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Original Research Article

Factors influencing COVID-19 preventive behaviour in South Indian region

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ABSTRACT

Background: The World Health Organization (WHO) has identified COVID-19 as a novel lung condition caused by an emerging virus. Socioeconomic factors significantly influence preventive behaviours like handwashing, wearing masks, social distancing, coughing cover, and avoiding touching the face to reduce COVID-19 transmission. Aim was to determine factors influencing COVID-19 preventive behaviour among selected households.
Methods: The cross-sectional descriptive study with 700 samples was conducted from July 2023 to November 2024 that collected quantitative data using an interviewer-administered questionnaire that was converted to Open Data Kit, a mobile data tool in South Indian region. Objective of study was to determine the association between socio-demographics, knowledge and preventive COVID-19 behaviours in this township residence over the age of 18 years old. One-way analysis of variance (ANOVA), independent t-test, and multiple linear regression were used to analyse the data.
Results: The overall mean score of knowledge related to COVID-19 was 25.95±7.07, whereas 37.48±15.05 was for preventive behaviours. After multiple linear regression, participants who living in urban, single, passed high educational status, family members who had COVID-19 history, COVID-19 patients who had underlying diseases reported higher preventive behaviour where as participants who had co morbidity reported lower performing preventive COVID-19 behaviours. Those participants with higher knowledge scores reported higher preventive COVID-19 behaviours (β=0.312, p=0.000).
Conclusions: Public health interventions should utilize these experiences to effectively communicate and promote preventive measures, thereby enhancing the targeting and impactful nature of future infectious disease prevention efforts.

Keywords: COVID-19, Knowledge, Preventive behaviour, India

INTRODUCTION

COVID-19, as defined by the World Health Organization (WHO), is a novel respiratory condition caused by an emerging virus first identified in Wuhan, China, in December 2019. The WHO declared COVID-19 a global health emergency on 30 January 2020 and later characterized it as a pandemic on 11 March 2020. This virus belongs to the group of severe acute respiratory syndrome (SARS)-like coronaviruses.[1] Patients infected with COVID-19 report a spectrum of symptoms ranging from mild to severe, which typically manifest between 2 to 14 days after exposure to the virus. Common symptoms include fever or chills, cough, shortness of breath, fatigue,

muscle or body aches, headache, loss of taste or smell, sore throat, nasal congestion, nausea or vomiting, and diarrhea.[2]

COVID-19 is highly transmissible, with primary transmission occurring via respiratory droplets when an infected individual coughs, sneezes, or talks within a close range (less than 1 meter) of another person. Additionally, indirect transmission through fomites in the immediate environment of an infected person has been documented.[3] Human behavior plays a crucial role in the transmission dynamics of the disease. Socioeconomic factors, age, lifestyle, mental health, and the level of awareness significantly influence an individual's ability to adopt preventive measures.[4]

Individuals with chronic conditions or those personally knowing someone affected or deceased due to COVID-19 often exhibit heightened risk perception and are more likely to engage in preventive practices.[4-10] Moreover, individuals with family members, close friends, or acquaintances who tested positive for COVID-19 demonstrated a higher likelihood of adhering to preventive measures compared to those without such personal experiences. Demographic factors such as age, sex, marital status, ethnicity, and employment status have also been associated with variations in preventive behaviors.[10]

Preventive measures like regular handwashing with soap, wearing face masks, maintaining physical distance, covering the mouth and nose while coughing, and avoiding touching the face have been shown to significantly reduce the transmission of COVID-19.[11] Access to COVID-19-related information, particularly through online platforms or local community interactions, further enhances the likelihood of adopting preventive practices.[10]

This study aims to assess factors influencing COVID-19 preventive behaviors among households in rural Srikakulam, South India. The objectives include examining the association between socio-demographic characteristics, knowledge, and the adoption of preventive behaviors among individuals aged 18 years and above.

METHODS

This cross-sectional descriptive study was conducted from July 2023 to November 2024 that collected quantitative data using an interviewer-administered questionnaire that was converted to Open Data Kit (ODK), a mobile data tool in South Indian region, India.

Inclusion criteria

The study's inclusion criteria were being at least 18 years old and living in South India region, India.

Exclusion criteria

Exclusion criteria were unwillingness to continue participating while responding. The number of sample size was calculated with significant level of 5% and 95% confidence level. In which data used from the study conducted by the previous literature.[5] The required sample size at 700 people. Multi-stage sampling was used.

Statistical analysis

Data analyses were performed using STATA (version 15.1). Data were presented as mean±standard deviation for continuous data and proportions and percentages for categorical or qualitative data. To determine the association between socio-demographics, knowledge and preventive COVID-19 behaviors, one-way analysis of variance (ANOVA) and independent t-test were used. Multiple linear regression was used to analyze the factors influencing preventive COVID-19 behaviors.

Socio-demographic variables were significantly associated with behavior score in univariate analyses ($p<0.05$) and were adjusted in the regression analysis. Multicollinearity of independent variables was detected if the variance inflation factor (VIF) was more than 10. A p value <0.05 was set as statistically significant.

Measures

The survey included questions on basic sociodemographics, knowledge, and preventive behaviors related to COVID-19.

Socio-demographic factors

Socio-demographic characteristics questionnaire included 10 items, such as residence, gender, age group, marital status, education, occupation, smoking habit. The participants were also asked about their history of chronic illness; history of infection due to COVID-19 in themselves or the people around including family members and their underlying diseases.

Knowledge about COVID-19

Knowledge was assessed based on five domains (i.e., symptoms, the spread of infection, source of information, vulnerable group and prevention), each consisting of true or false statements.

COVID-19 preventive behaviors

Questionnaire to preventive behavior scale consisted of a list of 33 behaviors in three sections including individual preventive behavior practices, preventive behavior practices when entering the house, preventive behavior practices when leaving the house. The participants' adherence to each behavior was scored on a 3-point Likert scale of 0=never, 1=sometimes and 2=always.

The final score was the sum of the scores of each section; therefore, the minimum and the maximum scores were 0 and 66, respectively.

RESULTS

Out of 620 respondents, male and female were equal distribution and 25% resided in urban areas and 75% in rural area that is 1:3 ratios in this study with an average age of 42.92 years (SD=12.704, range 18–89 years). Most of the participants were between 41 to 60 years of age (48.1%), 82.4% were married, 22.1% were high educational level, 48.4% were dependent, 72.9% were never smoker (Table 1).

Table 1: Distribution of participant characteristics.

Sociodemographic characteristics	N (%)
Residence	
Urban	155 (25)
Rural	465 (75)
Gender	
Male	310 (50)
Female	310 (50)
Age group (in years)	
18–40	272 (44.7)
41–60	297 (48.1)
>61	43 (7.1)
Marital status	
Single	62 (10.3)
Married	508 (82.4)
Widow	15 (2.4)
Divorce	31 (4.9)
Educational status	
Illiteracy	37 (6.1)
Read and write	77 (12.6)
Primary level	74 (12.0)
Middle level	136 (22.1)
High level	173 (28.1)
Passed high	50 (8.1)
Undergraduate	22 (3.6)
Graduated	45 (7.3)
Occupational status	
Dependent	297 (48.4)
Working (outside)	248 (40.4)
Working (inside home)	68 (11.1)
Smoking habit	
Current	124 (19.6)
Ex-smoker	47 (7.6)
Never	446 (72.9)
History of comorbidity	
Yes	316 (51.3)
No	297 (48.7)
Past history of COVID-19 among family member	
Yes	100 (16.7)
No	520 (83.3)
History of underlying disease in COVID-19 patients	
Yes	434 (70.1)
No	186 (29.9)

Regarding history of chronic diseases and COVID-19, 51.3% had underlying diseases, only 16.7% had past history of COVID-19 and 70.1% had underlying diseases among COVID-19 patients (Table 1).

Knowledge about COVID-19

The overall mean score of knowledge related to COVID 19 was 25.95±7.07. The COVID-19 knowledge mean score was significantly highest among the participants who live in urban area (26.77±6.993, t=1.189), family members who had COVID-19 history (28.43±6.27, t=4.19), and COVID-19 patients who had underlying diseases (29.00±5.18, t=3.007) and they were statistically significant at p value of p=0.016, p=0.000 and p=0.003 respectively.

The comparison between socio-demographic characteristics using ANOVA with post hoc test for knowledge of COVID-19. It was significantly highest among single participants (28.07±6.16, F=3.543), aged between 18 to 40 years of age (28.07±6.161, F=8.612) than other age group, people who had passed high educational status (30.53±5.56, F=7.67) than other educational level, people who never smoke (26.38±7.22, F=3.697) and dependent (25.85±7.584, F=4.261) and they were statistically significant at p value of p=0.014, p=0.000, p=0.000 and p=0.025, p=0.014 respectively (Table 2).

Preventive behaviors against COVID-19

The overall mean score of preventive behavior related to COVID-19 was 37.48±15.05.

The COVID-19 knowledge mean score was significantly highest among the participants who live in urban area (39.48±15.327, t=2.03), family members who had COVID-19 history (43.24±16.59, t=4.599), and COVID19 patients who had underlying diseases (44.49±18.68, t=3.251) and they were statistically significant at p value of p=0.042, p=0.000 and p=0.001 respectively.

The comparison between socio-demographic characteristics using ANOVA with post hoc test for knowledge of COVID-19. It was significantly highest among single participants (42.07±15.991, F=2.927), aged between 41 and 60 years of age (38.68±16.014, F=3.599), then other age group, people who had passed high educational status (45.44±11.843, F=4.155) than other educational level and they were statistically significant at p value of p=0.033, p=0.028, p=0.000 respectively (Table 3).

Those participants with higher knowledge scores reported higher preventive COVID-19 behaviours (β=0.312, p=0.000). However, the performance of preventive COVID-19 behaviours (adjusted R2=0.096) and the

overall model was significant (F=75.079, p=0.000) (Table 4).

Table 2: Distribution of participant characteristics in respect to knowledge of COVID-19.

Sociodemographic characteristics	Mean±SD	P value*
Residence		
Urban	26.77±6.993	0.016*
Rural	25.68±7.084	
Gender		
Male	26.26±6.983	0.703*
Female	25.64±7.200	
Age group (in years)		
18–40	28.07±6.161	0.000*
41–60	25.86±7.032	
>61	22.38±6.749	
Marital status		
Single	28.07±6.161	0.014*
Married	25.86±7.037	
Widow	24.00±7.558	
Divorce	23.97±8.347	
Educational status		
Illiteracy	27.35±5.033	0.000*
Read and write	25.16±8.190	
Primary level	25.26±6.686	
Middle level	23.70±7.594	
High level	26.30±6.958	
Passed high	30.53±5.562	
Undergraduate	24.56±2.800	
Graduated	28.33±5.552	
Occupational status		
Dependent	25.85±7.584	0.014*
Working (outside)	24.34±7.272	
Working (inside home)	24.00±6.235	
Smoking habit		
Current	24.96±6.235	0.025*
Ex-smoker	24.34±7.272	
Never	26.38±7.223	
History of comorbidity		
Yes		0.826*
No		
Past history of COVID-19 among family member		
Yes	28.43±6.273	0.000*
No	25.45±7.123	
History of underlying disease in COVID-19 patients		
Yes	29.00±5.183	0.003*
No	25.74±7.139	

*Significant at 0.05 level. The p values are calculated by one-way ANOVA and independent t-test

Table 3: Distribution of participant characteristics in respect to preventive behaviors of COVID-19.

Sociodemographic characteristics	Mean±SD	P value*
Residence		
Urban	39.48±15.327	0.042*
Rural	36.82±14.912	
Gender		
Male	38.60±14.878	0.143*
Female	36.37±15.159	
Age group (in years)		
18–40	36.91±13.896	0.028*
41–60	38.68±16.014	
>61	32.94±14.493	
Marital status		
Single	42.07±15.991	0.033*
Married	37.06±14.814	
Widow	38.71±16.702	
Divorce	34.38±14.894	
Educational status		
Illiteracy	34.74±8.835	0.000*
Read and write	34.55±18.011	
Primary level	34.74±18.280	
Middle level	37.78±12.878	
High level	36.95±16.788	
Passed high	45.44±11.843	
Undergraduate	36.92±8.789	
Graduated	41.88±6.647	
Occupational status		
Dependent	36.95±15.127	0.276*
Working (outside)	38.53±15.673	
Working (inside home)	35.97±12.021	
Smoking habit		
Current	37.66±15.717	0.976*
Ex-smoker	37.75±14.330	
Never	37.41±14.968	
History of comorbidity		
Yes		0.028*
No		
Past history of COVID-19 among family member		
Yes	43.24±16.590	0.000*
No	36.33±14.463	
History of underlying disease in COVID-19 patients		
Yes	44.49±18.686	0.001*
No	37.00±14.662	

*Significant at 0.05 level. The p values are calculated by one-way ANOVA and independent t-test

Table 5 showed that linear regression analysis of the socio demographic as associated with COVID-19 preventive behaviors. According to the gender distribution, these findings indicated that being male is associated with more preventive COVID-19 behaviors compared to females, however, it is not statistically significant (β=2.231, p=0.05).

Regarding the age distribution, these results indicated that 41 to 60 years more preventive COVID-19 behaviors compared to other age group, however, it is not statistically significant (β=2.316, p=0.077). Regarding the marital status distribution, these results indicated that single more

preventive COVID-19 behaviors compared to other marital status group, however, it is most statistically significant (β=5.114, p=0.006). Regarding the residence distribution, these results showed that residing in an urban area is associated with more preventive COVID-19 behaviors compared to rural areas which is statistically significant (β=2.665, p=0.042). Regarding the smoking status distribution, this finding showed that people who had current smoking habit had higher preventive COVID-19 behaviors compared to who had never smoke and ex smoke which is not statistically significant (β=0.218, p=0.879). Regarding the educational status, this finding suggested that individuals who passed high school education practices most in preventive COVID-19 behaviors compared to the other educational status which is statistically significant (β=8.663, p=0.000). Regarding the occupational status, this finding suggested that individuals who worked outside practices most in preventive COVID-19 behaviors compared to the other occupational status which is statistically significant (β=1.760, p=0.129) (Table 5).

By the comorbidities of the study participants, these results showed that having comorbidities is associated with less preventive COVID19 behaviors which is statistically significant (β=-2.504, p=0.028). Regarding the family history of COVID-19 among study participants, these results suggested that individuals with a family history of COVID-19 have more preventive COVID-19 behaviors compared to those without such a history which is strongly statistically significant (β=6.913, p=0.000). According the underlying diseases of study participants, these findings indicated that individuals with underlying diseases have more preventive COVID-19 behaviors compared to those without underlying diseases, however, which is statistically significant (β=7.489, p=0.001).

Table 4: Linear regression analysis of the knowledge level as associated with COVID-19 preventive behaviors.

Predictors	Unstandardized B	SE	Standardized B	95%CI	
				Lower	Upper
Constant	20.270	2.059		16.229	24.312
Knowledge	0.663	0.077	0.312	0.513	0.813

*Significant at 0.05 level B: unstandardized coefficient; beta: standardized coefficient; SE: standard error

Table 5: Linear regression analysis of the socio demographic as associated with COVID-19 preventive behaviors.

Predictors	Unstandardized coefficients		Standardized coefficients		95.0% confidence interval for B		Collinearity statistics	
	B	SE	Beta	P value	95% CI		Tolerance	VIF
					Lower	Upper		
Constant	35.581	1.096		0.000*	33.428	337.72		
Gender[a]	2.231	1.135	0.074	0.050	0.002	4.461	0.746	1.341
Age group[b]	2.316	1.136	0.077	0.042*	0.086	4.546		
Marital status[c]	5.114	1.864	0.103	0.006*	1.455	8.774	0.923	1.083
Residence[d]	2.665	1.311	0.077	0.042*	0.091	5.238	0.983	1.017
Smoking status[e]	0.218	1.435	0.006	0.879	-2.599	3.035	0.739	1.353
Educational status[f]	8.663	2.055	0.158	0.000*	4.627	12.698	0.944	1.059
Occupational status[g]	1.760	1.158	0.057	0.129	-0.513	4.034	0.870	1.149
Comorbidities[h]	-2.504	1.135	-0.083	0.028*	-4.732	-0.275	0.950	1.052
Family COVID-19 history[i]	6.913	1.503	0.172	0.000*	3.962	9.865	0.721	1.388
Underlying diseases in COVID-19 patients[j]	7.489	2.304	0.122	0.001*	2.966	12.012	0.735	1.360

*Significant at 0.05 level; B: unstandardized coefficient; beta: standardized coefficient; SE: standard error; [a]reference category: male; [b]reference category: 41–60 years; [c]reference category: single; [d]reference category: urban; [e]reference category: current; [f]reference category: passed high; [g]reference category: working outside; [h]reference category: comorbidities: no; [i]reference category: family COVID-19 history: yes; [j]reference category: underlying diseases in COVID-19 patients: yes

DISCUSSION

In this study, it revealed that disparities between genders in health-related knowledge and practices, frequently linking greater health participation to women which is similar with previous research.[12,13]

These results were similar with earlier studies that show younger people typically participate in more preventive practices and have greater levels of health knowledge, for instance, discovered that younger persons had a higher propensity to look for and interact with health information online, which may account for their better knowledge ratings.[14] On the other hand, the older persons may have difficulty obtaining information or may perceive danger differently, which could explain why they score lower on preventative actions and knowledge.[15] It is imperative to comprehend how age affects COVID-19 knowledge and

preventative behaviors in order to customize public health interventions. The found substantial differences imply that alternative strategies may be needed for younger and older age groups. For instance, community-based programs or digital literacy initiatives could be used to reach older persons with interventions that emphasize the value of preventive practices and better information access.

Using social media and other online platforms to maintain engagement and reinforce correct knowledge could be beneficial for younger adults.

These results were same with earlier research suggesting that marital status can affect people's health-related beliefs and practices. For example, single people tend to know more about health because they have access to a wider range of information sources than married people, who may depend more on their close friends and family but not difference with previous research.[11,16]

People who live in urban frequently have better access to medical facilities and health information, which can result in more effective preventative measures which is similar with the previous study.[17] The necessity for focused public health initiatives is highlighted by the notable differences in preventative practices between urban and rural populations. While rural areas might need more concentrated efforts to increase participation with these habits, urban areas might benefit from strengthening current preventive measures. In order to encourage and facilitate preventive measures, this could entail using mobile health units, community engagement initiatives, and local leaders.

People who with higher education levels were more likely to follow COVID-19 preventive measures, similar with the previous research.[13,14] In this study, findings that those working outside have higher knowledge scores align with other studies. However, the lack of significant differences in preventive behaviors contrasts with some research suggesting that occupational settings can influence health behaviors.[18]

These results not similar with some studies that indicate individuals with comorbidities may be more cautious and adhere more strictly to preventive behaviors.[19] The significant difference in preventive behaviors emphasizes the importance of targeted interventions for individuals with comorbidities. Public health strategies should highlight personalized guidance and support for this group to enhance their adherence to preventive measures. This could involve tailored educational materials, remote health monitoring, and accessible healthcare services to mitigate the risk of COVID-19 complications. These results align with existing literature suggesting that personal experiences or proximity to COVID-19 cases can enhance knowledge and prompt behavior change. Studies have shown that individuals with direct exposure to COVID-19 cases are more likely to adhere to preventive measures and seek out accurate information to protect themselves and their families.[5]

These results are consistent with existing literature suggesting that personal or family experiences with severe illness can lead to heightened health awareness and behavior change. Studies have shown that individuals with underlying health conditions are more likely to engage in protective behaviors during pandemics to reduce their risk of infection and severe outcomes.[5] The significant differences observed in both knowledge and preventive behaviors underscore the profound impact of personal or familial health experiences on health-related attitudes and actions. The significant differences in knowledge and behaviors highlight the importance of personal or familial health experiences in shaping health outcomes during a pandemic. Public health strategies should incorporate these experiences by utilizing personal narratives and real-life examples in educational campaigns. Emphasizing the severity of COVID-19 and the importance of preventive measures through direct accounts can resonate more deeply with individuals and communities affected by underlying health conditions.

Limitations

In this study, one of the main limitations was the sampling method, which could affect the generalizability of the results, as the findings may not be representative of the larger population. Future research could address these limitations by securing representative a sample by utilizing more objective data collection methods.

CONCLUSION

This study highlights key demographic, educational, and experiential factors influencing COVID-19 preventive behaviors in South India. Younger individuals, urban residents, and those with higher educational attainment demonstrated greater adherence to preventive measures, underscoring the need for targeted public health interventions. Notably, individuals with comorbidities exhibited lower preventive behavior engagement despite comparable knowledge levels, emphasizing the necessity for tailored health strategies. Additionally, personal and familial experiences with COVID-19 were significant motivators for preventive action, suggesting that public health campaigns should leverage personal narratives to enhance awareness and compliance. These findings contribute to the growing body of evidence on behavioral responses to infectious diseases, offering valuable insights for designing more effective, equitable, and personalized public health interventions to mitigate future pandemics.

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