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Original Research Paper

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COVID-19 RISK ASSESSMENT AMONG THE SUSCEPTIBLE INDIVIDUALS IN CHENNAI: A CASE CONTROL STUDY

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ABSTRACT

BACKGROUND The 21st century is facing a long series of scourge from SARS (2003), H1N1 (2009), MERS (2012), and Ebola (2014) to Zika virus (2015). H1N1 spread by a novel influenza virus in the year 2009, was the first pandemic of the century, which luckily turned out to be not as severe as expected. In contrast COVID-19 pandemic is characterized by a very rapid spread and high fatality. The best way to prevent and slow down the transmission is to be well informed about its causes and spreads. Risk awareness thus prevent and slow-down the transmission of COVID-19.

OBJECTIVES

- To measure the risk of association between parameters of health, exposure, behaviour, social policy and COVID-19 infection
- To evaluate the knowledge gaps on COVID-19 safety measures among the public

METHODS A case control study was conducted among 100 cases and 200 controls. A standard Risk assessment tool was used to assess the risk factors for COVID-19 infection through telephonic interview after obtaining a verbal informed consent.

RESULTS The odds of getting COVID-19 infection is 4.5 times higher with increase in age. The study also shows a positive and strong correlation between age group and total risk, co-morbidities and total risk among both cases and control groups. On the other hand, gender and behaviour showed a negative and negligible correlation among controls and positive but negligible correlation among the cases.

CONCLUSION The risk of getting COVID – 19 disease increases with Age, underlying medical conditions, smoking, hand washing, mask wearing behavior, compliance with social distancing and place of residence. Although the government has laid preventive strategies, the results show unsatisfactory compliance towards social policies. Hence stringent laws should be implemented to scrutinize the population to follow these preventive measures.

KEYWORDS : COVID-19, Pandemic, RIKA, Risk assessment, Risk communication

INTRODUCTION

COVID-19 pandemic, as a public health emergency has brought into picture, the need for a trans-disciplinary view of the current crises through various angles of global governance, technology and risk communication (Zhang & Shaw, 2020). While health organizations and governments advise many preventive measures like social distancing and personal hygiene practices, risk communication and awareness generation is essential to break the chain of spread. Understanding of the risk at the community level goes a long way in enhancing prevention. Risk assessment tools are intended to analyze the probable risk of the respondents based on information provided on current health status and other essential data being collected. Cheng et. al., points out at the role of inter-connecting risk factors such as social behaviour and exposure which contribute to contracting the disease as observed in the case of SARS (Cheng, 2006). As per Shaw et. al., citizen compliance helps in containment of the spread of disease in China and many other countries (Shaw et al., 2020).

Risk assessment involves evaluation of existing vulnerability, hazard, exposure and current capacities for prevention. Risk tools are needed to assess the risk and the relationship among those factors thus producing a sort of template for risk assessors so that it can be used in their assessments. South Korea's successful edge in overcoming crises was community-based activity, such as aggressive case finding and assisting vulnerable populations (Innovative Responses to COVID-19, n.d.). A high-level "STOP Pandemics 2020 Strategy Committee" among Japan's 26 national resilience working groups released numerous recommendations, especially on risk communication, in order to better integrate pandemic threats into all-hazard national resilience (DeWit, 2020). In comparison to the Arogya Setu App launched by the Government of India, the COVID-19 Risk assessment tool provides information in the form of questions which can be used to assess the risk based on the individual behavior and social compliance. The present study aims to measure the risk of association between parameters of health, exposure, behaviour, social policy and COVID-19 infection

METHODS

A Case control study was conducted over a period of three months among 100 cases and 200 controls after obtaining ethical clearance from the Institutional Ethics Committee (ECMGR0300144). The RTPCR reports of the individuals who were tested for COVID-19 were collected from the COVID-19 RTPCR testing laboratory of The Tamilnadu Dr MGR medical University, Chennai, Tamilnadu. A computer generated random number was used to choose 2 cases and 2 controls every day. The individuals were interviewed over telephone after obtaining a verbal informed consent. When the selected

participant denied consent consecutive number was chosen. The Approximate time taken for each interview was 15 – 20 mins. The data was collected using the Resilience Innovation Knowledge Academy (RIKA) Tool (Chatterjee et al., 2020) and entered was entered in EpiData version 3.1.

Case definition

Case- RTPCR tested COVID-19 positive individuals with or without symptoms.

Control- RTPCR tested COVID-19 Negative individuals with or without symptoms.

RESULTS

A total of 100 cases and 200 controls were interviewed in the study. Analysis and interpretation of the data was done using SPSS Software. Descriptive and inferential statistics was done based on the objective of the study.

1. DESCRIPTIVE

A. Health (H)

A total of 300 respondents were interviewed in total among which 51% of respondents were male and 49% of respondents were female. 54% of the respondents in control group and 44% of the respondents in cases group were male. 23% of the respondents in the control group and 42% of the respondents among the cases had an underlying medical condition. Considering smoking habit among the males, 32 out of 109 (29%) respondents in control group and 18 out of 44 (40%) respondents in control group were smokers. The age distribution of the respondents is tabulated below (Table 1).

Table 1: Distribution of the respondents by age

		CASE	CONTROL
Age_interval			
	10-39	57.0%	40.0%
	40-49	21.0%	8.0%
	50-59	15.5%	14.0%
	60-69	3.0%	13.0%
	70-79	2.5%	12.0%
	80& above	1.0%	13.0%

B. Behaviour (Be)

The people' compliance to the public norms, use of mask, hand washing and sanitizing practices constitutes the behavioural aspects of the risk for COVID-19. When questioned about the type of mask used a majority of the respondents (67%) used washable cloth masks followed by three ply mask (20%) and respirators (5%). But only 20% of the respondents reported that they cover both their nose and mouth completely all the time whenever they wear a face mask. It is seen that in advertently 95% of the respondents tend to touch their face or adjust their mask while being engaged in other activities. A very few (8%) reported that they always sanitize their hands before touching their eyes, nose or mouth while the rest of the population sometimes or never did it (Table 2).

Table 2: Frequency and percentage of Behavior risk factors

		Group			
		Case		Control	
		Frequency	Percentage	Frequency	Percentage
(Be1) Do you wear face mask every time you step out of the house?	Always	32	32.0%	100	50.0%
	Sometimes	62	62.0%	94	47.0%
	Never	6	6.0%	6	3.0%
(Be2) Do you wash your hands after coming home with soap?	Yes	44	44.0%	129	64.5%
	Sometimes	53	53.0%	70	35.0%
	No	3	3.0%	1	0.5%
(Be3) Do you sanitize your hand before touching your eyes, nose & mouth?	Always	6	6.0%	17	8.5%
	Sometimes	66	66.0%	130	65.0%
	Never	28	28.0%	53	26.5%
(Be4) Do you follow social distancing norm?	Always	26	26.0%	93	46.5%
	Sometimes	71	71.0%	103	51.5%
	Never	3	3.0%	4	2.0%

C. EXPOSURE (Ex)

With respect to the respondent data in control group regarding the type of residence, 58.5% reported to stay in apartments, 29.5% in detached houses, 9% in informal settlement and 3% from shared accommodation and among cases, 66% reported to stay in apartments, 12% in detached houses, 19% in informal settlement and 3% from shared accommodation. With regards to the travel history, the history of international travel, travel within India and travel through public transport was recorded. Only 2% of the respondent from the control group had an international travel history (Table 3). The exposure component is also measured in terms of occupation. It is observed that maximum respondents from both the groups did not fall in high-risk occupation types listed in the questionnaire (medical and emergency professionals). Only 14% from each group were from high risk occupation.

Table 3: Frequency and percentage of exposure risk

		Group			
		Case		Control	
		Frequency	Percentage	Frequency	Percentage
(Ex1) Where do you stay?	Informal settlement	19	19.0%	18	9.0%
	Shared accommodation	3	3.0%	6	3.0%
	Apartment	66	66.0%	117	58.5%
	Detached houses	12	12.0%	59	29.5%
(Ex2) What is your occupation?	Medical	3	3.0%	10	5.0%
	Law & order	1	1.0%	4	2.0%
	Essential service provider	9	9.0%	15	7.5%
	others	87	87.0%	171	85.5%
(Ex3) History of Travel and attending public gatherings	None of these	80	80.0%	150	75.0%
	Travel history	0	0.0%	4	2.0%
	Public gatherings	20	20.0%	40	20.0%
	Both	0	0.0%	6	3.0%

D. SOCIAL POLICY (SP)

In terms of effectiveness of lockdown, more than 70% of people had reported that it is followed with maximum compliance in both the groups. In terms of mask wearing and maintenance of social distancing, more than half of the respondents have reported that only some follow it (Table 4).

Table 4: Compliance with Social Policy

		Group			
		Case		Control	
		Frequency	Percentage	Frequency	Percentage
(Sp1) How effective was the lockdown in your locality?	A very few are following	2	2.0%	3	1.5%
	Some people are following	18	18.0%	52	26.0%
	Most are following	80	80.0%	145	72.5%

(Sp2) Was people wearing masks and following social distancing in your locality?	A very few are following	24	24.0 %	36	18.0 %
	Some people are following	46	46.0 %	117	58.5 %
	Most people are following	30	30.0 %	47	23.5 %

2. Association

The significance of association was studied using a Chi square test and the risk of association was estimated using odds ratio. Results showed a statistically significant association (p value <0.05) between age, underlying medical condition, hand washing practices, compliance to social distancing norm, type of residence and COVID-19 disease. Since smoking, mask wearing behavior and occupation are considered clinically significant factors those were included while estimating odds ratio.

Table5: Adjusted and unadjusted odds ratio of variables

VARIABLES	UNADJUSTED			ADJUSTED		
	OR	95% CI		OR	95% CI	
		lower	upper		lower	upper
Age	4.697357	3.52909	6.67124	4.566542	3.433768	6.486612
Do you have any underlying medical conditions?	1.535469	1.244015	2.321584	1.526531	1.241949	2.28362
Smoking habit	2.219854	1.461043	5.350566	2.254144	1.474557	5.479409
Do you wear mask every time you step out of your house?	3.10899	1.722952	10.64364	2.200785	1.314163	9.752839
Do you wash your hands with soap after coming home?	2.188839	1.533547	4.200509	2.255707	1.574625	4.295143
Do you sanitize your hand before touching eyes, nose & mouth?	2.189408	1.312103	9.589839	-	-	-
Do you follow social distancing norm?	1.645927	1.297366	2.595535	1.650996	1.306067	2.563647
Where do you stay?	1.367259	1.154115	1.979144	1.377275	1.158963	2.00287
What is your occupation?	1.49843	1.191407	2.544342	1.470856	1.183339	2.421474

The odd's of contracting the COVID-19 infection is 4.5 times higher among cases when compared to the controls with increase in age. The odd's of contracting COVID-19 infection is 2 times higher among cases when compared to the controls due to co-morbidities, smoking habit and hand washing practices.

3. Correlation

The study shows a positive and strong correlation between age group and total risk, and co-morbidities and total risk in both cases and control groups. Gender and behaviour show a negative and negligible correlation among controls and a positive but negligible correlation among the cases.

Table6: Correlation between the associated variables using Pearson's correlation analysis

VARIABLES	CONTROL		CASE	
	r	Strength of correlation	r	Strength of correlation
Age group and co-morbidities	0.529	Positive & Moderate correlation	0.461	Positive & Moderate correlation
Age group and Total risk	0.852	Positive & Strong correlation	0.922	Positive & Strong correlation
Age group and behavior	0.130	Positive & Weak correlation	0.241	Positive & Weak correlation
Co-morbidities and total risk	0.690	Positive & Strong correlation	0.695	Positive & Strong correlation
Hand washing and compliance of social distancing	0.305	Positive & Moderate correlation	0.208	Positive & Weak correlation
Gender and Behavior	-0.028	Negative & negligible correlation	0.087	Positive & negligible correlation
Smoking and total risk	0.382	Positive & Moderate correlation	0.266	Positive & Weak correlation
Social policy compliance (Sp1&Sp2)	0.324	Positive & Moderate correlation	0.277	Positive & Weak correlation
Social policy and Behavior	-0.070	Negative & negligible correlation	-.0.006	Negative & negligible correlation

DISCUSSION

Effective risk communication strategies can raise public awareness and build social trust towards authority (Bruinen de Bruin et al., 2020). Providing the accurate and necessary information can lead to risk avoidance and improved risk governance procedures. The COVID-19 Risk Assessment tool is intended to raise awareness, communicate risks, and assist in decision-making. According to Lin et al., an increase in availability of information from internet searches on hand-washing and wearing masks was associated with a decrease in COVID-19 speed (Lin et al., 2020).

The factors assist for Covid risk includes four factors - health (HR), behaviour (Be), exposure (Ex) and social policy (SP). Each of these factors have some parameters. Each of these parameters are assigned linear weights and based on the weightage given in the tool the risk is calculated using the formula: Risk = (HR*0.5) + (Be*0.2) + (Ex*0.2) + (Sp*0.1).

The relationship between age-group and co-morbidities is an important risk factor for Covid-19 disease as it places the elderly population with existing disease at a higher risk of mortality (Divo et al., 2014). As observed, the age-group and total risk depict a strong positive correlation among both cases and controls with coefficient of 0.922 and 0.822 respectively. Similarly, comorbidities and total risk also showed a strong correlation with a coefficient of 0.695 and 0.690 among cases and controls respectively. These two correlation results were in compliance with a descriptive study by Chatterjee et, al. (Chatterjee et al., 2020).

With respect to individual behaviour, washing hands and following of social distancing norm has a weak correlation among cases and moderate correlation among controls. This depicts that while one may practice social distancing but might not comply with hand washing behavior or the vice versa. The gender and behaviour show negligible correlation with a coefficient of 0.087 among cases and negative

correlation with a coefficient of -0.028 among controls. This implicates that behaviour factors are not dependent on gender. Similarly, age-group and behaviour showed negligible correlation coefficient among both cases and controls.

There are two components considered in social policy, one being effective lockdown and other is the community compliance of wearing of mask and practicing social distancing. Ideally, the two factors should have a strong positive correlation. However, as observed, there is a positive weak correlation among cases and positive moderate correlation among controls.

CONCLUSION

The risk of getting COVID – 19 disease increases with Age, underlying medical conditions, smoking, hand washing, mask wearing behavior, compliance with social distancing and place of residence. Although the government has laid preventive strategies, the results show unsatisfactory compliance towards social policies. Hence stringent laws should be implemented to scrutinize the population to follow these preventive measures.

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