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Original Article

Community Section

Effect of Non Incentivised and Incentivised Free COVID-19 Vaccination Camps in Augmentation of State's Efforts in Achieving Vaccination Targets Necessary for Herd Immunity

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ABSTRACT

Introduction: Most effective way to defeat the Coronavirus Disease-2019 (COVID-19) pandemic is mass vaccination to achieve herd immunity which requires vaccination of about 80% of the population.

Aim: To compare the effect of non incentivised and incentivised free COVID-19 vaccination camps on augmentation of state's efforts in achieving vaccination targets of covering 80% of population.

Materials and Methods: The present retrospective observational study included free COVID-19 vaccination camps, both non incentivised (8 days) and incentivised (8 days), were organised in month of June and July, 2021 at a hospital in association with an NGO under the supervision of District Immunisation Officer. Data of all vaccinations done was compared to document the effect of incentivised free vaccination camp as compared to non incentivised camps. Data was represented as frequency, percentage and Chi-square test was used.

Results: Total of 4111 vaccinations were done during the free vaccination camps, including 1406 during non incentivised and 2705 during incentivised camps. During non incentivised camps 1114 people were given 1st dose and 292 were given 2nd dose, while during incentivised camps 2334 people were given 1st dose and 371 were given 2nd dose. Analysis of the data showed that the difference in number of 1st dose and 2nd dose vaccinations done during the incentivised vaccination camps was statistically significantly higher as compared to the number of 1st dose and 2nd dose vaccinations done during non incentivised vaccination camps. Similar results showed that the difference in number of vaccination done among the age groups of 18-44 years and >44 years during the incentivised vaccination camps was statistically significantly higher as compared to the number of vaccination among the age groups of 18-44 years and >44 years done during the non incentivised vaccination camps.

Conclusion: The present study documented statistically significantly higher number of 1st dose of vaccinations, 2nd dose of vaccinations, vaccinations among 18-44 years age group and >44 years age group done during incentivised vaccination camps as compared to non incentivised vaccination camps. Results of the present study suggest that incentivised vaccination campaigns should be incorporated as an important component of COVID-19 vaccination campaign strategy to vaccinate enough Indian population and achieve herd immunity for protection from COVID-19 pandemic.

Keywords: Coronavirus disease-2019, Immunity, Pandemic, Vaccine

INTRODUCTION

Global scientific community agrees that the most effective way to defeat the COVID-19 pandemic is mass vaccination. Development of vaccines for COVID-19 has been a powerful demonstration of unprecedented levels of scientific collaboration to spur innovation in a very short time. However, the rollout of vaccines does not herald immediate end of the COVID-19 pandemic, as attaining herd immunity will require the vaccination of roughly 80% of population [1]. Indian Government has constituted a National Expert Group on Vaccine Administration for COVID-19 (NEGVAC) for vaccine related guidance [2] and initiated the National COVID-19 vaccination programme to ensure free and rapid vaccination of all eligible Indians. With all efforts, vaccinations till 21st October 2021 were 1,00,75,34,203 total doses, 71,14,28,668 1st dose and 29,61,05,535 2nd dose; that is about 75% of total eligible adult Indian population had at least one dose, while about 30% are fully immunised [3]. Initially, there was a slow rate of vaccination because of several reasons including shortages of vaccine, increasing skepticism, disinformation and lack of trust on vaccine, but the rate picked up in later months from August to October, 2021 [3-6]. Large number of strategies like community-engagement work, awareness campaigns, tailored communication to remove vaccine hesitancy among populations as well as increasing access to vaccination have been used to increase vaccinations [7].

There is paucity of studies, both theoretical and empirical data, comparing effects of non financial incentives with financial incentives, but a study by Kevin Volpp observed that during immunisation campaigns the non monetary incentives like in-kind gifts, food handouts may attract to a few people. A universal acceptance was observed for monetary incentives which typically work better [8]. Experts observe that if education, motivation, encouragement, awareness and facilitation fail to increase vaccinations sufficient for herd immunity some countries were also using other strategies involving incentives or disincentives (mandatory measures) [9]. Financial incentives like cash transfers, lotteries and gift vouchers have been used in the Canada, USA, and some other countries to reduce COVID-19 vaccine hesitancy [10,11].

A systematic review in 2019 including three randomised controlled trials, studying the interventions to promote hepatitis B vaccination among people with substance use disorders, concluded that monetary incentives were the most effective interventions to promote hepatitis B vaccination [12]. Similarly in England, a randomised trial on Human Papillomavirus (HPV) vaccinations among girls of 17-18 years documented that cash incentives of USD $73 equivalent improved the vaccination rate by nearly double from 12% to 22% [13]. Studies from developing countries like one from Nigeria have documented substantial effects of conditional cash payments for tetanus vaccination campaign among women in Nigeria and

observed that higher cash incentives lead to dramatically higher vaccination rate [14].

Evidence suggests positive effect of financial incentives on vaccine uptake during 2009-2010 influenza pandemic before COVID-19 pandemic [15]. A review that included 95 RCTs and 13 CCTs observed that patient financial incentives was the most effective intervention components, next was patient reminders, then was patient education, and last was for feedback [16]. North Carolina, in the US, have announced incentivised COVID-19 vaccination programs including lotteries for $1 million to motivate COVID-19 vaccination [16]. A pilot program in North Carolina, USA, providing a guaranteed small financial incentive slowed the decline in COVID-19 vaccination and alleviated barriers to vaccination, especially for Black, Hispanic and low-income population [17].

Some organisations as well as Governments worldwide have initiated incentives to promote vaccination, ranging from lotteries in Ohio, payments of $5 in Vancouver and payments of 150 in Greece [18,19]. A study in detroit observed increase in the weekly vaccination numbers by 44.19% (from 0.86 to 1.25%) for 1st dose and suggested offering of incentives early and for 2nd doses, along with education [20].

Reviews provide evidence of positive effectiveness of incentives schemes during hepatitis B and influenza vaccinations and literature suggests help of financial incentives in increasing high levels of adherence for COVID-19 vaccinations necessary for achieving herd immunity [21]. Most recently Dr VK Paul, Member Niti Aayog (Health), stated that the country is at a critical juncture right now and we have to accomplish high vaccine coverage with full two dose course [22]. Various reports in media suggests that a number of community organisations are conducting motivational, awareness and free vaccination campaigns to increase vaccinations among people, but there is paucity of studies from India to document the role of incentivised free vaccination campaigns as compared to non incentivised vaccination campaigns to augmenting the Government's efforts for achieving vaccination targets. So, this study aimed to compare incentivised and non incentivised free vaccination campaign in augmenting Punjab State's efforts to achieve appropriate herd immunity to protect Punjab state's population intern will help achieve appropriate herd immunity for overall Indian population from COVID-19.

MATERIALS AND METHODS

The present retrospective observational study was approved by Institutional Ethical Committee vide letter no; 13/2021 dated 1.6.2021. COVID-19 vaccination campaign was initiated by organising free COVID-19 non incentivised as well as incentivised vaccination camps at a private primary care hospital (Kishori Ram Hospital and Diabetes Care Centre), Bathinda, Punjab in association with a local NGO, under the supervision of District Immunisation Officer in month of June and July, 2021.

Inclusion criteria: Data of all people getting vaccinated during the camps were included in the study.

Exclusion criteria: Data with missing records were excluded from the study.

Non Incentivised Free COVID-19 Vaccination Camps

Non incentivised free COVID-19 vaccination camps were held for eight days in the month of June 2021- 14th (day 1), 15th (day 2), 17th (day 3), 18th (day 4), 19th (day 5), 20th (day 6), 21st (day 7), and 22nd (day 8). During non incentivised free vaccination camps only awareness and education was imparted to all people and no incentives were offered. Data from eight days of non incentivised camps regarding the 1st dose, the 2nd dose and age was recorded after informed consent was obtained for use of their data for comparative study.

Incentivised Free COVID-19 Vaccination Camps

After conclusion of non incentivised camps, incentivised free vaccination camps were held for eight days. Incentivised free vaccination camps were organised by offering 'lucky draw coupons' to all the people getting vaccinated for 15 prizes worth rupees 1.25 lac to be announced on conclusion of the incentivised camps and lucky draw winners got the prizes on the last day. The funds for the prizes were arranged by the local NGO assisting in organisation of free COVID-19 vaccination camps. The data regarding number of the 1st dose, the 2nd dose and age was recorded after obtaining informed consent from the participants.

Total number of vaccinations done during the non incentivised and incentivised camps were recorded and analysed according to dosage schedule of 1st dose and 2nd dose and according to age groups of 18-44 years and >44 years age groups as was being recorded by District Immunisation Officer. Individual vaccination data of people and data according to various socio-economic variables as well as gender was not recorded.

STATISTICAL ANALYSIS

Data was represented as frequency and percentage. Chi-square test was used to compare the frequency among two groups. The p-value <0.05 was taken as statistically significant whereas p-value <0.001 was taken as highly significant. All the analysis was done using 'IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, N.Y., USA)'.

RESULTS

[Table/Fig-1] shows vaccinations done during non incentivised and incentivised vaccination camps and distribution of according to age groups and dosages. Total 4111 vaccinations were conducted during the free vaccination camps, including 1406 vaccinations during non incentivised camps and 2705 vaccinations during incentivised camps.

Variables		Non incentivised group n (%)	Incentivised group n (%)	χ^2 value	p-value
Total (N-4111)		1406 (34.2)	2705 (65.8)	410.46	<0.001**
Age group	18-44 years (n-3256)	1086 (33.4)	2170 (66.6)	360.89	<0.001**
	>44 years (n-855)	320 (37.4)	535 (62.6)	54.064	<0.001**
Dosage	1st dose (n-3448)	1114 (32.3)	2334 (67.7)	432.25	<0.001**
	2nd dose (n-663)	292 (44.0)	371 (56.0)	9.413	0.002*

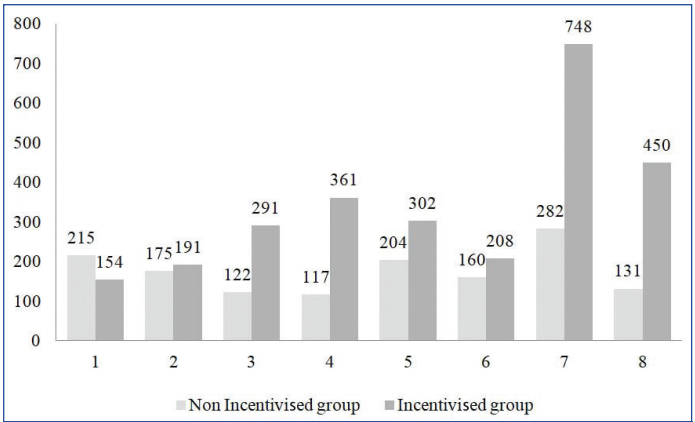
[Table/Fig-1]: Distribution of number of vaccinations among non incentivised and incentivised groups, based on age group N (%).
Chi-square test: *p<0.05; Significant; **p<0.001; Highly significant

Overall, 1114 1st dose vaccinations were done during non incentivised vaccination camps and 2334 1st dose vaccinations were done during incentivised vaccination camps. Similarly, 292 2nd dose vaccinations were done during non incentivised vaccination camps and 371 2nd dose vaccinations were done during incentivised vaccination camps.

Among age group of 18-44 years, 1086 vaccinations were done in non incentivised vaccination camps and 2170 vaccinations were done in incentivised camps. Similarly, among age group of >44 years, 320 vaccinations were done in non incentivised vaccination camps and 535 vaccinations were done in incentivised camps.

[Table/Fig-2] shows increased number of vaccinations during the incentivised vaccination camps as compared to non incentivised vaccination camps, except for the first day.

[Table/Fig-3] shows most 178 vaccinations were done among age group of 18-44 years on 1st and 5th day of non incentivised camps. Among age group of >44 years most 105 vaccinations were done



[Table/Fig-2]: Distribution of number of vaccinations among non incentivised and incentivised groups based on the day of vaccination.

on 7th day of non incentivised vaccination camp. Similarly, most (720) vaccinations were done among age group of 18-44 years on 7th day of incentivised camps and among age group of >44 years most (150) vaccinations were done on 4th day of incentivised vaccination camp.

Days	Non incentivised group			Incentivised group		
	Vaccinations	18-44 Yr	>44 Yr	Vaccinations	18-44 Yr	>44 Yr
1	215	178 (82.8)	37 (17.2)	154	108 (70.1)	46 (29.9)
2	175	150 (85.7)	25 (14.3)	191	166 (86.9)	25 (13.1)
3	122	113 (92.6)	9 (7.4)	291	204 (70.1)	87 (29.9)
4	117	103 (88.0)	14 (12.0)	361	211 (58.4)	150 (41.6)
5	204	178 (87.3)	26 (12.7)	302	233 (77.1)	69 (22.9)
6	160	97 (60.6)	63 (39.4)	208	139 (66.8)	69 (33.2)
7	282	177 (62.8)	105 (37.2)	748	720 (91.8)	28 (8.2)
8	131	90 (68.7)	41 (31.2)	450	389 (86.4)	61 (13.6)
Total	1406	1086 (77.2)	320 (22.8)	2705	2170 (80.2)	535 (19.8)

[Table/Fig-3]: Distribution of number of vaccinations among non incentivised and incentivised groups according to age N (%).

[Table/Fig-4] shows most (190) 1st dose vaccinations were done on 1st day non incentivised camps and most (95) 2nd dose vaccinations were done on 7th day of non incentivised vaccination camp. Similarly, most (722) 1st dose vaccinations were done on 7th day of incentivised camps and most (75) 2nd dose vaccinations were done on 6th day of incentivised vaccination camp.

Days	Non incentivised group			Incentivised group		
	Vaccinations	1st dose	2nd dose	Vaccinations	1st dose	2nd dose
1	215	190 (88.4)	25 (11.6)	154	114 (74.0)	40 (26.0)
2	175	135 (77.1)	40 (22.9)	191	157 (82.2)	34 (17.8)
3	122	111 (91.0)	11 (9.0)	291	267 (91.8)	24 (8.2)
4	117	96 (82.1)	21 (17.9)	361	287 (79.5)	74 (20.5)
5	204	163 (79.9)	41 (20.1)	302	251 (83.1)	51 (16.9)
6	160	117 (73.1)	43 (26.9)	208	133 (63.9)	75 (36.1)
7	282	187 (66.3)	95 (33.7)	748	722 (96.5)	26 (3.5)
8	131	115 (87.8)	16 (12.2)	450	89.6 (403)	47 (10.4)
Total	1406	1114 (79.2)	292 (20.8)	2705	2334 (86.3)	371 (13.7)

[Table/Fig-4]: Distribution of number of vaccinations among non incentivised and incentivised groups according to dosages N (%).

DISCUSSION

Second wave of COVID-19 was branded as 'COVID hell' hardly leaving anyone untouched with brush of tragedy during an apocalyptic situation of collapsing public healthcare system, fleecing by private hospitals, oxygen and hospital beds shortages, overcrowded crematoriums along with numerous mind-numbing devastating stories from India [23,24]. Vaccine and COVID19 appropriate behaviour are the only weapons to combat COVID-19 pandemic [25,26].

The present study showed that during the present vaccination campaign, 4111 vaccinations were done across 16 camps, eight non incentivised and eight incentivised vaccination camps. The media reported a few incentives based vaccination campaigns from India as well as from other parts of the world to improve vaccinations, but internet search and review of literature did not show any study documenting the effect of incentivised COVID-19 vaccination campaigns [27,28].

The present incentivised vaccination campaign showed excellent results, where a total of 2705 (65.80%) people got vaccinated during incentivised camps as compared to 1406 (34.20%) during the non incentivised camps and the difference was statistically highly significant.

The results [Table/Fig-1] showed that in 18-44 years age group vaccinations statistically increased from 1086 among non incentivised group to 2170 among incentivised group (p-value <0.001). Similarly, statistically significant increase was observed among >44 years age group with increase in number of vaccinations from 320 in non incentivised camps to 535 in incentivised vaccinations camps (p-value <0.001). Among vaccination groups according to dosage, 1st dose vaccinations increased from 1114 in non incentivised camps to 2334 vaccinations in incentivised camps and the difference of increase was statistically significant (p-value <0.001). Among 2nd dose recipients the number of vaccinations increased from 292 in non incentive camps to 371 vaccinations in incentivised group and the difference of increase was statistically significant (p-value=0.002).

In present study more 1st dose vaccinations during non incentivised and incentivised vaccination camps were done as compared to number of 2nd dose, may be because people were becoming more and more aware of dangers of COVID-19 pandemic and as the Government has initiated vaccinations in 18-44 years age group more and more people in this age group were coming forward to get the benefit of vaccinations. Similarly higher vaccinations in age group of 18-44 years both during non incentivised and incentivised vaccination camps as compared to >44 years age group may also be because this age group was included for vaccinations only recently so more people are getting vaccinated in this age group as compared to >44 years age group. In June 2021, media reported offer of incentives like free rations and free travel by Rajasthan Government to increase vaccinations in tribal districts with low coverage, but there was no documentation of effect of incentives on vaccination campaign [29].

An article in New England Journal of Medicine stated that standard "information and education" strategies for vaccinations are inadequate and a few state Governments have initiated payments for getting vaccinated and suggested that in the short term a well-designed incentive program could increase vaccinations, but may face significant implementation problems and timely delivery of incentives would be important for success, credibility and effectiveness of incentive programme [1]. Experts feel that presence of positive externalities like subsidies and incentives are a logical policy approach [30]. Another observation suggests, that incentives are beneficial strategies especially when any behaviour changes can reduce future health expenditures [31]. Experts believe that incentives are especially effective in modifying one-time behavioural conditions like vaccinations and cancer screening [32].

During the present study, it was observed that there was a progressive increase in vaccinations under the influence of incentives. Subgroup analysis of a systematic review and meta-analysis of 11 RCTs studying implementation of strategies to increase three-dose completion of HBV vaccine series in Persons Who Inject Drugs

(PWID) showed that odds of vaccine completion in those offered financial incentives was most effective (OR, 7.01; 95% CI, 2.88-17.06), followed by accelerated vaccine schedules (OR, 1.90; 95% CI, 1.14-3.14) [12].

Another review observed that addition of financial incentives may be a useful for the behavioural change toolkit and this observation was based on evidence of benefits of financial incentives to promote vaccination and other preventive behaviours [33].

More over evidence from a recent survey from Germany suggests beneficial role of financial incentives in increasing number of COVID-19 vaccination and financial incentives were more effective in convincing the study subjects to subscribe to a COVID-19 contact tracing app as compared to providing information, cause for personal advantage or reasons for common good [34]. Initial results of German conjoint experiment documented that as part of a mass vaccination scenario hypothetical financial incentive of 50 Euros could increase vaccinations among the hesitant subjects [35]. Similarly, about a third of the unvaccinated subjects in a UCLA. COVID-19 Health and Politics Project survey experiment observed that cash incentives would make subjects more likely to get vaccinated [36].

Beneficial influence of incentives on children vaccination programme was documented by a clustered randomised controlled trial evaluating two interventions, one non incentivised vaccination camps and other incentivised vaccination camps offering small incentives concluding large positive effect of small incentives on the uptake of vaccinations in resource poor areas, proved to be more cost-effective than only improvement in supply [37].

Worldwide insufficient number of COVID-19 vaccinations poses a threat to public health and the Governments are considering the use of monetary incentives to increase vaccination. A large pre-registered RCT including 8286 subjects in Sweden studied the effect of guaranteed payments on COVID-19 vaccination rates and found that modest cash payments of 24 US dollars increased number of vaccinations by 4.2% points (p=0.005) as compared to small and statistically not significant effect on number of vaccination by behavioural nudges highlighting the potential of modest financial incentives in increasing the number of vaccinations [38].

Data from controlled studies exploring the overall health promoting interventions suggests that Health Promoting Financial Incentive (HPFI) interventions are more effective as compared to the usual care or no intervention for promoting and encouraging healthy behaviour change amongst populations residing in high income countries [34]. Moreover, evidence suggests that in changing one-off health behaviours like vaccination and screening, HPFI may be more effective as compared to changing more complex behaviours like smoking [39].

Present study is a small step forward to document the beneficial effect of incentivised COVID-19 vaccination programme but also stress very strongly that incentives alone may not be sufficient to achieve the vaccination targets. India needs to strengthen National COVID-19 vaccination programme with an over-reaching commitment involving community based organisations, increased awareness and motivation, curbing rumours and misconceptions, making vaccination mandatory for attending Institutions, person to person contact activities, travel, frequent reminder, feedback, education, legislative action, organisational change, or mass media campaign along with incentivising vaccination programme.

Limitation(s)

Small sample size is one of the major limitations. Other limitation is that the study capture only total daily data rather than data of individual subject related to various socio-demographic variables making it difficult for data analysis related to association of various socio-demographic variables with incentivised vaccination campaigns as compared to non incentivised vaccination campaigns. Present study did not consider the influence of factors like government awareness and educational campaigns, reminders, NGO's education campaigns, celebrity vaccination campaigns etc., which may also have influenced vaccinations in addition to the incentivised campaign of present study.

CONCLUSION(S)

Present study documents statistically significant higher response of number of vaccinations in incentivised vaccination camps as compared to non incentivised vaccination camps. Statistically significant higher number of vaccinations among 1st dose recipients and among age group of 18-44 years as compared to 2nd dose vaccinations and among >44 years age group was observed in incentivised group may be because vaccinations were permitted late in age group of 18-44 years. Favourable response to incentives in the present study suggest that option of incentivised vaccination campaigns should be part of multifaceted campaigns comprising on-site vaccination, vaccination stands, educational and promotional campaigns, an overreaching commitment involving community based organisations, increased awareness and motivation, curbing rumours and misconceptions, making vaccination mandatory for attending institutions, person to person contact activities, travel, reminder, feedback, education, legislative action, organisational change, or mass media campaign.

Findings of present study will help policymakers in developing effective immunisation policies, implementing immunisation programs, addressing vaccine hesitancy and generating public interest in the vaccinations and encourage further extensive research to explore effect of incentivised vaccination campaigns in achieving vaccination targets among various social, cultural and religious population groups and a well-tailored incentivised vaccination campaigns may help boost vaccination rates needed to achieve herd immuntiy.

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