How Did the Pharmacist Come Across the COVID-19 Vaccine? A Review Article.

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Abstract

Pharmacists have, in recent years, been identified as a vital component in the healthcare industry, with professional organizations calling for their involvement in health processes. Previously, pharmacists were limited exclusively to the administration of dosages and medicine to patients in a bid to improve their health. On the contrary, there has been a surge in interest based on the ancillary role they can play in preventing or managing diseases. Specifically, the role of pharmacists in vaccine discovery and development has come to the fore, with practitioners relying on their skills, competencies, and knowledge. The coronavirus pandemic brought to light the seminal nature of pharmacists, especially in the discovery of the vaccine. The vaccine was discovered and developed based on previous research and data collected by pharmacists. The data helped fast-track the vaccine development process, thereby minimizing the spread of the coronavirus and helping society return to normalcy. The subsequent literature review focuses on how pharmacists discovered the COVID-19 vaccine. The review is guided by the thesis that the skills, competencies, and knowledge of the pharmacists allowed the international community to curb one of the most deleterious pandemics ever known to mankind.

Keywords: Pharmacists, vaccine discovery, vaccine development, phases.

Introduction

The advent and subsequent spread of the coronavirus caused a healthcare scare in society due to its novel nature. The coronavirus was caused by the SARS-CoV-2 virus, with the first case being reported on December 31st, 2019 (Harapan et al., 2020). According to Harapan et al. (2020), the disease contained similar signs and symptoms to pneumonia, although its effects were quite deleterious. Most people who contracted the disease reported breathing difficulties since the virus undermined their respiratory system (Shereen, Khan, Kazmi, Bashir, & Siddique, 2020). Comparative analyses reveal that the associated mortality rates increased daily, with densely populated nations like India reporting the highest rates at 4144.86 compared to the United States at 588.57, as shown in figure 1 below (Mathieu et al., 2022).

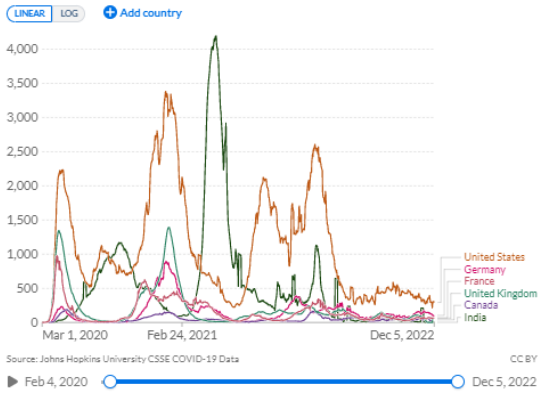

Figure 1: Coronavirus cases in the past two years

Source: (Mathieu, et al., 2022)

The surge in cases necessitated concerted efforts from the healthcare industry, with pharmacists spearheading the development and rolling out of vaccines (Durand et al., 2022; Elbeddini, Prabaharan, Almasalkhi, & Tran, 2020; Gatta & Ghldlnell, 2021). The role of pharmacists in vaccine discovery and development has been the subject of disputatious debates due to their understanding of pharmacokinetics and body response to the medicine. Most pharmacists are enrolled in vaccine development processes to guide companies on the effects, response levels, and social hesitancy.

Literature Review

Poudel et al. (2019) presented a journal article on the role of pharmacists in vaccination. According to the authors, pharmacists have gained a role in the healthcare environment as established advocates and qualified providers of vaccinations (Poudel et al., 2019; Paudyal et al., 2021). Their role is linked intermittently with their immense knowledge regarding disease causes, patterns, and mitigating strategies (Poudel et al., 2019). Kolge and Sargar (2020) build upon this disposition by highlighting that pharmacists have always been involved in vaccine discovery ever since the mid-1800s. In most instances, the healthcare industry relies on pharmacists to guide it on how to develop targeted interventions (Kolge & Sargar, 2020).

Based on this notion, Hilotin (2020) reported that the first people to discover the COVID-19 vaccine were two pharmacists called Ugur Sahin and Ozlem Tureci. The pharmacists had conducted a myriad of lab work and tests on the BNT162 vaccine using messenger RNA technology. It is imperative to note that pharmacists had previously focused on creating cancer therapies by programming cells intending to harness healing proteins (Hilotin, 2020). The processes used for the cancer therapies and targeted interventions played a major role in setting forth the foundation for the development of the COVID Vaccine. As a matter of fact, the first-ever vaccine was produced by Pfizer in conjunction with their company, BioNTech (Hilotin, 2020). The vaccine was deemed by scholars and practitioners alike as 90% effective against the coronavirus due to its ability to target the human body's own proteins and generate a fake virus similar to the pathogen (Hilotin, 2020; Li et al., 2020).

According to Bauters (2021), the vaccine contained an anti-viral messenger RNA (mRNA) similar to the one used for cancer therapies. Previously, pharmacists were adamant about deploying this technique against diseases due to the associated risk and lack of funding. France 24 (2020) alludes that the knowledge and insight used by the pharmacists were based on the findings by Katalin Kariko. Kariko was a biochemist cum pharmacist who focused on RNA at a time when the scientific community was hell-bent on

understanding DNA (France 24, 2020). According to Kariko, RNA influenced how the cells produced proteins by doling out instructions. Her research was criticized because most practitioners believed that the body attacked the RNA and treated it as an intruder, thereby contributing to strong inflammatory reactions (France 24, 2020). Contrarily, Kariko continued with her research by placing the RNA into lipid nanoparticles which prevented them from degrading too quickly and facilitating entry into the body (France 24, 2020). Contrarily, the strides made by Ugur Ahin and Ozlem Tureci heralded a new era in medicine with the mRNA vaccine injecting synthetic genes into the body (Bauters, 2021). The genes would then elicit a response from the immune system, thus increasing its ability to fend off infections (Bauters, 2021).

Mellet and Pepper (2021) highlight that the involvement of pharmacists in the development of the vaccine inadvertently reduced the time spent and associated costs. Traditionally, the development of efficient vaccines takes several years, with most targeted interventions going through clinical trials (Patel, Patel, & Akinmuyiwa, 2020). Furthermore, the vaccines require strict regulatory approvals prior to manufacturing and distribution. The traditional vaccine discovery and development is conducted in 5 phases, with the initial phase involving the pre-clinical analysis, as shown in figure 2 below. The analysis focuses on determining whether the candidate vaccine is safe and effective for humans (Turcu-Stiolica et al., 2021).

Thereafter, the vaccine goes through phase 1, whereby it is administered to between 20 and 80 people to determine tolerance and health effects (Mellet & Pepper, 2021). Phase II involves testing the vaccine on a bigger sample of between 100 and 300 people in order to develop insight regarding the efficacy, immunogenicity, and safety of the vaccine (Mellet & Pepper, 2021). In Phase III, the practitioners license the vaccine and administer it to between 1000 and 3000 people (Mellet & Pepper, 2021). If the phase demonstrates efficiency, then the vaccine is marketed to the national regulatory authority (Yaseen et al., 2021). The final phase is characterized by administering the vaccine to over 10000 people after gaining approval from the government (Yemeke, McMillan, Marciniak, & Ozawa, 2021; Mellet & Pepper, 2021).

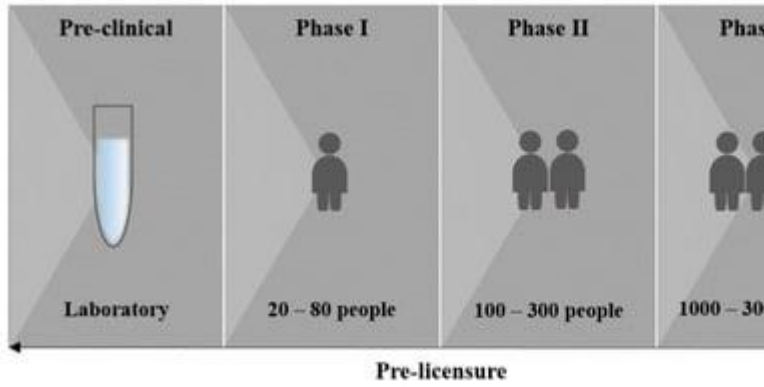

Figure 2: Vaccine Development Phases

Source: (Mellet & Pepper, 2021)

Kashte, Gulbake, El-Amin III, and Gupta (2021) highlight that the previous data collected by pharmacists on mRNA vaccines fast-tracked the discovery and development. The data helped reduce the amount of time from 15 years to 24 months (Government Accountability Office, 2022). Additionally, the pre-clinical development of the vaccine candidates by Ugur Sahin and Ozlem Tureci, in tandem with Pfizer, omitted the initial pre-clinical phase. Other pharmacists used the pre-clinical and toxicology data to modify their vaccine candidates, with the first trial starting in March 2020 (Kashte, Gulbake, El-Amin, & Gupta, 2021). The trials were formulated to reduce the time horizon with rapid advancement occurring in phases 1 and II, while phase III focused on doling out the vaccines to the masses (Kashte, Gulbake, El-Amin, & Gupta, 2021).

Conclusion

The preceding literature review explores various works of erudition focusing on the role played by pharmacists in discovering and developing the COVID-19 vaccine. The literature review indicates that the vaccine was discovered by two pharmacists who used insight from a biochemist on how to introduce the mRNA into the body and train the

immune system to produce the necessary antibodies. The foundation laid by the pharmacists fast-tracked the development of the vaccine while reducing the need to go through the arduous process of testing the vaccines. Their data improved decision-making and understanding of the adverse effects of the vaccine on the body. Additionally, the collaborative effort among pharmacists, biochemists, and other healthcare professionals was crucial in streamlining the research and development process. This collaboration not only enhanced the vaccine's efficacy but also ensured a swift response to the global health crisis. The comprehensive understanding of mRNA technology by the pharmacists played an essential role in overcoming the challenges associated with traditional vaccine development.

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