronavirus 2 omicron BA.2 subvariant in Jilin, China from March to May 2022" , Journal of Translational Internal Medicine, 2023
- [3] Elias C, Sekri A, Leblanc P, Cucherat M, Vanhems P. The incubation period of COVID-19: A meta-analysis. *Int J Infect Dis.* 2021;104:708-710. doi:10.1016/j.ijid.2021.01.069
- [4] Fraser C, Riley S, Anderson RM, *et al.* Factors that make an infectious disease outbreak controllable. *Proc Natl Acad Sci U S A* 2004;101:6146–51. doi:10.1073/pnas.0307506101 pmid:http://www.ncbi.nlm.nih.gov/pubmed/15071187
- [5] Quesada JA, López-Pineda A, Gil-Guillén VF, Arriero-Marín JM, Gutiérrez F, Carratala-Munuera C. Período de incubación de la COVID-19: revisión sistemática y metaanálisis [Incubation period of COVID-19: A systematic review and meta-analysis]. *Rev Clin Esp.* 2021 Feb;221(2):109-117. Spanish. doi: 10.1016/j.rce.2020.08.005. Epub 2020 Oct 1. PMID: 33024342; PMCID: PMC7528969.