https://doi.org/ 10.33472/AFJBS.6.10.2024.443-461

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

EFFICACY OF AYURVEDIC DRUGS IN CONVALESCENT CASES OF SARS-COV-2 INFECTION

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Article History
Volume 6,Issue 10, Feb 2024
Received:17 Feb 2024
Accepted : 01 Apr 2024

doi: 10.33472/AFJBS.6.10.2024.443-461

ABSTRACT

INTRODUCTION

By the end of 2021 and beginning of 2022, with the reduction in cases of COVID-19, Post COVID and Convalescent cases became a subject of health concern, as they had multiple systemic involvement and also had impact on the sufferer's work and routine. The growing number of recoveries comes with a growing number of questions about what it means to overcome COVID-19: about a patient's contagiousness, subsequent immunity to the disease, and long-term effects. According to Ayurveda concepts, there will be Dhatu-Kshaya (depletion of body tissues) & Agnimandya (reduction in the digestive capacity) Post COVID 19 infection. Hence, Dhatuposhana (growth of body tissues) and Rasayana (Rejuvenation) are to be advised, for which drugs like Curcuma longa and Withania somnifera are suggested after clinical recovery, Hepatoprotective and renal protective drugs like Phyllanthus niruri and tablets prepared from Tinospora cordifolia called Samshamani Vati and a poly herbal combination called Bruhat Haridra Khanda as a combative agent in Respiratory tract infections.

METHODS

In this Interventional study, 156 confirmed COVID-19 positive cases were selected during their convalescent period and enrolled into 3 groups; Group-1 with Severe cases, Group-2 with Moderate to Mild cases and Group-3 was the Control group with no drug intervention. Group 1 and 2 were administered with above mentioned medicines for 30 days. Assessment was

carried out during Pre and Post test period for Myalgia, Fatigue, Sleep disturbance, Anxiety and Dyspnoea.

RESULTS

Among the 51 subjects involved in Group 1 and 53 in Group 2, statistically significant difference is found in all the 5 Assessment Parameters after the Intervention period of 30 days.

Among the 52 subjects involved in Group 3, statistically significant difference is found in Assessment Parameters of Myalgia and Sleep, whereas, no significant difference is observed in Fatigue, Anxiety and Dyspnoea after the observation period of 30 days.

Whereas, in comparison with the control group, there is significant improvement in all parameters except Anxiety. Though significant improvement was found in all cases, on comparing between the groups, there is a significant reduction in symptoms among Severely infected Cases

CONCLUSION

Based on the results obtained, it can be concluded that, the used intervention has brought significant improvement in all the parameters in Severe, Moderate and Mild cases of SARS-CoV-2 infected cases. It can also be concluded that, there is a significant reduction in symptoms among Severely infected Cases.

And also, no untoward effects were observed in the cases who took medication and no one experienced a second episode of infection during the study period.

Keywords**:** COVID-19, SARS-CoV-2 Infection, Convalescent cases, Myalgia, Fatigue, Sleep disturbances, Anxiety, Dyspnoea.

INTRODUCTION:

Along with the daily spikes in confirmed coronavirus cases and deaths have reduced drastically, a third, more hopeful number is also ticking upward: the number of people who have recovered from COVID-19. Public health experts have said COVID - 19 is unique and complex. By the end of 2021 and beginning of 2022, with the reduction in cases of COVID-19, Post COVID and Convalescent cases became a subject of health concern, as they had multiple systemic involvement and also had impact on the sufferer’s work and routine. The growing number of recoveries comes with a growing number of questions about what it means to overcome COVID-19: about a patient's contagiousness, subsequent immunity to the disease, and long-term effects. Early evidence suggests that coronavirus victims may experience lingering health effects of COVID-19, even after testing negative. Medical experts in Hong Kong who have observed discharged COVID-19 patients report the patients had shortness of breath and may have lost some lung function, but the researchers were unsure how long those ailments would last.

The World Health Organization (WHO) declared the outbreak to be a Public Health Emergency of International Concern on 30/01/2020[2,3] and recognized it as a pandemic on 03/11/2020, mainly due to the speed and scale of the transmission of the disease[3,4,5]

In December-2019 a series of Pneumonia cases of unknown cause emerged in Wuhan, Hubei, China with clinical symptoms greatly resembling Viral Pneumonia[6]. Initially, the

disease was called Wuhan pneumonia by the press because of the area and Pneumonia symptoms. The etiologic agent was isolated and identified as a novel corona virus, initially designated as 2019-nCoV[4,6].

World Health Organisation (WHO) temporarily termed the new virus 2019 novel coronavirus (2019-nCoV) on 12 January 2020 and then officially named this infectious disease coronavirus disease 2019 (COVID-19) on 12 February 2020[6].

The pathology of the disease is fast progressive, affecting the uttarottara dhatu and Ojus posing a great threat to vital organs, therefore suitable interventional methods which could boost the immunity and in turn prevent the relapse were the need of the hour.

The recent study outlined that COVID-19 Positive condition is subject to relapse. This possibility of relapse and post viral myalgia, arthralgia and other arising conditions can be effectively managed in the present study which is safe, cost effective, abundantly available and the drugs are well documented in the most ancient classical literature of Ayurveda like Charaka Samhita, Sushruta Samhita and other important classical texts. The medicines have been chosen after analyzing their immune-modulatory effects.

SARS like disease condition are not named, as stated by Charaka (author of Ayurvedic text called Charaka Samhita) one should understand a disease based on the Sammuthanna-Vishesha (cause of the disease), Vikara-prakruti (signs and symptoms of the disease) and adhishtana vishesha (organ or system involved) and then treat them accordingly[8].

According to Ayurveda concepts, there will be Dhatu-Kshaya & Agnimandya Post COVID 19 infection. Hence, Dhatuposhana and Rasayana for at-least 45 days and to combat the residual effects of the virus on the body, drugs like powder of Curcuma longa and Withania somnifera is suggested after clinical recovery. Hepatoprotective and renal protective drugs like Phyllanthus niruri and tablets made of Tinospora cordifolia may be given for 45-60 days after clinical recovery to combat toxicity produced from antiviral drug therapy and the virus itself. A poly herbal combination Bruhat Haridra Khanda is suggested as a combative agent in Respiratory tract infections.

MATERIALS AND METHODS

DESIGN – An Interventional study.

SOURCE OF DATA – 156 COVID-19 confirmed subjects were selected for the study randomly without the bias of age, gender, residential address, socio-economic status, existing co-morbidities, religion, educational status who were under treatment. After their discharge from the hospital, during the convalescent period, the study was carried out.

DIAGNOSTIC CRITERIA

Subjects already being diagnosed as COVID-19 Positive

INCLUSION CRITERIA

COVID-19 positive cases above 18 years of age who are already treated.

EXCLUSION CRITERIA

1. Co-morbidities such as Diabetes Mellitus, Hypertension, Cardiovascular diseases and Renal disorders.
2. Patients below the age of 18 years.
3. Pregnant and Lactating mothers.

STUDY DESIGN **–** An Interventional study. Patients fulfilling the Inclusion criteria were enrolled for the study in three groups.
Group 1 – Severe cases, Recovered from COVID-19.
Group 2 – Moderate to Mild cases, Recovered from COVID-19.
Group 3 – Control group. No drug intervention.

STUDY PERIOD**:** 30 days

DETAILS OF INTERVENTION

Sl No	**Name of the Drug**	**Dosage**	**Time of Administration**
1	Tablet. Bhumyamalaki	1gm	Thrice daily
2	Ashwagandha Churna	10 gm with Warm Milk	Twice a day
3	Haridra Churna	10 gm With Warm Milk	Twice a day
4	Tablet. Samshamani Vati	2 tablets 250 mg each	Twice daily
5	Brihat Hridra Khanda	10 gms with Warm Milk	Twice daily

METHOD OF PREPARATION

- Tablet Bhumyamalaki (Tablet prepared from aqueous extract of Bhumyamalaki - Phyllanthus niruri).
- Patient is advised / trained to prepare a mixture of one tea spoon (10g) of Turmeric powder, add Ashwagandha Root in powder form (10 g) with 150ml of warm milk.
- Samshamani Vati (Tablet prepared from aqueous extract of Guduchi-Tinospora cordifolia).
- Patient is advised / trained to prepare a mixture of one tea spoon (10g) of Brihat Haridra Khanda with 150ml of warm milk.

PERIOD OF INTERVENTION

The intervention with the above drugs was initiated on the next day of discharge of the patient (Day-1 of drug administration) and continued up to Day 30 in groups 1 and 2. Whereas Group 3 was a Control Group with just observation.

FOLLOW-UP DURING THE STUDY

On the 31st day i.e., after the intervention or after the observation period.

ASSESSMENT CRITERIA

The patients were assessed on the basis of below mentioned parameters before and after the treatment.

SUBJECTIVE PARAMETERS: The following symptoms were assessed before and after Intervention in Groups 1 and 2, where as in Group 3 it is assessed after an observational period of 30 days -

1. Myalgia
2. Fatigue
3. Sleep disturbance
4. Anxiety
5. Dyspnoea

RESULTS

This study entitled "Efficacy of Ayurvedic drugs in Convalescent cases of SARS-CoV-2 Infection" was conducted in 3 groups, where enrolled subjects were asked about their complaints in detail, a case history was written and assessments were done for Myalgia, Fatigue, Sleep, Anxiety and Dyspnoea before and after the intervention with Tab. Bhumyamalaki, Haridra Churna, Ashwagandha Churna, Bruhat Haridra Khanda, Samshamani Vati. Assessment of the above said parameters revealed following results. The results are shown at first as assessment within the groups and later between the groups.

WITHIN THE GROUP BEFORE AND AFTER THE INTERVENTION

GROUP 1

MYALGIA

Myalgia assessment before and after treatment for group 1 using **Wilcoxon Signed Ranks Test.**

Myalgia	Median (IQR)	Z-value	p-value*
Before treatment	7 (5-7)	6.2146	0.0001
After treatment	0 (0-1)		

The myalgia levels in Group 1 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. The median and interquartile range (IQR) of myalgia levels before treatment were 7 (5-7), indicating a high level of myalgia symptoms within the group.

After treatment, the median myalgia level significantly decreased to 0 (0-1) ($Z = 6.2146$, $p < 0.001$), suggesting a substantial improvement in myalgia symptoms following the intervention. These findings highlight the effectiveness of the treatment in reducing myalgia symptoms within Group 1.

FATIGUE

Fatigue assessment before and after treatment for group 1 using **Wilcoxon Signed Ranks Test.**

Fatigue	Median (IQR)	Z-value	p-value*
Before treatment	0 (0-17)	4.2857	0.0001
After treatment	0(0-10)		

The fatigue levels in Group 1 were assessed before and after treatment utilizing the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of fatigue levels were 0 (0-17), indicating variability within the group. Following treatment, the median fatigue level decreased to 0 (0-10), demonstrating a significant reduction in fatigue symptoms ($Z = 4.2857$, $p < 0.001$). The statistically significant decrease in fatigue levels after treatment suggests that the intervention effectively alleviated fatigue symptoms within Group 1.

SLEEP

Sleep assessment before and after treatment for group 1 using **Wilcoxon Signed Ranks Test.**

Sleep	Median (IQR)	Z-value	p-value*
Before treatment	0 (0-15)	2.5194	0.01174
After treatment	0(0-14)		

The sleep quality in Group 1 was assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of sleep quality were 0 (0-15), indicating variability within the group. After treatment, the median sleep quality remained at 0 (0-14), showing a slight improvement; this change was statistically significant ($Z = 2.5194$, $p = 0.01174$). The statistically significant improvement in sleep quality after treatment suggests that the intervention had a positive effect on sleep outcomes within Group 1.

ANXIETY

Anxiety assessment before and after treatment for group 1 using **Wilcoxon Signed Ranks Test.**

Anxiety	Median (IQR)	Z-value	p-value*
Before treatment	21(0-36)	-4.2857	0.0001
After treatment	0(0-23)		

The anxiety levels in Group 1 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of anxiety levels were 21 (0-36), indicating variability within the group. After treatment, the median anxiety level decreased to 0 (0-23), demonstrating a significant reduction in anxiety symptoms ($Z = -4.2857$, $p < 0.001$). The statistically significant decrease in anxiety levels after treatment suggests that the intervention effectively alleviated anxiety symptoms within Group 1.

DYSPNOEA

Dyspnoea assessment before and after treatment for group 1 using **Wilcoxon Signed Ranks Test.**

DYSPNOEA	Median (IQR)	Z-value	p-value*
Before treatment	1(0-2)	-4.8599	0.0001
After treatment	0(0)		

The dyspnea levels in Group 1 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of dyspnea levels were 1 (0-2), indicating low to moderate dyspnea within the group. After treatment, the median dyspnea level decreased to 0 (0), demonstrating a significant reduction in dyspnea symptoms ($Z = -4.8599$, $p < 0.001$). The statistically significant decrease in dyspnea levels after treatment suggests that the intervention effectively alleviated dyspnea symptoms within Group 1.

SUMMARY OF RESULTS FOR GROUP 1

Among the 51 subjects involved in Group 1, statistically significant differences were found in all five assessment parameters (Myalgia, Fatigue, Sleep, Anxiety, and Dyspnea) after the intervention period of 30 days.

- Myalgia levels significantly decreased from a median of 7 (IQR: 5-7) to 0 (IQR: 0-1) after treatment ($Z = 6.2146$, $p < 0.001$).
- Fatigue levels significantly decreased from a median of 0 (IQR: 0-17) to 0 (IQR: 0-10) after treatment ($Z = 4.2857$, $p < 0.001$).
- Sleep quality significantly improved from a median of 0 (IQR: 0-15) to 0 (IQR: 0-14) after treatment ($Z = 2.5194$, $p = 0.01174$).
- Anxiety levels significantly decreased from a median of 21 (IQR: 0-36) to 0 (IQR: 0-23) after treatment ($Z = -4.2857$, $p < 0.001$).
- Dyspnoea levels significantly decreased from a median of 1 (IQR: 0-2) to 0 (IQR: 0) after treatment ($Z = -4.8599$, $p < 0.001$).

These results indicate the effectiveness of the intervention in improving various health parameters among participants in Group 1.

GROUP 2

MYALGIA

Myalgia assessment before and after treatment for group 2 using **Wilcoxon Signed Ranks Test.**

Myalgia	Median (IQR)	Z-value	p-value*
Before treatment	7 (5-9)	6.1959	0.0001
After treatment	1 (0-0.25)		

The myalgia levels in Group 2 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of myalgia levels were 7 (5-9), indicating a moderate level of myalgia within the group. After treatment, the median myalgia level decreased significantly to 1 (0-0.25) ($Z = 6.1959$, $p < 0.001$), indicating a substantial reduction in myalgia symptoms. The statistically significant decrease in myalgia levels after treatment suggests that the intervention effectively alleviated myalgia symptoms within Group 2.

FATIGUE

Fatigue assessment before and after treatment for group 2 using **Wilcoxon Signed Ranks Test.**

Fatigue	Median (IQR)	Z-value	p-value*
Before treatment	13 (0-19)	4.1786	0.0001
After treatment	10(0-10)		

The fatigue levels in Group 2 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of fatigue levels were 13 (0-19), indicating variability within the group. After treatment, the median fatigue level decreased to 10 (0-10), demonstrating a significant reduction in fatigue symptoms ($Z = 4.1786$, $p < 0.001$). The statistically significant decrease in fatigue levels after treatment suggests that the intervention effectively alleviated fatigue symptoms within Group 2.

SLEEP

Sleep assessment before and after treatment for group 2 using **Wilcoxon Signed Ranks Test.**

Sleep	Median (IQR)	Z-value	p-value*
Before treatment	14 (0-23)	3.6214	0.003
After treatment	0(0-14)		

The sleep quality in Group 2 was assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of sleep quality were 14 (0-23), indicating variability within the group. After treatment, the

median sleep quality decreased to 0 (0-14), demonstrating a significant improvement in sleep quality ($Z = 3.6214$, $p = 0.003$). The statistically significant improvement in sleep quality after treatment suggests that the intervention effectively improved sleep outcomes within Group 2.

ANXIETY

Anxiety assessment before and after treatment for group 2 using **Wilcoxon Signed Ranks Test.**

Anxiety	Median (IQR)	Z-value	p-value*
Before treatment	21(0-43)	-4.2858.	0.0001
After treatment	0(0-21)		

The anxiety levels in Group 2 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of anxiety levels were 21 (0-43), indicating variability within the group. After treatment, the median anxiety level decreased to 0 (0-21), demonstrating a significant reduction in anxiety symptoms ($Z = -4.2858$, $p < 0.001$). The statistically significant decrease in anxiety levels after treatment suggests that the intervention effectively alleviated anxiety symptoms within Group 2.

DYSPNOEA

Dyspnoea assessment before and after treatment for group 2 using **Wilcoxon Signed Ranks Test.**

DYSPNOEA	Median (IQR)	Z-value	p-value*
Before treatment	2(0-2)	-4.7589	0.0001
After treatment	0(0)		

The dyspnea levels in Group 2 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of dyspnea levels were 2 (0-2), indicating moderate dyspnea within the group. After treatment, the median dyspnea level decreased to 0 (0), demonstrating a significant reduction in dyspnea symptoms ($Z = -4.7589$, $p < 0.001$). The statistically significant decrease in dyspnea levels after treatment suggests that the intervention effectively alleviated dyspnea symptoms within Group 2.

SUMMARY OF RESULTS FOR GROUP 2

Among the 53 subjects involved in Group 2, statistically significant differences were found in all five assessment parameters (Myalgia, Fatigue, Sleep, Anxiety, and Dyspnea) after the intervention period of 30 days.

- Myalgia levels significantly decreased from a median of 7 (IQR: 5-9) to 1 (IQR: 0-0.25) after treatment ($Z = 6.1959$, $p < 0.001$).
- Fatigue levels significantly decreased from a median of 13 (IQR: 0-19) to 10 (IQR: 0-10) after treatment ($Z = 4.1786$, $p < 0.001$).
- Sleep quality significantly improved from a median of 14 (IQR: 0-23) to 0 (IQR: 0-14) after treatment ($Z = 3.6214$, $p = 0.003$).
- Anxiety levels significantly decreased from a median of 21 (IQR: 0-43) to 0 (IQR: 0-21) after treatment ($Z = -4.2858$, $p < 0.001$).
- Dyspnoea levels significantly decreased from a median of 2 (IQR: 0-2) to 0 (IQR: 0) after treatment ($Z = -4.7589$, $p < 0.001$).

These results suggest that the intervention was effective in improving various health parameters among participants in Group 2.

GROUP 3

MYALGIA

Myalgia assessment before and after treatment for group 3 using **Wilcoxon Signed Ranks Test.**

Myalgia	Median (IQR)	Z-value	p-value*
Before treatment	8 (7.5-9)	-4.6226	0.0001
After treatment	7 (5-8)		

The myalgia levels in Group 3 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of myalgia levels were 8 (7.5-9), indicating a moderate to high level of myalgia within the group. After treatment, the median myalgia level decreased to 7 (5-8), showing a slight improvement, and this change was statistically significant ($Z = -4.6226$, $p < 0.001$). The statistically significant decrease in myalgia levels after treatment suggests that the intervention had a positive effect on reducing myalgia symptoms within Group 3.

FATIGUE

Fatigue assessment before and after treatment for group 3 using **Wilcoxon Signed Ranks Test.**

Fatigue	Median (IQR)	Z-value	p-value*
Before treatment	0 (0-17)	2.3934	0.022
After treatment	0(0-11.5)		

The fatigue levels in Group 3 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of fatigue levels were 0 (0-17), indicating variability within the group. After treatment, the median

fatigue level decreased to 0 (0-11.5), showing a trend towards improvement, although this change was not statistically significant (Z = 2.3934, p = 0.022). While there was a trend towards decreased fatigue levels after treatment, the result did not reach statistical significance.

SLEEP

Sleep assessment before and after treatment for group 3 using **Wilcoxon Signed Ranks Test.**

Sleep	Median (IQR)	Z-value	p-value*
Before treatment	0 (0-14)	2.5194	0.01174
After treatment	0(0-15)		

The sleep quality in Group 3 was assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of sleep quality were 0 (0-14), indicating variability within the group. After treatment, the median sleep quality remained at 0 (0-15), showing no significant change (Z = 2.5194, p = 0.01174). The p-value obtained (p = 0.01174) is less than the significance level of 0.05, indicating a statistically significant difference in sleep quality before and after treatment. Thus, despite the small change in the median sleep quality, the result is statistically significant.

ANXIETY

Anxiety assessment before and after treatment for group 3 using **Wilcoxon Signed Ranks Test.**

Anxiety	Median (IQR)	Z-value	p-value*
Before treatment	0(0-41)	2.3854	0.1684
After treatment	0(0-33)		

The anxiety levels in Group 3 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of anxiety levels were 0 (0-41), indicating variability within the group. After treatment, the median anxiety level remained at 0 (0-33), showing no significant change (Z = 2.3854, p = 0.1684). The p-value obtained (p = 0.1684) is greater than the significance level of 0.05, indicating that the difference in anxiety levels before and after treatment is not statistically significant.

DYSPNOEA

Dyspnoea assessment before and after treatment for group 3 using **Wilcoxon Signed Ranks Test.**

DYSPNOEA	Median (IQR)	Z-value	p-value*
Before treatment	2(0-3)	-0.3145	0.75656
After treatment	2(0-3)		

The dyspnea levels in Group 3 were assessed before and after treatment using the Wilcoxon Signed Ranks Test. Before treatment, the median and interquartile range (IQR) of dyspnea levels were 2 (0-3), indicating mild to moderate dyspnea within the group. After treatment, the median dyspnea level remained at 2 (0-3), showing no significant change ($Z = -0.3145$, $p = 0.75656$). The p-value obtained ($p = 0.75656$) is greater than the significance level of 0.05, indicating that the difference in dyspnea levels before and after treatment is not statistically significant.

SUMMARY OF RESULTS FOR GROUP 3

Among the 52 subjects involved in Group 3:

- Myalgia: There was a statistically significant difference observed in myalgia levels before and after the observation period of 30 days ($Z = -4.6226$, $p < 0.001$).
- Sleep: Similarly, there was a statistically significant difference observed in sleep quality before and after the observation period ($Z = 2.5194$, $p = 0.01174$).
- Fatigue: No statistically significant difference was found in fatigue levels before and after the observation period ($Z = 2.3934$, $p = 0.022$).
- Anxiety: Likewise, no statistically significant difference was found in anxiety levels before and after the observation period ($Z = 2.3854$, $p = 0.1684$).
- Dyspnea: There was also no statistically significant difference observed in dyspnea levels before and after the observation period ($Z = -0.3145$, $p = 0.75656$).

These findings indicate that there is a significant difference in myalgia and sleep parameters within Group 3, there was no significant change in fatigue, anxiety, and dyspnoea levels after the 30-day observation period.

BETWEEN THE GROUPS BEFORE AND AFTER THE INTERVENTION

MYALGIA

Myalgia VAS score comparison for group 1 and group 2 after intervention and after observation period in group 3 using One-way ANOVA test.

VAS(AT)	Mean (SD)	F-value	p-value*	p-value*
Group 1	0.784 (**0.923)**	126.885	0.0001	0.0001
Group 2	1.339 (**1.628)**			
Group 3	6.057 (**2.600)**			

A one-way ANOVA test was conducted to compare the myalgia VAS scores between Group 1, Group 2, and Group 3 after the intervention and observation period.

The mean (SD) myalgia VAS score for Group 1 after intervention was 0.784 (0.923), significantly lower than Group 2 (mean = 1.339, SD = 1.628) and Group 3 (mean = 6.057, SD = 2.600) after the observation period. The F-value was found to be 126.885, indicating a statistically significant difference in myalgia VAS scores between the groups ($p < 0.0001$).

Additionally, pairwise comparisons using post hoc tests revealed that the myalgia VAS scores for Group 1 were significantly lower than both Group 2 and Group 3 ($p < 0.0001$).

These findings suggest that Group 1, which received intervention, had significantly lower myalgia VAS scores compared to Group 2 and Group 3 after the observation period.

FATIGUE

Fatigue comparison for group 1 and group 2 after intervention and after observation period in group 3 using Kruskall-Wallis H Test.

Fatigue (AT)	Median (IQR)	H-value	p-value*	p-value*
Group 1	0(0-10)	7.5165	0.02332	0.0001
Group 2	10(0-10)			
Group 3	0(0-11.5)			

A Kruskal-Wallis H Test was conducted to compare the fatigue levels between Group 1, Group 2, and Group 3 after the intervention and observation period.

The median (IQR) fatigue level for Group 1 after intervention was 0 (0-10), significantly lower than Group 2 (median = 10, IQR = 0-10) after the observation period. The H-value was found to be 7.5165, indicating a statistically significant difference in fatigue levels between the groups ($p = 0.02332$).

Furthermore, the median (IQR) fatigue level for Group 3 was 0 (0-11.5), showing no significant difference compared to Group 1 after intervention.

Additionally, Mann-Whitney U tests were conducted to compare fatigue scores before treatment among the groups. The results showed a statistically significant difference between Group 1 and Group 2 ($Z = 2.71475$, p-value = 0.00672) and between Group 2 and Group 3 ($Z = 3.34777$, p-value = 0.0008).

These findings suggest that Group 1, which received intervention, had significantly lower fatigue levels compared to both Group 2 and Group 3.

SLEEP

Sleep comparison for group 1 and group 2 after intervention and after observation period in group 3 using Kruskall-Wallis H Test.

Sleep (AT)	Median (IQR)	H-value	p-value*	p-value*
Group 1	0(0-14)	10.7718	0.00458	0.0001
Group 2	14(0-14)			
Group 3	0(0)			

A Kruskal-Wallis H Test was conducted to compare the sleep levels between Group 1, Group 2, and Group 3 after the intervention and observation period.

The median (IQR) sleep level for Group 1 after intervention was 0 (0-14), significantly lower than Group 2 (median = 14, IQR = 0-14) after the observation period. The H-value was found to be 10.7718, indicating a statistically significant difference in sleep levels between the groups (p = 0.00458).

Furthermore, the median (IQR) sleep level for Group 3 was 0 (0), showing no significant difference compared to Group 1 after intervention.

Additionally, Mann-Whitney U tests were conducted to compare sleep scores after treatment among the groups. The results showed a statistically significant difference between Group 1 and Group 2 (Z = 1.98323, p-value = 0.0477) and between Group 2 and Group 3 (Z = 3.15931, p-value = 0.00158).

These findings suggest that Group 1, which received intervention, had significantly lower sleep disturbance levels compared to both Group 2 and Group 3 after the observation period. Furthermore, there were significant differences in sleep scores among the groups after treatment.

ANXIETY

Anxiety comparison for group 1 and group 2 after intervention and after observation period in group 3 using Kruskall-Wallis H Test.

Anxiety (AT)	Median (IQR)	H-value	p-value*	p-value*
Group 1	0(0-23)	0.5658	0.75358	0.0001
Group 2	0(0-21)			
Group 3	0(0-34)			

A Kruskal-Wallis H Test was conducted to compare the anxiety levels between Group 1, Group 2, and Group 3 after the intervention and observation period.

The median (IQR) anxiety level for Group 1 after intervention was 0 (0-23), which was not significantly different from Group 2 (median = 0, IQR = 0-21) after the observation period. The H-value was found to be 0.5658, with a p-value of 0.75358, indicating no statistically significant difference in anxiety levels between the groups (p = 0.75358).

Furthermore, the median (IQR) anxiety level for Group 3 was 0 (0-34), indicating no significant difference compared to Group 1 after intervention.

These findings suggest that there is no statistically significant difference in anxiety levels between Group 1, Group 2, and Group 3 after the observation period.

DYSPNOEA

Dyspnoea comparison for group 1 and group 2 after intervention and after observation period in group 3 using Kruskall-Wallis H Test.

Dyspnoea (AT)	Median (IQR)	H-value	p-value*	p-value*
Group 1	0(0)	22.0048	0.0002	0.0001
Group 2	0(0-1)			
Group 3	1(0-3)			

A Kruskal-Wallis H Test was conducted to compare the dyspnea levels between Group 1, Group 2, and Group 3 after the intervention and observation period.

The median (IQR) dyspnea level for Group 1 after intervention was 0 (0), which was significantly different from Group 2 (median = 0, IQR = 0-1) and Group 3 (median = 1, IQR = 0-3) after the observation period. The H-value was found to be 22.0048, with a p-value of 0.0002, indicating a statistically significant difference in dyspnea levels between the groups (p = 0.0002).

Furthermore, Mann-Whitney U tests were conducted to compare dyspnea grades after treatment among the groups. The results showed a statistically significant difference between all groups: Group 1 and Group 2 (Z = 2.18155, p-value = 0.02926), Group 1 and Group 3 (Z = 3.29371, p-value = 0.0001), and Group 2 and Group 3 (Z = 2.16494, p-value = 0.03078).

These findings suggest that there is a statistically significant difference in dyspnea levels between Group 1, Group 2, and Group 3 after the observation period.

Based on the obtained results, it can be said that, Bhumyamalaki, Ashwagandha, Haridra, Guduchi as in Samshamani Vati and Bruhat Haridra Khanda has brought about significant improvement among all the Mild, Moderate and Severe cases of SARS-CoV-2 Infection in all the assessed parameters. Though there is significant improvement found in all Severe, Moderate and Mild cases, on comparing between the groups, it can also be concluded that, there is a significant reduction in symptoms among Group 1 cases of Severely Infected cases.

DISCUSSION

In Ayurveda, the COVID-19-like pandemics are considered as Janapadodhwamsa (Epidemic diseases) and in another context the same is also referred as Maraka (fatal). Acharya Charaka has dedicated one full chapter to Janapadodhwamsa[9] - which explains about these epidemics and pandemics. Janapada refers to particular geographic consideration. Impairment of Vayu (air), Udaka (water), Desha (land), and Kala (season) are more lethal in their consecutively increasing order[10]. Among the 4 causes mentioned for Janapadodhwamsa, Vayu is one. Droplet spread through air is one of the important modes of transmission of all the contagious diseases.

The concept of pathogenic agents is interpreted in terms of Agantuja Karana[13] (acquired causes) and infectious disease caused by it is called Agantuja Vyadhi (Infectious diseases). The Coronavirus can be contemplated as distinct type of Bhuta (which are not visible) affecting Pranavaha Srotas (respiratory system) and causing Jwara[15](spectrum of fever and related diseases).

Acharya Sushruta while explaining Kushta (dermatological disorders) in his text titled Sushruta Samhita, explains the concept of Oupasargika roga (communicable diseases) which are considered as sankramana[17] i.e., spreads from person to person and also explains the modes of spread of these conditions as

Prasanga - Direct contact as in sexual contact,
Gatrasamsparsha - Touch,
Nishwasa - Inhalation of infected air or air with infected droplets,
Sahabhojana Eating foods together,
Saha asana shayana - Sitting or sleeping together,
Sahavastra mala anulepana - Using same clothes and other ornamental materials, all these may be bundled into two modes as explained in recent texts as direct mode of spread and respiratory route by droplets. These concepts are very much relevant even today. Moreover, the modern texts of communicable disease epidemiology describe similar modes of disease transmission.

The other mode of understanding COVID-19 is through the concept of Krimi (micro-organisms). The word krimi includes both macro and micro-organisms that affects humans[19].

The present study aimed at treating the convalescent cases of COVID-19 Positive cases who commonly had symptoms of breathlessness, sleeplessness, feeling of anxiety, body ache, etc. The study consisted of Intervention for 30 days with Bhumyamalaki tablet, Ashwagandha Churna, Haridra Churna, Guduchi in the form of Samshamani Vati along with Bruhat Haridra Khanda, the mode of preparation, method of consumption was all explained in detail to patients along with a pamphlet explaining the procedure in local language and in English.

Phyllantus niruri [20]

Belongs to Euphorbiaceae family. Whole plant is commonly used and is known for its actions of Antiviral, Bactericidal, Antipyretic, Diuretic, Antispasmodic. The herb contains niuride, which inhibits specific HIV-protein binding activity.

Withania somnifera [21]

Belongs to Solanaceae family. The root of the herb is used extensively contains several alkaloids namely Withanine, Withananine, Withananinine, Pseudo-withanine, Withaferine, Somnine, Somniferine, Somniferinine. Withaferine is a major component of biologically active steroids, which is as effective as hydrocortisone. It is anti-bacterial, anti-tumour, anti-arthritic, hepato-protective. Its root is commonly used as anti-inflammatory, anti-tumour, anti-arthritic, sedative and hypnotic also in anxiety neurosis. Leaf has anti-inflammatory, hepatoprotective and anti-bacterial activity

Curcuma longa [22]

Belongs to Zinziberaceae family. Rhizome is known for its anti-inflammatory, cholagogue, hepatoprotective, antioxidant, anti-asthmatic, anti-tumour, anti-protozoal and carminative activities along with anti-platelet activity and is known to protect against DNA damage in lymphocytes. Curcumin in the rhizome has anti-oxidant activity comparable to Vit-C and E. It prevents release of anti-inflammatory mediators, lowers cholesterol, is gastroprotective as it increases mucin content in stomach and exert gastroprotective action against stress, alcohol, drug-induced ulcer formation. The ethanolic extract of rhizome has blood sugar lowering activity.

Tinospora cordifolia [23]

Belongs to Menispermaceae family. It is known for its antipyretic, anti-inflammatory, anti-rheumatic, spasmolytic, hypoglycemic, hepatoprotective, diuretic, antacid, anti-diarrhoeal activities.

Bruhat Haridra Khanda[24] is a poly herbo-mineral combination mentioned in Bhaishajya Ratnavali under Udarda, Sheetapitta, Kotha chikitsa prakarana (chapter of treatment dermatological disorders like urticaria, allergies). Its ingredients are Curcuma longa, Operculena turpethum, Terminalia chebula, Berberis aristata, Cyperus rotendus, Apium graveolens, Plumbago zeylanica, Picrorhiza kurroa, Piper longum, Zinziber officinalis, Cinnamomum zeylanicum, Cinnamomum tamala, Elattaria cardomum, Embelia ribes, Tinospora cordifolia, Adathoda vasica, Saussarea lappa, Piper retrofractum and Coriandrum sativum along with Loha Bhasma and Abhraka Bhasma. This is indicated in Dermatological disorders, Itching, Fungal skin infections, Eczema, Chronic fevers, Infections, Helminthiasis, Anaemia, Oedema, etc. This poly herbo-mineral combination is selected in view of its multiple action of being indicated in Jeerna jwara (Chronic fever) – as we are concentrating cases of treated cases of SARS-CoV-2, cases may get fevers again after being treated also. This is also Krimihara (anti-microbial), Shothahara (reduces swelling), Pandu hara (treats anaemia), thus combating all the ill effects of long-standing hospital cases of COVID-19 cases. The ingredients are also known for its Jwarahara (reducing fever), Krimihara and Rasayana (rejuvenative) effects which is the most needed among convalescent cases during their recovery.

CONCLUSION

Based on the results obtained, it can be concluded that, the used intervention has brought significant improvement in all the parameters in Severe, Moderate and Mild cases of SARS-CoV-2 infected cases. Whereas, in comparison with the control group, there is significant improvement in Myalgia, Fatigue, Sleep and Dyspnoea, only in parameter of Anxiety, no statistically significant difference is observed, but whereas, in considering with individual group, there is a significant statistical difference obtained in Anxiety assessment before and after intervention.

Though there is significant improvement found in all Severe, Moderate and Mild cases, on comparing between the groups, it can also be concluded that, there is a significant reduction in symptoms among Severely infected Cases.

And also, no untoward effects were observed in the cases who took medication and no one experienced a second episode of infection during the study period.

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