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Examination of the ocular inflammatory effects after COVID-19 - vaccine

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ABSTRACT

Background: Recent researches indicated that the ophthalmologic negative impacts of COVID-19 disease and COVID-19 vaccination are highly overlapping. Objective: The present study aimed to investigate the inflammatory side effects after COVID-19 vaccination.

Patients and methods: A total of (60) cases who received two doses of COVID-19 vaccine were included to report ocular side effects appeared within14 days of receiving the second dose.

Results: Uveitis was recorded in (60%) of the study population after COVID-19 vaccinations, while the other inflammatory side effects were distributed as follows; scleritis (15%), VKH (10%), other effects (8.4%) and neuroretinopathy(6.6%). The majority (71.67%) of the study population was treated by corticosteroids. Visual acuity lowered ≤ 3 lines in (25%) of other inflammatory conditions; VA lowered > 3 lines in (25%) of other inflammatory conditions and (5.56%) of uveitis.

Conclusion: Following COVID-19 vaccination, ophthalmologic inflammatory events are possible.

Keywords: *COVID-19, Ocular, Uveitis, Vaccination*

INTRODUCTION

Even so, with over 1.5 billion doses of COVID-19 vaccinations prescribed globally, defining the causal link throughout every case of a potential unwanted outcome becomes a challenging. Given the massive number of vaccinations prescribed, it's logical for such occurrences of being fortuitous (1).

The mechanism explains the ocular inflammatory processes after COVID-19 vaccination is unknown. Popularly possible explanations entail molecular imitation due to similarities between uveal peptides and vaccine peptide particles, antigen-specific cell and antibody-mediated allergic responses, and inflammatory destruction caused by adjuvants, which also include vaccines stimulating innate immunity via endosolic or cytoplasmic nucleic acid receptor sites (2,3).

Facial nerve palsy, abducens nerve palsy, acute macular neuroretinopathy, central serous retinopathy, thrombosis, uveitis, multiple evanescent white dot syndrome, Vogt-Koyanagi-Harada (VKH) disease reactivation, and new-onset Graves' disease are among the ophthalmologic side effects of COVID-19 vaccinations (4).

PATIENTS AND METHODS

A data collection form was completed by ophthalmology clinicians regarding the ocular inflammatory effects appeared within14 days of receiving COVID-19. The data completed were about the demographic characteristics of patients such as age, gender, in addition to, time and type of COVID-19 vaccine, and the type of recorded ophthalmologic side effects, type of management and visual acuity outcomes.

STATISTICAL ANALYSIS

An Excel spreadsheet was established for the entry of data. The analyses were carried with SPSS software (Statistical Package for the Social Sciences, version 24, SSPS Inc, and Chicago, IL, USA).

RESULTS

The demographic characteristics of the study population (n=60) are shown in Table (1); it was found that (32/60) (53.3%) of the study population were females and (28/60) (46.7%) were males. Regarding age groups distribution, results showed that (19/60) (31.7 %) were aged (40 ≤ 55 years); (15/60) (25.0 %) were aged (25 ≤ 40 years); (14/60) (23.3 %) were aged (≥ 55 years) and (12/60) (20.0 %) were aged (18≤ 25 years).

TABLE 1: Demographic characteristics of the study population (n=60)

Demographic characteristics	**No**	**%**
Gender		
Male	28	46.7%
Female	32	53.3%
Age		
18≤ 25 years	12	20.0 %
25 ≤ 40 years	15	25.0 %
40 ≤ 55 years	19	31.7 %
≥ 55 years	14	23.3 %

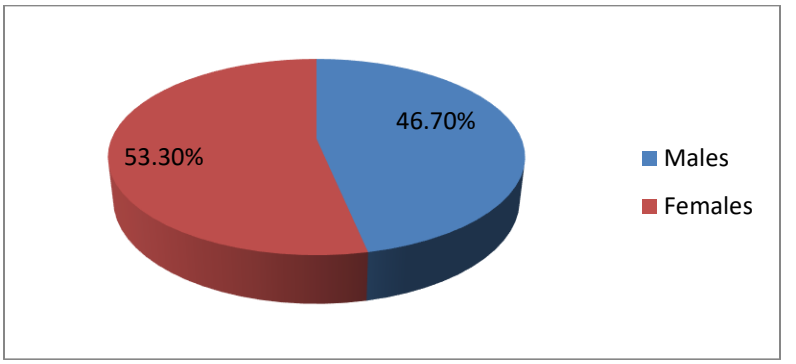

FIGURE 1: Gender distribution in the study population

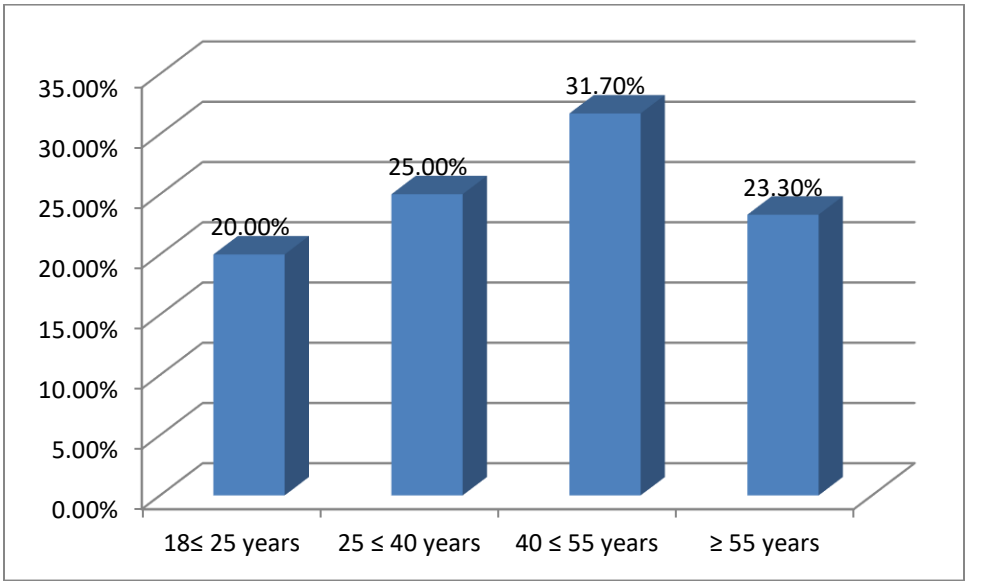

FIGURE 2: Age distribution in the study population

According to the results presented in Table (2); it was found that (28.3%) of the study population were vaccinated by Pfizer vaccine, (26.7%) by Moderna, (25.0%) by Sinopharm and (20.0%) by Astra-Zeneca.

TABLE 2: Distribution of the used vaccines in the study population (n=60)

Type of vaccine	***No, %***
Sinopharm	15 (25.0%)
Astra-Zeneca	12 (20.0%)
Pfizer	17 (28.3%)
Moderna	16 (26.7%)

Table (3) showed that (60%) of the study population had uveitis after COVID-19 vaccinations, while the other inflammatory side effects were distributed as follows ; scleritis (15%), VKH (10%), other effects (8.4%) and neuroretinopathy(6.6%).

TABLE 3: Distribution of ocular inflammatory side effects after COVID-19 vaccination in the study population (n=60)

	No, %
Uveitis	36 (60%)
Scleritis	9 (15%)
VKH	6 (10%)
Neuroretinopathy	4 (6.6%)
Others	5 (8.4%)

Table (4) showed that (36.11 %) of the cases with uveitis take place after Moderna vaccination, (33.33%) after Pfizer vaccine, (16.7 %) after Astra-Zeneca, and (13.88 %) after Sinopharm vaccine. Regarding scleritis, (44.44%) of cases appeared after Sinopharm vaccine, (22.22%) of cases appeared after Astra-Zeneca, (22.22%) of cases appeared after Pfizer vaccine, and (11.11%) appeared after Moderna. In addition, (33.33%) of cases of VKH were appeared after Sinopharm vaccine, also (33.33%) were appeared after Astra-Zeneca, (16.67%) after Pfizer vaccine, and (16.67%) after Moderna. Fifty percent of neuroretinopathy cases were appeared after Sinopharm vaccine, (25%) after Astra-Zeneca, and (25%) after Pfizer vaccine. Regarding other inflammatory conditions; (40%) of cases appeared Sinopharm vaccine, (20%) after Astra-Zeneca, (20%) after Pfizer vaccine, and (20%) after Moderna.

TABLE 4: Distribution of ocular inflammatory side effects after COVID-19 vaccination regarding the type of vaccine

	Uveitis	***Scleritis***	***VKH***	***Neuroretinopathy***	***Others***
Type of vaccine					
Sinopharm	5 (13.88 %)	4 (44.44%)	2 (33.33%)	2 (50%)	2(40%)
Astra-Zeneca	6 (16.7 %)	2 (22.22%)	2 (33.33%)	1(25%)	1(20%)
Pfizer	12 (33.33%)	2 (22.22%)	1 (16.67%)	1(25%)	1(20%)
Moderna	13 (36.11 %)	1 (11.11%)	1 (16.67%)	0	1(20%)

According to the results presented in Table (5); it was found that (71.67%) of the study population was treated by corticosteroids, (13.33%) by antivirals, (8.33%) by non steroidal anti-inflammatory drugs (NSAID), and (6.67%) by antibiotics. Visual acuity (VA) was not affected in (93.33%) of the study population, VA lowered ≤ 3 lines in (1.67%) and VA lowered > 3 lines in (5.0%) of cases.

TABLE 5: Treatment and visual acuity consequences after inflammatory side effects in total study population (n=60)

	No	**%**
Treatment		
Antibiotics	4	6.67%
NSAID	5	8.33%
Antivirals	8	13.33%
Corticosteroids	43	71.67%
VA consequence		
VA unaffected	56	93.33%
VA lowered ≤ 3 lines	1	1.67%
VA lowered > 3 lines	3	5.0%

Table (6) showed that (86.11%) of uveitis cases, (55.56%) of scleritis cases, (66.66%) of VKH, (40%) of neuroretinopathy and (25%) of other cases were treated by corticosteroids. While, (8.33%) of uveitis cases, (22.22%) of scleritis cases, (16.67%) of VKH, (20%) of neuroretinopathy and (25%) of other cases were treated by antivirals. On the other hand, (2.78%) of uveitis cases, (11.11%) of scleritis cases, (0%) of VKH, (20%) of neuroretinopathy and (50%) of other cases were treated by NSAID.

(2.78%) of uveitis cases, (11.11%) of scleritis cases, (16.67%) of VKH, (20%) of neuroretinopathy and (0%) of other cases were treated by antibiotics.

Visual acuity was not affected (94.44%) of uveitis, (50%) of other inflammatory cases and (100%) of VKH, scleritis and neuroretinopathy; VA lowered ≤ 3 lines in (25%) of other inflammatory conditions; VA lowered > 3 lines in (25%) of other inflammatory conditions and (5.56%) of uveitis.

TABLE 6: Distribution of treatment and visual acuity consequences after COVID-19 vaccination regarding ocular inflammatory side effects

	Uveitis	***Scleritis***	***VKH***	***Neuroretinopathy***	***Others***
Type of treatment					
Antibiotics	1/36 (2.78%)	1/9 (11.11%)	1/6(16.67%)	1/5(20%)	0/4 (0%)
NSAID	1/36 (2.78%)	1/9 (11.11%)	0	1/5(20%)	2/4(50%)
Antivirals	3/36 (8.33%)	2/9 (22.22%)	1/6(16.67%)	1/5(20%)	1/4(25%)
Corticosteroids	31/36 (86.11%)	5/9 (55.56%)	4/6 (66.66%)	2/5 (40%)	1/4(25%)
VA consequence					
VA unaffected	34/56(94.44%)	9/9 (100%)	6/6(100%)	5/5(100%)	2/4(50%)
VA lowered ≤ 3 lines	0	0	0	0	1/4(25%)
VA lowered > 3 lines	2/36(5.56%)	0	0	0	1/4(25%)

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DISCUSSION

Results of the current study showed that out of the (15) patients received Sinopharm vaccine , the distribution of ocular side effects was as follows ; (5) had uveitis, (4) had scleritis , (2) had VKH , (2) had neuroretinopathy and (2) had other inflammatory effects. Other ocular findings were obtained recently (5) identified ocular side effects that occur soon after getting an inactivated COVID-19 vaccination (Sinopharm). They reported seven patients with ocular side effects; one developed episcleritis, two developed anterior scleritis, two developed acute macular neuroretinopathy, one developed paracentral acute middle maculopathy, and one developed subretinal fluid. Also, (6) described a case of bilateral anterior uveitis five days after receiving the second dose of the Sinopharm COVID-19 vaccine.

In our study, (60%) of the study population had uveitis after COVID-19 vaccinations, (15%) had scleritis, (10%) had VKH, (8.4%) had other effects and (6.6%) had neuroretinopathy. Several researchers also found cases of uveitis and Vogt-Koyanagi-Harada (VKH) disease after vaccination, with the majority of cases resolving or significantly improving after both steroidal and non steroidal immuno-suppression (7-12). A previous case of arteritic anterior ischemic optic neuropathy after COVID-19 vaccination had been reported (13,14).

Regarding the AstraZeneca vaccine results in our study, it was found that the distribution of ocular side effects was as follows; (16.7%) had uveitis, (22.22%) had scleritis , (33.33%) had VKH , (22%) had neuroretinopathy and (20%) had other inflammatory effects.

Several negative ocular effects have been reported following immunization with the AstraZeneca adenovirus vector vaccine. Acute macular neuroretinopathy, bilateral immune-mediated keratolysis, and VKH disease have all been noted as possible side effects of vaccination (15-18). A young, Caucasian, and healthy woman developed bilateral acute macular neuroretinopathy after receiving the first dose of Oxford-AstraZeneca COVID-19 vaccine in the study of (19).

The AstraZeneca vaccine administration was linked to vaccine-induced immune thrombotic thrombocytopenia (VITT) and thrombosis with possibly deadly thrombotic events have been observed (20).

The current study results showed that (71.67%) of the study population was treated by corticosteroids, (13.33%) by antivirals, (8.33%) by non steroidal anti-inflammatory drugs (NSAID), and (6.67%) by antibiotics.

In terms of event management in the study of (21), it was found that (55.7 %) of patients received only topical corticosteroids, (18.6 %) received systemic corticosteroids, (8.6 %) received antivirals, and (2.8 %) received topical corticosteroids in combination with oral non steroidal anti-inflammatory (NSAIDs).

Results of our study showed that visual acuity (VA) was not affected in (93.33%) of the study population, VA lowered ≤ 3 lines in (1.67%) and VA lowered > 3 lines in (5.0%) of cases. The case study reported in (22) study showed a sudden onset of visual field darkening after receiving the second dose of the Pfizer-BioNTech COVID-19 vaccine.

In our study, VA lowered ≤ 3 lines in (1.67%) and VA lowered > 3 lines in (5.0%) of cases. (23) found that on the last follow-up, (4.9 %) had persistent visual loss; (visual acuity (VA) reduced ≤3 lines) and (2.4 %) due to nummular corneal lesions (VA reduced > 3 lines).

However, the recorded ocular side effects reported after vaccination; COVID-19 vaccination is validated as a significant public health dimension, and all approved vaccines have been shown to be safe and effective.

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Future multicenter investigations with larger study population are necessary to confirm the correlations between COVID-19 vaccination and ocular side effects; in addition, it is important to identify high-risk features in patients experiencing ophthalmologic side effects after COVID-19 vaccination.

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