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Effectiveness of homoeopathic medicine *Arsenicum album* 30 among primary contacts of COVID-19: An analytical cross-sectional study

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Abstract

Introduction: Coronavirus disease caused by Severe Acute Respiratory Syndrome Corona Virus -2 (SARS-CoV-2), has spread rapidly all over the world. There is currently no established consensus on the standard of care in the pharmacological treatment of COVID-19 patients. However, homoeopathic medicine *Arsenicum album* 30 do have a prophylactic role in preventing COVID-19 even among the primary contacts and may help in reducing the disease severity and economic burden associated with the pandemic.

Aim: The study intends to investigate the association between the use of homoeopathic medicine *Arsenicum album* 30 and the occurrence of COVID-19 among the primary contacts and to explore the association between the use of homoeopathic medicine *Arsenicum album* 30 and the duration and severity of illness among the primary contacts in the study group who became COVID -19 test positive based on medication compliance.

Materials and Methods: The study participants were assessed by using twelve item structured questionnaire based on the data collection protocol issued by AYUSH ministry.

Results: A total of 1976 primary contacts of different age group and both genders were assessed for proportion of COVID-19 positives as well as duration and severity of illness based on the compliance for medications. The compliance was good in 84.31% and poor in 15.69% of the subjects with 28% testing COVID-19 positive in medication adherent group and 56% testing COVID-19 positive in medication non-adherent group.

Conclusion: The level of prophylactic effect of the homoeopathic medicine *Arsenicum album* 30 positively correlated with the medication compliance of the study subjects and that it is effective in preventing the disease among the medication compliant primary /exposed contacts.

Keywords: COVID-19, corona virus, SARS-CoV-2 virus, homoeopathic preventive, primary contacts, medication compliance, *Arsenicum album* 30

Introduction

The global public health emergency of COVID-19 pandemic disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 that emerged in Wuhan, China unfolded rapidly and has now spread to at least 180 countries ^[1]. Healthcare resources in lower- and middle-income countries, already overwhelmed by patients with various communicable as well as non-communicable disease were overburdened with COVID-19 patients. Lack of adequate expertise, infrastructure, human resources and the economic situation in these countries forced the authorities to make difficult decisions regarding the allocation of available healthcare supplies ranging from health care professionals, hospital beds, personal protective equipment, diagnostic capacity and critical care services. In India too, the COVID 19 pandemic imposed considerable strain on the health services already reeling under pressures of inadequate health infrastructure and delivery systems.

Acknowledging the positive results obtained from the use of prophylactic homoeopathic medicines during epidemic outbreaks of various diseases like Chikungunya, Dengue Fever, Japanese Encephalitis and Malaria during recent past ^[2-6], the Scientific Advisory Board of the Homoeopathic Central Council for Research in Homoeopathy in its meeting held on 28 January 2020 declared *Arsenicum album* 30, widely used as prophylactic medicine for flu like illness, as the preventive medicine during the COVID-19 pandemic and a health advisory in this regard was issued by the Ministry of AYUSH ^[7, 8].

In the article published on BMC Complementary and Alternative Medicine, *Arsenicum album* was shown to enhance the innate immunity [9]. Lipopolysaccharide (LPS)-stimulated macrophages treated with highly diluted *Arsenicum album* decreased tumour necrosis factor alpha (TNF- α) release and decreased Interferon gamma (IFN- γ) production. Further there was decreased Nuclear Factor-Kappa B (NF- κ B) activity on Tumor Necrosis Factor- α stimulated reporter cell line [9].

The Expert Group has further suggested that general hygienic measures for prevention of air-borne infections suggested by the Ministry of Health and Family Welfare, Govt. of India, should also be followed by the public. *Arsenicum album* 30 is a time-tested homoeopathic medicine in use for decades which is affordable, easily available and has been used widely for a long time with good safety records.

As COVID-19 is a novel disease entity for which treatment protocol were slowly evolving, supportive care and prevention are the only available option. Homeopathic preventive could prove to be an economical as well as beneficial alternative to curtail the elevated healthcare costs incurred due to the exorbitant pricing of antiviral drugs and vaccines, intensive care including ventilatory support. This study aims to summarize the effectiveness of Homoeopathic medicine *Arsenicum album* 30, which may serve as a mass prophylactic agent for improving the health status of the community and may also pave way for future research work in the evolution of homoeopathic prophylaxis domain. Any positive outcome from this study will be a step forward in the right direction.

The study objectives were to investigate whether there is any association between the use of Homoeopathic medicine *Arsenicum album* 30 and the occurrence of COVID-19 among the primary contacts of COVID-19 positive cases and to explore the association between the use of homoeopathic medicine *Arsenicum album* 30 and the duration and severity of illness among the primary contacts in the study group who became COVID -19 test positive.

Materials and Methods

An analytical cross-sectional study was conducted based on the data of 74160 subjects obtained from the OPD of the Govt. Homoeopathic Medical College, Kerala collected between February 2021 and July 2021. The research objectives were to investigate whether there is any association between the use of Homoeopathic medicine *Arsenicum album* 30 and the occurrence of COVID-19 among the primary contacts of COVID-19 positive cases and to explore the association between the use of homoeopathic medicine *Arsenicum album* 30 and the duration and severity of illness among the primary contacts who became COVID -19 test positive in the study group. This analytical cross-sectional study compared the proportion of COVID-19 cases, the severity and the average duration of symptoms between medication (homoeopathic preventive) compliant and non-compliant primary contacts who became COVID-19 test positive in the study group and also intended to describe the baseline demographic characteristics among the participants.

Sample size and ethical consideration

The representative target sample size needed, to achieve the study objectives and sufficient statistical power, was

calculated with sample size calculator [10]. The sample size calculator arrived at 1500 participants, a confidence level of 99%, and design effect 1. After approval and clearance from the Institutional Ethics Committee, 1976 consecutive participants, who were primary contacts of COVID-19 positive cases, were prospectively enrolled and included in the study by the investigators. More number of participants were enrolled for the study considering the loss to follow up. Study participants were recruited by purposive sampling method from February 2021 to July 2021 (6 months).

A 12-item pretested structured questionnaire regarding the exposure history, compliance to the prescribed medications, the nature and duration of illnesses, severity of the illness, management of symptoms, the laboratory diagnosis was prepared based on the data collection protocol issued by AYUSH ministry. The Study participants received the homoeopathic medicine *Arsenicum album* 30 as per the Advisory of Ministry of AYUSH for three consecutive days. The same dose was repeated at intervals of one month (8). The participants were interviewed through telephone after 2 weeks corresponding to the maximum incubation period of the disease successively for 6 months for assessing medication compliance as well as the development of disease symptoms. The demographic details were also documented. Informed consent from the respondent or parent/guardian was obtained verbally through the telephone before proceeding with the interview as per the permission accorded by the Institutional Ethics Committee. Respondents were informed that all the information and opinions provided would be anonymous and confidential and that they will not be reported by name in any publication resulting from data collected in the study.

The individuals who had any contact with the COVID-19 positive patient (detection of either SARS-CoV-2 in a real-time fluorescent RT-PCR of respiratory specimens or blood specimens, or a positive rapid antigen test) were considered as primary contact as per the definition of WHO and such primary contacts who received the homoeopathic medicine *Arsenicum album* 30 were included in the study [11, 12]. The individuals with comorbidities, malignancies or terminal illnesses, inconsistent diagnostic results, pregnant women and those taking other medications including AYUSH medications were excluded from the study.

Results

The Statistical Package for the Social Sciences (SPSS) statistical software IBM SPSS (version 22.0,) was used for data analysis. The chi-square test was used, when necessary, to test differences between proportions. After an initial analysis, the participants were separated into two groups: medication complaint and non-complaint groups.

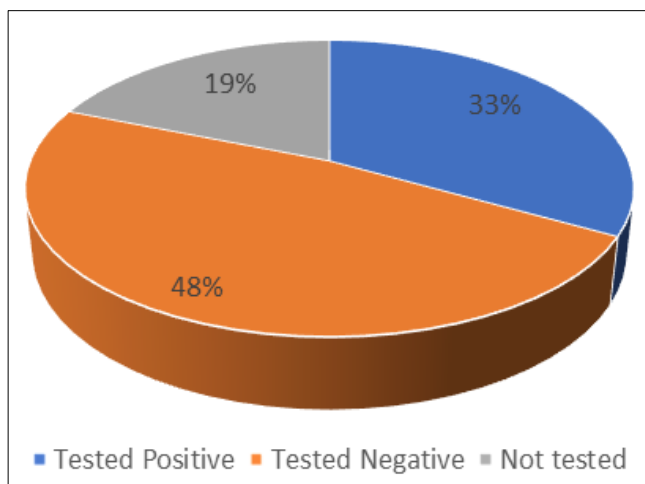
The comparison between medication compliance and test result among COVID-19 primary contacts is summarized in [Table/Fig-01]. Graph-01a shows the distribution of COVID -19 test positives among the primary contacts under study, Graph-01b the distribution of COVID -19 test positives among the medication adherent group and Graph-01c the distribution of total number of COVID-19 test positives among the medication non-adherent group. Of the total no. of 1976 study subjects, 1666 were consuming the medicine in conformation to the instruction with respect to the timing, dosage, and frequency. Table no-02a gives the result of chi-square test for independence and the table no-02b of post hoc test showing the comparison of pair of groups, the corresponding chi square value and level of significance.

The study shows significant association between the proportion of COVID-19 positive cases and medication adherence. The compliance was good in 84.31% and poor in 15.69% of the subjects with 28% testing COVID-19 positive in medication adherent group and 56% testing COVID-19 positive in medication non-adherent group. It is notable that the post hoc test comparing the pair of groups also suggest statistical association of very high significance with p-value <0.001. Table no-03 shows the comparison between compliance i.e., medication adherent / non- adherent and duration of symptoms in COVID-19 test positive. Graph-03a shows the duration of symptoms among COVID-19 positive cases, Graph-03b the the duration of symptoms in the medication adherent group and Graph-03c the duration of symptoms among the medication non-adherent group. Table no-04a summarizes the result of the chi-square test for independence for association between medication adherence and the duration COVID-19 symptoms in positive cases. In the analysis between duration of symptoms in COVID-19 primary contacts who tested positive and medication adherence, 29% possessed COVID-19 symptoms for less than 5 days, 30% possessed symptoms for 1 week, 15% possessed symptoms for 2 weeks and 1% possessed symptom for 3-4 weeks. Data of 25% participants who gave inconsistent answers or were unable to recall clearly the duration of illness were not included though they tested positive. As per Table no-04a, the computed value of chi-square is 21.053 with P-value <0.001 suggesting there exists significant association between medication and duration COVID-19 symptoms in positive cases. Table no-04b depicts the post-hoc test to find group association, the chi square value and P-value for each pair of groups. However, in the post hoc analysis for each pair of groups, the

association was not statistically highly significant indicating that homoeopathic medicine Arsenicum album 30 may not be useful in reducing the duration of illness among the primary contacts. Table no-05 shows the comparison between medication compliance and management of symptoms for COVID-19 test positive among the primary contacts. Graph no-05a presents the management of symptoms in in COVID-19 test positives. Management of symptoms in medication adherent group is presented in Graph no-05b and management of symptoms in medication non-adherent group is presented in Graph no-05c. Table no-06a shows the result of chi-square test for independence and Table no-06b the post-hoc test. Regarding the medication adherence and management required for COVID-19 primary contacts who tested positive, chi-square and post hoc analysis was highly significant ($p < 0.001$). Among the participants in medication adherent group, 69% managed symptoms at home without any consultation, 23% managed symptoms by consulting doctor and 8% needed hospitalization to manage symptoms. Whereas in the medication non-adherent group, 60% managed symptoms from home, 35% managed symptoms by consulting doctor and 5% were hospitalized to manage symptoms. Table no - 07 shows the age distribution of COVID-19 test positive primary contacts. The mean age of the study participants was 39 ± 20.52 years with 32% of the participants belonging to the group of 21-40 years. Regarding the gender distribution of the study subjects, 43% of the subjects were females ,44% were males and 13% were children. Table no: 08a the gender distribution of COVID-19 test positive primary contacts and the Diagram no-08b is the pie chart showing the age distribution of COVID-19 test positive primary contacts.

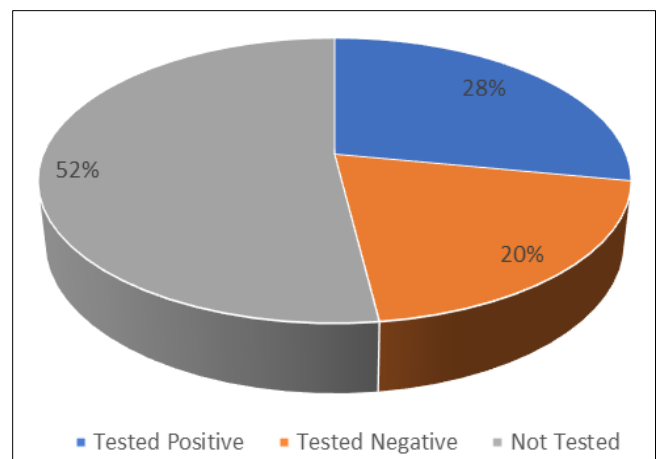
Table 1: Comparison between Medication Compliance and test result among COVID-19 primary contacts

Compliance	COVID-19 primary contacts							
	Tested Positive		Tested Negative		Not tested		Total	
	N	%	N	%	N	%	N	%
Medication adherent	471	28	856	52	339	20	1666	100
Medication non-adherent	174	56	101	33	35	11	310	100
Total	645	33	957	48	374	19	1976	100



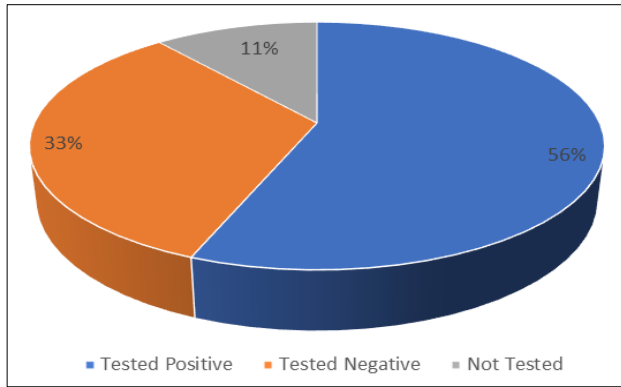
Graph 1a: Distribution of COVID -19 test positives among primary contacts under study

33% of total participants under study were tested positive, 48% were tested negative and 19% belong to not tested category.



Graph 1b: Distribution of COVID -19 test positives among medication adherent group

Among the participants in medication adherent group, 28% were tested positive for COVID-19 test, 52% were tested negative and 20% of participants not tested.



Graph 1c: Distribution of COVID - 19 test positives among medication non- adherent group

Among the participants in medication non-adherent group, 56% were tested positive for COVID-19, 33% were tested negative and 11% of participants not tested.

Table 2a: Result of chi-square test for independence

Chi-square	92.543
P-value	<0.001

The computed value of chi-square is 92.543 and P-value is <0.001. Hence it can be concluded that there exists significant association between medication and COVID-19 primary contacts. In order to find which all groups are associated and which are not associated, chi-square value and P-value for each pair of groups is calculated.

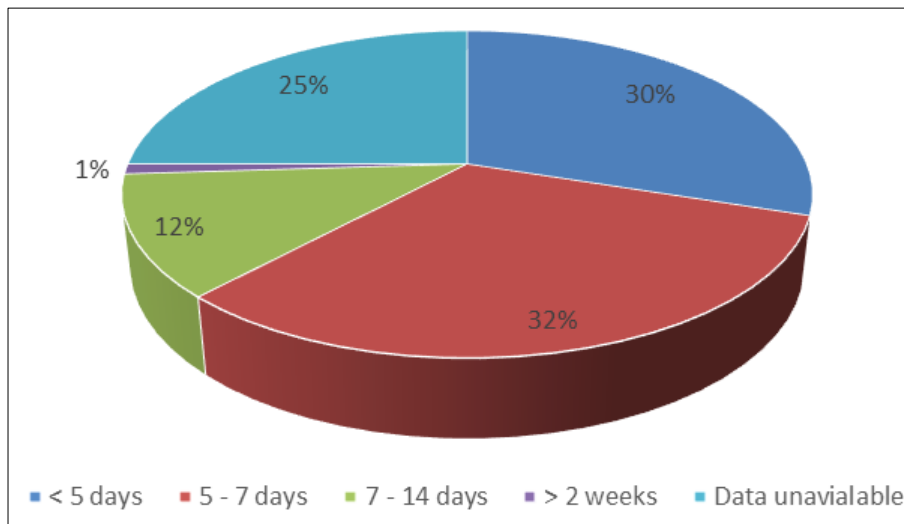
Table 2b: Post-hoc test

Pair of groups	Chi-square	P-value
Medication adherent and positive cases	92.16	<0.001**
Medication adherent and negative cases	36.97	<0.001**
Medication adherent and not tested	13.99	<0.001**
Medication non-adherent and positive cases	92.16	<0.001**
Medication non-adherent and negative cases	36.97	<0.001**
Medication non-adherent and not tested	13.99	<0.001**

**Significant at 1% level

Table 3: Comparison between medication compliance and duration of symptoms in COVID-19 positive cases

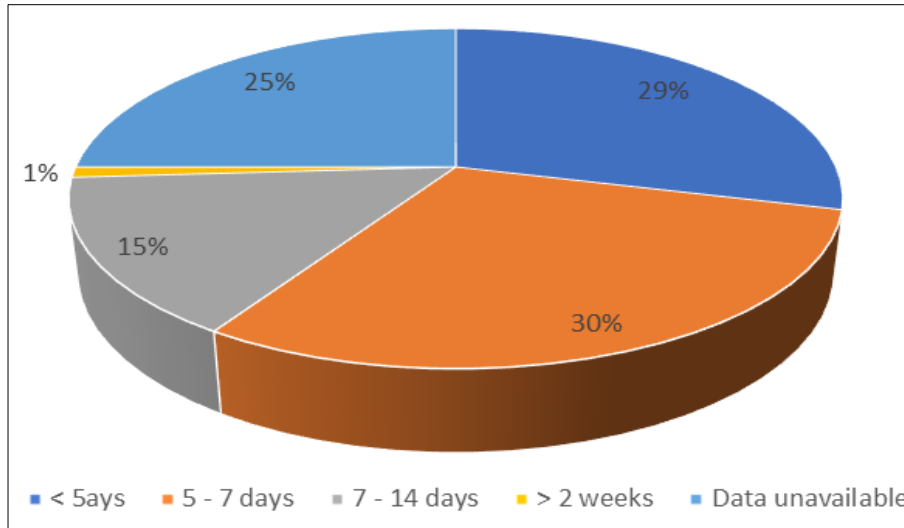
Medication Compliance	Duration of symptoms in COVID-19 positive cases											
	<5 days		5-7 days		7-14 days		> 2 weeks		Data unavailable		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Medication adherent	135	29	142	30	73	15	4	1	117	25	471	100
Medication non-adherent	61	35	66	38	5	3	1	1	41	23	174	100
Total	196	30	208	32	78	12	5	1	158	25	645	100



Graph 3a: Duration of symptoms in COVID -19 positive cases

30% participants of the total COVID-19 positive tested under the study possessed symptoms for less than 5 days, 32% possessed symptoms for 5-7 days, 12% possessed

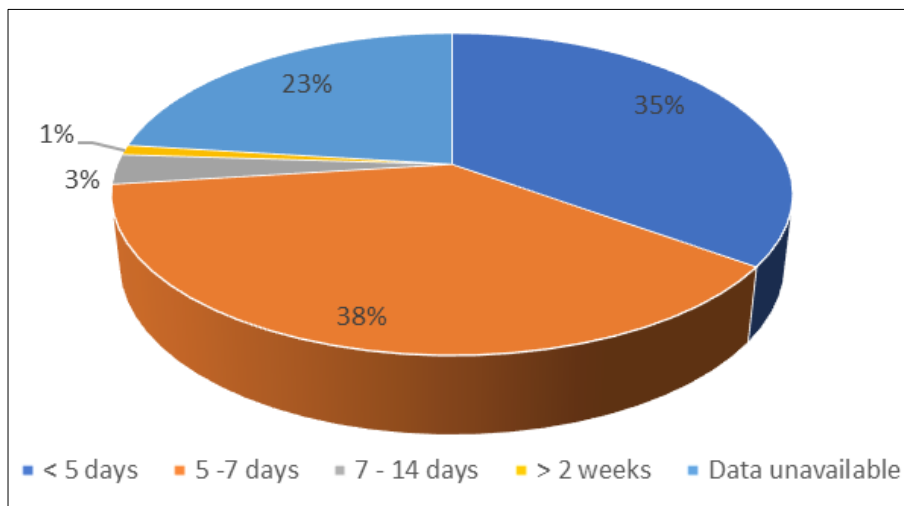
symptoms for 7-14 days and 1% possessed symptoms for more than 2 weeks. Data is unavailable for 25% participants.



Graph 3b: Duration of symptoms in medication adherent group

Among the participants in medication adherent group, 29% possessed COVID-19 symptoms for less than 5 days, 30% possessed symptoms for 5 – 7 days, 15% possessed

symptoms for 7 – 14 days and 1% possessed symptom for more than 2 weeks. Data is unavailable for 25% participants.



Graph 3c: Duration of symptoms in medication non-adherent group

Among the participants in medication non-adherent group, 35% possessed COVID-19 symptoms for less than 5 days, 38% possessed symptoms for 1 week, 3% possessed symptoms for 2 weeks and 1% possessed symptom for 3-4 weeks. Data is unavailable for 23% participants.

The computed value of chi-square is 21.053 and P-value is <0.001. Hence there exists significant association between medication and duration COVID-19 symptoms in positive cases.

In order to find which all groups are associated and which are not associated, chi-square value and P-value for each pair of groups is calculated.

Table 4a: Result of chi-square test for independence

Chi-square	21.053
P-value	<0.001

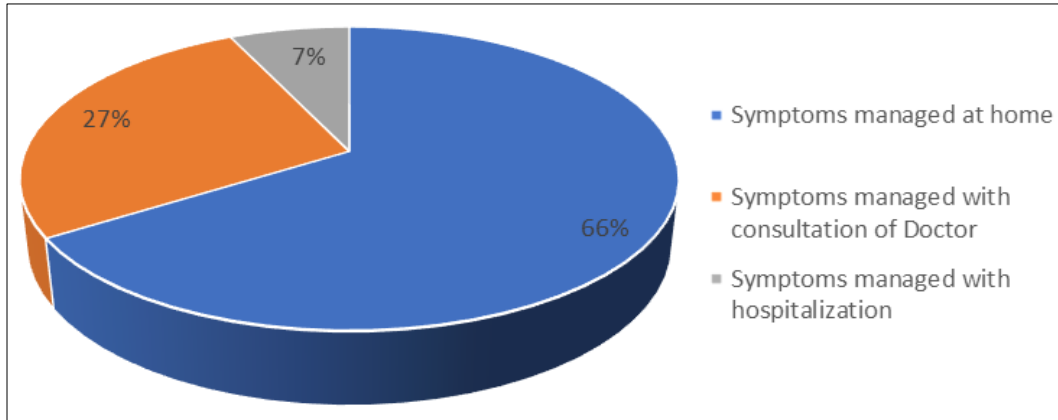
Table 4b: Post-hoc test

Pair of groups	Chi-square	P-value
Medication adherent and <5 days	2.46	0.12
Medication adherent and 5 - 7 days	3.53	0.06
Medication adherent and 7 -14 days	19.01	<0.001**
Medication adherent and > 2 weeks	0.12	0.73
Medication adherent and data unavailable	0.11	0.74
Medication non-adherent and <5 days	2.46	0.12
Medication non-adherent and 5 - 7 days	3.53	0.06
Medication non-adherent and 7 -14 days	19.01	<0.001**
Medication non-adherent and > 2 weeks	0.12	0.73
Medication non-adherent and data unavailable	0.11	0.74

**Significant at 1% level

Table 5: Comparison between medication compliance and management of symptoms for COVID-19 test positive primary contacts

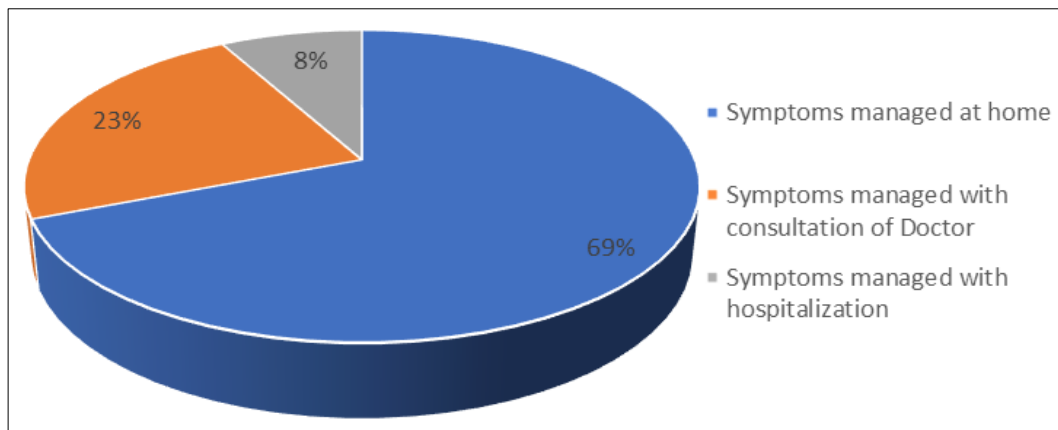
Medication Compliance	Management of symptoms for COVID-19 test positive primary contacts							
	Symptoms managed at home		Symptoms managed with consultation of doctor		Symptoms managed with hospitalization		Total	
	N	%	N	%	N	%	N	%
Medication adherent	325	69	110	23	36	8	471	100
Medication non-adherent	104	60	62	35	8	5	174	100
Total	429	66	172	27	44	7	645	100



Graph 5a: Management of symptoms in COVID-19 positive cases

Among the total participants with symptoms who were COVID-19 positive, 66% managed symptoms from home,

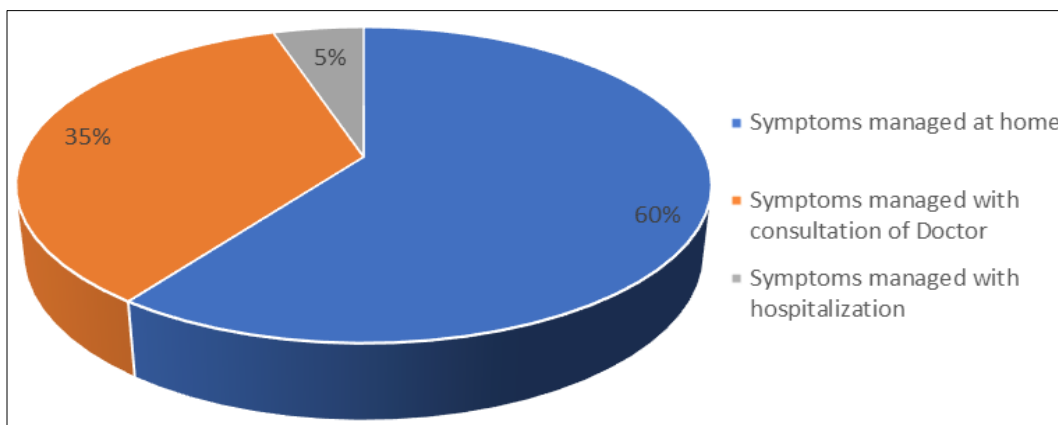
27% managed symptoms by consulting doctor and 7% needed hospitalization in order to manage symptoms.



Graph 5b: Management of symptoms in medication adherent group

Among the participants in medication adherent group, 69% managed symptoms from home, 23% managed symptoms

by consulting doctor and 8% were hospitalized in order to manage symptoms.



Graph 5c: Management of symptoms in medication non-adherent group

Among the participants in medication non-adherent group, 60% managed symptoms from home, 35% managed symptoms by consulting doctor and 5% were hospitalized in order to manage symptoms.

Table 6a: Result of chi-square test for independence

Chi-square	10.538
P-value	0.005

Table 6b: Post-hoc test

Pair of groups	Chi-square	P-value
Medication adherent and symptoms managed at home	4.84	0.03*
Medication adherent and symptoms managed with consultation of doctor	9.80	<0.01**
Medication adherent and symptoms managed with hospitalization	1.85	0.17
Medication non-adherent and symptoms managed at home	4.84	0.03*
Medication non-adherent and symptoms managed with consultation of doctor	9.80	<0.01**
Medication non-adherent and symptoms managed with hospitalization	1.85	0.17

**Significant at 1% level

*Significant at 5% level

Table 7: Age distribution of COVID-19 test positive primary contacts

Age (years)	N	%
0-20 years	133	20.36
21-40 years	217	33.23
41-60 years	186	28.48
61-80 years	113	17.30
Above 80 years	4	00.61
Total	653	100

Table 8: Gender distribution among the primary contacts of COVID-19.

Gender	Male (N)	%	Female (N)	%	Child (N)	%
Total	861	43.57	850	43.02	265	13.41

Discussion

In this study, an attempt has been made to assess the association between the use of homoeopathic medicine Arsenicum album 30 and the occurrence, the duration and severity of illness among the primary contacts of COVID-19 positive cases based on medication compliance. Data collection in the present study was based on 12-item pretested structured questionnaire prepared based on the data collection protocol issued by Central Council of Homoeopathy under AYUSH ministry. The questionnaire was pretested with the help of subject experts and linguistic experts.

In this study of 1976 primary contacts of COVID 19 who consumed the homoeopathic medicine Arsenicum album 30, the proportion of COVID 19 positives were compared between the medication compliant and non-compliant participants. The study shows significant association between the proportion of COVID-19 positive cases and medication adherence. The compliance was good in 84.31% and poor in 15.69% of the subjects with 28% testing COVID-19 positive in medication adherent group and 56% testing COVID-19 positive in medication non-adherent group. It is notable that the post hoc test comparing the pair of groups also suggest statistical association of very high significance. These observations suggest that the homoeopathic medicine Arsenicum album 30 do have a prophylactic action in preventing COVID-19 among primary contacts. Debadatta Nayak *et al.* reported the

The computed value of chi-square is 10.538 and P-value is 0.005 which is less than 0.05.

Hence it can be concluded that there exists significant association between medication and management of COVID-19 symptoms in positive cases. In order to find which all groups are associated and which are not associated, chi-square value and P-value for each pair of groups is calculated.

protective effect of Arsenicum album 30C against laboratory confirmed COVID-19 was 74.40% [13].

In our study, the association between the duration of symptoms in COVID-19 primary contacts who tested positive and medication adherence, 29% possessed COVID-19 symptoms for less than 5 days, 30% possessed symptoms for 1 week, 15% possessed symptoms for 2 weeks and 1% possessed symptom for 3-4 weeks. The computed value of chi-square suggests the existence of significant association between medication and duration COVID-19 symptoms in positive cases. However, in the post hoc analysis for each pair of groups, the association was not statistically highly significant. Most of the studies on COVID-19 suggest that the symptoms last for about 7-10 days in mild cases. Hence it can be presumed that the homoeopathic medicine Arsenicum album 30 may not have the effect to reduce the duration of symptoms among primary contacts once they get infected with COVID-19.

Regarding the medication adherence and management required for COVID-19 primary contacts who tested positive, majority of the participants in medication adherent group (69%) managed symptoms at home without any consultation and only 8% needed hospitalization to manage symptoms. Whereas in the medication non-adherent group, 60% managed symptoms from home, 35% managed symptoms by consulting doctor and 5% were hospitalized to manage symptoms. The management of symptoms has a direct correlation with medication adherence as the subject requiring hospitalization was fewer in the medication adherent group. Different studies have shown a potential prophylactic effect of Arsenicum album 30 against Covid-19 [14, 15].

None of the study participants reported adverse reaction to the homoeopathic medicine Arsenicum album 30 during the study period.

Limitation

Owing to the cross-sectional nature of study, there is a limitation in the study to show causal association as well as to restrict the confounders. A possible bias in our results is the fact that the questionnaires typically require respondents to recall their activities over the determined period. There is the possibility of both recall and interviewer bias. Further, data on those who did not agree to participate in the study

were not collected and analysed to exclude the possibility of a sampling bias. Being a hospital-based study, extrapolation is not possible and the study may not be representative of patients from all socioeconomic backgrounds.

Conclusion

This study was undertaken to investigate the usefulness of the homeopathic medicine Arsenicum album 30 in preventing the disease, reducing the duration and severity of illness among the primary contacts of Covid 19. Our findings suggest that the Arsenicum album 30 is effective in medication compliant participants in preventing the disease among the exposed and in reducing the severity of illness as only few of subjects consuming the homeopathic preventive as per the instruction required hospitalization due to severe symptoms. Overall, only few studies have been conducted in developing countries on effectiveness of homeopathic medicine Arsenicum album 30 on primary contacts of COVID-19 and hence there is a need for more systematic studies. Based on the results of the current study, it is suggested that research institutes such as ICMR may collaborate with AYUSH system/ Central Research Institute, Homeopathy and carry out further research in the area of homeopathic prophylaxis and implement the prophylactic programs using homeopathic medicines for viral infections and other infectious diseases as protective health measure to contain infectious diseases such as the COVID-19 pandemic.

Financial support and sponsorship

The study is not funded by any external agency.

Conflicts of interest

There are no conflicts of interest.

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