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Research Paper

Vaccine Hesitancy For Covid-19 Vaccine Among Teenagers

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Abstract
The COVID-19 pandemic posed a serious threat to the health care system all over the World. There was atmosphere of fear and panic. No existing drugs and medicines were working to cure it. Developing a new vaccine seemed to be the only solution. In its usual course vaccines are developed after lots of research and multiple trials and hence a number of years are required before it is developed. But the situation due to COVID-19 was very grim so the whole process was put on a fast track. And within few months many Pharma companies were ready with their versions of vaccine. Though it came as a relief for the World but the fast track process created doubts in the minds about safety and efficacy of the vaccine. As a result many people showed hesitancy to take vaccine. This hesitancy actually became another challenge to be overcome to create herd immunity through vaccine. Feeling its importance researchers aimed to study vaccine hesitancy towards COVID-19 vaccine among the teenager population of tricity of Chandigarh, India. They also aimed to study the difference in hesitancy for getting vaccinated during COVID-19 between girls and boys, and those residing in rural and urban areas of Tricity of Chandigarh. A representative sample of 157 teenager girls and boys was taken. Questionnaire on vaccine hesitancy was constructed by investigators to study vaccine hesitancy. Percentage responses were calculated and t-test was employed to study the difference in responses between girls and boys and teenagers of rural and urban areas. The results highlighted that though 47% did not perceive various risks of taking vaccine, slightly more than one fourth of the teenagers were hesitant in taking COVID-19 vaccine due to perceived risks. Lack of proper awareness about the COVID-19 vaccine hampered intentions of around 1/3rd of the teenagers to take the said vaccine. About 50% of the teenagers were aware about the efficacy of the vaccine and were not hesitant in taking the vaccine. Psychological and emotional factors also prevented around 1/5th of the teenagers from taking the vaccine. Some general factors like lack of time to get vaccinated, mistrust in the healthcare or loss of studies due to vaccination also prevented around 18% of the participants from taking the vaccine. Also boys showed more hesitancy for getting COVID-19 vaccine than girls. Teenagers residing in rural areas showed more hesitancy for getting COVID-19 vaccine than those residing in urban areas.

Key words: *COVID-19, vaccine hesitancy, perceived risk, awareness, psychological and emotional factors, general factors, teenagers*

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I. Introduction

The COVID-19 pandemic proved to be a challenging phase globally. With the number of sick people increasing daily in ten folds, healthcare systems around the world strained while trying to contain the pandemic's fury. The only ray of hope was rapid development of vaccine to fight the Corona virus. In a usual course vaccines are developed after lots of research and multiple trials. So it takes long time before it is available for actual use.

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 immune deficiencies (World Health Organization, 2020).

But COVID presented a unique emergency where time was too short. Researchers all over the world came together and developed multiple vaccines in record time.

The immunization program started in different countries subjected to the availability of the vaccine. In India vaccine was first given to the health care workers and people above 60 then to 45+. Finally it started for teenagers (15 to 18 years).

It is seen in the past also that success of any immunization program depends not only on availability of the vaccine but also on how it is accepted by the people who are going to receive it. If the recipients are hesitant in taking the vaccine the immunization program is bound to be hit.

Under immunisation is a public health concern because it can reduce population protection, also referred to as *herd immunity*, towards certain potentially dangerous infectious agents and increases the risk of disease outbreaks (Dem., Jafflin, Merten, et al., 2019). Herd immunity is form of indirect protection of individuals who do not have specific immunity against a virus or bacteria as a result of immunization of a large percentage of population who developed immunity in the case of an infectious disease (Luca, Azoicăi, Alexa, Vata, Natalia, Pascariu, Onofrei, 2020).

Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services (MacDonald, 2015, Soares, Rocha, Moniz et al., 2021). The concepts of indecision, uncertainty, delay, and reluctance vary across place, time, and vaccines and are considered by WHO as a major threat in the world which needs a continuous monitoring (WHO, 2019).

Accepting vaccine is a decision making process. There can be many factors which contribute towards vaccine hesitancy ranging from socio-cultural to trust in the vaccine as well as health care providers (Soares, Rocha, Moniz et al., 2021). Hesitancy about vaccination is one of the reasons that lead to low immunization coverage rate.

In case of COVID vaccination initially people were largely hesitant to take the vaccine. Various researches have shown that many factors may have contributed towards it.

Perceived risks of taking the vaccine such as its efficacy or side effects, the fear of getting COVID even after getting vaccinated, perceived ineffectiveness of vaccine in protecting against future variants are some of the factors.

Role of social media cannot be undermined in contributing to hesitancy by fake news or stories. Younger generation has more effect of social media on their thought process and choices.

Apart from these psychological and emotional factors, certain religious beliefs or financial issues can also prove to be the determinants of vaccine hesitancy.

Though vaccine hesitancy is being studied widely throughout the globe but not many studies are found related to vaccine hesitancy specifically among teenagers. One may anticipate that there can be variation in vaccine related perspective and attitude among teenagers from that of older generation. Since the process of eradication of COVID depends upon higher coverage rate of immunisation so the researchers found it useful to study and understand the various factors which can lead to vaccine hesitancy in teenagers.

II. Review Of Literature

Danabal et al.(2021) analyzed the attitude of COVID-19 vaccines and vaccine hesitancy in urban and rural communities in Tamil Nadu, India. 564 participants, who were not vaccinated, were picked through random sampling. All of the participants were 18 and above and people who had COVID were removed from the study. 70% of the participants were below 45 years of age and 63% were women. 13% of the participants had no schooling and 66% had completed some level of schooling. The remaining 21% had studied beyond high school. 25% of workers were labourers and 30% were skilled workers. The participants were clubbed into 4 clusters based on the attitudes they had towards vaccination. These clusters were 'Preference of natural immunity over vaccine and low concern about adverse effects', 'High trust in vaccines', 'Concern about adverse effects of vaccine but low mistrusting vaccines' and 'High trust in vaccine and low preference for natural immunity'. The study concluded the older individuals with higher education levels were likely to belong in the last cluster, while younger individuals, women, rural workers and laborers were distrusting of the vaccine. Prevalence of vaccine hesitancy was about to be 40% and refusal towards vaccine is 19.5-20%.

İkiışık, Akif Sezerol, Taşçı & Maral (2021) conducted a study in Istanbul (Turkey) between 25 to 30 December, 2020 for a sample of 384 people in the age group of 20 to 85 years. The results showed that 45.3% were hesitant to take COVID-19 vaccine. 89.6% were hesitant about getting their children vaccinated .Though 51.6% thought that vaccine will be effective in controlling the disease. 32.8% thought that they would be protected by natural and traditional way.

Jain et al. (2021) conducted cross sectional survey among college students in India to assess their intentions to get vaccinated. The sample included both students from health care and non health care sectors. Total 655 students across the country participated in the study. The result showed that about 63.8% showed their willingness to get vaccinated but 1/3rd was either unsure or not willing to get vaccinated. Non health care students showed more acceptance than health care students.

King, Rubinstein, Reinhart, & Mejia (2021) conducted a massive survey of US adults from January to May 2021 involving 5088772 adults. The results showed that hesitancy decreased from 25.4% in January to 16.6% in May. Also, difference in hesitancy by race (black/white) and age were found.

Umakanthan and Lawrence (2021) investigated factors determining COVID 19 vaccine hesitancy in German adults during lockdown (21Feb, 2021 -April 3, 2021). A survey questionnaire was used to assess the hesitancy towards COVID vaccine and adherence to prevention measures. The data was collected from 2029 adult participants out of whom 75.3% were women. The results showed that only 57.5% were willing to take the vaccine, 12.1% were not willing and 30.4% were still undecided. Women were less willing to take the vaccine than men but they were more interested in taking preventive measures than men. Also higher education level and higher life satisfaction predicted higher willingness to take the vaccine.

Beusekom (2022) found that high school education is a major factor in predicting vaccine hesitancy. The study, undertaken by a team of scientists of the University of North Carolina, included analyzing county level databases on COVID-19 vaccination rate and hesitancy and determined population characteristics based on those in the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index. As of May 2021, the average COVID 19 Vaccination rate was 34.7% while 8% were against the vaccination. Lack of high school education was a major predictor for vaccine hesitancy. Some of the common features among the vaccine hesitant people were: people belong to a racial minority, age older than 65 years, households with children younger than 18 years, and unemployment. Vaccine access was not cited as a reason for hesitancy. Majority of the people showed lack of trust in vaccine, side effects and low trust in government. Five of the 10 most common reasons given for vaccine hesitancy were related to a lack of knowledge about potential side effects, benefits, effectiveness, and risks of being unvaccinated. The results also indicated that lack of education, gaps in knowledge about vaccine and poor infrastructure acted as hesitancy towards COVID-19 vaccine.

Duong, Nguyen, & Duong (2022) formulated a qualitative study about COVID -19 vaccine hesitancy and associated determinants in Vietnam when the 4th COVID wave was prevalent there and vaccine had been rolled out on a priority basis. Two focused groups of 20 participants were formed. Among the 20 participants, the median age was 39 years old (21–66 years old), 13 were females, seven were health professionals, four had chronic conditions, and three were vaccinated. The various factors taken into consideration were internal factors like acceptance, hesitancy, anti vaccine and external factors like vaccine cost, number of injections, etc. The results of this study showed mixed attitudes towards vaccination. Self risk benefit analysis of vaccination found to be the major reason for the mixed results.

Delimitation

The study was delimited to teenagers- girls and boys of Tricity of Chandigarh.

Objectives

The objectives of the present study are:

1. To study the hesitancy for getting vaccinated during COVID-19 by teenagers, in the age group of 15-18 years, of Tricity of Chandigarh.
2. To study the difference in hesitancy for getting vaccinated during COVID-19 between teenager girls and boys, in the age group of 15-18 years, of Tricity of Chandigarh.
3. To study the difference in hesitancy for getting vaccinated during COVID-19 between rural and urban teenagers, in the age group of 15-18 years, of Tricity of Chandigarh.

Hypotheses

1. There is no significant difference in hesitancy for getting vaccinated during COVID-19 between teenager girls and boys, in the age group of 15-18 years, of Tricity of Chandigarh.
2. There is no significant difference in hesitancy for getting vaccinated during COVID-19 between Rural and urban teenagers, in the age group of 15-18 years, of Tricity of Chandigarh.

Population

The population of the study were all the teenager girls and boys in the age group of 15-18 years, residing in the Tricity of Chandigarh.

Sample

A representative sample of 157 teenager girls and boys was drawn out from the said population residing in rural and urban areas of tricity of Chandigarh.

Tools used

Questionnaire on Vaccine hesitancy was constructed by investigators and was used to collect data. Vaccine hesitancy questionnaire constituted of four areas, viz., perceived risk due to vaccine, awareness about vaccine and its efficacy, psychological and emotional factors and general factors related to vaccine. Each area was explained through number of statements which respondents were required to respond on the Likert scale.

Procedure

Questionnaire related to vaccine hesitancy was constructed by the investigators. Google form was prepared. The link was mailed to teenagers residing in rural and urban areas of Chandigarh tri-city. The data was collected and was tabulated in the excel sheet and subjected to descriptive and inferential statistics. The difference in the mean scores between girls and boys and teenagers residing in rural and urban areas and t-ratios were calculated for vaccine hesitancy using SPSS software. Thereafter results were interpreted and conclusions are drawn out.

Statistical tools used

Descriptive statistics, such as mean, standard deviation, percentage responses, and inferential statistics such as t-ratios were employed to analyze the data.

Analysis of the data

The questionnaire was administered to teenage girls and boys in the age group of 15-18 years, residing in the Tricity of Chandigarh. To study why the teenagers were hesitant towards taking COVID-19 vaccine, their opinion related to vaccine hesitancy was taken in terms of perceived risks of taking the COVID-19 vaccine, awareness regarding the efficacy of COVID-19 vaccine, psychological and emotional factors of the teenagers which prevent them from taking the vaccine and other general factors.

Perceived risk:

Table 1: Vaccine hesitancy due to the perceived risk of taking COVID-19 vaccine

S.No.	Statements	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagreed (%)
1	I fear that the vaccine could have many side effects	11.5	14.7	23.7	22.4	27.6
2	I fear I can get COVID even after getting vaccinated.	28	20.4	24.2	14.6	12.7
3	I feel that the current vaccines will not work against the future variants.	16	21.2	34.6	13.5	14.7
4	Rumors about negative effects of vaccines have reduced my confidence in the vaccine.	7.6	13.4	27.4	18.5	33.1
5	I believe that getting vaccinated later will help me deal with the side effects better.	16.1	13.5	22.6	20.6	27.1
6	I fear that my body would not be able to deal with the immediate side effects (fever, nausea etc).	10.8	8.9	22.3	24.8	33.1
7	The risks of side effects are more than the benefit of the vaccine.	10.2	7.6	14	26.1	42
8	I might have some unforeseen side effects of the vaccine in future.	11	14.2	30.3	20	24.5
	Average	13.9	14.2	24.9	20.1	26.8

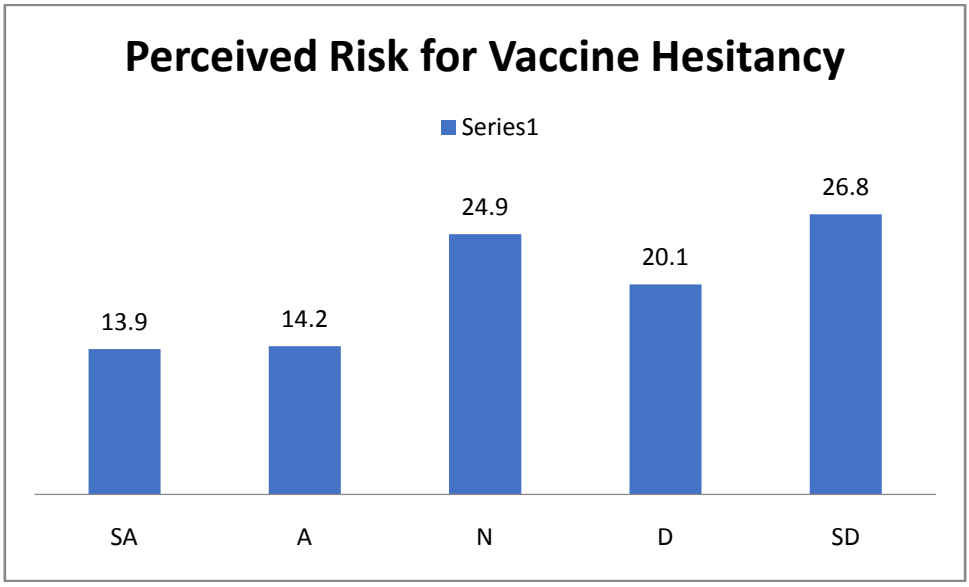

Figure1: Vaccine hesitancy due to the perceived risk of taking COVID-19 vaccine

28.1% (13.9+14.2) of the teenagers perceived risk of taking COVID-19 vaccine and were hesitant of taking COVID-19 vaccine whereas 46.9% (26.8+20.1) did not perceived any risk of taking vaccine. 24.9% were undecided.

Going in detail, it was found that 26.2% (14.7+11.5) teenagers fear about the side effects after taking the vaccine, whereas, 50% (27.6+22.4) of the teenagers felt the opposite. 23.7% were unsure. Out of all the participants, 28% strongly agreed that they could get COVID even after being vaccinated, while 20.4% agreed with some apprehension. On the other hand, 27.3% believed that they would not get COVID after being vaccinated and nearly 24.2% were unsure about it. 16% of the teenagers strongly agreed that the current vaccines would not work against the future variants. 21.2% of the participants supported this argument with some doubt. 34.6% of the people did not have a certain opinion on this statement, while almost 28.3% of the teenagers surveyed disagreed with this statement. 7.6% of the teenagers, based on the rumours they've heard, strongly agree to have no confidence in the vaccine. 13.4% of the total surveyed also showed distrust in the vaccine due to the rumours prevalent in the society. 27.4% of the participants are neutral on these rumours, whereas 51.6% (33.1+18.5) of the participants did not believe the rumours at all.

29.6%(16.1+13.5) of the participants agreed that getting vaccinated later could help them deal with the side effects better, whereas, 47.7% (27.1+20.6) of the teenagers believed that getting vaccinated would not help them in fighting the side effects later. The rest 22.6% showed neutral view and did not support a particular stand. 19.7%(10.8+8.9) of the participants had a belief that their bodies would not be able to deal with the immediate side effects of the vaccine but at the same time 57.9% of the participants thought that their body could bear them. 22.3% of the people had a neutral stance. 10.2% of the participants believed that taking the vaccine has greater risks than benefits, while 42% strongly disagree with this belief. Nearly 8% of the teenagers supported this statement with some apprehension, and 14% of the participants were neutral. 11% of the surveyed participants fear that they might develop some unforeseen side effects of the vaccine in the future. 14.2% participants supported this thought with some doubt, whilst 44.5% disagree with the given statement. Rest of the participants had neutral opinion.

Awareness:

Table 2: Vaccine hesitancy due to the awareness about taking COVID-19 vaccine

S.No.	Statements	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree(%)	Strongly disagreed (%)
1	I feel that there is insufficient information about efficacy of the vaccine.	20.6	20.6	27.1	18.7	12.9
2	I believe that I should wait for another vaccine which is more effective.	11.5	11.5	15.9	26.8	34.4
3	There is insufficient data regarding safety of the vaccine.	16.7	20.5	24.4	21.8	16.7
4	Vaccines cannot eradicate covid completely, so there is no point in	10.8	7.6	21	21.7	38.9

	taking the vaccine.					
5	It is better to develop immunity by getting sick rather than by getting a vaccine.	13.5	12.2	23.1	16	35.3
	Average	14.6	14.5	22.3	21	27.6

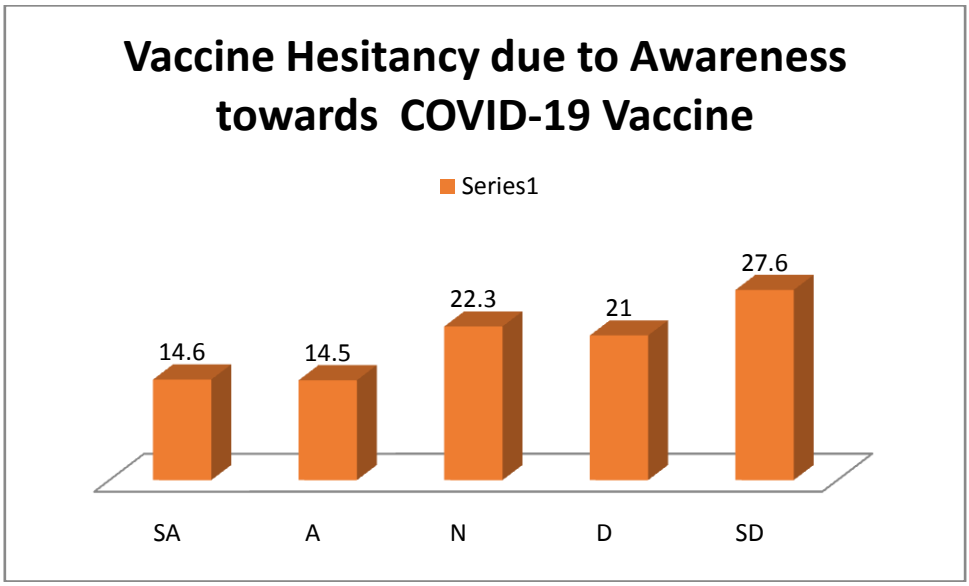

Figure 2: Vaccine hesitancy due to the awareness about taking COVID-19 vaccine

29.1% (14.6+14.5) showed hesitancy towards taking COVID-19 vaccine because of no proper awareness about the COVID-19 vaccine whereas 48.6% (27.6+21) showed awareness regarding vaccine and were not hesitant towards taking of vaccine.

Further analysing their opinions in detail, it has been found that 41.2% (20.6+20.6) of the teenagers felt that they do not have sufficient information about the efficacy of the vaccine and at the same time 31.6% felt that they do have all the relevant information regarding the vaccine's efficacy. 27.1% of the people did not have any certain belief. 23% (11.5+11.5) of the participants still wanted to wait for another vaccine which would be more effective and 61.2% (34.4+26.8) of the participants did not agree to wait for any other vaccine. The rest 15.9% had not made any particular decision. 37.2% (20.5+16.7) of the participants felt that there was insufficient data regarding the vaccine's safety. According to 38.5% (16.7+21.8) of the participants, the data available was sufficient while 24.4% of the participants had no specific opinion on the availability of the data. 10.8% of the people strongly agreed that vaccination could not eradicate COVID completely, and hence there was no point in taking the vaccine. 7.6% participants supported this statement with some apprehension. 21.7% of the participants disagreed with this thought, whilst 38.9% strongly opposed this completely. The rest had a neutral opinion. 25.7% (13.5+12.2) of the people believed that they were better off developing immunity by getting sick than by getting vaccinated and the 51.3% (35.3+16) of the people had the opposite beliefs. Nearly 23% of the people did not make any particular decision regarding the same.

Psychological and Emotional factors:

Table 3: Vaccine hesitancy due to the psychological and emotional factors **of the teenagers**

S.No.	**Statements**	**Strongly agree (%)**	**Agree (%)**	**Neutral (%)**	**Disagree (%)**	**Strongly disagreed (%)**
1	I feel scared from getting jabbed (injection).	11.5	8.3	14.6	22.3	43.3
2	I believe there is no urgency to get vaccinated.	11.5	8.3	19.7	18.5	42
3	I feel that my work/academics will suffer due to the side effects of vaccination.	11.5	11.5	19.9	23.1	34
	Average	11.5	9.4	18.1	21.3	39.7

20.9% (11.5+9.4) of the participants agreed that their psychological and emotional factors prevented them from taking COVID-19 vaccine, whereas, 61% (39.7+21.3) disagreed to have impacted by their psychological and emotional factors for taking COVID-19 vaccine. 18.1% were neutral towards this factor.

The detail analysis showed that 19.8% (11.5+8.3) of the participants were scared of getting jabbed. 65.6% (43.3+22.3) of the participants did not have a fear of getting jabbed. 14.6% of the participants had a neutral view. Almost 19.8% (11.5+8.3) of the participants did not feel the urgency to get vaccinated, whereas 60.5% (42+18.5) of the teenagers felt that it's an urgency to get vaccinated. 8.3% of the people had a neutral view. 23% (11.5+11.5) of the teenagers believed that their academics and work would suffer due to the side effects of vaccination but at the same time 57.1% (34+23.1) of the teenagers felt the opposite. 19.9% of the people did not have any particular stance.

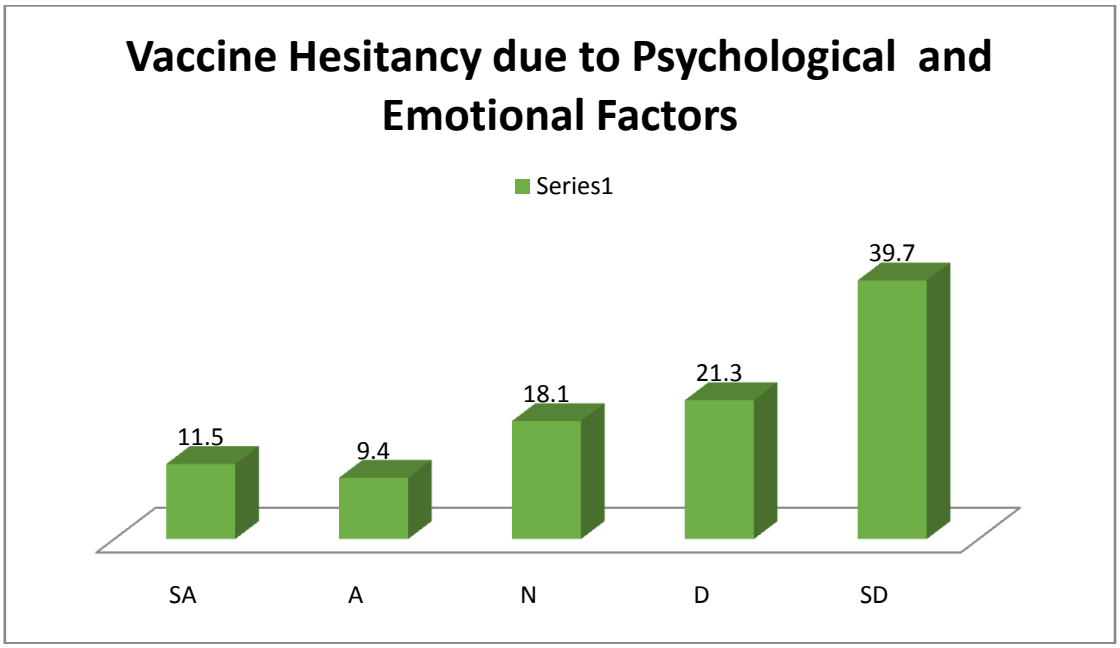

Figure 3: Vaccine hesitancy due to the psychological and emotional factors **of the teenagers**

General factors:

Table 4: Vaccine hesitancy due to General factors of the teenagers

S.No.	Statements	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagreed (%)
1	I believe that there is no use of taking the vaccine since I still have to follow COVID guidelines.	10.9	10.3	17.3	21.2	40.4
2	I don't have time to go for vaccinations because of my studies.	5.8	10.3	13.5	20.6	49.7
3	Getting vaccinated goes against my religious beliefs.	5.1	5.1	7.1	12.8	69.9
4	Vaccines are being promoted for commercial gains of pharmaceutical companies.	11	9.7	22.7	21.4	35.1
5	There are financial motives behind the vaccine and not the public health interest.	14.4	7.2	20.9	29.4	28.1
	Average	9.4	8.5	16.3	21.1	44.6

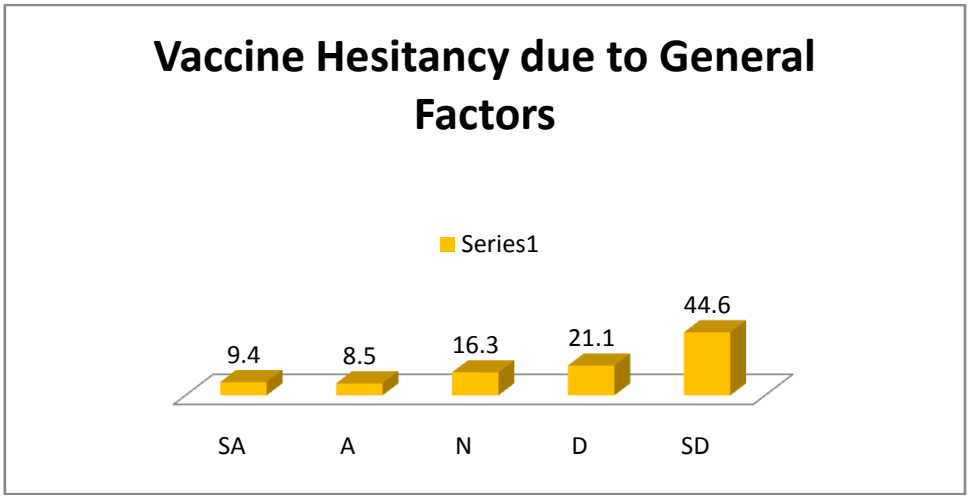

Figure 4: Vaccine hesitancy due to General factors of the teenagers

17.9% (9.4+8.5) agreed that some general factors prevented them from taking COVID-19 vaccination whereas 65.1% (44.6+21.1) of the teenagers disagreed to have impacted by the general factors. Only 16.3% of the participants were undecided.

21.2% (10.9+10.3) of the teenagers agreed that there is no use of taking the vaccine because they would still have to follow the COVID guidelines, at the same time, 61.6% (40.4+21.2) had the opposite feeling. 17.3% could not make any particular decision. Almost 16.1% (5.8+10.3) of the students say that they did not have time to go for vaccination because of their studies. 70.3% (49.7+20.6) of the participants disagreed with this statement. 5.1% of the participants strongly oppose vaccination as it goes against their religious beliefs, whilst another 5.1% supported this reason with some apprehension. 7.1% had a neutral opinion, while the rest disagree. 11% of the participants felt that vaccines are being promoted for commercial gains of the pharmaceutical companies. 22.7% had no strong opinions on this thought, while 56.5% did not support this statement. 21.6% of the people had a feeling that there are financial motives behind the vaccine and not the public health interest, whereas, 57.5% felt the exact opposite. 20.9% could not make any particular decision.

Table 5: Difference in mean scores for vaccine hesitancy and t- value between Girls and boys in the age group of 15-18 years

Gender	N	M	SD	SEm	Df	t-value	Level of significance
Girls	96	49.98	15.20	1.55	155	2.65	.01
Boys	61	56.77	16.22	2.08			

Table 5 shows that the mean values for scores of vaccine hesitancy between teenager girls (96) and boys (61) residing in Tricity of Chandigarh are, 49.98 and 56.77 respectively. t-value is 2.65 for 155 degrees of freedom which is significant at 0.01 levels of significance. Hence the null hypothesis, "There is no significant difference in hesitancy for getting vaccinated during COVID-19 between teenager girls and boys, in the age group of 15-18 years, of Tricity of Chandigarh", may not be accepted. Since the mean value for vaccine hesitancy for boys is more than that for girls hence boys showed more hesitancy for getting COVID-19 vaccine than girls.

Table 6: Difference in mean scores for vaccine hesitancy and t- value between in the age group of 15-18 years residing in rural and urban areas of Tricity of Chandigarh

Gender	N	M	SD	SEm	Df	t-value	Level of significance
Rural	38	59.26	13.52	2.19	155	3.035	.01
Urban	119	50.50	16.08	1.47			

Table 6 shows that the mean values for scores of vaccine hesitancy between teenagers residing in rural (38) and urban areas (119) of tricity of Chandigarh are, 59.26 and 50.50 respectively. t-value is 3.035 for 155 degrees of freedom which is significant at 0.01 levels of significance. Hence the null hypothesis, "There is no significant difference in hesitancy for getting vaccinated during COVID-19 between rural and urban teenagers,

in the age group of 15-18 years, of Tricity of Chandigarh", may not be accepted. Since the mean value for vaccine hesitancy for teenagers residing in rural is more than those residing in urban areas, hence teenagers residing in rural areas showed more hesitancy for getting COVID-19 vaccine than those residing in urban areas.

Results of the study

The results of the study are:

1. Slightly more than one fourth of the teenagers were hesitant in taking COVID-19 vaccine due to some perceived risks whereas around 47% did not perceive any such risk.
2. Even lack of proper awareness about the COVID-19 vaccine prevented around $1/3^{rd}$ of the teenagers to take the said vaccine. And about 50% of the teenagers were aware about the efficacy of the vaccine and were not hesitant in taking the vaccine.
3. Psychological and emotional factors also prevented around $1/5^{th}$ of the teenagers to take the vaccine. 61% of the teenagers were not impacted by the Psychological and emotional factors for taking the vaccine.
4. Some general factors also prevented around 18% of the participants for taking the vaccine. Still 65% of the teenagers were not impacted by the general factors.
5. Boys showed more hesitancy for getting COVID-19 vaccine than girls.
6. Adolescent residing in rural areas showed more hesitancy for getting COVID-19 vaccine than those residing in urban areas.

III. Discussion Of The Results

Hesitancy in taking vaccine is a global issue but it vary in each community or country, So it has become a vital topic for research in every country, (Rodrigues, Block, & Sood, 2022). Danabal et al. (2021) found that people are hesitant in taking vaccine. It has become a significant area of concern in determining the handling of any epidemic or pandemic. The present study and many more studies (Solís Arce, Warren, et al., 2021, Beusekom, 2022), have shown that perceived risks of taking vaccine such as side effects and efficacy contribute majorly to the hesitancy.

Paul, Steptoe, Fancourt (2021) reported that there are high levels of mistrust about vaccine across one or more domains. The mistrust or lack of confidence in COVID vaccine arose due to the limited time in which it was developed across the world. So it was thought that vaccine was not developed using proper protocols and hence lack in efficacy. Rumours about the side effects especially in social media added to the fears and led to more hesitancy. Hossain, Alam, Islam, Sultan, Faysal, Rima et al. (2021) supported this view and found that the vaccine hesitancy tend to decrease with increase in knowledge about vaccine. In the present study more than 41% teenagers agreed that there is insufficient information about efficacy of vaccine. Also there is large percentage (29%) that lacked in awareness regarding efficacy and safety. The governments should put in more serious efforts to spread awareness about COVID vaccine through different means. Making correct data and information available to the people can prove to be helpful in increasing vaccination rates.

The present study also shows that even small issues which are generally considered trivial like feeling scared from getting jabbed (about 20%) can contribute to hesitancy and lead to under immunisation. About $1/5^{th}$ of the respondents in the present study felt that the vaccines are promoted for financial gains and not for public health. This lack of trust in health care system contributed towards vaccine hesitancy among teenagers.

Also the present study reflected that boys are more hesitant in taking the vaccine which is against the results shown by Marzo, Sami, Alam et al. (2022). This may be due to the fact that females are known to be more precautious than males and hence they might want to get vaccinated.

Further, the hesitancy in taking COVID-19 vaccine by rural teenagers is found to be more as compared to urban teenagers. Lack of information, superstitious beliefs and availability of vaccines could be the probable reasons. The result is being supported by Marzo, Sami, Alam et al. (2022).

IV. Conclusion

This study gives a critical insight about the factors which can lead to COVID-19 vaccine hesitancy among teenagers. It can be used as baseline information even beyond COVID-19 pandemic and help in designing evidence based strategies to promote vaccination among teenagers.

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