Original Research Article

Knowledge, attitude and practice towards COVID-19 Vaccination Acceptance in Tamilnadu: Cross-sectional Study

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Abstract:

Background: Vaccines are effective interventions that can reduce the high burden of diseases globally. However, public vaccine hesitancy is a pressing problem for public health authorities. Getting people vaccinated is the only long-term solution to the current COVID-19 crisis. In India currently two vaccines namely covaxine and covidshield are used against COVID-19. With the availability of COVID-19 vaccines, little information is available on the public acceptability and attitudes towards the COVID-19 vaccines in India. Ason: 05Jun2021, 08:00IST: 77, 83, 926 people got vaccinated as per https://www.mygov.in/covid-19 sources, i.e 10% of Tamilnadu population. So, this study aimed to investigate general public Knowledge, attitudes, Perceptions, and acceptance towards COVID-19 vaccinations in Tamilnadu.

Methods: The survey was conducted using a semi-structured and self-reported questionnaire by using Google Forms and a shareable link was generated and disseminated publicly on various social media outlets containing informed consent along with six sections (Demographic Details, Knowledge, Attitudes, Perceptions and acceptance towards COVID-19 vaccinations). The correlation between knowledge, attitude and perceptions score was analysed using Karl Pearson correlation method.

Results: An exploratory and anonymous population-based e-survey was conducted among 440 general individuals (44.79% male, 55.21% Female; mean age 31.33+12.34 years; age range=18-62 years) of different districts in Tamilnadu. Among the study population 68.63% (302 out of 440) said they are willing to take the vaccine while 21.59% (95 out of 440) said they were not willing to take the vaccine and remaining 9.77% (43 out of 440) had not yet decided about it. Similar results got for encouraging family/friends/relatives to get vaccinated. 59.54% of participants feel COVID-19 vaccine may have side effects and 40.54% doesn't think so. 63.63% participants were willing to pay for their vaccine. Overall, 59.54% participants agreed, 27.95% participants disagreed and 12.5% participants undecided with "It is not possible to reduce the incidence of COVID-19 without vaccination. Our study shows public having 59.30%, 63.17% & 61.33% knowledge; attitude and perception score respectively calculated using mean difference with 95% CI and proportion with 95% CI.

Conclusions: The possibility of controlling the COVID-19 pandemic depends on vaccine uptake and acceptance of the COVID-19 vaccine. When it comes to executing vaccination programmes, developing strategies and systematic interventions are required by public health authorities to reduce the levels of vaccines hesitancy and improve their acceptance.

Keywords: Knowledge; Attitudes; Acceptance; perception; COVID-19; Vaccine.

Introduction

Coronavirus disease (COVID-19) is a deadly disease which continues to affect many countries in the world. This is caused by the new coronavirus strain SARS-CoV-2 which has become a serious public health concern worldwide[1]. The World Health Organization (WHO) declared the COVID-19 outbreak as a pandemic on 11 March 2020 [2]. At the time of writing, this pandemic has affected 223 countries, with over 104.37 million confirmed cases and 22.71 million deaths recorded globally [3]. The incidence is higher in the Americas (46313540 cases and 1072244 deaths) and Europe (35003091 cases and 767235 deaths) than in Southeast Asia (12982540 cases and 199668 deaths), Africa (2616892 cases and 64473 deaths) and the Western Pacific (1466248 cases and 25526 deaths) [3]. Since then, the numbers of new cases have been rising rapidly in the country. As of 6 February 2021, the country has recorded 537465 positive cases of COVID-19 and 8182 deaths domestically [6].

Vaccines are the most important public health measure and most effective strategy to protect the population from COVID-19, since SARS-CoV-2 is highly contagious virus and affects populations widely and globally. The competition for COVID-19 vaccine invention and development against the spread and catastrophic effects of the disease is ongoing [7,8], and new, more effective vaccines are likely to be developed as we move through the pandemic. With the distribution of vaccines underway, it is very important to examine community acceptance of COVID-19 vaccinations [9].

A safe and effective vaccine for the Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has been on the wish list of healthcare agencies across the globe.1 The process of vaccine development is a slow and time consuming process, and has to go through multiple checks for potency, efficacy and safety, particularly in high-risk individuals viz., elderly, pregnant women, and people with co-morbidities, and immunodeficiencies.[2]

In addition, the acceptability of the newly launched vaccine is yet another parameter to be considered, since vaccine coverage rate among the population is essential for a successful immunization program. The launch of the COVID-19 vaccine has been an accelerated program, with the vaccine going to market merely nine months after discovering of the virus. While there is some early data to suggest safety and efficacy of the approved vaccines, long term efficacy and any long-term side effects are largely unknown.

Understandably, the acceptance of the new vaccine remains uncertain by both, healthcare experts and the public at large. In addition, a strong anti-vaccine movement, with multiple pseudo-scientific conspiracy theories have flooded the media reports. It is for these reasons that vaccine hesitancy may become an important challenge in the immunization campaign against COVID-19.[3]

Vaccination against COVID-19 is voluntary in most countries, and it is therefore important to understand the current views of local populations before the vaccination program is rolled out.

In India, at the time of submission of this article, three vaccines has received regulatory approval, Covidshied, Covaxin and Sputnik V.

The knowledge and perspective regarding COVID-19 vaccine has not much studied and it is anticipated that there will be great variation in vaccine related perspectives and attitudes across Tamilnadu as well, depending on demographic factors, education levels and overall knowledge regarding COVID-19 and the vaccines available.

In this study, we analyse the various socio demographic and economic variables, as well as the beliefs and barriers that may prove to be hurdles during the immunisation program.

Indian authorities agreed to use the Covidshield & Covaxinevaccine, but there is a great controversy about COVID-19 vaccinations among the general population of Tamilnadu, India. A proportion of the Tamilan population are hesitating to take the vaccine from India lest they should be infected. A global survey of potential COVID-19 vaccine acceptance shows that 48% of their study population were confused about the COVID-19 vaccinations and remained unsure about whether they would have the vaccination [10]. Similarly, a Chinese study found that only just over half of their participants (54%) said that they intended to have the vaccination [11]. These relatively low proportions of people willing to have the vaccine are potentially worrying, since although the most effective measure of controlling the spread of the virus is to protect oneself from being exposed to COVID-19, it is also necessary to vaccinate the vulnerable group of people as soon as possible [12].

In order implement the most effective vaccination strategy in Tamilnadu, we need to know the knowledge, attitudes and perceptions of tamil people about COVID-19 vaccinations. In such a scenario, people's knowledge, attitudes and perceptions towards COVID-19 are crucial for Government and policymakers to address all barriers to vaccine distribution. To date, there has been no prior study among the general population of Tamilnadu investigating their knowledge, attitudes and perceptions towards COVID-19 vaccine.

Aims and Objectives of the Study

Aim of the Study:

Several vaccines have been approved against coronavirus disease (COVID-19) and distributed globally in different regions. However, general community knowledge, attitudes and perceptions towards COVID-19 vaccinations are poorly understood. Thus, the study aimed to investigate community knowledge, attitudes and perceptions towards COVID-19 vaccinations in Tamilnadu.

Methodology

Participants and procedure

An exploratory and anonymous population-based e-survey was conducted among individuals aged above 18 years. The survey was conducted for six months from February 2021 to July 2021, coinciding with the implementation of COVID-19 vaccination programs in other parts of the world. Thus, rather than being a hypothetical study of knowledge, attitudes and perceptions, our study aimed to capture real-world evidence to inform policymakers and practitioners in Tamilnadu in terms of how best to implement our vaccination program. A semi-structured questionnaire is designed and incorporated into the Google survey tool (Google Forms) and a shareable link will be generated and disseminated publicly on various social media outlets (e.g., Facebook, WhatsApp, etc.). Likewise, the link will be also shared personally to the contact lists of the investigators and co-investigators. For data collection, the investigators used online approaches (as opposed to face-to-face data collection) because of maintaining spatial distancing and proper precaution during the pandemic. Initially, respondents provide informed consent via e-survey. The inclusion criteria of participants were ⅰ) being a Tamilnadu resident, ⅱ) being adults (≥18 years old), ⅲ) having good internet access, and ⅳ) having voluntary participation. The exclusion criteria included being under 18 years old and incomplete surveys.

A semi-structured and self-reported questionnaire containing informed consent along with six sections (i.e., socio-demographics, Fear of COVID-19, COVID-19 related experiences and perceptions, Knowledge, attitudes and perceptions towards COVID-19 vaccinations and Vaccine related preferences) will be utilized during data collection.

Socio-demographic information

Some questions related to socio-demographics were asked during the survey including age, sex, Religion, marital status, Type of Family, Place of living, District Currently Living, Your educational qualification, Employment Status, Monthly family income. In addition, another "yes/no" question was asked about their previous history of taking all the recommended vaccines (i.e., *Have you received all the necessary vaccines in your lifetime?*).

COVID-19 related experiences and perceptions:

Six questions related to COVID-19 related experiences and perceptions were asked during the survey including Did you have COVID-19 in the past, Did anyone in family COVID-19 infected in the past, Did anyone in family died due to COVID-19, How likely do you feel that you can get COVID-19 anytime , How likely do you feel you can get COVID-19 reinfection, How likely do you feel that you may die from COVID-19.

Knowledge, attitudes, and perceptions

To assess the level of knowledge, attitudes, and perceptions of the respondents, a total of 17 items structured questions (including 5-items for knowledge, 6-items for attitudes and 6-items for perceptions). All questions were based on validated questions in previous literature [13–16].

The knowledge section comprised 5-items with three possible responses (i.e., "Yes", "No" and "Don't know") (e.g., Do you know about the COVID-19 vaccine?) The 'yes' response was coded as 1, while the 'No/ Don't know' responses were conducted as 0. The total score was obtained by summating the raw scores of five items and ranged from 0-5, with the higher score indicating the greater level of knowledge towards COVID-19 vaccinations. The Cronbach alpha of knowledge items was 0.68. In addition, an additional question was asked about the source of their knowledge about COVID-19 vaccines (i.e., How you came to know about COVID-19 vaccines first?) with some possible answers (e.g., mass media [radio/television], newspaper, internet, social media [Facebook, Twitter], family and relatives, friends and neighbors). The answers to this question are useful for policy makers in terms of disseminating COVID-19 vaccination information in the future in Tamilnadu.

The attitude section consisted of 6-items (e.g. The newly discovered COVID-19 vaccine is safe.; I will take the COVID-19 vaccine without any hesitation, if it is available in Tamilnadu), and the response of each item was indicated on a three-point Likert scale (i.e., 0 = Disagree, 1 = Undecided, and 2 = Agree). The total score was calculated by summating the raw scores of the six items ranging from 0 to 12, with an overall greater score indicating more positive attitudes towards COVID-19 vaccine. The Cronbach alpha of attitudes items was 0.77.

The perceptions section included 6-items regarding participant's perceptions towards the COVID-19 vaccine, including 4 items as "yes/no" questions (e.g., Do you think the vaccine should be administered free of charge in Tamilnadu?) and additional 2 items related to the application of COVID-19

vaccine (e.g., Which population groups should be prioritized for vaccinations?).

Vaccine related preferences

Some questions related to Vaccine related preferences will be asked during the survey including Preferred route, Preferred dose, Minimum acceptable effectiveness, Preferred covid 19 vaccine, Least tolerable side effect for you, Acceptable adverse reaction, Preferred price for COVID vaccine, Preferred place where you like to get it, If required, will you take the vaccine every year, Have you taken yearly flu vaccine, Is your child immunized, Would you volunteer for Human Challenge study, Who should get the vaccine first,

Statistical analysis

The data analysis will be performed using Microsoft Excel 2019 and SPSS version 25.0 (Chicago, IL, USA). Microsoft Excel will be used for data cleaning, editing, sorting, and coding. The excel file will be then imported into SPSS software. Descriptive statistics (i.e., frequencies, percentages, means, standard deviations) and first-order analysis (i.e., chi-square tests, Fisher's exact test) will be performed. Likewise, t-tests or one-way ANOVA tests will be performed to determine significant relations of the mean knowledge and attitudes scores with socio-demographic information. Finally, factors that significantly differed in terms of knowledge and attitudes scores, will be included into multivariate linear regression analysis with knowledge and attitudes, respectively as the dependent variables. All statistical tests will be con-

sidered significant at 95% confidence interval with a p-value less than .05.

All subjects would be recruited from the study following obtaining an informed consent. all consenting formalities would be completed using digital platform only.

Result

A total e-survey was conducted among 440 general individuals (44.79% male, 55.21% Female; mean age 31.33+12.34 years; age range =18-62 years) of different districts in Tamilnadu. Male mean age was 31.51+11.67 and female mean age was 31.12+13.27 years. More than half the respondents 48.18% (212) were married and most 66.67% had attained postsecondary education.

Among the study population 68.63% (302 out of 440) said they are willing to take the vaccine while 21.59% (95 out of 440) said they were not willing to take the vaccine and remaining 9.77% (43 out of 440) had not yet decided about it. Similar results got for encouraging family/friends/relatives to get vaccinated. This acceptability rates in our study are higher in comparison to previous research from other developing as well as developed countries. [14-16] 59.54% of participants feel COVID-19 vaccine may have side effects and 40.54% doesn't think so. 63.63% participants were willing to pay for their vaccine. Overall, 59.54% participants agreed, 27.95% participants disagreed and 12.5% participants undecided with "It is not possible to reduce the incidence of COVID-19 without vaccination.
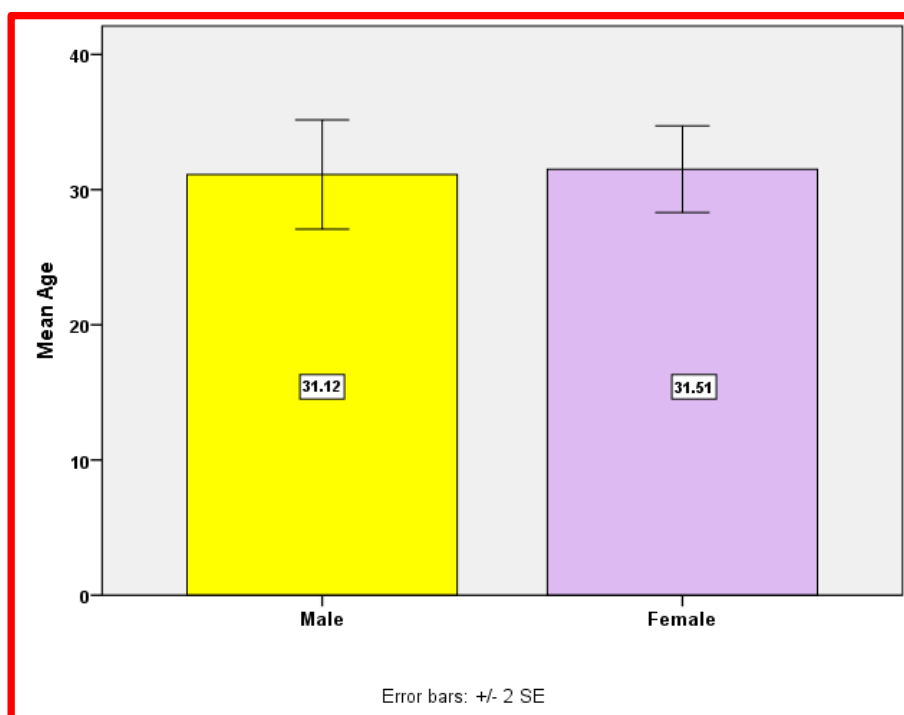

Figure 1: simple bar with 2 standard error bar diagram compares the gender-wise age distribution of participants.

Table 1:

COVID-19 Infection related experiences		Number of respondents(n=440)	%
Have you received any vaccines previously in your lifetime?	Yes	373	84.77%
	No	67	15.22%
Did you have COVID-19 in the past	Yes	68	15.45%
	No	372	84.54%
How likely do you feel Person can get COVID-19 reinfection	Strong feeling	76	17.27%
	Moderately feeling	113	25.68%
	Some time	86	19.54%
	Not at all	165	37.50%
Did anyone in family COVID-19 infected in the past	More than one person	56	12.72%
	None	321	72.95%
	One person	63	14.31%
Did anyone in family died due to COVID-19	No	46	10.45%
	No COVID in family	372	84.54.71%
	Yes	22	5.00%

Table 2:

Knowledge towards COVID-19 vaccinations		%
Do you know about the COVID-19 vaccine?	No	15.63%
	Yes	84.38%
Do you know about the effectiveness of COVID-19 vaccine?	No	31.25%
	Yes	68.75%
is vaccine increase specific immunity?	No	27.08%
	Yes	72.92%
is allergic people can get vaccine?	No	85.42%
	Yes	14.58%
is already infected with covid-19 can get vaccine?	No	44.79%
	Yes	55.21%

Table 3: Level of Knowledge Score

Level of score	%
Inadequate	28.13%
Moderate	64.58%
Adequate	7.29%
Total	100.00%

In general, 28.13% of them are having inadequate level of knowledge score, 64.58% of them having moderate level of knowledge score and 7.29% of them are having adequate level of knowledge score.

Table 4: Level of Attitude Score

Level of score	%
Disagree	22.92%
Undecided	21.88%
Agree	55.20%
Total	100.00%

In general, 22.92% of them are having Disagree level of attitude score, 21.88% of them having undecided level of attitude score and 55.20% of them are having agree level of attitude score.

**Table 5: Level of Perceptions Towards Covid-19 Vaccinations Score**

Level of score	%
Poor	35.41%
Moderate	39.59%
Good	25.00%
Total	100.00%

In general, 35.41% of them are having poor level of perception score, 39.59% of them having moderate level of perception score and 25.00% of them are having good level of perception score.

Table 6: Generalization of Knowledge, Attitude and Practice Score

	Max score	Mean score	% of Knowledge score	Mean Difference of Knowledge gain score with 95% Confidence interval	Percentage of Knowledge gain score with 95% Confidence interval
knowledge	5	2.96	59.20%	2.96(2.68– 3.23)	59.20% (53.60% – 64.60%)
Attitude	12	7.58	63.17%	7.58(6.68– 8.48)	63.17% (55.67%-70.67%)
Perception	3	1.84	61.33%	1.84(1.67– 2.02)	61.33% (55.67%-67.33%)

Respondent are having COVID-19 knowledge score is 59.20%, COVID-19 attitude score is 63.17%, COVID-19 perception score is 61.33%, it was calculated using and mean difference with 95% CI and proportion with 95% CI.
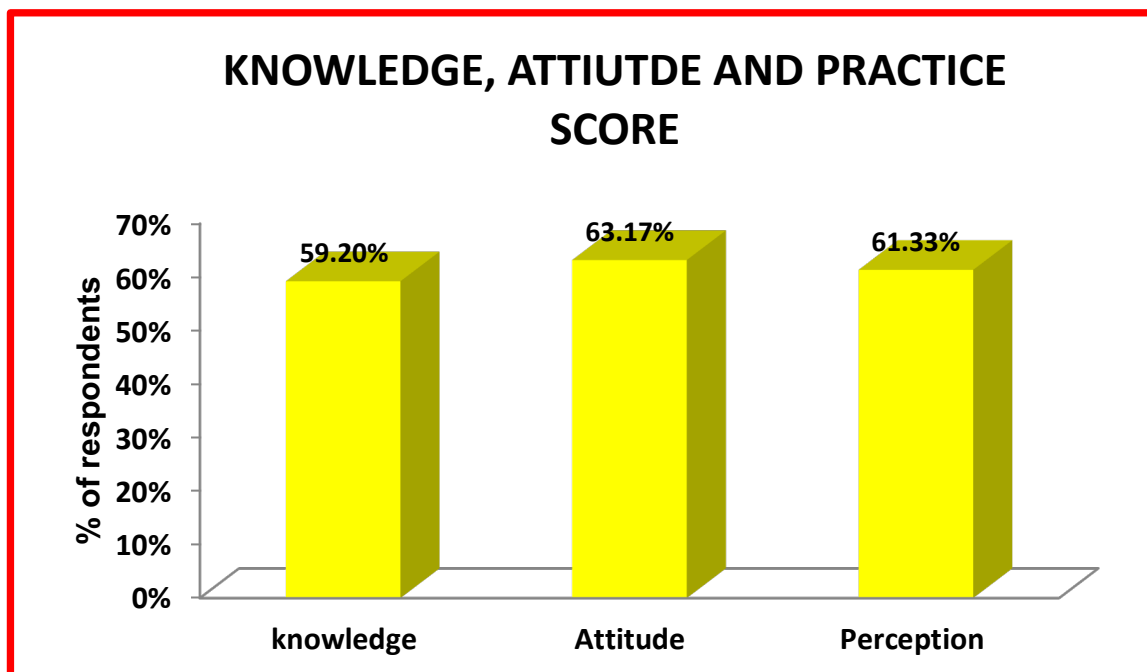
Figure 2: Respondent knowledge, attitude and practice score

Table 7:

Correlation between	Mean score Mean±SD	Karl pearson Correlation coefficients	Interpretation
Knowledge score Vs Attitude score	2.95±1.34 7.58±4.44	r= 0.49 P=0.001***	There is a significant positive moderate correlation between knowledge score and attitude score. It means knowledge increases their attitude score also increases moderately
Knowledge score Vs Perceptions score	2.95±1.34 1.84±0.86	r= 0.52P=0.001***	There is a significant positive moderate correlation between knowledge gain score and Perceptions score. It means knowledge increases their Perceptions score also increases substantially
Attitude score Vs Perceptions score	7.58±4.44 1.84±0.86	r= 0.42 P=0.001***	There is a significant positive moderate correlation between attitude score and Perceptions score. It means attitude increases their Perceptions score also increases moderately

Regarding vaccine acceptance and efficacy, 176 (40%) reported their willingness to take the vaccine with an efficacy of more than 90%, 234 (53.18%) with an efficacy of 60-90%, and only 30 (6.8%) with an efficacy of below 60%.

21-40 years respondents, male respondents, unmarried, respondents, students, upper middle class re-

spondent are having more knowledge score than others. Female respondents, urban area respondent and upper middle class respondent are having more attitude score than others.21-40 years respondents, female respondents and upper middle class respondent are having more perception score than others

Oneway ANOVA F-test/t-test analysis, only marital status, geographical region, whether currently infected with COVID-19, having a family member infected with COVID-19, and having family members or friends who died due to COVID-19 were statistically associated with acceptance of a vaccine with an efficacy of 70% or more; $p < 0.05$.
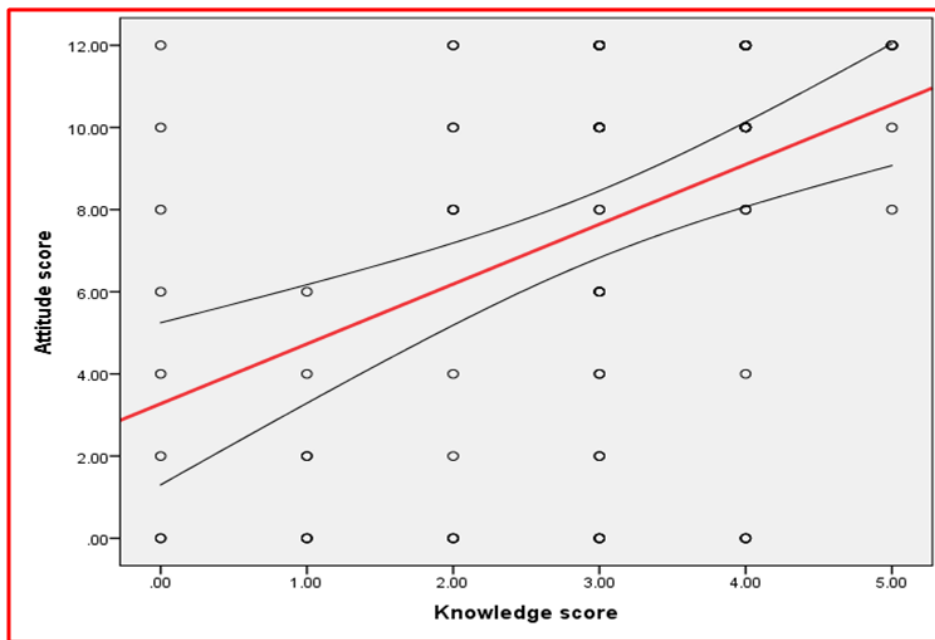

Figure 3: Scatter diagram with regression estimate shows the moderate positive correlation(r=0.49 P≤0.001) coefficient between knowledge score and attitude score
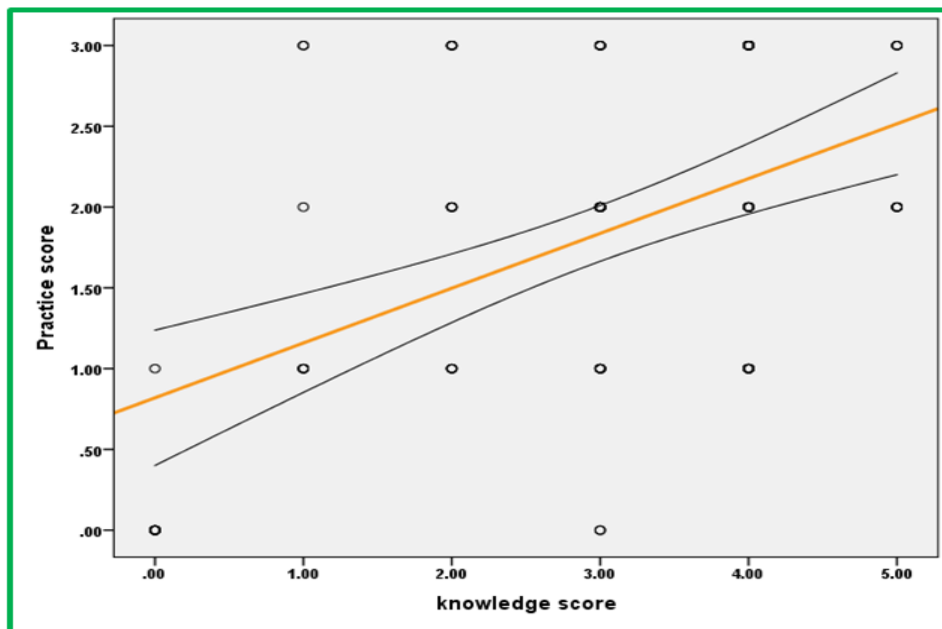

Figure 4: Scatter diagram with regression estimate shows the moderate positive correlation(r=0.52 P≤0.001) coefficient between knowledge score and practice score
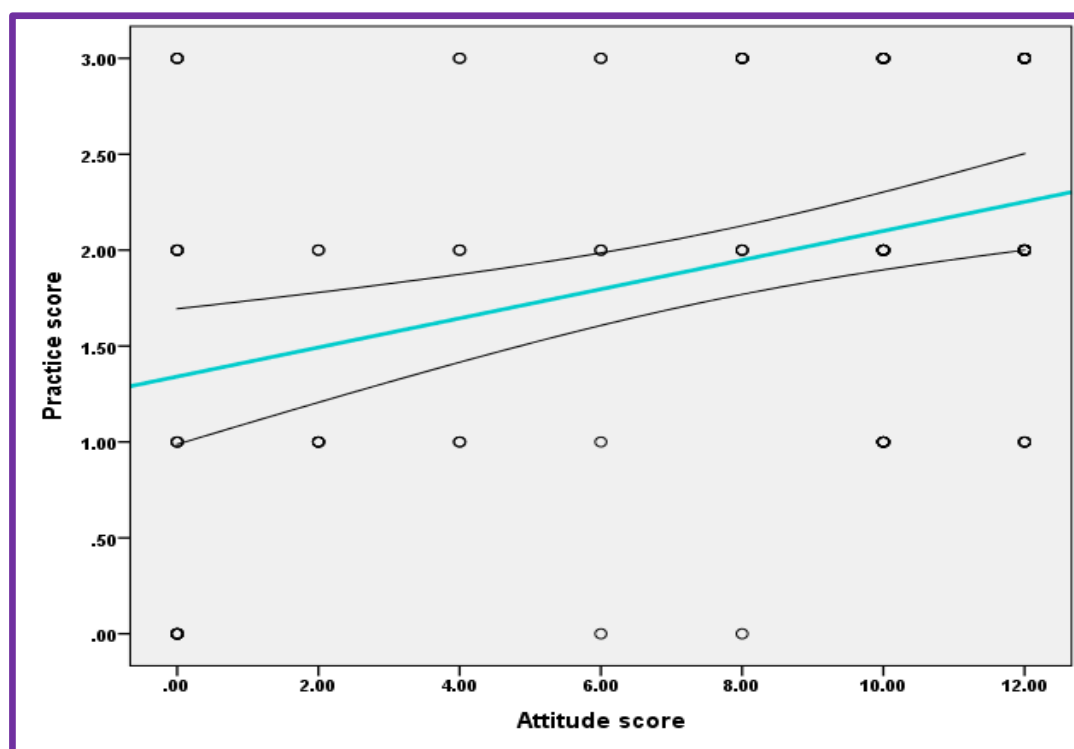
Figure 5: Scatter diagram with regression estimate shows the moderate positive correlation(r=0.42 P≤0.001) coefficient between attitude score and practice score

Discussion

Availability and efficacy of the COVID-19 vaccine are vital to successfully control the pandemic. It was observed that overall participants were quite aware about the COVID- 19 vaccine and likely to get a vaccine if it were available. About 15% of respondent had COVID-19 in their family, with mortality rate of 5%.In regards to factors effecting vaccine acceptance, it was observed the future COVID-19 vaccine acceptance was relatively higher among younger age group (83.11%) among 30 or lower), females (56.62%), currently not married (54.30%), Urban(61.25%), students (46.68%) and participants with degree & above education level (72.84%),income more than Rs 26,355(55.62%), having a family member infected with COVID-19 (62.84%) was positively associated with the likelihood of vaccine acceptance, while having a family member who died due to COVID-19 was associated with it (77.27%). about a third (70.86%) responded that they would purchase the vaccine at their own expense Preferred route is intramuscular injection (85.43%). People prefer Covidshield vaccine (50.33%) and covaxine vaccine (34.43%) compared to other.

The higher acceptability in the study reflects good public confidence in COVID-19 vaccine. First, the overall immunization coverage and vaccine acceptability in Indian is higher due efforts of the government of India in collaboration with UNICEF and GAVI in providing free as well as universal vaccination. While good acceptance rate in our study is depicts the positive attitudes towards a vaccine in India, we should also pay attention to portion who have not yet decided. These are the potential candidates for intervention for increasing vaccination acceptance among community.

Conclusion

Our study demonstrated the knowledge, attitudes, and perception and acceptance pertaining to the COVID-19 vaccine in the Tamilnadu population during the ongoing pandemic. According to the results, Tamilnadu People having an adequate degree of knowledge, attitudes about vaccine. Vaccine misinformation will have to be tackled. Addressing the public concerns, raising awareness about COVID-19 vaccination as a disease-control method, addressing conspiracy theories, reducing hesitation toward vaccination, and increasing efforts toward to provide vaccines, to prevent further deterioration of general public health due to COVID-19 is imperative.

Limitations

Only a sub sample of the population could be included in the study. Large scale studies from whole of Tamilnadu and India are needed to understand the knowledge, expectation and apprehension before the launch of the vaccine. Another limitation of the study was that it did not have equal representative from various economic and occupationa strata of society which could bias the result.

Author's contribution

Dr. Dheepa. N- conceptualization, data curation, investigation, methodology, project administration, visualization, writing—original draft, writing—review and editing; A.V. Mathivadhana-conceptualization, methodology, writing—original draft, writing—review and editing; Dr. Bagavathi-ammal Periyasamy and Dr. Sasikala Gunasekaran-conceptualization, visualization, supervision, writing—original draft; Dr. K.C. Subhaand Panneerselvam Periasamy - methodology, writing—original draft, writing, review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript.

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