Issues on COVID-19 vaccines

Characteristics of mortality cases reported post COVID-19 vaccination, 2021 - The result of causality assessment by adverse reaction demage investigation team

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Abstract

On February 26, 2021, the Korea Disease Control and Prevention Agency (KDCA) began coronavirus disease 19 (COVID-19) vaccinations for staff and patients in nursing hospitals and nursing facilities. The aim of this article was to report the result of causality assessment and characteristics of COVID-19 vaccine-related mortality cases. Adverse reactions to the vaccine were collected using the vaccine adverse event reporting system (VAERS) of essential vaccinations. A rapid response system was established, including a city-state/public-private quick reaction team to rapidly evaluate the causality of reported adverse reactions. The city-state/public-private quick reaction team and the KDCA's COVID-19 vaccination damage investigation team began operations in March 2021. By July 12, 2021, the two teams had held twenty-two meetings to assess the causality of 373 COVID-19 vaccine adverse reaction cases of mortality. The cases consisted of 191 males and 182 females. There were 146 cases related to the AstraZeneca vaccine (ChAdOx) and 227 cases related to the Pfizer BioTec vaccine (BNT162b2). 165 people died within six days of receiving the COVID-19 vaccine, and 112 autopsies were conducted. 355 people had underlying diseases, and hypertension was the most common disease due to causal evaluation; one person was diagnosed with thrombosis with thrombocytopenia syndrome. The rest of the cases did not accept causality, and the leading cause of death was ischemic heart disease.

Keywords: COVID-19, Vaccination, Adverse reactions

Introduction

On February 26, 2021, the Korea Disease Control and Prevention Agency (KDCA) began COVID-19 vaccinations for high-risk populations; staff and patients in nursing hospitals and nursing facilities. The aim of the KDCA was to reduce mortality due to COVID-19 and to prevent the spread of COVID-19. As of 2021, there are four types of COVID-19 vaccines currently in use in the Repulic of Korea: AstraZeneca (AZ), Pfizer BioTech, Janssen, and Moderna. A vaccine adverse event reporting system (VAERS) was established to detect risk signals in severe adverse events such as death, intensive care unit treatment, and life-threatening conditions post COVID-19-vaccination. The city-state operates this system with a public-private quick reaction team. The COVID-19 vaccination damage investigation team is comprised of medical experts from the department of internal medicine, pediatrics, neurology, and civil officers from the Ministry of Food and Drug Safety (MFDS), and the National Forensic Service (KFS). The team evaluates the causality of death post COVID-19 vaccination. Evaluations are based on autopsy records from the KFS, literature reviews, etc.

This study found that 373 deaths were reported after

COVID-19 vaccination between March 7 to July 16, 2021. Further findings indicated that, by July 12, 2021, 15,586,467 people had completed the first round of vaccination, and 5,872,306 had completed the second round of vaccination. Among them, 101,180 cases reported adverse reactions after receiving the COVID-19 vaccine. Furthermore, there were 5,101 cases of severe adverse reactions such as death, anaphylaxis, and thrombosis with thrombocytopenia syndrome [1,2].

Results

General characteristics of post-COVID-19 vaccination mortality cases

The causality of death after COVID-19 vaccination was reviewed. There were two types of vaccines reported: AstraZeneca (ChAdOx1) and Pfizer (BNT162b). Of the AstraZeneca vaccine-related deaths, eighteen people were in their 50s, and 43 people were in their 60s. The AstraZeneca vaccine was administered to those under 40 years of ages and 40s. A total of 222 individuals 70 years of age and older were given the Pfizer vaccine. In the causal assessment cases, the proportion of male and female deaths was 191 males (51.2%) and 182 females (48.8%) (Table 1).

Findings indicated that 30 (8.0%) deaths occurred within 24 hours after vaccination, 67 deaths (18.0%) occurred between 24 and 72 hours after vaccination, and 68 deaths (18.2%) occurred between 72 and 144 hours after vaccination. In addition, 208 deaths (55.8%) occurred more than 144 hours after vaccination, which accounted for 44.2 percent of all deaths within 6 days after vaccination (Table 1).

Autopsies were conducted for 99 cases due to the request of

Table 1. Characteristics of death case after COVID-19 vaccination

unit: n (%)

Category	Case (n=373)	ChAdOx1 (n=146)	BNT162b2 (n=227)
Age group, years			
≤39	3 (0.8)	3 (2.0)	-
40-49	7 (1.8)	7 (4.7)	-
50-59	19 (5.0)	18 (12.3)	1 (0.4)
60-69	47 (12.6)	43 (29.4)	4 (1.7)
70-79	87 (23.3)	27 (18.4)	60 (26.4)
≥80	210 (56.3)	48 (32.8)	162 (71.3)
Sex			
Male	191 (51.2)	84 (57.5)	107 (47.1)
Female	182 (48.8)	62 (42.5)	120 (52.9)
Time from vaccination to death			
Within 24hrs	30 (8.0)	16 (10.9)	14 (6.1)
24-72hrs under	67 (17.9)	37 (25.3)	30 (13.2)
72-144hrs under	68 (18.2)	21 (14.3)	47 (20.7)
144hrs over	208 (55.7)	72 (49.3)	136 (59.9)
Autopsy			
Yes	99 (26.5)	51 (34.9)	48 (21.1)
No	274 (73.4)	95 (65.0)	179 (78.8)

the family and judgment of the judicial authorities. Furthermore, 24 autopsy cases were responded to. For 69 cases, a quick result was presented orally or with a written note in the causality assessment team meeting (Table 1).

In the epidemiological investigation of death cases, 355 (95.1%) had underlying diseases, and 18 (4.8%) had no underlying diseases. Of those cases with underlying diseases, 136 (93.1%) were AstraZeneca cases and 219 (96.4%) were Pfizer cases. The underlying diseases were classified according to the Korean Standard Classification of Diseases (KCD). The underlying diseases across all reports included Hypertensive disease (227; 60.8%), Diabetes mellitus (142; 38.1%), Organic, including symptomatic, mental disorders (78; 20.9%), cerebrovascular diseases (63; 16.8%), and other forms of heart disease (48; 12.8%) (Table 2).

The vaccination damage investigation team reviewed the type of adverse reactions based on the medical records and autopsy reports. The causes of death estimated by the vaccination damage investigation team were combined with the immediate cause of death and preceding cause of death to quickly determine vaccination causality. In addition, if there was no evidence to suggest causality with the vaccination other than a temporal relationship and lack of supporting data to determine the mechanism of death, or if the autopsy did not indicate vaccination and causality, it was classified as an unknown cause of mortality. If two or more causes of non-vaccination and causality were in conflict, the authors either extracted the most likely causes or randomly extracted and suggested them as subcategories according to KCD.

In the vaccination damage investigation team, only one case (0.3%) of vaccine causality was accepted, and the other 372 cases (99.7%) of causality were rejected (Table 3). However, one of the cases in which causality was not accepted, in which the cause of death was acute myocarditis after AstraZeneca vaccination,

Table 2. Underlying diseases with death case after COVID-19 vaccination

unit: n (%)

	Total cases (n=373)	ChAdOx1 (n=146)	BNT162b2 (n=227)
Underlying diseases			
Yes	355 (95.1)	136 (93.1)	219 (96.4)
No	18 (4.8)	10 (6.8)	8 (3.5)
Types of underlying diseases *			
Hypertensive disease	227 (60.8)	92 (63.0)	135 (59.5)
Diabetes mellitus	142 (38.1)	59 (40.4)	83 (36.6)
Organic, including symptomatic, mental disorders	78 (20.9)	37 (25.3)	41 (18.1)
Cerebrovascular diseases	63 (16.8)	39 (26.7)	24 (10.6)
Other forms of heart disease	48 (12.8)	16 (11.0)	32 (14.1)
Ischemic heart disease	45 (12.0)	13 (8.9)	32 (14.1)
Metabolic disorders	43 (11.5)	17 (11.6)	26 (11.5)
Chronic lower respiratory diseases	42 (11.3)	12 (8.2)	30 (13.2)
Renal failure	38 (10.1)	18 (12.3)	20 (8.8)
Diseases of male genital organs	27 (7.2)	8 (5.5)	19 (8.4)

* If the intermediate classification has different basal diseases, aggregated in duplicate.

Table 3. The cause of deaths after COVID-19 vaccination and causality

unit: n (%)

	Total cases (n=373)	ChAdOx1 (n=146)	BNT162b2 (n=227)
Accepted the causality	1 (0.3)	1 (0.6)	-
- Thrombosis with thrombocytopenia syndrome	1	1	-
Rejected the causality	372 (99.6)	145 (99.3%)	227 (100%)
- Ischemic heart disease	71	28	43
- Other forms of heart disease*	57	20†	37
- Influenza and pneumonia	47	14	33
- Cerebrovascular disease	45	17	28
- Other bacterial diseases	27	15	12
- Unknown	26	10	16
- Diseases of arteries, arterioles and capillaries	18	3	15
- Renal failure	11	5	6
- Renal tubulo-interstitial diseases	9	5	4
- Pulmonary heart disease and diseases of pulmonary circulation	7	4	3
- Etc.‡	54	24	30

* Including sudden cardiac death

† One case after ChAdOx1 vaccination requires re-evaluation

‡ Etc. category including disorders of gallbladder, biliary tract and pancreas, diseases of oesophagus, stomach and duodenum, episodic and paroxysmal disorders, chronic lower respiratory diseases, symptoms and signs involving the circulatory and respiratory systems, other respiratory diseases principally affecting the interstitium, intestinal infectious diseases, other diseases of intestines, diseases of liver, and malignant neoplasms of digestive organs.

was assessed as an unlikely-indeterminate due to insufficient scientific evidence for vaccine and adverse reactions.

Conclusion

On April 7, 2021, the European Medicines Agency (EMA) recognized thrombosis with thrombocytopenia syndrome as a side effect of the AstraZeneca vaccine, and the Korean COVID-19 vaccination promotion team immediately stopped administering AstraZeneca. Then, the AstraZeneca vaccine was authorized for people aged 30 years and older and its administration was resumed on April 12, 2021. On May 27, 2021, a man in his 30s received the AstraZeneca vaccine. He was then diagnosed with thrombosis with thrombocytopenia syndrome on June 15, 2021, and he died the next day. On June 18, 2021, the vaccination damage investigation team accepted the causality of the vaccination. The COVID-19 vaccination response promotion team reviewed the risk-benefit ratio of the AstraZeneca vaccine based on the causal assessment results by the vaccination damage investigation team and adjusted the vaccination age to 50 years and older from July 1, 2021. This study analyzed the general characteristics and the results of the causality assessment for death cases in the vaccination damage investigation team from the 1st to 22nd meeting. COVID-19 vaccinations are the most effective tool in managing the morbidity and mortality rate of SARS-Cov-2 infection. The COVID-19 vaccination promotion team was expanded to vaccines for use among people aged ≥ 18

years and about 80% of general population being fully-vaccinated is expected to be reached by November 2021. The KDCA's vaccination damage investigation team and the city-state/public-private quick reaction team will continue to monitor known or unknown risk signals and to conduct causality assessments to share data with medical experts and related institutions to establish a safe vaccination adverse reaction management system.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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