RESEARCH ARTICLE

Prevalence of COVID-19 at Theni medical college and hospital in Kanavilakku, Theni district, Tamil Nadu, India

C. Sagaya Rani*, S. Priyanka Devi, S. Iruthaya Kalai Selvam, A. Anitha Mary, A. Vinothini

Rani CS, Devi SP, Selvam SIK, et al. Prevalence of COVID-19 at Theni medical college and hospital in Kanavilakku, Theni district, Tamil Nadu, India. AGBIR.2023;39(4):605-613.

In absence of extensive testing for SARS-CoV-2, true prevalence of COVID-19 cases at Theni District in India remain unknown. This study examined the prevalence and risk factors of COVID-19 in Theni District, including active cases, discharge, mortality, blood groups, age, and sex-related factors wise COVID-19 positivity rate among patients with severe respiratory illness as reported by Theni medical college and hospital. RTPCR analysis was conducted at Theni Medical College and Hospital in Kanavilakku, Theni District, with 101,201 samples analyzed over the 2020-2022 time period. The highest COVID-19 incidence rates were seen in people aged 60 to 80, irrespective of sex or gender. Males had higher notification rates than females across all age groups.

Key Words: *COVID-19; SARS-CoV-2; MERS-CoV; Samples*

INTRODUCTION

A novel coronavirus (SARS-CoV-2) that originated form Wuhan, China, has been linked to the outbreak of severe respiratory infections in human first reported on December 31, 2019. SARS-CoV-2 has been linked to the outbreak of severe respiratory infections in humans, with 13,876,411 confirmed cases and 593,087 deaths in 216 countries. WHO characterized COVID-19 as a pandemic, and the Coronaviridae family is divided into Torovirinae and Coronavirinae.

Common human CoVs: HCoVs can cause common colds, upper respiratory tract infections, and lower respiratory tract infections [1].

Other human CoVs: SARS-CoV and MERS-CoV are more virulent and can cause epidemics.

This study examined the prevalence and risk factors of COVID-19 in Theni District, including active cases, discharge, mortality, blood groups, age, and sex-related factors.

MATERIALS AND METHODS

Collection of data

RT-PCR identified 1,01,201 samples from Theni Medical College and Hospital in 2020-2022, with male, female, and transgender cases.

Sample collection

A swab is used to collect respiratory material in the nose for the COVID-19 PCR test, which is sealed and sent to a laboratory.

Extraction

Laboratory scientist receives the sample; they isolate (extract) genetic material from the rest of the material in the sample.

Test for COVID-19

Reverse Transcription Polymerase Chain Reaction (RT-PCR) Test: RT-PCR is a molecular test; this COVID-19 test detects genetic material of the virus using a lab technique called Reverse Transcription Polymerase Chain Reaction (RT-PCR). It involves the following steps.

Polymerase chain reaction (PCR): The RNA is reverse transcribed to DNA, and additional fragments of DNA are added. The mixture is then placed in an RT-PCR machine, which cycles through temperatures to create new copies of the target sections of viral DNA. This process usually goes through 35 cycles, creating 35 billion new copies of the sections of viral DNA.

RT-PCR tests measure the amount of fluorescence in a sample after each cycle to estimate the severity of the infection. Results may be available in minutes, but can miss some cases.

Computed tomography (CT) scan: Testing for COVID-19 is done using a special swab in the nose or back of the throat, which can take from one to several days to find out the results. Imaging tests, such as CT scans or chest x-rays, should not be used alone to diagnose or rule out COVID-19 [2].

Rapid antigen and antibody test: Rapid antigen and antibody tests are used to monitor personnel operating in at-risk environments or to carry out extensive screening strategies on populations where a new outbreak of infection is suspected. The swab buffer is loaded in the sample well and flows to the conjugation pad containing control rabbit antibodies and specific antibodies against SARS-CoV-2 antigens. In the case of a positive sample, the binding between antibodies immobilized in the test line and the antigen-conjugated antibody complex gives rise to a colorimetric reaction. In the case of a positive sample, the IgA, IgG or IgM-gold-tagged antigen complex binds to the human anti-antibodies immobilized in the test line, indicating a colorimetric reaction. Finally, the gold-tagged control rabbit antibodies flow to the control line binding anti-rabbit antibodies.

Immunoenzymatic serological test: ELISA is a colorimetric, chemiluminescent or fluorescent microwell plate-based assay used for the quantitation and detection of human proteins, immunoglobulins, antigens and other peptides. It allows researchers to obtain highly specific and sensitive results in a relatively short time. 96-well commercial COVID-19 ELISA indirect tests contain immobilized viral antigens that are recognized and bound by anti-SARS-CoV-2 antibodies. 96-well commercial COVID-19 ELISA sandwich tests contain immobilized antibodies against SARS-CoV-2 antigens at the bottom of each well able to bind antigens contained in the serum samples of patients.

Department of Zoology, Jayaraj Annapackiam College for Women (Autonomous), Periyakulam, Affiliated to Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India

Correspondence: *C. Sagaya Rani, Department of Zoology, Jayaraj Annapackiam College for Women (Autonomous), Periyakulam, Affiliated to Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India, E-mail: anbuani347@gmail.com*

Received: 27-May-2023, Manuscript No. AGBIR-23-100246; **Editor assigned:** 31-May-2023, Pre QC No. AGBIR-23-100246 (PQ); **Reviewed:** 15-Jun-2023, QC No. AGBIR-23-100246; **Revised:** 29-Jun-2023, Manuscript No. AGBIR-23-100246 (R); **Published:** 06-Jul-2023, DOI:10.35248/0970-1907.23.39.605-613

Statistical analysis: The Results were expressed as Mean ± Standard error. All data were analyzed using statistical package for the social sciences 17.0 Software (SPSS Inc., Chicago, IL, USA).

RESULTS AND DISCUSSION

COVID-19 affected patients reported 516 active cases, 12 discharge cases, 224 discharge cases and 10 fatalities in September 2020, the most of any month (Table 1 and Figure 1). COVID-19 affected patients had 4216 active cases, 1791 discharge cases, and 348 deaths in 2021, with the highest number in May and lowest in December (Table 2 and Figure 2). Active cases, discharge cases, and deaths for December 2022 were highest in January 2021, lowest in March 2022 and highest in January 2022 (Table 3 and Figure 3). Blood groups A+, AB+, B+ have significant impact on COVID-19 (Table 4 and Figure 4). COVID-19 was found most often in A+, AB+, B+, and B-blood groups in May 2021 (Table 5 and Figure 5). COVID-19 was found in B- and B+ blood groups in January 2022 (Table 6 and Figure 6). The lowest number of COVID-19 patients was observed in the 0-20 age group (Table 7 and Figure 7). In May 2021, the age group 40-60 (2447) had the highest incidence of COVID-19, while the lowest age group (0-20) had no cases. In January 2022, the age group 40-60 accounted for 792 cases, and in March 2022, the lowest age group (0-20) had no cases. COVID-19 is based on the distinct sexes, and is vetted at the level of January 2022 in Transgender (4) (Tables 8-12 and Figures 8-14).

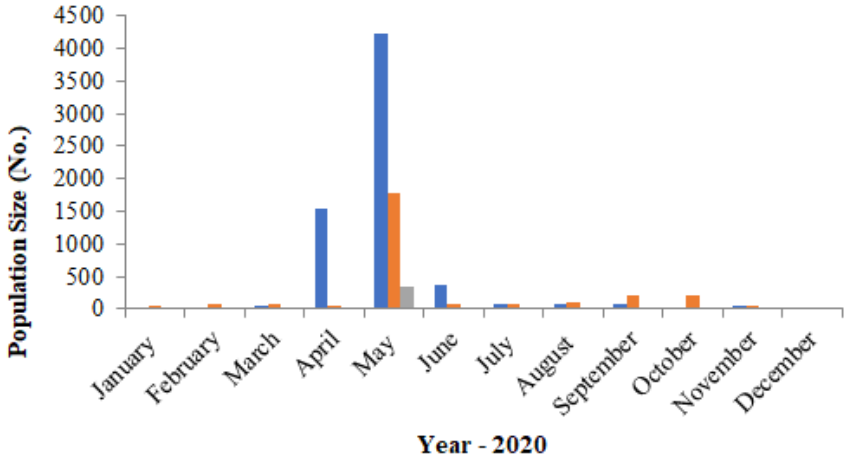

Figure 1) *Incidence of COVID-19 in 2020.* **Note:** (■) *Active case,* (■) *Discharge,* (■) *Death.*

TABLE 1
Incidence of COVID-19 in 2020

Month	COVID-19			
	Active	Discharge	Death	Total
March	40	49	0	89
April	12	31	0	43
May	21	86	2	109
June	516	163	2	593
July	299	154	5	458
August	77	171	0	248
September	312	224	10	546
October	57	190	3	250
November	97	46	2	145
December	60	87	7	154
Mean ± SE	149.1 ± 53.236	120.1 ± 21.604	3.1 ± 1.048	263.5 ± 62.8580

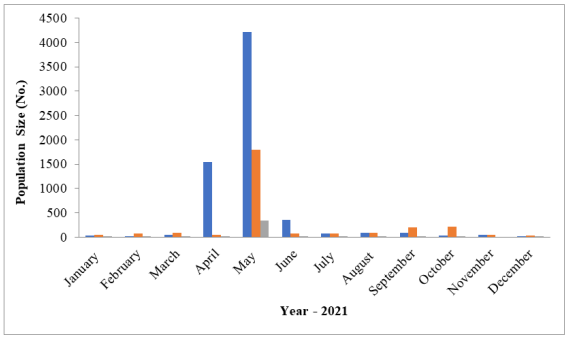

Figure 2) *Incidence of COVID-19 in 2021.* **Note:** (■) *Active case,* (■) *Discharge,* (■) *Death.*

TABLE 2
Incidence of COVID-19 in 2021

Month	COVID-19			
	Active case	Discharge	Death	Total
January	30	44	1	75
February	10	78	3	81
March	43	90	10	143
April	1547	53	6	1606
May	4216	1791	348	6355
June	363	76	2	441
July	83	74	2	159
August	86	96	3	185
September	87	209	2	298
October	32	220	4	266
November	53	55	0	108
December	18	30	2	50
Mean ± SE	547.33 ± 356.047	234.67 ± 142.549	31.92 ± 28.745	813.92 ± 1795.85
Correlation	-202	-96	-141	-172

Figure 3) *Incidence of COVID-19 in 2022.* **Note:** (■) *Active case,* (■) *Discharge,* (■) *Death.*

TABLE 3
Incidence of COVID-19 in 2022

Month	COVID-19			
	Active case	Discharge	Death	Total
January	1197	1513	6	2746
February	16	34	3	53
March	15	28	1	44
Mean ± SE	409.33 ± 393.833	525 ± 494.00	3.33 ± 1.453	947.67 ± 899.17
Correlation	-866	-868	-993	-867

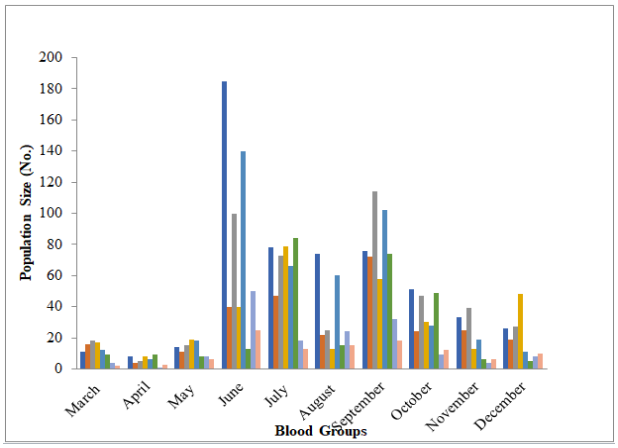

Figure 4) *COVID-19 prevalence in 2020 regarding blood group.* **Note:** (■) *A+,* (■) *A–,* (■) *B+,* (■) *B–,* (■) *AB+,* (■) *AB–,* (■) *O+,* (■) *O–.*

TABLE 4
COVID-19 prevalence in 2020 regarding blood group

Month	Blood group							
	A+	A-	B+	B-	AB+	AB-	O+	O-
March	11	16	18	17	12	9	4	2
April	8	4	5	8	6	9	1	3
May	14	11	15	19	18	8	8	6
June	185	40	100	40	140	13	50	25
July	78	47	73	79	66	84	18	13
August	74	22	25	13	60	15	24	15
September	76	72	114	58	102	74	32	18
October	51	24	47	30	28	49	9	12
November	33	25	39	13	19	6	4	6
December	26	19	27	48	11	5	8	10
Mean ± SE	55.6 ± 16.7	28 ± 6.3	46.3 ± 11.8	32.5 ± 7.3	46.2 ± 14.2	27.2 ± 9.55	15.8 ± 95	11 ± 2,26
Correlation	0.057	0.285	0.232	0.281	0.005	0.159	0.017	0.266

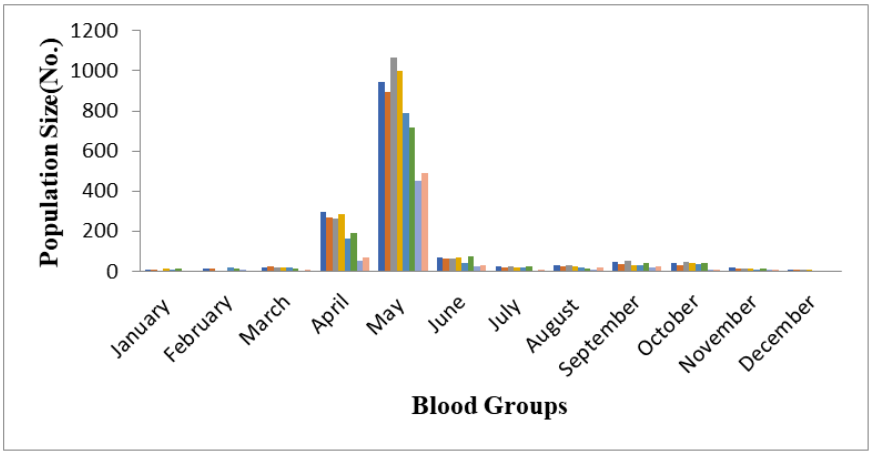

Figure 5) *COVID-19 prevalence in 2021 regarding blood group.* **Note:** (■) *A+*, (■) *A–*, (■) *B+*, (■) *B–*, (■) *AB+*, (■) *AB–*, (■) *O+*, (■) *O–*.

TABLE 5
COVID-19 prevalence in 2020 regarding blood group

Month	Blood group							
	A+	A-	B+	B-	AB+	AB-	O+	O-
January	11	10	7	16	10	14	3	4
February	17	14	6	4	21	17	8	2
March	24	25	20	22	19	17	6	10
April	295	272	266	288	163	195	55	72
May	947	895	1064	997	792	55	450	493
June	70	66	63	72	41	72	27	35
July	25	21	25	23	19	29	7	10
August	31	29	32	25	21	17	11	19
September	51	39	52	35	31	41	21	28
October	42	34	47	42	39	41	11	10
November	19	17	16	14	11	15	8	8
December	9	8	10	11	7	4	0	1
Mean ± SE	128 0 ± 77.7	119 ± 73.55	134 ± 86.98	129 ± 81.99	97 ± 64.25	98 ± 58.1	50 ± 36.5	57 ± 39.9
Correlation	-0.571	0.565	0.613	0.576	0.6	0.576	0.642	0.642

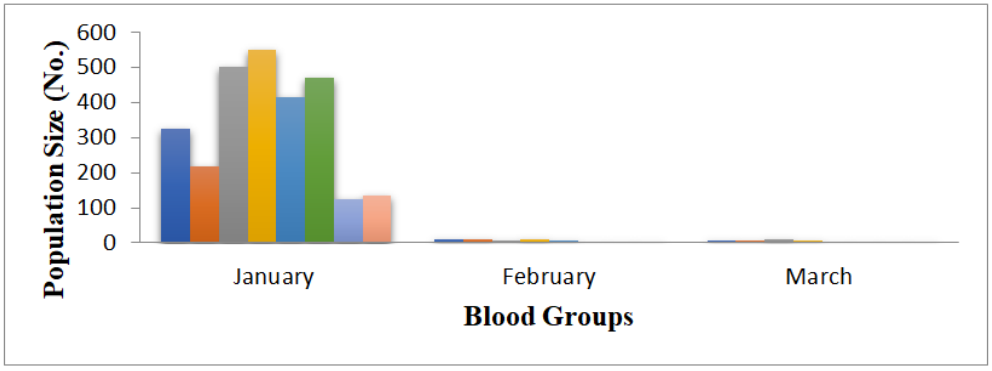

Figure 6) *COVID-19 prevalence in 2022 regarding blood group.* **Note:** (■) A+, (■) A–, (■) B+, (■) B–, (■) AB+, (■) AB–, (■) O+, (■) O–.

TABLE 6

COVID-19 Prevalence in 2022 regarding blood group

Month	A+	A-	B+	B-	AB+	AB-	O+	O-
January	326	218	503	550	416	472	125	136
February	11	10	8	10	8	5	1	0
March	9	8	11	7	5	4	0	0
Mean ± SE	115.33 ± 105.3	78.67 ± 89.66	174 ± 164.5	189 ± 180.5	143 ± 136.5	160.33 ± 155.8	42 ± 41.5	45.33 ± 45.33
Correlation	-0.869	0.328	0.337	0.33	0.329	0.332	0.329	0.333

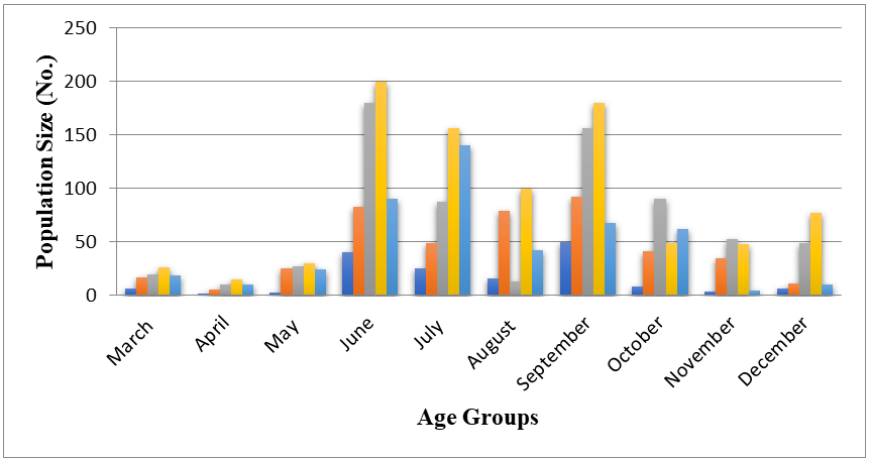

Figure 7) *Age related changes in COVID-19 (2020).* **Note:** (■) 0-20, (■) 20-40, (■) 40-60, (■) 60-80, (■) 80-100.

TABLE 7

Age related changes in COVID-19 (2020)

Month	Age groups				
	0-20	20-40	40-60	60-80	80-100
March	7	17	20	26	19
April	2	6	10	15	10
May	3	25	27	30	24
June	40	83	180	200	90
July	25	49	88	156	140
August	16	79	13	100	42
September	50	92	156	180	68
October	8	41	90	49	62
November	4	35	53	48	5
December	7	11	49	77	10
Mean ± SE	16.2 ± 5.32	43.8 ± 9.88	68.6 ± 18.89	88.1 ± 21.48	47 ± 13.74
Correlation	0.065	0.168	0.224	0.181	-0.038

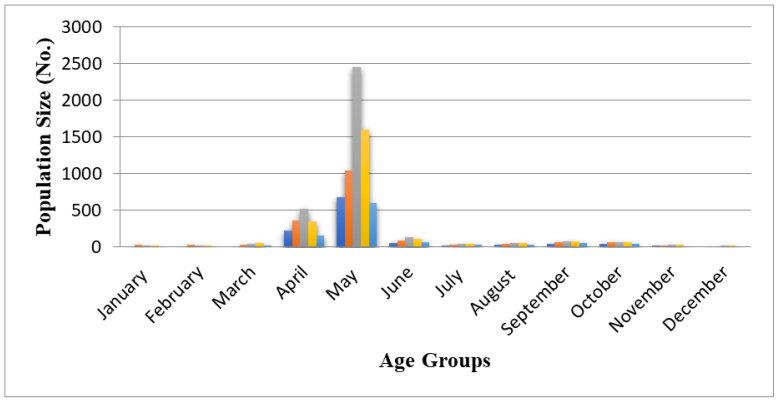

Figure 8) *Age related changes in COVID-19 (2020).* **Note:** (■) *0-20,* (■) *20-40,* (■) *40-60,* (■) *60-80,* (■) *80-100.*

TABLE 8
Age related changes in COVID-19 (2021)

Month	Age groups				
	0-20	20-40	40-60	60-80	80-100
January	5	26	21	14	9
February	7	24	19	20	11
March	11	33	39	47	15
April	218	364	516	352	156
May	672	1045	2447	1596	595
June	46	84	136	112	63
July	21	34	42	35	27
August	24	35	47	49	30
September	40	67	74	69	48
October	40	63	66	59	38
November	17	20	31	29	11
December	5	11	13	21	0
Mean ± SE	98.17 ± 55.324	150.5 ± 85.877	287.58 ± 200.32	200.25 ± 129.63	83.58 ± 166.35
Correlation	-0.169	-0.193	-0.169	-0.165	-0.167

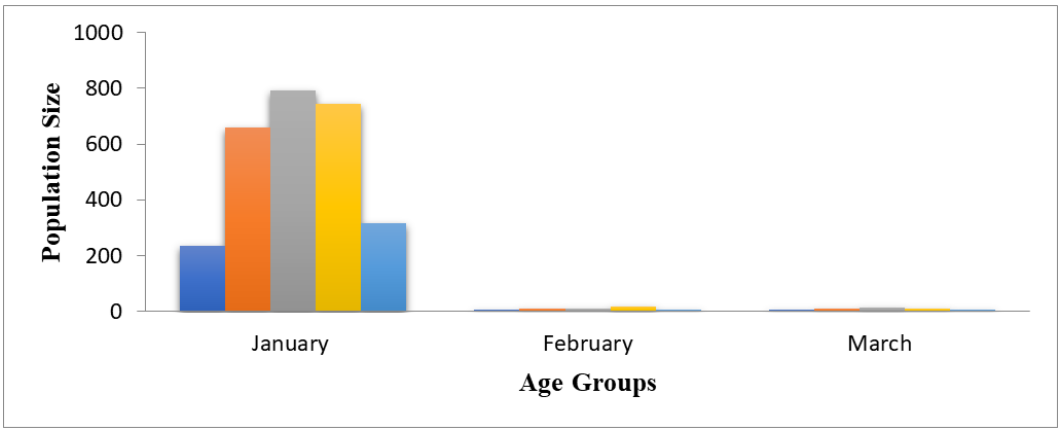

Figure 9) *COVID-19 prevalence in 2020 regarding blood group.* **Note:** (■) *A+,* (■) *A–,* (■) *B+,* (■) *B–,* (■) *AB+,* (■) *AB–,* (■) *O+,* (■) *O–.*

TABLE 9

Age related changes in COVID-19 (2022)

Month	Age groups				
	0-20	20-40	40-60	60-80	80-100
January	236	660	792	743	315
February	7	10	11	19	6
March	5	9	13	10	7
Mean ± SE	82.67 ± 76.66	226.33 ± 216.83	272 ± 260.0	257.33 ± 242.84	109.33 ± 102.83
Correlation	0.329	0.332	0.335	0.327	0.335

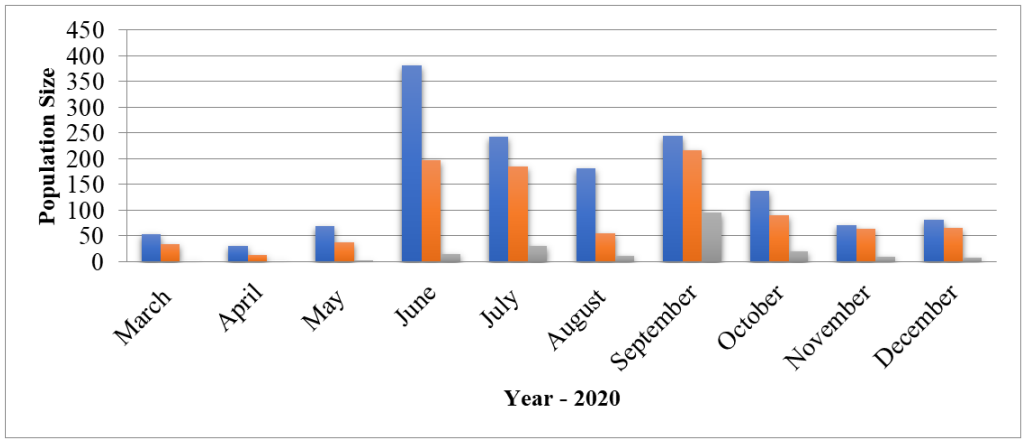

Figure 10) *Sex related changes of COVID-19 in 2020.* **Note:** *(■) Male, (■) Female, (■) Transgender.*

TABLE 10

Sex related changes of COVID-19 in 2020

Month	Sex		
	Male	Female	Transgender
March	54	35	0
April	30	13	0
May	69	38	2
June	382	197	14
July	243	185	30
August	181	56	11
September	244	216	96
October	138	91	21
November	71	64	10
December	82	65	7
Mean ± SE	149 ± 35.505	96 ± 23.595	19.1 ± 9.055
Correlation	0.067	0.202	0.292

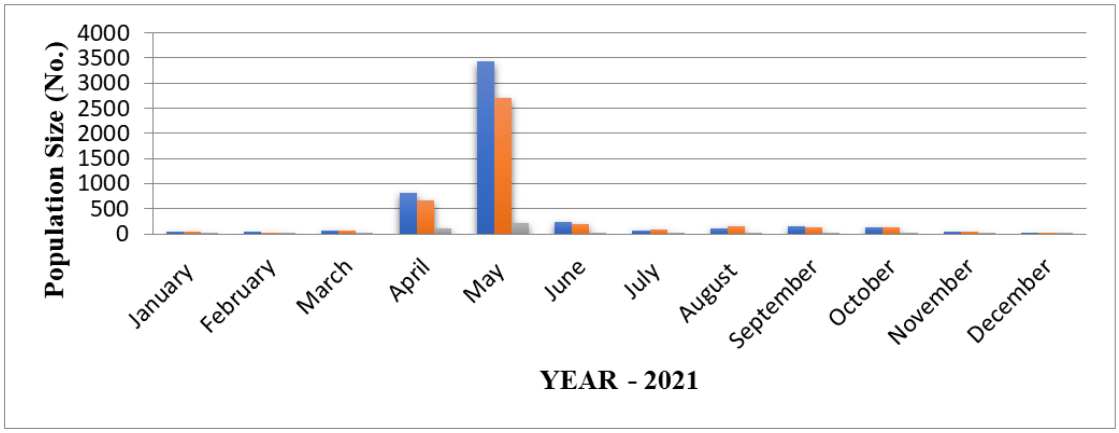

Figure 11) *Sex related changes of COVID-19 in 2021.* **Note:** *(■) Male, (■) Female, (■) Transgender.*

TABLE 11

Sex related changes of COVID-19 in 2021

Month	Sex		
	Male	Female	Transgender
January	40	33	2
February	45	29	7
March	75	63	5
April	826	664	116
May	3445	2696	214
June	234	192	15
July	74	76	9
August	112	150	23
September	142	139	17
October	132	121	13
November	51	47	10
December	25	16	4
Mean ± SE	433.42 ± 280.94	352 ± 218.96	36.25 ± 18.458
Correlation	-0.172	-0.166	-0.191

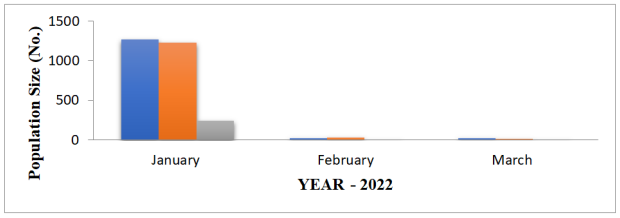

Figure 12) *Sex related changes of COVID-19 in 2022.* **Note:** (■) *Male,* (■) *Female,* (■) *Transgender.*

TABLE 12

Sex related changes of COVID-19 in 2022

Month	Sex		
	Male	Female	Transgender
January	1270	1232	244
February	21	27	5
March	26	14	4
Mean ± SE	439 ± 415.503	424.33 ± 403.851	84.33 ± 79.834
Correlation	-0.864	-0.871	-0.868

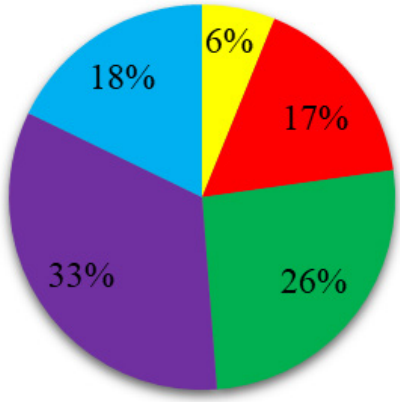

Figure 13) *Mean value of COVID-19 cases as per Age group during 2020-2022.* **Note:** (■) *0-20,* (■) *20-40,* (■) *40-60,* (■) *60-80,* (■) *80-100.*

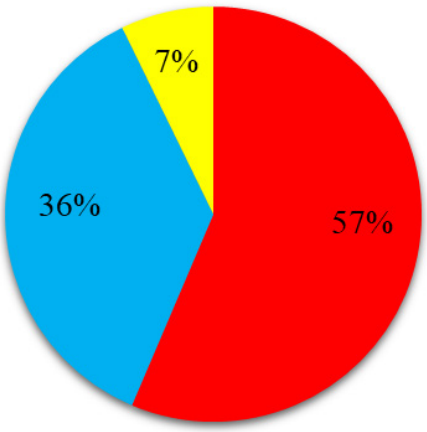

Figure 14) *Mean value of COVID-19 cases as per Sex during 2020-2022.* **Note:** (■) *Male,* (■) *Female,* (■) *Transgender.*

This rapid assessment of symptoms and symptom severity during an early phase of the COVID-19 pandemic provides important insights regarding SARS-CoV-2 infection in a community-based population not widely available in other data sources. Common symptoms were dry cough, fever, and shortness of breath/difficulty breathing. Factors predictive of testing positive for COVID-19 included modifiable and unmodifiable characteristics, such as symptoms, Black ethnicity, living in a home with someone experiencing COVID-19 symptoms, or recent international travel. Trouble waking up after sleeping was a predictor of a positive test result. Age and sore throat were identified as being predictive of a negative test result.

This study found that younger adults were more likely to be tested and report a positive COVID-19 test than other cohorts. Individuals with comorbidities, especially respiratory-related comorbidities, were at a higher risk of severe outcomes with SARS-CoV-2 infection. Disparities in access to healthcare may be an underlying factor contributing to these findings. A positive diagnostic test said they were 27% of individuals negative for COVID-19 antibodies, while 16% of the individuals who reported a negative diagnostic test reported a positive COVID-19 antibody test. Until effective therapies or vaccines become available, there are important strategies to build a stronger immune system and help prevent infection.

Self-reported survey data is subjective in nature, and mortality data is not reported. This study demonstrated that a community-based representative sample can be collected quickly to identify characteristics of individuals most likely to test positive for COVID-19. Analysis suggests substantial variation in individuals' likelihood of transmitting, with no secondary infections linked to 71% of cases whose contacts were traced and tested. School closures and other non-pharmaceutical interventions may have contributed to reductions in contact among children, but social interactions among children may be conducive to transmission. The overall case fatality ratio is 2.1%, with lower relative incidence among older adults in Tamil Nadu and Andhra Pradesh.

The limited COVID-19 incidence and mortality among older adults in Tamil Nadu and Andhra Pradesh may be due to imperfect surveillance systems, case-based surveillance, and survivorship bias [1]. Prospective testing of a large sample of exposed individuals through integrated active surveillance and public health interventions provided an opportunity to characterize secondary attack rates, identify risk factors for transmission, and account for deaths outside of health care settings. However, several limitations should be considered, such as the lack of data on timing of exposure and onset of symptoms in relation to testing dates [2,3]. Data from two states of South India provided key insights into the local epidemiology and transmission dynamics of SARS-CoV-2, without competing with emergency response activities for limited resources. This study provided key insights into the local epidemiology and transmission dynamics of SARS-CoV-2 without competing with emergency response activities for limited resources [4].

Imperfect test sensitivity was attributed to inadequate sample collection

procedures and low viral load in the upper respiratory tract, leading to an overall underestimate of transmission risk within case-contact pairs [5-7]. Surveillance and contact tracing are critical components of an effective public health response to COVID-19, and similar studies are necessary to inform the successful adoption of epidemic control measures in low-resource settings globally [8-15].

CONCLUSION

The development and use of Whole Inactivated Virus (WIV) and protein-based vaccines has been recommended, especially for use in developing countries. Affected people and those caring for someone infected should wear masks, proper hand hygiene is suggested, and respirators N95 or equivalent are recommended for healthcare workers. The WHO promotes ventilation and air filtration in public settings to remove infectious aerosols. Social distance (physical separation) refers to infection control measures that aim to delay disease transmission. Deep cleaning and other surface sanitation advice have been challenged as hygiene theatre.

Those who have been diagnosed with COVID-19 and those who believe they have been infected are advised to self-isolate at home. The Harvard T.H. Chan School of Public Health advocates a good diet, physical activity, stress management, and sufficient sleep.

REFERENCES

1. Albert E, Torres I, Bueno F, et al. Field evaluation of a rapid antigen test (Panbio™ COVID-19 Ag Rapid Test Device) for COVID-19 diagnosis in primary healthcare centres. Clin Microbiol Infect. 2021; 27(3):472-e7.
2. Alhajj M, Zubair M, Farhana A. Enzyme linked immunosorbent assay. StatPearls. 2023.
3. Augustine R, Das S, Hasan A, et al. Rapid antibody-based COVID-19 mass surveillance: relevance, challenges, and prospects in a pandemic and post-pandemic world. J Clin Med. 2020; 9(10):3372.
4. Carter LJ, Garner LV, Smoot JW, et al. Assay techniques and test development for COVID-19 diagnosis.
5. Hamer M, Kivimäki M, Gale CR, et al. Lifestyle risk factors, inflammatory mechanisms, and COVID-19 hospitalization: A community-based cohort study of 387,109 adults in UK. Brain Behav Immun. 2020; 87:184-187.
6. Harvey A. Covid-19: medical students and FY1 doctors to be given early registration to help combat covid-19.
7. Hassan SA, Sheikh FN, Jamal S, et al. Coronavirus (COVID-19): a review of clinical features, diagnosis, and treatment. Cureus. 2020; 12(3).
8. Kullar R, Marcelin JR, Swartz TH, et al. Racial disparity of coronavirus disease 2019 in African American communities. J Infect Dis. 2020; 222(6):890-893.
9. Li W, Moore MJ, Vasilieva N, et al. Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. Nature. 2003; 426(6965):450-454.
10. Liu H, Zhang Q, Wei P, et al. The basis of a more contagious 501Y. V1 variant of SARS-CoV-2. Cell Res. 2021; 31(6):720-722.
11. Mehta P, McAuley DF, Brown M, et al. COVID-19: consider cytokine storm syndromes and immunosuppression. The lancet. 2020; 395(10229):1033-1034.
12. Pilarowski G, Lebel P, Sunshine S, et al. Performance characteristics of a rapid SARS-CoV-2 antigen detection assay at a public plaza testing site in San Francisco. J Infect Dis. 2021; 1139–1144.
13. Tenforde MW, Rose EB, Lindsell CJ, et al. Characteristics of adult outpatients and inpatients with COVID-19—11 academic medical centers, United States, March–May 2020. Morb Mortal Wkly Rep. 2020; 69(26):841.
14. Watanabe K, Rahmasari R, Matsunaga A, et al. Anti-influenza viral effects of honey in vitro: potent high activity of manuka honey. Arch Med Res. 2014; 45(5):359-365.
15. Wortham JM. Characteristics of persons who died with COVID-19—United States, February 12–May 18, 2020. Morb Mortal Wkly Rep. 2020; 69.