Effects of Covid-19 in Odisha State

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Abstract
Covid infection has been spread globally and millions of people have been affected by it. It has been outlawed from Wuhan and most countries have been affected by it. Lockdown has been imposed globally and along with India. The main aim of lockdown was to prevent Covid infection. The research shows that a large number of people have suffered due to Covid infection and for this reason it is necessary to avoid this infection. Liver injury and diabetes patients were at high risk during Covid infection. Odisha has faced many challenges to prevent this infection and taking initial action has helped to reduce damages of this infection in the state. Qualitative analysis has been done in the proposed study and for this purpose several journals have been considered.
Keywords: Covid infection, Lockdown, Odisha, Journals.

1. Introduction

The review of the epidemiology of covid-19 summarizes the burden of infection & other related epidemiological features, countries like China, Italy & United States have particularly high rates of infection, and the disease gradually spread to India as well, threatening the health & economy of the country. It has been found that viral infection has increased in the previous decades and severe diseases are responsible and lethality is associated with it. First time, Covid virus has been found in Wuhan of China and isolation has been implemented in the city from January2020 and severe pneumonia is responsible for it. The chapter is based on the spread of Covid infection, initial outbreak except China and public health policies. Cases from initial stages from China before declaration of pandemic by WHO have been covered by the chapter on 11 February, 2020. Similarly, among Covid viruses, MERS and severe acute respiratory syndrome has been described in this chapter. Cov is considered as a RNA virus that is single-stranded and it has circulated globally for centuries. It is found that Cov is detected in birds, mammals,bats and many reptiles and frequently among humans who have mild respiratory issues with SARS issues. Corona is considered as an RNA virus which has glycoprotein spikes in the surface areas that work to bind in the membrane. Hosting range restrictions are determined as per belief of it. Four subgroups such as alpha,delta,gamma and beta are involved in it. It is found that normal cov is considered endemic internationally and mild respiratory diseases are caused by it. Basically, it happens in the winter season of warm countries.

Novel coronavirus has emerged in Wuhan and it has spread in various countries globally. It has been reported that about 200 cases have been found in the initial stages and for this alert

has been increased globally (Khan *et al.* 2020). Developing countries such as Bangladesh and India have witnessed fatal impacts of coronavirus Odisha has been taken for this research to discuss Covid 19 epidemiology. It has been reported that the state has shared 3.01% cases of total cases. Odisha has shared 3.03% among total recovery cases (state dashboard.odisha.gov.in, 2022). Odisha has faced with several challenges such as poor health workers, low investment on public welfare and issues in service delivery at the time of Covid pandemic has hit the entire state. Here we review the recent awareness level in the state of Odisha for maintaining a very low mortality rate & can be used as a model to deal with future challenges for effective handling COVID-19 as of very limited facts about the current epidemiology of COVID-19 in this picture.

2. Review of Literature on Covid-19 Disease

COVID-19 was rapidly spread in early December 2019 and declared global pandemic across the world by WHO in March month, 2020. Lockdown has been implemented in India on 24 March 2020 to ensure limited activities of about 1.3 billion people. Lockdown has affected the national economy and also affected daily life of people and fear has been created on food security and economic conditions among people due to the pandemic. Returning massive migrant workers is responsible for increasing Covid cases in the state. Gradually, transportations have been organized to ensure safe movements of migrant workers and many quarantine centers have been built to prevent virus transmission. A series of restrictions have been imposed through various levels at the time of implementing strict lockdown from 1st May, 2020 nationwide and by the Central and state government over next months. Health authorities and the government have taken an awareness campaign to improve consciousness among people over Covid 19 to prevent a massive outbreak of the virus. Different kinds of guidelines such as washing hands, frequently staying home, social distancing, wearing masks and avoiding touching have been covered by the guidelines. After deleting duplicate records, a total of 386 records were retained. Then, 288 articles were excluded by titles and abstracts and 98 of the remaining 68 articles deleted for various reasons. All studies were considered to have a low risk of bias for selection.

Challenges of Covid 19 in India

The Indian government has imposed a lockdown to prevent infection of this virus in most states and along with union territories. It has been reported that the Indian government has imposed a lockdown on 24 March 2020 (Gopalan and Misra, 2020). GDP growth rate is the primary aspect to understand economic growth of a country and it has been affected badly due to imposing lockdown in India. Social conditions are also affected badly by imposing lockdowns. It has become a challenge for the government to continue lockdown without stopping economic activities during Covid infection. As per the opinion of Behera *et al.* (2021), Odisha is one of the important states which has been badly affected by lockdown. Economic activities of the state have decreased and for this reason it has been much more difficult to provide basic needs to people during Covid period.

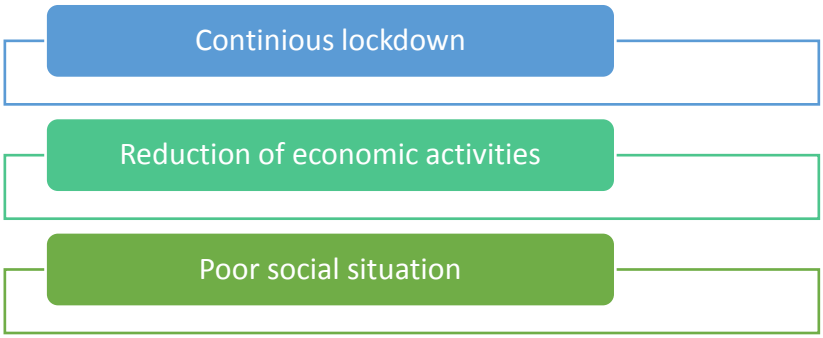


Figure 1: Challenges in Covid-19
(Source: Self-developed)

COVID-19 resulted in an increased number of morbidity and mortality within India that also caused serious mental issues in the population. In a study, it has also been seen that mental health issues mainly affect youth populations (Kaushal and Srivastava, 2021). At the time of COVID-19, all have to stay inside their homes and are forbidden from all social gatherings. This situation stayed all over India a very long time that also resulted in several stress symptoms of post-traumatic, anger, and confusion (Choudhari, 2020). In some studies, it has shown that children aged between 9 to 18 years were suffering from different psychological issues as they did not understand the whole matter. This lockdown became a severe matter of problem to the daily wage workers as they were unable to go to work. Their survival became in danger, their productivity became zero. Many were unable to feed their family, and a maximum number of people were suffering from hunger issues (Bhagat *et al*. 2020). These viral diseases played an important factor in the stigma of society in the issue of health among several individuals.

India's war against Coronavirus

India was not among the first country that infected by this deadly virus though the time this outbreak happened in this country the health sector here became handicapped. There was no proper management to deal with this situation, hospital structures were not sufficient to deal with this, also fewer patient beds within every hospital (Arnold, 2020). That the outbreak happened in India, the number of dead was increased day by day, and every single day the toll number of dead increased. The testing scale of this disease was "***RT-PCR test or reverse transcription polymerase"***, India was slow in this sector and unable to isolate the infectious people. Isolation of an infected person could save India from this disaster, yet was unable to perform this more perfectly. Analysis of this "***contact-tracing dataset"*** resulted in the largest objective studies of this infection within exposed people to this date (Barrat*et al.* 2021). More openness of greater and granular data of data coordination and sharing could enable data of surveillance to use in decisions making of the management (Sharma *et al.* 2021). In India rather than in high-income countries deaths of COVID-19 were between the age of 50 to 64 years and reported cases did not actually rise with respect to old age.

Pandemic Epidemiology:

Odisha also has not escaped from covid-19 disaster at present as of August 31st Odisha has reported 1,03,356 confirmed cases 25,705 confirmed cases, 545 deaths & 77,286 recovered among all districts. Ganjam is having highest confirm cases. Interestingly less death reported compared to other state as per affected cases, Odisha has maintained a low mortality rate.

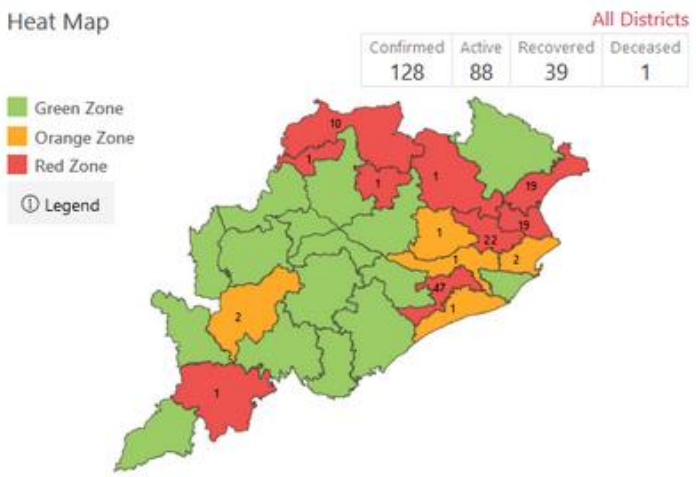


Figure 2: Covid-19 cases in India
(Source: Moneer*et al*. 2022)

Emergency COVID-19 response: Odisha accepted and planned implementation component to slow and limit as much as possible spread of COVID-19 in Odisha. On March 13, chief minister Mr. Naveen Patnaik declared it "Disaster" ordered immediate closure of educational institutions, cinema halls, public swimming pools, gyms.

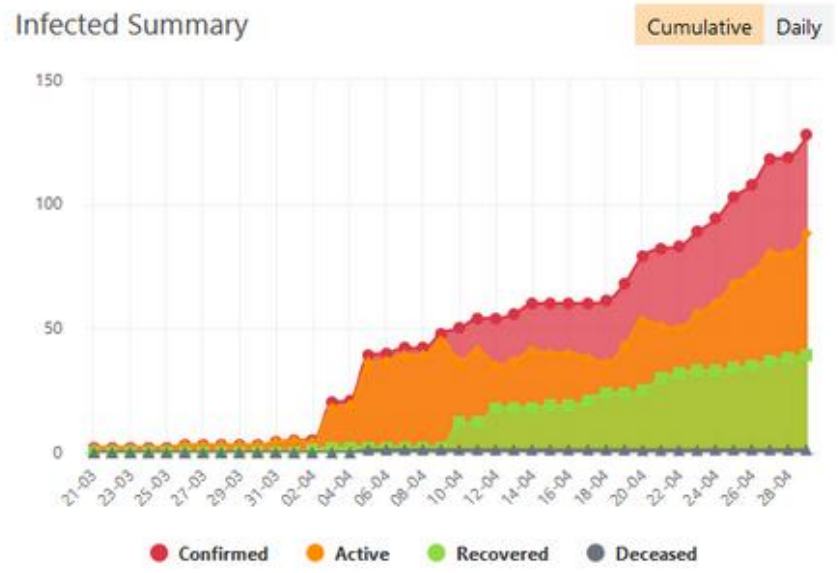


Figure 3: Trend of Covid-19 cases in Odisha
(Source: Gopalan and Misra, 2020)

Odisha is the first state which has approached international thinking and innovative ideas for addressing the pandemic situation. Odisha launched website on 3rd March before national website. It was made mandatory for all the visitors of the state to register on the portal. Benefits of 15000, &rs 2000 each was announced for those who obtained government appeal of 14 quarantined from abroad.

3. Methodology

Elaboration of systematic review is the purpose of methodology and for this purpose meta-analysis with PRISMA statement and systematic review has been followed for achieving accurate structure of study.

Data collection method is used to collect research relevant information that helps to make analysis. Primary and secondary, these both data collection methods are used in research. Interviews and surveys are used to collect primary data. This kind of data is collected from human participants and it is a lengthy process. Primary data collection method has not been used in this research for this reason. As per the opinion of Islam *et al.* (2020), articles, journals and newspapers are considered as sources of secondary data collection methods. As per the opinion of Dhawan (2020),

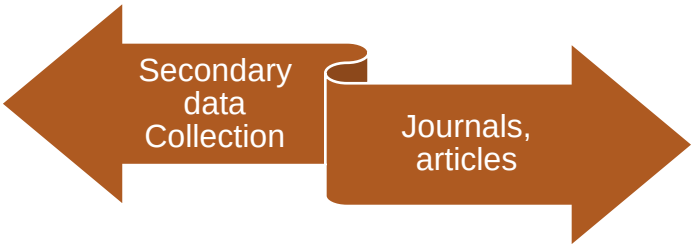
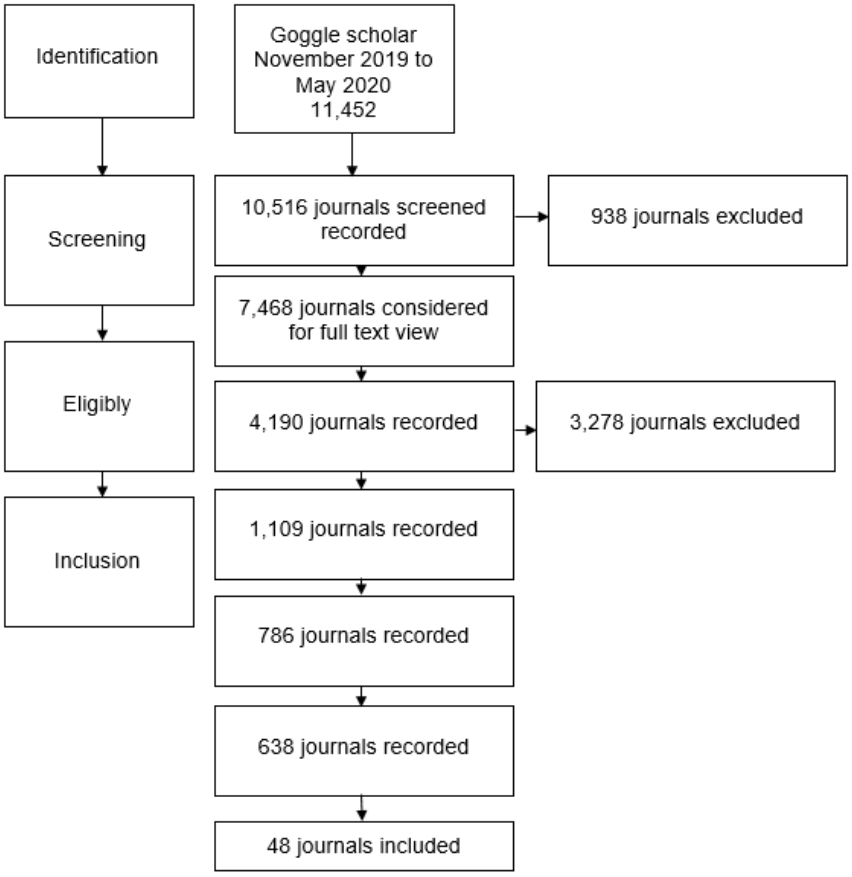


Figure 4: Secondary data collection

(Source: Self-developed)

Secondary data is used in previous studies and for this reason cleaned and structured data is found. This data helps to improve the quality of research outcomes that plays an important role to increase acceptance of the study. As per the opinion of Lester *et al.* (2020), data analysis method is about the way which is used to analyze data. Both qualitative and quantitative data analysis methods have been used.

Table 1: Prima chart



(Source: Self-developed)

A total number of 48 journals have been considered as samples for this research. Needed data has been collected from these journals to make analysis on the gathered data. 11,452 data have been collected from Google Scholar November 2019 to May 2020, 10,516 journals screened recorded. 7,468 journals here considered for full text view and 4,190 journals recorded. From these 1,109 journals recorded, after that 786 journals recorded, again 638 journals have been recorded and lastly 48 journals included. In the prisma chart, first identification have been done, then screening and eligibility and lastly inclusion occurred.

Search Strategy and procedure:

Literature review has been based on a web science database, Dialet and Scopus, WHO library and it has been focused on the last week of May, 2020. 576 articles have been chosen due to restrictions in search of journals and after the search language filter has been used to select needed articles which are published in both Spanish and English and for this reason 537 articles have been left. Search was done in Spanish in the initial stage when pandemic was started in China as individual nationality was not written in English language. Finally, a proposed research area has been selected: sociology, psychology and education research and for this purpose 48 articles which are scientific have been chosen as samples. Result: 11,452 preprints references were available from 1st November to 1st May, 2020 and these have been defined under search strategy. 10516 references have remained among 7468 articles after pre review.4190 articles have not been included for data analysis. The original study has been conducted based on 1109 articles, 786 research letters, 697 case reports and 638 reviews and 48 systemic reviews. Flowchart has been used in the study for presentation. This kind of publication is depicted in the supplementary from figure 1.

Publication dynamics

Aim of the study is to find out Covid publication dynamics. Publication day has been recorded for individual publication and functions are used smoothly and in this usage R package is utilized to show cumulative number of articles related to medical as per the publication time. A total number of cases have been recorded from an available database from the "University of John Hopkins".

Publications classification

Under the aim of publication classification, medical articles are taken based on associated topics and types of publication. A total number of six sets of publications were chosen through pre specific definition as per methodology of BMC: research letter, original articles, journal, management guidelines, clinical reports and WHO database.

4. Results and Findings

Results

The following systematic review is conducted on the topic to identify the related factors of COVID-19 epidemiology:

Table 2: Systematic review

Author	Publication year	Research aim	Methodology	Key findings	Conclusion
Sultan *et al.* 2020	2020	The article aimed at documenting the best practices for the consultative meaning	Meta-analysis and systematic review of	● GI symptoms were estimated, indicating 7.8% vomiting/nausea, 7.7% diarrhoea, and 2.7%	<10% of patients are associated with GI symptoms of COVID which is

Author	Publication year	Research aim	Methodology	Key findings	Conclusion
		of multiple gastrointestinal (GI) symptoms and liver issues of COVID-19.	international data	abdominal pain. ● Liver issues were estimated, indicating 15.0% alanine transaminase and 15.0% aspartate transaminase.	higher outside of China.
Mantovani *et al.* 2020	2020	The study aimed at evaluating the prevalence of diabetes and the clinical severity and mortality of it COVID-19	Meta-analysis and systematic review	● Diabetic prevalence is witnessed among 23.34% non-Asians and 11.06% Asians. ● Pre-existing diabetes is associated with critical COVID-19 illness twofold, increasing in-hospital mortality threefold.	Pre-existing diabetes increases the risks of severity and mortality among patients diagnosed with COVID-19.
Moneer *et al.* 2022	2022	The paper aims at comparing treatments for COVID-19 and analyzing the outcomes	Meta-epidemiological study based on randomised controlled trials	The treatment comparison conducted between lopinavir-ritonavir, hydroxychloroquine and placebo Observations based on RCTs indicated 78% overall agreement for 27 matched pairs and 82% agreement for 10 matched pairs for observational studies.	The treatment studies in RCTs can be replaced by observational studies during COVID for effective treatment.
Levin *et al.* 2022	2020	The study aims at analysing infection fatality rates (IFR) of COVID-19 among age-specific vulnerable groups.	Meta-analysis and systematic review	● The estimated IFR is 0.002% for ages 10 years and 0.01% for ages 25. ● IFR increases to 0.4% for age 55 and 1.4% for age 65. ● IFR further increases by 4.6% for 75 years old and 15% for ages 85.	The high IFR rates for middle-aged and older demographics indicate a higher infection and fatality rate than seasonal influenza and transport accidents.
Li *et al.* 2022	2022	The study aims to investigate the prevalence of insomnia during the acute COVID-19 phase in China.	Meta-analysis and systematic review	● The pooled prevalence of insomnia was 39.1%. ● Insomnia symptoms during the early stages of COVID were 37.0%. ● Insomnia symptoms during the later stages of COVID were 41.8%.	The prevalence of insomnia during the later stages of COVID-19 is higher irrespective of symptomatic controls and amelioration of adverse effects.
Fang *et al.* 2020	2020	The study aims at evaluating the comorbidity factors with the severity and prognosis of COVID-19.	Meta-analysis and systematic review	● Comorbidities most impactful for COVID-19 was chronic kidney disease leading to most deaths (RR: 7.10). ● Most severity is identified	In conclusion along with these comorbidities, older age and male gender have a strong correlation with the severity of COVID-

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				for chronic obstructive pulmonary disease (COPD) leading to the composite endpoint, intensive care unit admission, disease progression and invasive ventilation. ● Acute respiratory distress syndrome (ARDS) is seen most for cerebrovascular disease.	19.
Alimohamadi*et al.* 2020	2020	The study aims at determining the most common clinical symptoms among patients with COVID-19.	Systematic review	● The most common symptom is fever with 81.2% prevalence. ● Followed by 58.5% cough, 38.5% fatigue, 26.1% dyspnoea, and 25.8% sputum.	These common symptoms can be evaluated for the early detection of COVID-19, leading to the prevention of transmission.
Wong *et al.* 2020	2020	The paper aims at identifying the association of COVID-19 with liver injury.	Systematic review	The pooled ratio indicated a higher severity of COVID-19 patients with ALT, AST, and hyperbilirubinemia.	Liver injury is identified as more prevalent in severe COVID-19 than non-COVID-19 cases.
Chowdhury, and Oommen, 2020	2020	The paper aims at analysing the epidemiological features of COVID-19 such as transmission, infections	Systematic review	● The Chinese population was impacted with mild symptoms for 81%, severesymptoms for 14% and critical symptoms for 5%. ● A 2.3% mortality rate was indicated in China. ● The 7.2% fatality rate was indicated in Italy due to higher infection among the elderly demographic.	Limitations of healthcare facilities were seen in countries with low- and middle-income economies. Accessibility to healthcare was needed for the prevention of transmission and recovery.
Bhuiyan *et al.* 2021	2021	The aim of the study is to analysethe risks to children of COVID-19.	Meta-analysis and systematic review	● Pooled estimation indicated 50% of infants were affected by COVID-19. ● Males were 53%. ● Asymptomatic children were 43%. ● 5% required intensive care due to the severity of symptoms. ● 5 new-born babies were infected with COVID-19 out of 139 babies born to mothers infected with it.	In conclusion, children younger than 5 years were more infected during COVID-19. The percentage of affected infants and asymptomatic children were similar, which requires proper monitoring and prevention of transmission.

Author	Publication year	Research aim	Methodology	Key findings	Conclusion
Swain *et al.* 2021	2021	The study aims at analyzingthe combatresponse in Odisha to covid-19 pandemic	Systematic review	Adoption of Strategies for community preparedness is identified as an effective mortality prevention strategy. The complication readiness model is also used for situation management.	Odisha was successful in maintaining low transmission and mortality rates as the state prevention tactics focused on swift management through community restrictions and adherence to health guidelines during COVID-19.
Mishra *et al.* 2021	2021	The paper aims to identify the clinico-epidemiological characteristics of COVID-19-diagnosed patients of Odisha.	A retrospective single centre design for the study	● Among the 9754 sampled tests, 17.25% was the average positivity rate. ● 38.21 years was the mean age of diagnosed patients. ● Majorly affected group includes 38.77% of patients of 31-50 years, 31.48% of 15 -30 years, and 23.64% above 50 years. ● The least affected group was children with 6.11% of patients.	In Odisha, the prevalence of COVID-19 is seen in males and younger age people. Asymptomatic rates of patients are also high.
Bhattacharya *et al.* 2022	2022	The study aims at analyzingthe health infrastructure in various countries and the associated vulnerabilities that impact the transmission of COVID-19 in Odisha.	Systematic review	Analyzing 30 districts in Odisha indicates that preparedness, housing conditions and public hygiene and epidemiological factors are primary indicators of vulnerability.	The paper concludes that the successful containment of the pandemic in Odisha is related to the effective management of these factors, prioritising proper regions and resources among the different districts.
Nasker *et al. 2021*	2021	The study aims at analysing the epidemiology of SARS-CoV-2 Transmission in Odisha.	Exploratory Data Analysis	● In 2020, Odisha reported 2223 cases and 7 deaths due to COVID-19. ● In 2021, it reported 436,455 cases and 875 deaths. ● Population density, age, gender, and temperature are considered to be primary factors for coronavirus transmission.	Monitoring these factors is essential for predicting the risks of transmission in selected regions of Odisha.

(Source: Self-developed)

Table 3: Epidemiological characteristics of patients suffered from COVID-19

Type of cases	N	Prevalence (%)
Confirmed cases	13,52,766	4.09
Cases recovered	13,14,752	3.98
Active cases	1,794	0.01
Deceased	9,167	0.03

(Source: Self-developed)

Table 4: Epidemiological characteristics and prevalence of COVID-19 in different districts of Odisha

District	**Recovered (%)**	**Deceased (%)**	**Active cases (%)**
Angual	99.10	0.87	0.03
Balasore	99.17	0.73	0.09
Bargarh	98.72	1.00	0.28
Bhadrak	99.34	0.59	0.06
Bolangir	99.27	0.44	0.43
Boudh	98.77	0.75	0.65
Cuttack	99.13	0.78	0.08
Deograh	99.65	0.61	0.32
Dhenkanal	98.80	1.18	0.02
Gajapati	99.11	0.62	0.26
Ganjam	98.57	1.39	0.02
Jagatsinghpur	98.89	1.06	0.05
Jajpur	99.49	0.39	0.11
Jharsuguda	99.30	0.63	0.08
Kalahandi	98.85	0.74	0.41
Kandhamal	99.04	0.68	0.28
Kendrapada	98.95	0.97	0.07

(Source: Self-developed)

According to the preference of statistical analysis & interpretation of data for the epidemiological characteristics of patients presenting with covid pandemic based on the total number of tests done and district wise confirmed cases of Covid -19 in Odisha. Aim of the study is to find out a related report on learning and teaching of multiple studies that indicates forward movement.

Based on the above system magic review and analysis of the epidemiology characteristics of patients and the prevalence of COVID-19, it is seen that the analysis of specific demographic groups vulnerable to the virus is identified by many scholars. Districts such as Angul, Balasore, and Bargarh in Odisha show the highest percentage of recovery which indicates the adoption of proper treatment plans and imposing social isolation for the prevention of transmission.

5. Discussion

Providing explanation and interpretation of outcome is the purpose of the discussion chapter. This helps to find out answers to study questions. It is to be explored how findings of research are related with existing literature review. It will be argued by implication of practice and knowledge that is provided by a new dimension.

The prevalence of COVID-19 globally is epidemiologically evaluated to indicate that the prevalence of various comorbidities increases the risk of severity of symptoms. As per the words of Mantovani*et al.* (2020), diabetic patients remain at a higher risk of developing severe symptoms, leading to a higher rate of fatality for in-hospital patients. As part of the Asian continent, Odisha is able to manage the outbreak of Coronavirus with the introduction of a proper diet that reduces the risk of health deterioration. Gender, age, temperature, and population density are also analysed as the epidemiological factors related to the transmission of COVID-19. According to Nasker *et al.* (2021), the transmission of coronavirus in Odisha rose significantly from 2020 to 2021 leading to 875 recorded deaths in 2021 in comparison to 7 reported deaths the previous year On the other hand, Swain *et al.* (2021) stated that community preparedness is one of the primary factors that helped Odisha to prevent the dynamic transmission of COVID-19. For example, Bhuiyan *et al.* (2021) articulated that male infected constituted 53% of the clinical samples. Similarly, Mishra *et al.* (2021) also mentioned that in Odisha, males and younger people were most affected whereas the least affected group was children with 6.11%. Bhuiyan *et al.*(2021) also mentioned that the percentage of infants affected by COVID-19 (which was 50%) was similar to the percentage identified among asymptomatic patients. As mentioned by Alimohamadi*et al.* (2020), among the most common symptoms of COVID-19 are fever (81.2%), cough (58.5%), fatigue (38.5%), dyspnoea (26.1%) and sputum (25.8%). The absence of these common symptoms leads to ineffective diagnosis and prevention. In Odisha as well, the number of asymptomatic patients was high (Mishra *et al.* 2021). Therefore, the state adopted strict community guidelines which helped in managing the dynamic transmission of coronavirus.

The healthcare professionals in Odisha showed concern from the initial stages of COVID-19. Bhattacharyya *et al.* (2022) articulated that public hygiene and housing conditions are important epidemiological factors for COVID-19 in Odisha. Containment of the virus was provided with equal importance as clinical treatment and services for the infected. According to Fang *et al.* (2020), chronic kidney disease is identified as the most fatal comorbidity for COVID-19 leading to deaths. The management of the pandemic must include clinical management units for ensuring that patients with high fatality risks are provided with proper care.

Covid pandemic is responsible for SARS-CoV-2 infection that has been increased during the pandemic period (Moneer*et al*. 2022). Mortality has occurred due to this infection and for this reason it is necessary to find out the effect of this infection. It has a huge impact on respiratory distress syndrome in humans and for this reason different kinds of symptoms are found among patients. Meta analysis of this study helps to find out health issues which have occurred due to Covid 19.

Covid infection is also responsible for abnormal LFTs (Sultan *et al*. 2020). Many studies have shown that the patients who have high level risks due to abnormal LFTs. It is found that

adult people have a high-level risk of liver injury and Covid has increased issues of injury among adult patients (Wong *et al*. 2020). Many researches show that the effect of liver injury is mild.

Thoughts over Discussion and Covid

The entire study has been developed in an unprecedented nature that helps to improve the potential of the current study and as a result a unique contribution to knowledge has been developed.

Other Measures

- Primary health employees and Anganwadi Sevikas are engaged to complete screening of High-risk areas. A gigantic surveillance network has been used in the country.
- It was found that the Task force was built at the city and state level. Guidelines were updated as per the development of treatment by the Task force.
- Many cases were identified through screening as it can be; sending them quarantine, tracing contact sending them isolation.
- There was increased production of drugs to ensure availability of these: tocilizumab, hydroxychloroquine, remdesivir and ivermectin.

6. Conclusion

First outbreak of Covid has been found in Wuhan of China and it has spread quickly to other countries. Millions of people have been affected due to infection of it globally. It has been focused on Odisha state which has faced many challenges during Covid infection. From discussion, it is found that diabetes patients were at high level risk due to Covid infection. Better recovery rate has been found in the cases which are not pre diabetes. The data analysis shows that 11.06% Asians are victims of diabetes.

However, 23.34% of diabetes patients are non-Asians. These patients were at high risk during Covid time. Odisha belongs to the Asian continent and for this reason diabetes patients from Odisha have risk at the time of Covid infection. Older people have been affected heavily due to the infection and for this reason it was necessary to prevent old people from the infection. Significant differences between male and female people have been found by Covid infection. It has been reported that 53% male people have been affected by it. Lockdown has been imposed to avoid this rapid growth of infection. Odisha has faced challenges such as poor spending on public welfare and poor number of health workers during Covid infection.

Reference

[1] Alimohamadi, Y., Sepandi, M., Taghdir, M. and Hosamirudsari, H., 2020. Determine the most common clinical symptoms in COVID-19 patients: a systematic review and meta-analysis. *Journal of preventive medicine and hygiene*, *61*(3), p.E304.

[2] Arnold, D., 2020. Pandemic India: coronavirus and the uses of history. *The Journal of Asian Studies*, *79*(3), pp.569-577.

[3] Barrat, A., Cattuto, C., Kivelä, M., Lehmann, S. and Saramäki, J., 2021. Effect of manual and digital contact tracing on COVID-19 outbreaks: a study on empirical contact data. *Journal of the Royal Society Interface*, *18*(178), p.20201000.

[4] Behera, M., Mishra, S. and Behera, A.R., 2021. The COVID-19-led reverse migration on labour supply in rural economy: challenges, opportunities and road ahead in Odisha. The Indian Economic Journal, 69(3), pp.392-409.

[5] Bhagat, R.B., Reshmi, R.S., Sahoo, H., Roy, A.K. and Govil, D., 2020. The COVID-19, migration and livelihood in India: challenges and policy issues. *Migration Letters*, *17*(5), pp.705-718.

[6] Bhattacharyya, R., Burman, A., Singh, K., Banerjee, S., Maity, S., Auddy, A., Rout, S.K., Lahoti, S., Panda, R. and Baladandayuthapani, V., 2022. Role of multiresolution vulnerability indices in COVID-19 spread in India: a Bayesian model-based analysis. BMJ open, 12(11), p.e056292.

[7] Bhuiyan, M.U., Stiboy, E., Hassan, M.Z., Chan, M., Islam, M.S., Haider, N., Jaffe, A. and Homaira, N., 2021. Epidemiology of COVID-19 infection in young children under five years: A systematic review and meta-analysis. *Vaccine*, *39*(4), pp.667-677.

[8] Choudhari, R., 2020. COVID 19 pandemic: Mental health challenges of internal migrant workers of India. *Asian journal of psychiatry*, *54*, p.102254.

[9] Chowdhury, S.D. and Oommen, A.M., 2020. Epidemiology of COVID-19. *Journal of digestive endoscopy*, *11*(01), pp.03-07.

[10] Dhawan, S., 2020. Online learning: A panacea in the time of COVID-19 crisis. Journal of educational technology systems, 49(1), pp.5-22.

[11] Fang, X., Li, S., Yu, H., Wang, P., Zhang, Y., Chen, Z., Li, Y., Cheng, L., Li, W., Jia, H. and Ma, X., 2020. Epidemiological, comorbidity factors with severity and prognosis of COVID-19: a systematic review and meta-analysis. *Aging (albany NY)*, *12*(13), p.12493.

[12] Gopalan, H.S. and Misra, A., 2020. COVID-19 pandemic and challenges for socio-economic issues, healthcare and National Health Programs in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 14(5), pp.757-759.

[13] Islam, M.N., Islam, M.S., Islam, M.N. and Islam, M.S., 2020. Data Collection and Analysis. Islam and Democracy in South Asia: The Case of Bangladesh, pp.49-65.

[14] Kaushal, V. and Srivastava, S., 2021. Hospitality and tourism industry amid COVID-19 pandemic: Perspectives on challenges and learnings from India. *International journal of hospitality management*, *92*, p.102707.

[15] Khan, S., Siddique, R., Ali, A., Xue, M. and Nabi, G., 2020. Novel coronavirus, poor quarantine, and the risk of pandemic. *Journal of Hospital Infection*, *104*(4), pp.449-450.

[16] Lester, J.N., Cho, Y. and Lochmiller, C.R., 2020. Learning to do qualitative data analysis: A starting point. Human Resource Development Review, 19(1), pp.94-106.

[17] Levin, A.T., Cochran, K.B. and Walsh, S.P., 2020. Assessing the age specificity of infection fatality rates for COVID-19: Meta-analysis & public policy implications. *medRxiv*, pp.2020-07.

[18] Li, Y., Chen, B., Hong, Z., Sun, Q., Dai, Y., Basta, M., Tang, X. and Qin, Q., 2022. Insomnia symptoms during the early and late stages of the COVID-19 pandemic in China: a systematic review and meta-analysis. *Sleep medicine*, *91*, pp.262-272.

[19] Mantovani, A., Byrne, C.D., Zheng, M.H. and Targher, G., 2020. Diabetes as a risk factor for greater COVID-19 severity and in-hospital death: a meta-analysis of observational studies. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(8), pp.1236-1248.

[20] Mishra, B., Ravindra, A., Payal, P., Rath, S., Ranjan, J., Behera, B., Hallur, V.K., Mohanty, S. and Mahapatra, A., 2021. Clinico-epidemiological characteristics of COVID-19 patients in Odisha–A retrospective single centre study. *Indian Journal of Medical Microbiology*, *39*, p.S59.

[21] Moneer, O., Daly, G., Skydel, J.J., Nyhan, K., Lurie, P., Ross, J.S. and Wallach, J.D., 2022. Agreement of treatment effects from observational studies and randomized controlled trials evaluating hydroxychloroquine, lopinavir-ritonavir, or dexamethasone for covid-19: meta-epidemiological study. *bmj*, *377*.

[22] Moneer, O., Daly, G., Skydel, J.J., Nyhan, K., Lurie, P., Ross, J.S. and Wallach, J.D., 2022. Agreement of treatment effects from observational studies and randomized controlled trials evaluating hydroxychloroquine, lopinavir-ritonavir, or dexamethasone for covid-19: meta-epidemiological study. bmj, 377.

[23] Nasker, S.S., Nanda, A., Ramadass, B. and Nayak, S., 2021. Epidemiological Analysis of SARS-CoV-2 Transmission Dynamics in the State of Odisha, India: A Yearlong Exploratory Data Analysis. *International Journal of Environmental Research and Public Health*, *18*(21), p.11203.

[24] Sharma, N., Basu, S. and Sharma, P., 2021. Sociodemographic determinants of the adoption of a contact tracing application during the COVID-19 epidemic in Delhi, India. *Health Policy and Technology*, *10*(2), p.100496.

[25] statedashboard.odisha.gov.in, 2022. Dashboard. Odisha. Available at: https://statedashboard.odisha.gov.in/[Accessed on 10th March, 2023]

[26] Sultan, S., Altayar, O., Siddique, S.M., Davitkov, P., Feuerstein, J.D., Lim, J.K., Falck-Ytter, Y., El-Serag, H.B. and Institute, A.G.A., 2020. AGA institute rapid review of the gastrointestinal and liver manifestations of COVID-19, meta-analysis of international data, and recommendations for the consultative management of patients with COVID-19. *Gastroenterology*, *159*(1), pp.320-334.

[27] Swain, D., Vijay, V.R., Das, H., Issac, A., Stephen, S. and Jacob, J., 2021. Combit response to COVID-19 pandemic in Odisha: future public health challenges and measures. *Int J Community Med Public Health*, *8*(8), pp.979-85.

[28] Wong, Y.J., Tan, M., Zheng, Q., Li, J.W., Kumar, R., Fock, K.M., Teo, E.K. and Ang, T.L., 2020. A systematic review and meta-analysis of the COVID-19 associated liver injury. *Annals of Hepatology*, *19*(6), pp.627-634.