

Vaxzevria (AstraZeneca) as a Covid-19 Vaccination

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Abstract:- The vaxzevria is a vaccine for preventing covid-19 caused by SARS-CoV-2 virus in people from the age of 18 years and older. Also known as Astra-Zeneca or (ChAdOx1 S [recombinant]). The vaccine is 63% effective in an ongoing, large-scale clinical trial. The vaccine has been modified to induce either of mRNA COVID-19 vaccines (Pfizer or Moderna). They can be used as a second dose in cases where Astra Zeneca was given as the first dose. Though the vaccine has been approved in nearly 138 countries, a total of 184,679 cases of side effects were reported. The vaccine has reported to prevent over 50 million COVID-19 cases. The vaccine is taken as 2 doses plus a booster dose of injections.

Keywords:- Astra-Zeneca; AZD1222; Covid -19; Delta Variant; Side Effects; TTS.

I. INTRODUCTION

The Vaxzevria is a **Non-Replicating Viral Vector** vaccine developed by the Oxford/AstraZeneca and the Serum Institute of India. The vaccine is also known as Oxford, Astra Zeneca vaccine. It has been **approved in nearly 138 countries and trailed at 30 countries over 62 times** under the research name **AZD1222 (ChAdOx1)**. A non-replicating viral vector contains a harmless virus that can't make copies and contain viral geneticmaterial packaged inside them.

The Vaxzevria is administrated as an intramuscular injection. 3 shots of the Vaxzevria have proven to produce neutralizing antibody level against Omicron and 2 doses show promising results against the delta variant of the covid 19 (SARS-CoV-2)[16], [14], [13]. Vaxzevria generates diverse and durable T-cell responses to multiple variants. This results in broader response than antibodies [15], [12]. The vaccine is generally prescribed for people at the age of 18 and above. Vaxzevria doesn't contain the virus itself, hence it's potential to cause covid 19 is nearly nil.

As the AstraZeneca doesn't behave like any 'live vaccine', the don't replicate or spread to other cells. Hence, doesn't cause infections. The modified adenovirus carrier is safe in people who are immunocompromised [3].

II. PRODUCTION OF THE VACCINE

The production of the Vaxzevria involves procuring the required contents, discovering the right storing conditions, analysing the end product appearance and packaging the end product. These are discussed in detail below:

A. Contents

The vaccine is composed of GMOs. A single dose (0.5 ml) of the Vaxzevria contains: ChAdOx1-S* recombinant, not less than 2.5 * 10⁸ infectious units. The recombinant is obtained from the chimpanzee adenovirus vector that is replication-deficient and encodes the SARS-CoV-2 Spike glycoprotein. It is produced in the genetically modified human embryonic kidney (HEK) 293 cells. The vaccine also contains L-histidine hydrochloride monohydrate, polysorbate 80 (E 433), disodium edetate dihydrate, sucrose, magnesium chloride hexahydrate, L-histidine, and water along with sodium and alcohol [5].

B. Storage

The ingredients in the vaccine do not cause covid 19. The prepared vaccine is stored in a refrigerator at 2°C – 8°C, without freezing. The vaccine has to be protected from light hence are kept in vials in outer cartons. During use the vaccine has to be stored at 2°C to 25°C.

C. Appearance

The vaccine is a slightly opaque, colourless (Fig.1.) to slightly brown suspension (Fig.2.).



Fig. 1. – Image of Vaxzevria (Colourless).



Fig.2. - Image of Vaxzevria (Slightly brown).

D. Packaging

The general marketed package size is 10 dose multidose vial (5 ml). It comes with a rubber stopper and aluminium over seal. Each pack contains a total of 10 vials and each vial in turn contains 10 doses of 0.5 ml. (Fig.3.) It can also be marketed as 8 dose multidose vial (4 ml). With a rubber stopper and aluminium over seal. In a pack of 10 vials and each vial in turn contains 8 doses of 0.5 ml [5].



Fig.3. – Image depicting the packaging.

III. INJECTING VAXZERIA

Vaxzevria stimulates the immune system to produce its own antibodies against the covid 19 virus. It produces a natural defence mechanism against the virus and prevents from future attacks. They are injected as 2 injections. The shots are usually injected into the muscles at the upper arm. While the second dose is usually given 4 to 12 weeks after the first dose [5]. 0.5 ml of vaxzevria is injected into the upper arm muscle. 2 shots of the injection are given to the patient. The second shot is usually scheduled between 4 to 12 weeks after the first shot. It is compulsory to take both the shots as vaxzevria in case the first shot is vaxzevria. A booster (third) is taken approximately 6 months after the second dose.

IV. SIDE EFFECTS

The majority of the cases recording the side effects of vaxzevria were recorded within the first 4 weeks of vaccination. Special cases of CVST (cerebrovascular venous and sinus thrombosis) without thrombocytopenia. Some cases were fatal outcome. Treatments used for thrombosis with thrombocytopenia syndrome (TTS) can't be used for treating CVST. Following the vaccination, blood clots in the brain, not associated with low level of platelets were also observed in some rare cases [9]. The vaccine also has shown some adverse reaction including headache, muscle or body aches, nausea or vomiting, fever, chills, malaise, fatigue and painful injection sites. These effects are visible within a week after vaccination [1]. Other effects include shortness of breath, cough, new loss of taste or smell, congestion or runny nose, sore throat, and diarrhoea.

V. THROMBOSIS WITH THROMBOCYTOPENIA SYNDROME (TTS)

The Thrombosis with thrombocytopenia syndrome (TTS) are a phenomenon where low levels of blood platelets (thrombocytopenia) together with blood clot (thrombosis) is observed. The symptoms of TTS include persistent or severe headache that can't be treated with pain relief medications and abdominal pain. These symptoms are visible after 4 to 42 days of vaccinations [4].

The blood clot occurs primarily at the brain (cerebral venous sinus thrombosis or CVST) or in the abdomen (idiopathic splanchnic thrombosis) [3]. The causative mechanism for the TTS is similar to the heparin-induced thrombocytopenia (HIT) that causes the heparin treatment. TTS is more common among women and young adults.

Age	Potential of a Thrombosis with thrombocytopenia syndrome (TTS) per 1,00,000 first dose of Vaxzevria vaccine.
< 50 years	3.1
50 – 59 years	2.7
60 – 69 years	1.4
70 – 79 years	1.8
80 + years	1.9

Table 1 – Potential of TTS [7].

VI. PRECAUTIONS

It is highly recommended that people with anaphylaxis to both the previous dose of the vaccine or any component of the vaccine such as the polysorbate 80, to not receive the vaccinations. Also, patients with a history of capillary leak syndrome or with TTS occurring after the previous doses of the vaccine must retain from receiving vaccination. Patients with confirmed mastocytosis with recurrent anaphylaxis must also take precautions after receiving the dosage. These precautions include observation for 30 minutes after receiving the vaccinations [3].

People with cerebral venous sinus thrombosis, idiopathic splanchnic thrombosis, heparin-induced thrombocytopenia, and antiphospholipid syndrome with thrombosis recommended to receive Pfizer or Moderna [8]. It is also recommended that people with severe immunocompromise to have a third dose of Pfizer, Novavax or Moderna for their primary course.

Patients who have history of covid- 19 infection have to wait for up to 3 months to receive the vaccinations. The AstraZeneca vaccination is given to people aged 18 or older. For women who are wither pregnant or breastfeeding it is preferred to receive either Pfizer or Moderna as the second dose [3].

VII. RESULT

Though there are some adverse side effects and crucial manufacturing process, the vaxzevria has proven to be a successful vaccine against the variants and the original strain of the covid 19 (SARS-CoV-2). We also focused on production of the vaccine starting from the contents, storage, appearance and packaging. The mode of uptake of the vaxzevria infection was also discussed. The paper tries to understand the effects and the creditability of the AstraZeneca (vaxzevria) vaccine on different age group. It was discovered through this study that the side effects of the vaccine are predominant in young adults and women. But, with proper precautions these vaccines can be taken by any one above the age of 18.

VIII. DISCUSSION

The Astra-Zeneca vaccine has proven to be a successful vaccination against the covid-19 and its variations. The vaccine has been approved in over 138 countries. The packaging, storage and infection of the vaccine have been discussed in the paper. The paper also suggests precautions to be taken in case of pre-existing medical conditions such as various kinds of thrombosis. It is recommended that people with a history of covid-19 take the vaccine after 3 months of being tested negative. The vaxzevria vaccination is safe for both pregnant and breastfeeding mothers. Though there are a few side effects as listed above, the vaxzevria vaccine is safe for people above the age of 18.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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