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Original Research Article

Coverage evaluation survey of COVID-19 vaccination among adolescents aged 12 to 17 years in the rural field practice area of medical college near Bangalore

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ABSTRACT

Background: COVID-19 vaccination in India was started from 16 January 2021. The vaccination for adolescents was started one year later. The only source of COVID-19 vaccination coverage is government data. There is a lack of external studies on COVID-19 vaccine coverage in this age group. In this regard, the present study was taken up with the objectives to assess the vaccination coverage of COVID-19 among adolescents aged 12-17 years and the factors associated with COVID-19 vaccine hesitancy.
Methods: A coverage evaluation survey was done for assessing COVID-19 vaccination coverage among adolescents aged 12 to 17 years from September to December 2022 in the rural field practice area of a medical college near Bangalore.
Results: Out of the 420 study subjects, 294 (70%) were fully vaccinated, 70 (16.6%) were partially vaccinated and 56 (13.4%) were unvaccinated. It was observed that the coverage of COVID-19 vaccine in the age group of 15 to 17 years was higher compared to 12 to 14 years.
Conclusions: The COVID 19 vaccine coverage with two doses among adolescents aged 12-14 was 61.9% and 78.1% among 210 adolescents aged 15 to 17 years in the rural locality. The most common reason for partial vaccination was that the school did not provide the second dose and the most common reason for not being vaccinated is that the subject was not eligible for vaccination during the school vaccination campaign.

Keywords: COVID-19, COVID vaccination, Adolescents, Children, Vaccine coverage, Corbevax, Covaxin

INTRODUCTION

India is amongst the few countries to develop its own indigenous COVID-19 vaccines and started to vaccinate its people from 16th January 2021, and later emerged as the world's largest vaccination drive.[1,2] In the first phase of the immunization plan, vaccines were administered to the frontline and healthcare workers, followed by the elderly, people with co-morbidities, and people aged 18 years and above. The vaccination for adolescents aged 15-17 years was started one year later from February 2022 and for adolescents aged 12-14 years from 16th March 2022.[3] The delay of one year after adult vaccination was due to the non-availability of data in that age group and the rationale for vaccinating adolescents was to minimize school disruptions by reducing the number of infections. In India, as on October 2022; 3, 21, 27, 377 adolescents aged 12-14 years and 5, 32, 43, 367 adolescents aged 15-17 years were vaccinated with 2 doses of vaccine with interstate variations in vaccination coverage as reported by the Ministry of Health and Family Welfare, Government of India (MoHFW).[4] Nonetheless, demand-side obstacles

including vaccine reluctance and widespread misinformation about COVID-19 vaccines have been a concern for India. The most frequent causes include ignorance, perceived risks vs. benefits, religious convictions, etc.[1] According to the existing research, there are significant regional, socioeconomic, ideological, gender, class, and rural-urban differences in COVID-19 vaccination hesitation.[5] Digital tool availability is a two-edged sword; on the one side, the internet and smartphones aid in raising awareness and improving access to vaccines. Yet it also presents problems, primarily false information, anti-vax sentiments, fake news, and insufficient knowledge about vaccines. Research indicates that false narratives promote undesirable behavior, such as vaccine reluctance, and have a detrimental impact on health outcome.[1] The only source of COVID-19 vaccination coverage is government data. There is a dearth of external studies on COVID-19 vaccine coverage and covariates such as vaccine hesitancy, geography, education attainment, and socioeconomic status. In this regard, the present study was taken up with the objectives to assess the vaccination coverage of COVID-19 among adolescents aged 12-17 years and the factors associated with COVID-19 vaccine hesitancy.

METHODS

The WHO's standard EPI 30 cluster evaluation survey methodology was used for assessing COVID 19 vaccination among adolescents aged 12 to 17 years during September to December 2022 in the rural field practice area of a medical college near Bangalore.[6] A total of 59 villages coming under 3 primary health centres having a population of about 85,280 was the sampling frame. The study subjects were classified into two age groups as 12 to 14 years and 15 to 17 years. 30 clusters were chosen from the villages through random selection. In each cluster seven children in each age group were surveyed. Children aged 12 to 17 years who were resident of the village for minimum of 6 months, present during the study and willing to give consent were included and those with severe chronic illness were excluded. Selection of clusters: The population of each village was line listed; cumulative population was calculated and written against each village. This formed the sampling frame of the study. Sampling interval was calculated using the formula, Sampling interval=Total population/Number of clusters=85280/ 30=2842.67. The sampling interval thus calculated was 2842. Within this sampling interval, a random number which was equal to or less than sampling interval was chosen using Randbetween function of MS EXCEL. The random number chosen was 923. The village whose cumulative population was equal to or exceeded the random number was chosen as the first cluster. The second cluster was chosen by adding the sampling interval to the first random number (923+2842=3765) corresponding to a village whose cumulative population was either equal to or just greater than this number. In this manner the remaining 28 clusters were selected. Selection of household: The centre of the village was identified; the road, the street, household and direction of survey from the first household selected were all done through random allocation. The study subject or an adult responsible respondent of the subjects who fulfilled the inclusion and exclusion criteria were interviewed using a pretested, semi-structured questionnaire having questions on the demographic profile, COVID 19 vaccine, reasons for not taking the vaccine, history of previous COVID 19 infection and covid appropriate behaviour. Confirmation of vaccination coverage was done by asking for the COVID 19 vaccination certificate issued by the government authorities through CoWIN portal. The vaccination schedule for COVID 19 for children is 2 doses 4 weeks apart. A fully vaccinated child was one who had received both doses of vaccine. A partially vaccinated child was one who had received one dose of vaccine. An unvaccinated child was one who had not received any dose of the vaccine. The data was entered in google forms and analysis was carried out using IBM SPSS (SPSS Statistics for Windows, Version 26.0. Armonk, NY:IBM Corp). The results was expressed in terms of Descriptive statistics like frequency and percentages. Inferential statistics like z test was used to find the association between the variables, $p<0.05$ was said to be statistically significant. Informed consent and assent form was obtained from each subject and confidentiality of the data was maintained at all times.

RESULTS

A total of 420 subjects i.e., 210 from the age group of 12-14 years and 210 from 15-17 years were included in the study. Among them, 329 (78.33%) went to school, 77(18.33%) went to college and 14 (3.33%) were school dropouts. Among the study subjects, 57.9% were adolescent boys and 42.1% were adolescent girls. The present study showed that, of the total 420 study subjects, 294 (70%) at 95% CI (65.6%-74.4%) were fully vaccinated. Among fully vaccinated subjects; 163 were adolescent boys and 131 were adolescent girls; and among those who did not get vaccinated (N=56), 39 were adolescent boys and 17 adolescent girls (Table 1). It was observed that the coverage was more among adolescent boys as compared to girls. Of the 210 subjects aged between 12 to 14 years who had received Corbevax, 130 (61.9%) at 95% CI (55.3% - 68.5%) were fully vaccinated, 46 (21.9%) at 95% CI (16.3%- 27.5%) were partially vaccinated and 34 (16.2%) at 95% CI (11.2%-21.7%) were not vaccinated for COVID 19. Among the 210 subjects aged 15 to 17 years who had received Covaxin, 164 (78.1%) at 95% CI (72.5%- 83.6%) had received both the doses, 24 (11.4%) at 95% CI (7.1%-15.7%) were partially vaccinated and 22 (10.47%) at 95% CI (6.3%-14.6%) were not vaccinated for COVID 19. It was observed that the coverage of COVID 19 vaccine in the age group of 15 to 17 years was higher compared to 12 to 14 years and was found to be statistically significant (p=0.0001). The study observed that, 21 (5%) of them had a history of COVID 19 infection before the vaccination and one adolescent had after the first dose vaccination. Out of 420 subjects, 70 (16.6%) had informed that the main reason for partial

vaccination was that school/college did not provide the 2nd dose and among 56 (13.3%) who were not vaccinated the most common reasons was that the subjects were not yet eligible for vaccination during school campaign, other reasons for partial vaccination/ not vaccinated is described in (Table 2). The reasons for partial and not vaccinated are the same for both the groups.

Table 1: Vaccination coverage among 12-14 and 15-17 years (n=420).

Age group	Fully Vaccinated			Partially Vaccinated			Not Vaccinated		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
12-14	71 (43.6)	59 (45.1)	130	28 (68.3)	18 (62.1)	46	25 (64.1)	09 (52.9)	34
15-17	92 (56.4)	72 (54.9)	164	13 (31.7)	11 (37.9)	24	14 (35.9)	08 (47.1)	22
Total	163 (100)	131 (100)	294	41 (100)	29 (100)	70	39 (100)	17 (100)	56

Figures in parenthesis indicate percentages

The most common local adverse events were pain and swelling at the injection site and the systemic adverse events included fever, malaise, headache and body ache. All the adverse events subsided spontaneously and completely, without any complications (Table 3). Following both doses, the only tablet taken was paracetamol 500 mg. Among the 364 (86%) subjects who had received 1st dose vaccination, 110 (30.2%) had mild adverse events of which 65(59.1%) were in the age group 15 to 17 years. Among 294 (70%) subjects who had received second dose, 34 (11.56%) had mild adverse events.

Table 2: Reasons for partial vaccination/ not vaccinated.

Variable	Frequency (%)
Reasons for partial Vaccination	**(N=70)**
School/college did not provide 2nd dose vaccine	32 (45.7)
Not due for vaccination	25 (35.7)
Scared after the First dose	07 (10.0)
1 Dose is sufficient according to subject	03 (4.3)
School/ColNlege Drop out	02 (2.9)
Absent in school on the day of vaccination	01 (1.4)
Reasons for not vaccinated	**(N=56)**
Not eligible for vaccination during school campaign	14 (25.0)
Afraid of side effects	12 (21.4)
School Drop out	11 (19.6)
Vaccine not provided at school	08 (14.3)
Absent in school on the day of vaccination	08 (14.3)
Parents did not allow for vaccination	03 (5.4)

The present study showed that COVID appropriate behaviour such as wearing masks in public places, handwashing and social distancing was followed only among 328 (78.1%) subjects. The reasons for not following Covid appropriate behaviour was School/College did not insist, already vaccinated hence will not get infection, COVID does not exist, friends and family members do not follow.

Table 3: Adverse events following immunization.

Variable	Frequency (%)
Adverse events following first dose	**(N=110)**
Fever	50 (45.5)
Pain and Fever	21 (19.1)
Pain and swelling at the site of injection	13 (11.8)
Pain at the site of injection	10 (9.1)
Fever, Chills	09 (8.2)
Cough	05 (4.5)
Fever, Loose stools	02 (1.8)
Adverse events following second dose	**(N=34)**
Fever	09 (26.6)
Pain at the site of injection	06 (17.6)
Pain and Fever	06 (17.6)
Pain and swelling at the site of injection	06 (17.6)
Fever, chills	04 (11.8)
Cough, Fever with Chills	03 (8.8)

DISCUSSION

Children and adolescents typically endure milder illness from COVID-19 than adults do, and they suffer from the disease less frequently. Children and teenagers are still vulnerable to infection and can spread the virus to others. They tend to be tested less frequently, and cases may go unreported, as milder symptoms and asymptomatic presentations may cause these populations to seek medical attention less frequently. The danger of spreading the virus to and from children also depends on the extent of community transmission, the effectiveness of social controls on the virus, and the biological aspects of the virus itself.[7]

According to the Ministry of Health and Family Welfare of India, the vaccination coverage for 12-14 years with the first dose is 41.3 million and the second dose is 32.5 million, and for 15-17 years with the first dose is 62.1

million and the second dose is 53.7 million as on December 2022. In Karnataka by the end of December 2022, 2.81 million had completed both doses while 2.71 million had received a single dose among 12-14 years, and among 15-17 years, 2.3 million had received both doses and 2.1 million had received a single dose.[8] However, information on the percentage of coverage is not available from the government sources. Surveys done by Lee et al, Verger et al and Masthi et al showed a willingness to take the vaccine ranged from 62.7% to 69.1%. [9-11] The vaccination coverage in the present study was higher compared to the national average and may be attributed to the study place being closer to the capital city, awareness, and less averse to vaccine hesitancy.

According to the Morbidity and Mortality Weekly Report, CDC in the USA as of 31st July 2021, 42.4% of adolescents aged 12-17 years had received ≥ one dose of COVID-19 vaccine and 39.1% had completed the vaccine schedule and vaccination coverage was similar among males and female.[12] In a study done by Nguyen et al, 42.3% of children and 74.8% of adolescents were vaccinated. Vaccination coverage was lower among households with lower education.[13] The coverage was similar to the present study. Another study done by Li et al showed 98.4% of adolescent participants aged 12 to 17 years received the COVID-19 vaccine, and 1.6% of participants did not. Among those vaccinated participants who completed the first vaccine dose 21.5% reported one or more adverse events. Of those that received the second dose, 20.6% had adverse events, and the most common adverse event after either the first or second dose was pain at the injection site.[14] In a study done on the safety profile of COVID-19 vaccination among adolescents in India by Tiwari et al of 500 subjects, 68 (13.6%) developed an AEFI, all after the first dose of vaccine. 67 subjects had minor illnesses like pain, fever, body aches, swelling of arms, and chest pain. This is similar to the observation of the present study.[15] The adverse events reported are in concurrence with the finding of the present study. A study was done in the UK aged 12-17 years and 112 aged 6-11 years with two doses of vaccine. 80% of participants reported at least one solicited local or systemic adverse after the first dose, and 76% of participants followed the second dose. Pain and tenderness were the most common local solicited adverse events.[16] The ADR reported is higher than the observations of the current study. Children and adolescents can be protected from disease with COVID-19 vaccines that have undergone clinical trials and are listed as emergency use by the WHO. The direct health benefit of immunizing healthy children and adolescents is lower than the benefit of immunizing older adults due to the lower incidence of severe COVID-19 and deaths in younger people, despite benefit-risk analyses supporting the benefit of immunizing all age groups, including children and adolescents, to reduce the number of infections, hospitalizations, deaths, and long-COVID. But, there are advantages to immunizing kids and teenagers that go beyond the ones that are directly related to health. Children's schooling disruptions should be kept to a minimum, and their general well-being, health, and safety should be maintained.[7] COVID-19 was the first pandemic in history to use digital technology for information. Social media played a major role, in spreading a lot of information and knowledge related to the pandemic. However, digit technology has both pros and cons when it comes to its usage, as it helped people to know more about the disease, prevention, and cure as well it spreads misinformation on the disease vaccination which led to a high hesitancy rate among the population for the uptake of the vaccine. Planning of immunization strategies needs to have a special focus using mass media including social media for the promotion of vaccine acceptance through appropriate Behaviour Change and Communication strategies.[17] In the current study, the reasons for partial vaccination or not being vaccinated were belief that only one dose is sufficient, afraid of side effects, scared after the 1st dose, and School/college did not provide the 2nd dose. In a study done by Masthi et al 14.5% acquired COVID-19 breakthrough infection among vaccinated subjects, majority of these individuals (75.4%) experienced mild symptoms. All vaccinated individuals were protected from severe COVID-19 disease.[18] This observation of breakthrough infection is different from the finding of the present study.

CONCLUSION

The COVID-19 vaccine coverage with two doses among adolescents aged 12-14 was 61.9% and 78.1% among 210 adolescents aged 15 to 17 years in the rural locality. Following the first dose of vaccination, 30.2% of subjects reported adverse events and 11.5% of subjects reported adverse events following the second dose. It is recommended to build trust among the general public, via the spread of timely and clear messages through trusted channels advocating the safety and efficacy of currently available COVID-19 vaccines.

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