

Administration of sinopharm Covid-19 vaccine in cancer patients

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Abstract: For prevention against SARS-CoV-2, various vaccines have been approved globally including Pfizer, Sinopharm, Moderna, Johnson & Johnson etc which have proved quite effective. To evaluate the immunization and safety of Sinopharm vaccine in cancer patients. A prospective study was conducted in the Oncology Department of Nishtar Medical Hospital, Multan from March 2021- September 2021. A total of 150 cancer patients undergoing treatment were included in the study. All the patients were administered 0.5 ml Sinopharm vaccine with 28 day difference between the two doses. A two-month follow-up was done to test the immunization using ELISA kits. Among all the patients, 16 patients (10.7%) had a history of COVID-19 before the administration of the vaccine. At the time of vaccination, 23.3% of patients were seropositive. After the vaccination, 130 patients (86.7%) developed immunity against the infection. 30.6% of participants developed a fever and 20.9% had fatigue. Other side effects were also observed including pain, redness, swelling, itching, chills, anorexia, nausea, vomiting, myalgia and diarrhea. Sinopharm vaccine is effective and safe for patients with malignancies especially in patients receiving radiation therapy but still recommended for older patients and patients receiving chemotherapy.

Keywords: COVID-19, cancer patients, immunogenicity, vaccination

INTRODUCTION

Almost all the countries in the world started manufacturing of covid-19 vaccines in less than a year after the spread of the deadly pandemic. As a result, almost two dozen vaccines were developed in different countries including the United States, China, Russia, etc. Various studies have been conducted to test the efficacy, working, and immunogenicity of vaccines such as Sinopharm, Moderna and Astra Zeneca in different phases of clinical trials. Given the spread of disease, health organizations such WHO and FDA allowed the administration of vaccines after successful initial trials (Korompoki *et al.*, 2021).

Research has reported that cancer patients are more susceptible to SARS-CoV-2 and have a high mortality rate than healthy people (Lee *et al.*, 2020, Taghizadeh-Hesary *et al.*, 2021, Shahidsales *et al.*, 2021, Desai *et al.*, 2021). Additionally, cancer patients recently diagnosed during the pandemic reported advanced cancer stages which led to delays in cancer screening in contrast to screening periods before the pandemic (Kregting *et al.*, 2021). Cancer treatment was also delayed as a result of the refusal by patients due to fear of getting infected by Covid-19, hence worsening their condition (Riera *et al.*, 2021). Therefore, it is important to test the effectiveness and safety of SARS-CoV-2 vaccines in patients with malignancy to provide them with timely protection and continuation of their treatment (Kuderer *et al.*, 2021).

In Pakistan, the Sinopharm vaccine was approved for administration to the public in March 2021. Cancer patients were encouraged to get vaccinated, however, the

respective oncologist took the decision to vaccinate the patients receiving cancer treatment. No study has been conducted in Pakistan to test the efficacy of Sinopharm in cancer patients. This study aims to evaluate the immunization and safety of Sinopharm vaccine in cancer patients.

MATERIALS AND METHODS

A prospective study was conducted in the Oncology Department of Nishtar Medical Hospital, Multan from March 2021- September 2021. A total of 150 cancer patients undergoing treatment were included in the study. The patients with any infection or immune disease were excluded from the study. All patients signed a consent form for inclusion in the research. The ethical committee of the hospital approved the study design.

All the patients were analyzed for prior covid-19 infection by performing PCR. Anti-SARS-CoV-2 Nucleocapsid (N) immunoglobulin G was calculated. Then all the patients were administered 0.5ml Al(OH)₃ adjuvant Sinopharm vaccine with 28 day difference between the two doses. A two-month follow-up was done after vaccination to test for SARS-CoV-2 anti-Spike protein (S) immunoglobulin G and neutralizing antibodies, SARS-CoV-2 Anti-Spike immunoglobulin G and SARS-CoV2 Anti RBD immunoglobulin G levels by using ELISA kits. The sensitivity and specificity of kits were 100% and 99% respectively with 99.5% accuracy. The cut-off points of 8µg/ml for SARS-CoV-2 Anti-Spike immunoglobulin G and 2.5µg/ml for SARS-CoV2-neutralizing antibody were considered a positive response.

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Three months follow-up was done on the patients to assess the short-term effects. The data regarding side effects were collected through questionnaires by phone or in person.

STATISTICAL ANALYSIS

All the data was analyzed by SPSS version 20. Univariate and multivariate analysis was done to evaluate relationship between baseline characteristics. Continuous variables were presented as means and categorical factors were summarized as proportions. Chi-squared test was done for categorical variables. A p value less than 0.05 was considered statistically significant.

RESULTS

A total of 150 cancer patients older than 18 years were a part of the study. The participants were classified into distinct age groups with 53.3% of patients in the 40-60 years range. More than half of the population (60%) were females. The patient's baseline characteristics are shown in table 1. The type of malignancies in the patients are also shown. 44% of the patients had breast cancer and 54% of patients had a stage III active cancer. 74 patients were receiving active treatment with chemotherapy with radiotherapy or radiotherapy alone.

Table 1: Patients' baseline characteristics

Characteristics	N (%)
Age (years)	
<40	25 (16.7)
40-60	80 (53.3)
>60	45 (30)
Gender	
Male	60 (40)
Female	90 (60)
Stages	
I	19 (12.7)
II	30 (20)
III	84 (54)
IV	17 (11.3)
Malignancy	
Chest cancer	66 (43)
Prostate cancer	7 (3.7)
Upper GI cancer	13 (7.7)
Colorectal cancer	22 (13.7)
Brain glioma	4 (2.7)
Head and neck cancer	8 (5.3)
Hematologic malignancies	10 (5.4)
Gynecological cancers	4 (1.5)
Other types	16 (9.6)
Treatment	
Chemotherapy ± RT	54 (34)
Radiotherapy alone	20 (12.3)
Follow-up patients	76 (49.7)

Among all the patients, 16 patients (10.7%) had a history of COVID-19 before the administration of the vaccine. At the time of vaccination, 23.3% of patients were seropositive. After the vaccination, 130 patients (86.7%) developed immunity against the infection. 1 person developed COVID-19 after 1st dose.

Table 2: Patients' data after vaccination

Characteristics	SARS-CoV-2 Spike protein-positive (%)	COVID-19 neutralizing antibody positive (%)	Either SARS-CoV-2 Spike Protein or neutralizing antibody protein (%)
Age (years)			
<40	20 (83.3)	19 (79.2)	22 (91.7)
40-60	67 (83.8)	66 (82.5)	72 (90)
>60	26 (57.8)	34 (75.5)	35 (77.8)
P value	<0.001	0.329	0.039
Sex			
Male	43 (71.7)	45 (75)	49 (81.7)
Female	72 (80)	77 (85.5)	81 (90)
Stages			
I	14 (73.9)	19 (100)	19 (100)
II	23 (76.7)	23 (76.7)	25 (83.3)
III	68 (80.1)	70 (83.3)	75 (89.2)
IV	14 (82.4)	13 (76.4)	4 (23.5)
Cancer			
Breast cancer	56 (84.9)	58 (87.9)	62 (93.4)
Prostate cancer	5 (71.5)	4 (57.1)	6 (85.7)
Upper GI cancer	12 (92.3)	11 (84.6)	12 (92.3)
Colorectal cancer	14 (63.7)	16 (72.8)	18 (81.8)
Brain glioma	2 (50)	3 (75)	3 (75)
Head and neck cancer	5 (62.5)	6 (75)	6 (75)
Hematologic malignancies	4 (40)	5 (50)	6 (60)
Gynecological cancers	3 (75)	3 (75)	3 (75)
Others	13 (81.2)	13 (81.2)	14 (87.5)
Treatment			
Chemotherapy ± RT	38 (70.4)	41 (76.2)	45 (83.3)
Radiotherapy alone	18 (90)	18 (90)	19 (95)
Follow-up patients	66 (87.4)	72 (95.3)	73 (96)
P value	0.007	0.001	0.003
History of Covid-19			
Yes	132 (88)	137 (91.3)	137 (91.3)
No	118 (78.7)	112 (74.6)	112 (74.6)
SARS-CoV-2 immunoglobulin G positive after vaccination			
Yes	132 (88)	136 (90.7)	138 (92)
No	116 (77.3)	110 (73.3)	127 (84.6)
P value	0.003	0.059	0.162

Table 3: Vaccine side effects

	Adverse effects	Grade	Total (%)	
Local	Pain	Mild	14.1	
		Moderate	8.9	
		Severe	1.9	
Systemic	Swelling		0.8	
		Itching		.6
			Redness	
	Fever			I (38-39°C)
		II (>39-40°C)		3.7
		III (>40°C ≤ 24h)	1.7	
	Chills	I	7.2	
		II	1.6	
		III	0.5	
	Fatigue	I	15.9	
		II	3.5	
		III	0.5	
Anorexia	I	2.3		
	II	2.5		
	III	0.5		
Nausea	I	6.9		
	II	2.9		
	III	0.5		
Vomiting	I	1.9		
	II	.5		
	III	.2		
Adverse effects				
Myalgia		I	12.1	
		II	5.8	
		III	1.5	
Diarrhea		I	1.5	
		II	.5	
		III	.2	

The rate of seroconversion was 90% in patients from 40-60 years old which was high than in other age groups. Similarly, seroconversion was highest in breast cancer patients (93.4%). Antibody response was higher in patients receiving radiotherapy alone (95%) than in chemotherapy (83.3%). The serologic responses after vaccination are shown in table 2.

Local and systemic side effects post-vaccination are shown in table 3. 30.6% of participants developed a fever and 20.9% had fatigue. Other side effects were also observed including pain, redness, swelling, itching, chills, anorexia, nausea, vomiting, myalgia and diarrhea. Pain, myalgia and high fever were most common in females. Subjects who were covid positive before vaccination mostly reported swelling, headache, pain and myalgia.

DISCUSSION

Research has revealed that cancer patients are at great risk if they develop a Covid-19 infection. Cancer patients need mechanical ventilation and ICU admission 3.5 times more than the general public (Liang *et al.*, 2020). Another study observed a 28% mortality rate in cancer patients with Covid-19 (Lee *et al.*, 2020). They also develop fewer immunoglobulin G antibodies after Covid-19 infection (72.5% seropositive).

Although there was limited knowledge regarding the side effects of SARS-CoV-2 vaccination in patients with malignancy, it was recommended in all parts of the world due to its satisfactory results. Sinopharm (BBIBP-CorV) is one of those vaccines manufactured by China but is an inactivated vaccine. Several clinical trials confirmed its safety and efficacy in healthy individuals (78.1%) (Liu *et al.*, 2020). The most frequent side effects in the phase III trial were headache and injection site pain. In addition, fever was also a common side effect in phases I and II similar to our study (Al Kaabi *et al.*, 2021, Xia *et al.*, 2021).

According to a recent report, the Pfizer vaccine was effective in cancer patients as in healthy individuals and similar side effects in both groups except myalgia (34%) which was mostly observed in patients with malignancy. As in our study, injection site pain was reported by 63% of the participants (Xia *et al.*, 2021).

A common concern was reported by physicians that COVID-19 vaccination in patients receiving cancer treatment may lead to adverse effects, missing some treatment sessions (Brko *et al.*, 2021). However, this was not proved true in our study as any of the side effects caused any patient to miss treatment sessions.

Another study also addressed the safety of Covid-19 vaccines in which Pfizer was administered in two shots

that were 21 days apart (Monin *et al.*, 2021). The seroconversion observed after 1st dose was 95% for healthy patients, 38% in cancer patients and 18% in patients with hematological malignancy and after 2nd dose seroconversion was 100% for healthy patients, 95% in cancer patients and 60 % in patients with hematological malignancy. Similar results were noted in our study where seroconversion in hematological malignancy patients was 60% and 83.7% in cancer patients. Similarly, 95% of patients receiving radiotherapy showed a positive response to the vaccine which was reassuring. However, only 40% of patients with hematologic malignancies had an anti-spike protein.

Agha *et al* concluded that less than half of the blood cancer patients were not able to produce antibodies to the SARS-CoV-2 spike protein after mRNA vaccines were administered (Agha *et al.*, 2021). The results showed only 23% of blood cancer-produced antibodies. Similar results were reported in Ollila *et al.* where seroconversion was observed in only 39.3% of patients with hematologic malignancy (Ollila *et al.*, 2021). The B-cell/plasma cell-depleting monoclonal antibodies treatment greatly influenced this rate. A low seroconversion was also observed in patients with malignancies and patients whose time interval between recent chemotherapy and vaccination was less.

Massarweh *et al* reported that cancer patients showed high seroconversion after two doses of vaccine by administration of BNT 162b2, an mRNA vaccine (Massarweh *et al.*, 2021).

Our study had some limitations including a shorter follow-up period to assess long-term side effects, the effectiveness of the vaccine against new variants and the requirement of a booster dose. It is recommended to conduct a study with longer period and administration of other vaccines as well.

CONCLUSION

Sinopharm vaccine is effective and safe for patients with malignancies especially in patients receiving radiation therapy but still recommended for older patients and patients receiving chemotherapy.

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