COVID-19 PANDEMIC: PRE AND POST COVID RELATIVE ANALYSIS OF RURAL PATIENTS' HEALTH

Manisha Shinde-Pawar[1], Kirti Kadam[2], Babasaheb Patil[3], Pratap Desai[4]
[1]Bharati Vidyapeeth (Deemed to be University), Pune
[2,3,4]Institute of Management and Rural Development Administration, Sangli
Email: mjs.imrda@gmail.com
DOI: 10.47750/pnr.2022.13.S06.199

Abstract

In this uncertainty of COVID 19 pandemic, everyone want to be safer and there is no choice than to adopt new normal, so it is sound to analyse pre and post COVID relative impact an patients health so as to redesign routine or new normal. In fact, all these patients and such patients from entire world are facing post COVID problems also which may be related to different parameters different symptoms, age, pre-existing conditions, infection frequency, severity level, stage of diagnosis and more specifically life span and treatment styles in various Hospitals at diverse socio-economic structures/though processes. Hence the medical staff and stakeholders necessarily have to adopt a distinct strategy for future treatments based on past experiences. COVID treatment in hospitals need to be understood as the systematic and coordinated implementation of medical policy by Medical undertakings whether private or state owned, local or regional, national or international, level to achieve the optimum cost of life, time and resources of the needs of particular patient groups and, in doing so, to achieve an appropriate treatments and care.

1. INTRODUCTION

In this uncertainty of COVID 19 pandemic, everyone want to be safer and there is no choice than to adopt new normal, so it is sound to analyse pre and post COVID relative impact an patients health so as to redesign routine or new normal. In fact, all these patients and such patients from entire world are facing post COVID problems also which may be related to different parameters different symptoms, age, pre-existing conditions, infection frequency, severity level, stage of diagnosis and more specifically life span and treatment styles in various Hospitals at diverse socio-economic structures/though processes. Hence the medical staff and stakeholders necessarily have to adopt a distinct strategy for future treatments based on past experiences. COVID treatment in hospitals need to be understood as the systematic and coordinated implementation of medical policy by Medical undertakings whether private or state owned, local or regional, national or international, level to achieve the optimum cost of life, time and resources of the needs of particular patient groups and, in doing so, to achieve an appropriate treatments and care.

2. RESEARCH MOTIVATION

Against the backdrop of the global outbreak of Corona, Indian Medical stakeholders provided various collaborations, services and assistance through social support and also created awareness about Corona. Being second largest population in the world India is doing and can do well for COVID-19 fight with new possibilities of potential in future. COVID-19 and Post COVID-19 vulnerable need special attention to appreciate value of treatments available. Analysing existing cases is popular way to add value appreciation, but in India especially area like rural area needs study on appropriate treatments and care and post COVID phases of treatment.

Preliminary investigation and observation on site studied created opportunity to focus on development of treatment and decision making. The Researcher has identified underdeveloped medical strategies in rural region. So by considering the requirement of

improvement in the systematic and coordinated implementation of medical policy can be focused for COVID treatment and post COVID care to avoid severe impact on health and body organs due to COVID infection.

3. THE RESEARCH PROBLEM

COVID-19 is global problem and India has sufficient potential for development in medical strategies, but not yet exploited effectively. This is witnessed by the poor medical management of available resources. The inadequate proportion of medical resources into the country is due to the insufficient medical facilities. Suddenly due to pandemic truth revealed that, there exists an exponential demand for medical facility approaches in the development of hospital and required resources, pricing the treatments, awareness creating activities. Since the Medical facilities and strategies are not established well, the patients are lacking from the adequate satisfaction.

1. Does the patient in Rural Area have major symptoms, pre-existing health conditions of vulnerable?

2. Are these patients facing some common post COVID problems, which can be addressed in near future?

3. What was the COVID-19 vaccination status before infection of the patients?

4. What is the impact of gender, test result and pre-existing health condition, stage of diagnosis influencing escalation of treatments?

These are some of the questions which require an in-depth study. An investigation into these issues will provide the basis for establishing some medical strategy or to design some medical solutions for the decision making in COVID-19 treatments and post COVID care and precautionary measures.

This research work or study presents an empirical study or analytical model to perform mixed research paradigm to assess current scenarios and future strategies for medical strategies in the Sangli district of Maharashtra. This empirical analysis model intends to assess current infrastructures availed in the ROI under study, the efficacy of current policies and need of further optimization, medical policy, and specifically provide machine learning based model for further enrichment to support medical stakeholders so as to serve more patients in systematic and co-ordinated way etc.

4. OBJECTIVES

Varied approaches and practices to be applied for a strategic medical solution for COVID-19 patients are assessed empirically and eventually a conceptual and machine learning based model is intended to be derived. Some of the key research objectives are defined as follows:

- To study the COVID-19 patient's current scenario in Bharati Hospital, COVID center, Sangli.

- To conduct an in-depth study of COVID-19 patient's pre and post COVID health in Bharati Hospital, COVID center, Sangli.

- To evaluate the symptoms of patients on the critical factors and impact on body organ.

- To formulate strategy and to design the machine learning based model for COVID-19 treatment and cure related decision making.

5. RESEARCH HYPOTHESES

Considering above derived research objectives and respective subject matter analysis, in this article certain well defined research hypotheses have been defined. The proposed research hypotheses represent the predominant factors pertaining to COVID-19 patient's treatment and care strategy with their respective significance towards the technical solutions to support medical stakeholders. These defined hypotheses are given as follows:

H0: COVID-19 do not have significant impact on other body organs.

Ha: COVID-19 have significant impact on body organs.

H0: There is no relationship between pre-existing health conditions, COVID-19 infection and post COVID problems.

Ha: There is relationship between pre-existing health conditions, COVID-19 infection and post COVID problems.

H0: There is no relationship between symptoms, test result and escalation of treatment of patient.

Ha: There is relationship between symptoms, test result and escalation of treatment of patient.

6. SCOPE OF THE STUDY

To exploit the medical facility at COVID centre rapidly and effectively, there is a requirement for giving importance for some of the key areas such as symptoms, age, test results, pre an post COVID health conditions and treatment related facilities and medical service strategies at local as well as international levels, awareness and skill development in local people about COVID-19 infections, treatments and care, taking care on maintaining hygiene and sanitation concerns. It is well known fact that COVID-19 treatment and care is getting enormous importance throughout the world as well as bringing huge economic benefits to host communities, and causing many environmental and social impacts to the entire globe. Rural area in Maharashtra is in infant stage in COVID_19 management, an integrated approach is required to frame medical strategies and to provide some technical solutions to support medical stakeholders. Rural Medical stakeholders faces problems due inadequate resources, lack of professional strategy, unawareness of patients. Specifically as the problem is very recent, global and having variant cases with varied pre-existing health issues and post COVID impact, so it becomes difficult to understand nature of each specific case to treat. So this study can identify some patterns, relationship among different factors of study and plan to provide machine learning based solutions focusing to Rural area Hospital Bharati Hospital, COVID Center, Sangli.

7. SAMPLE DESIGN

Sampling Method Used – Simple Random Sampling

Sample Size

Table No.1: Sample size of data observed for Study

Sr. No	Sample	Sample Size
1	Male	135
2	Female	56
	Total	**191**

*Source-Primary Data

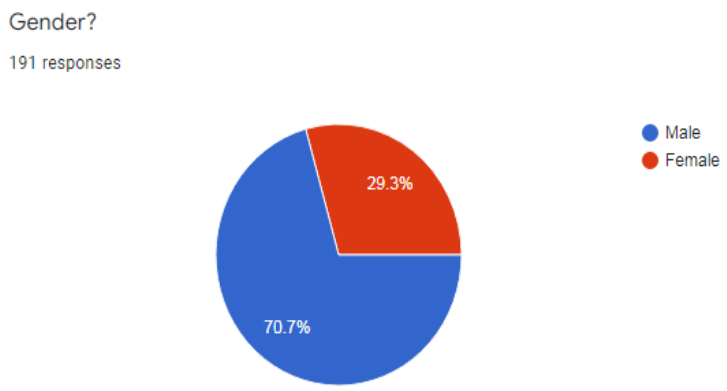

Figure No.1 Gender-wise patients admitted to Hospital

Data Collected from field survey that is from Bharati Hospital, Sangli shows that around 71% patients admitted to hospital from sample data are male patients and 29% patients admitted are female patients, so in observed data proportion of COVID-19 infection in females in Rural area is very less as compared males.

8. Tools for Data Analysis

Table No.2: Tools Used

Sr. No.	Tools	Purpose
1	Google Forms	Patients Data Entry from Medical Stakeholders
2	Microsoft Excel	Data Storage retrieval and access, table and graphs designing
3	R Tools- R Studio and R Framework	Machine Learning based Model designing and testing

R Tool will be used in future research for Model designing and Testing

9. Data Analysis

The data collected and analyzed using tools Specified main results are shown here

RT-PCR Result Analysis

Table No.3: Gender-wise Vaccination Status and COVID RT-PCR Test Result

Gender	Average of Vaccination Status before infection?	Count of RT-PCR test result?
Female	0.017857143	54
Male	0.074074074	131
Grand Total	0.057591623	185

*Source: Primary Data, Compiled by Researcher

Average Vaccination Status before infection seems very less, not even 5% in total in observed data.

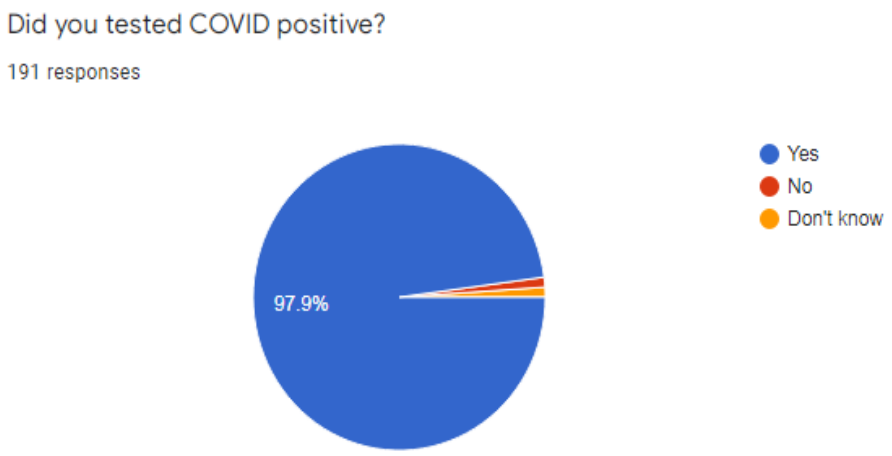

Figure No.2 COVID-19 infection RT-PCR Test result

Table 3 shows that out of total 185 positive cases 54 females RT-PCR Test result is positive and 131 males RT-PCR Tested positive.

Gender-wise Vaccination status, oxygen level, RT-PCR Result Relative Analysis

As shown in figure no.3, though female patients are less and male patients observed are high, oxygen level dropped seems at same level in both males and females. This also shows very low vaccination status before infection.

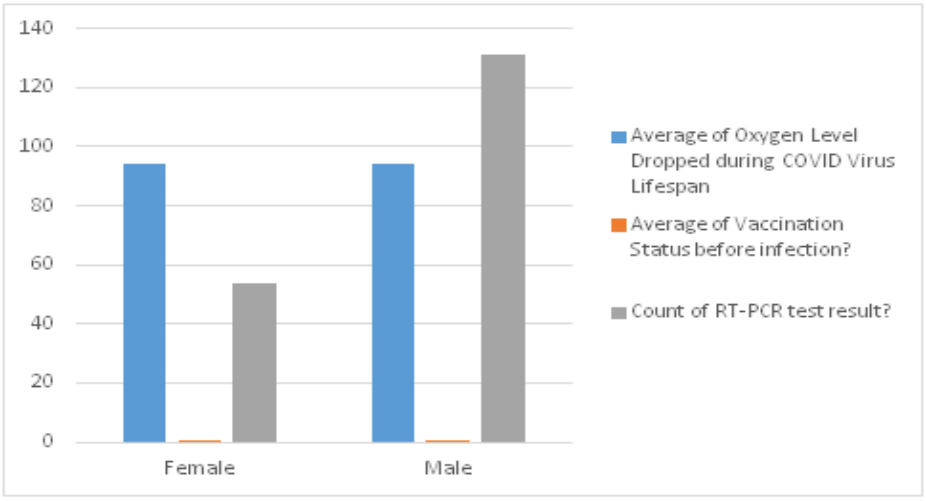

Figure No.3 COVID-19 vaccination status, oxygen level, RT-PCR Result Analysis Compiled by Researcher

Symptoms Observed

From the statistics plotted in the table 4, it can be observed that major symptom observed is fever, 147 patients, i.e. 77% patients faced fever during infection as major symptom for decision making, second major symptom observed is Bodyache and Pains in 69 patients, i.e. 36.1% faced bodyache and pains problem, approximately 22% were having cold as third major symptom around 21% faced shortness of breath and all other symptoms were considerably negligible or absent in observed data.

Table No. 4: Symptoms Observed in Admitted Patients

Symptoms	Count	Percentage
Cold	42	22%
Fever	147	77%
Cough	26	13.6%
Bodyache and Pains	69	36.1%
Skin Rash or Discoloration of fingers	0	0%
Loss of Taste and Smell	5	2.6%
Sore Throat	4	2.1%
Diarrhea	0	0%
Shortness of breath	39	20.4%
Chest Pain	7	3.7%

*Source: Primary Data

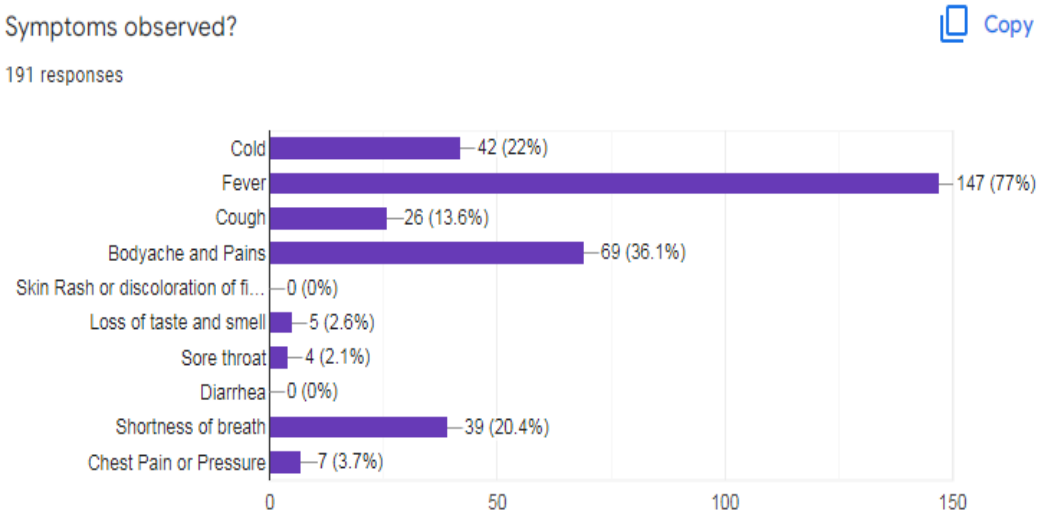

Figure No.4 COVID-19 Patients Symptoms observed

So as depicted in figure no.4, Fever, Bodyache, Bodypain and cold are major symptoms relatively severe cases also faced shortness of breath.

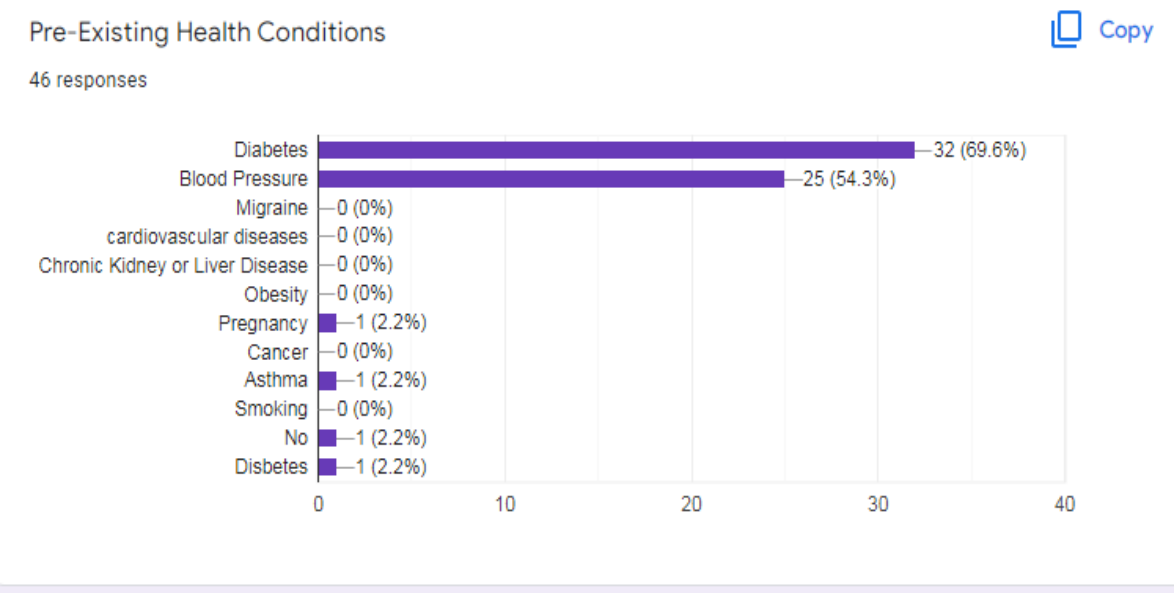

Figure No.5 COVID-19 Patients Pre-Existing Health Conditions

It can be observed form the figure no. 5 that approximately 70% patients were having pre-existing health condition as diabetes and 54% were having Blood pressure problem 2.2% having pregnancy issue and 2.2 % patients were having asthma.

Post COVID Health problems and effect on body organs-

Table No.5: Post COVID problems reported by patients

Post COVID issues	Count	Percentage
Diabetes	17	50%
Blood Pressure	5	14.7%
Heart Problems	1	2.9%
Lungs Problems	5	14.7%
Nasal Problems	1	2.9%
Black Fungus	0	0
Sinus	1	2.9%
Migraine	0	0
Weakness	18	52.9%

*Source: Primary data

Out of 191 patients observed, total 34 patients reported post COVID problems as shown in Table No.5, approximately 53% patients reported weakness as major post COVID problem, around 50% reported diabetes as post COVID issue they are facing, Blood pressure and Lungs problem reported by around 15% patients each. Heart Problem, Nasal Problem and Sinus problem reported by around 3% of patients of each category. Whereas amongst observed data no one reported black fungus or migraine issue after COVID treatment.

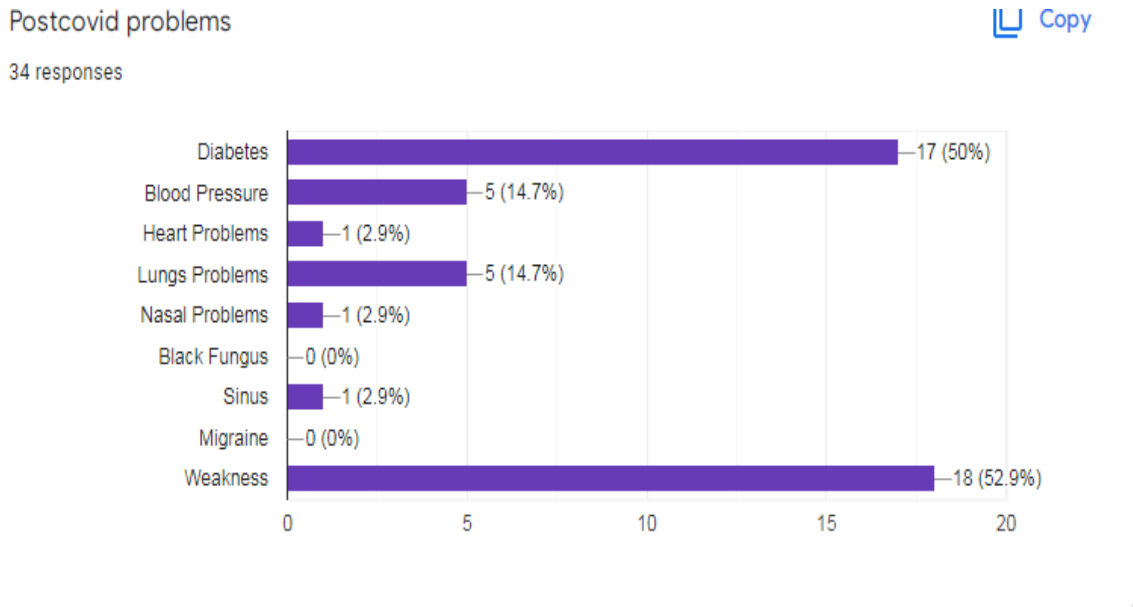

Figure No.6 COVID-19 Patients Post COVID Health Problems

So Diabetes and Weakness are major post COVID health issues observed and also Blood pressure and Lungs issues observed in few patients.

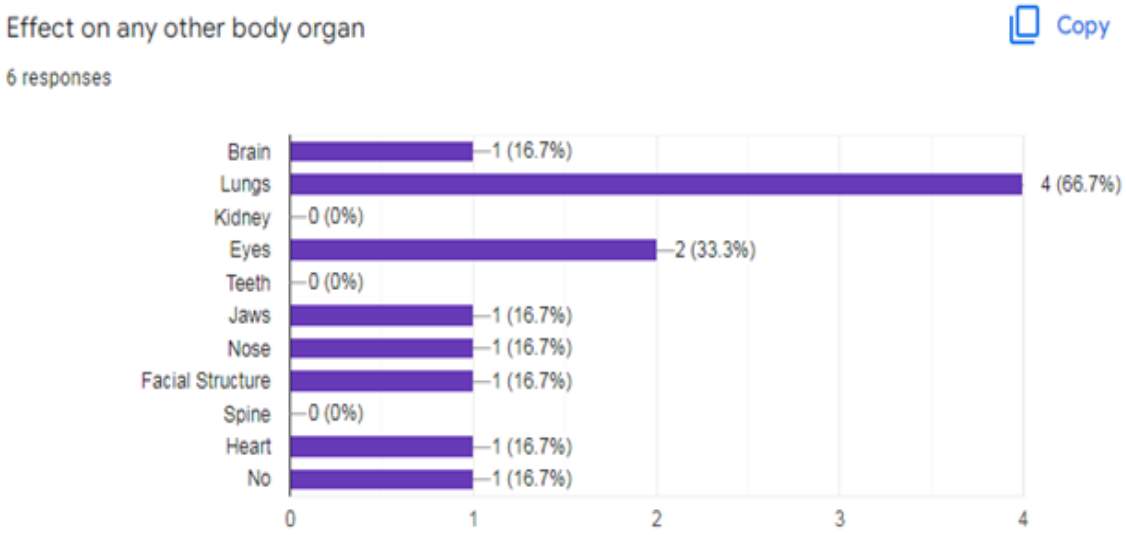

Figure No.7 COVID-19 Effect on Body Organs

As depicted in Figure No. 7, around 67% patients reported impact of COVID-19 on lungs, 34% patients reported impact of COVID-19 on eyes and around 17% reported Brain, Jaws, Nose, Facial structure and Heart Problems in each category. Whereas 17% patients reported not having any impact on any body organ of COVID-19 infection.

Escalation of Treatment

As depicted in Table No. 6 Escalation of Treatment majority of cases cured after treatment pattern being followed applied.

Table No.6: Escalation of Treatment

Escalation of Treatment	Count of Name	Average of Age
Complications	7	63
Cured	181	43
Death	3	74
Grand Total	**191**	

*Source: Primary data

The study revealed that average age of death cases was 74 and average age of serious complications observed during treatment was 63. But patients with average age 43 are successfully cured 95% of patients with this age got cured as shown in Figure no.8.

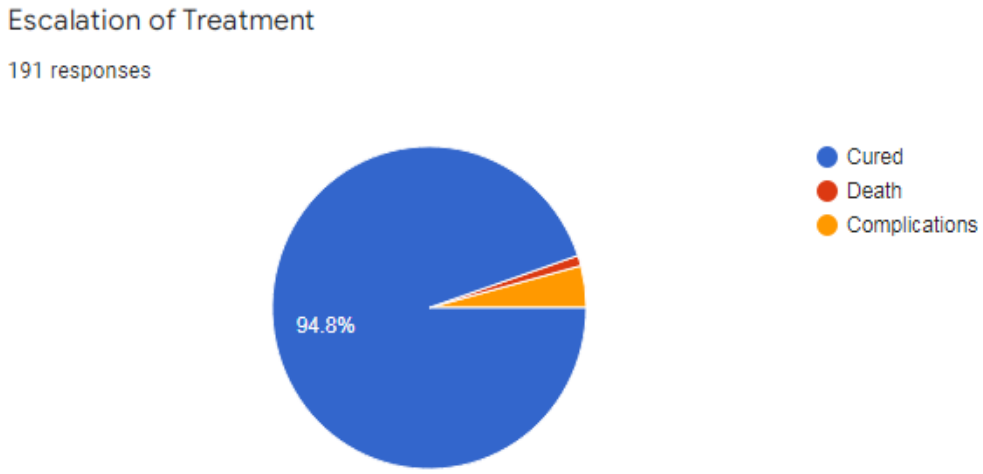

Figure No.8 Escalation of Treatment

Though number of complications and death cases is very less as compared to cured cases, it is important to save all such patients life facing complications and specifically needs to anylse complications separatly to address the problem.

10. CONCLUSION

The proposed research work mainly emphases on the COVID-19 treatment and care of the patients admitted in Bharati Hospital, Sangli and status of pre-COVID and post-COVID health problems faced by the patients and finally the medical stakeholders. The potential benefits of a medical strategy and solution development in Sangli district are highlighted in the study which is summarized as follows: Pattern in Symptoms occurred and infection level, Pre and Post COVID problems, major Impact of COVID-19 infection on body organs mechanism for improving medical strategies. A detail mapping of strategies will help in the future treatment and post COVID care of the patient and will support the medical treatment decisions; technically researcher has planned to design a machine learning based model for COVID-19 patient treatment and decision making to address the problem, this stood the main purpose behind selection of the proposed research area.

The study will help all the stake holders in medical sector to craft management and decision making strategies for optimised treatment model. It can also help to create awareness amongst patients and common people about COVID impact. It will help to medical stakeholders and researchers in the area to identify major parameters of COVID-19 impact observed in patients.

REFERENCES

1. Ayoubkhani D, Khunti K, Nafilyan V, Maddox T, Humberstone B, Diamond I et al. Post-COVID syndrome in individuals admitted to hospital with covid-19: retrospective cohort study BMJ 2021; 372 :n693 doi: 10.1136/ bmj.n693
2. Debnath, S., Barnaby, D.P., Coppa, K. et al. "Machine learning to assist clinical decision-making during the COVID-19 pandemic". Bioelectron Med 6, 14 (2020). https://doi.org/10.1186/s42234-020-00050-8
3. Khanday, A.M.U.D., Rabani, S.T., Khan, Q.R. et al. (2020) "Machine learning based approaches for detecting COVID-19 using clinical text data". Int. j. inf. tecnol. 12, 731–739. https:// doi.org/ 10.1007/ s41870-020-00495-9
4. Menges D, Ballouz T, Anagnostopoulos A, Aschmann HE, Domenghino A, Fehr JS, et al. (2021) Burden of post-COVID-19 syndrome and implications for healthcare service planning: A population-based cohort study. PLoS ONE 16(7): e0254523. https://doi.org/10.1371/journal.pone.0254523
5. Mohammad Sadeq Mottaqi, Fatemeh Mohammadipanah, Hedieh Sajedi (2021), "Contribution of machine learning approaches in response to SARS-CoV-2 infection,Informatics in Medicine Unlocked",Volume 23, ISSN 2352-9148, https:// doi.org/ 10.1016/ j.imu. 2021.100526. (https:// www.sciencedirect.com/ science/article/pii/S2352914821000162).
6. Muhammad, L.J., Algehyne, E.A., Usman, S.S. et al.(2021) "Supervised Machine Learning Models for Prediction of COVID-19 Infection using Epidemiology Dataset". SN COMPUT. SCI. 2, 11 (2021). https://doi.org/10.1007/s42979-020-00394-7
7. N. Peiffer-Smadja, T.M. Rawson, R. Ahmad, A. Buchard, P. Georgiou, F.-X. Lescure, G. Birgand, A.H. Holmes(2020), "Machine learning for clinical decision support in infectious diseases: a narrative review of current applications,Clinical Microbiology and Infection",Volume 26, Issue 5,2020,Pages 584-595,ISSN 1198-743X,https://doi.org/10.1016/j.cmi.2019.09.009.(https://www.sciencedirect.com/science/article/pii/S1198743X1930494X)
8. Said Agrebi, AnisLarbi(2020), "Use of Artificial Intelligence in infectious diseases.", Artificial Intelligence in Precision Health,Academic Press,2020,Pages 415-438,ISBN 9780128171332, https:// doi.org/10.1016/B978-0-12-817133-2.00018-5.
9. https://www.datarevenue.com/en-blog/machine-learning-covid-19
10. Osaka University. "Sorting out viruses with machine learning." ScienceDaily, 11 November 2020.https://www.sciencedaily.com/releases/2020/11/201111102641.htm
11. https://oig.hhs.gov/oei/reports/oei-06-20-00300.pdf
12. https://www.commonwealthfund.org/publications/2020/apr/impact-covid-19-outpatient-visits