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Side Effects of COVID-19 Pfizer Vaccine among Al-Makassed Islamic Charitable Hospital Employees

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Side Effects of COVID-19 Vaccine among Al-Makassed Islamic Charitable Hospital Employees

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Dedication

To my parents, your unfaltering love, sacrifice and firm belief in me had formed the basis for this academic journey. I have, indeed, relied on your guidance, encouragement and unwavering support, throughout. I, therefore, dedicate this thesis to you, with the deepest expressions of gratitude and love, as words fail me at this moment.

I wish to pay tribute to the venerable professors at Al-Quds University. With your guidance, teaching and counsel you have helped me pave the way forward as I near the end of this academic journey. I appreciate your being so dedicated to teaching me and deepening my understanding. Thank you for your help and assistance.

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This achievement is a testimony to the tremendous impact of my loved ones. I would like to express my greatest appreciation for your endless support and love that brought me here.

Mohammad Hisham Khallaf

Declaration

I certify that this thesis submitted for the degree of Master, is the result of my research, except were otherwise acknowledged, and that this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed 

Name: Mohammad Hisham Khallaf

Date: 04/04/2024

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List of Abbreviations

SARS-Cov-2	Severe Acute respiratory syndrome corona virus 2
WHO	World health organization
FDA	Food and Drug Aminitstration
SPSS	Statistical backage for the social science
SARS-Cov	Severe Acute Respiratory Syndrome -Corona virus
MERS-Cov	Middle East Respiratory syndrome-corona virus
EUAs	Emergency used authorization.
CDC	Center for Disease control and prevention

Abstract

Side effects of Covid-19 Vaccine among Al-Makassed Islamic Charitable Hospital Employees.

Background: The BioNTech-Pfizer Covid-19 vaccine was given to the employees at Al-Makassed Hospital, at a time when the data on the side effects of the respective vaccine were very scarce. Therefore, in this research, we seek to examine the side effects that might be caused by the vaccine and its related complications, as experienced by the vaccinated employees at Al-Makassed Hospital.

Study methodology: A cross-sectional study was conducted at Al-Makassed Hospital, Participants' prior consent was obtained. The data was collected through an online questionnaire and analyzed through the use of Statistical Package for the Social Sciences (SPSS) software. Univariate and bivariate analysis was conducted to examine the study objectives.

Result: The study examined 203 employees from Al-Makassed Hospital, investigating the side effects that they experienced post Covid-19 vaccination. Half of the sample were males, 44% were in the age group 20-30 years, and 60.6% hold a bachelor degree.

The most common side effects were pain at the injection site (82.9%), and the least one was the erection problems (1.1%). Nausea presented a significant association with the female gender compared to male participants, and was more prevalent in those in the age group20-30 years old. Also, city of residence showed significant association with the following side effects: lymph node enlargement, syncope and allergic reactions after vaccination and city of residence. A significant association were found between rashes and participants with chronic diseases. Those with allergies reported general weakness more than those without such allergies. Syncope and diarrhea were reported more by participants using chronic medications. No association founded between post covid-19 vaccine and other vaccines. The study found a

significant association between working in shifts and the following two covid-19 vaccine side effects: general weakness and cough. Nausea, cough, difficulty of breathing, low back pain and menstrual cycle changes, all these side effects were reported more by participants diagnosed with an infection of covid-19 post any dose of the vaccine. The study showed that pain in the injection site and muscle and joint pain were the most reported side effects following the first vaccine dose, pain in the injection site and general weakness were the most reported side effects post the second vaccine dose, and headache and pain in the injection site were the most reported following the third dose of the vaccine. (65.3%) of participants had similar side effects to those of their vaccinated family members. Majority of participants complained of side effects in less than 24 hours post vaccination. In terms of the duration of side effects, the majority (58.5%) lasted for three days. (59.6%) of the reported side effects were mild. (64.2%) received treatment as a result of vaccine side effects and (78.2%) responded well to treatment. **Conclusion**: The majority of vaccine side effects in this study, whether common or rare, are consistent across the board. Some correlations were found drawing, thus, a number of associations with common demographic factors such as gender, age and health status among others. The predominance of side effects appeared to be mild to moderate in severity, appearing within 24 hours following vaccination and lasting, for the most part, up to 48 hours, indicating that the vaccine itself is safe and effective, highlighting, therefore, the need for vaccination and enhancing people's confidence toward the vaccine itself, as the virus still lurks around, not so much in disguise, as new variants of the virus have come out and spread globally with the virus still infecting people.

الملخص:

عنوان الدراسة: الآثار الجانبية للقاح كوفيد-19 على العاملين في مستشفى المقاصد الإسلامية الخيرية.

إعداد: محمد هشام خلاف

إشراف: د. ربيع عدوان

خلفية الدراسة:

في جميع أنحاء العالم، كان العاملون في مجال الرعاية الصحية في الخطوط الأمامية للوباء في الاستجابة لحالات الطوارئ وتوفير الرعاية للمرضى المصابين؛ وبالتالي، كانوا الأكثر عرضة للإصابة بالفيروس من غيرهم بسبب تعرضهم المستمر للمرضى المصابين بكوفيد-19، وعلى هذا النحو، تم منحهم الأولوية في التطعيم حفاظًا على صحتهم وضمان لاستمرارية خدمات الرعاية الصحية الأساسية، حيث تم إعطاء لقاح كوفيد-19 من شركة BioNTech-Pfizer للموظفين في مستشفى المقاصد، في وقت كانت فيه البيانات حول الآثار الجانبية للقاح المعني شحيحة للغاية. لذلك نسعى في هذا البحث إلى دراسة وفحص الآثار الجانبية للقاح المذكور وأي مضاعفات محتملة ذات صلة، كما عاشها العاملون الذين تم تطعيمهم في مستشفى المقاصد.

النتائج: شارك في الدراسة 203 موظفًا من مستشفى المقاصد، لاستكشاف الآثار الجانبية التي تعرضوا لها بعد تلقي لقاح كوفيد-19. كان توزيع الجنس في عينة الدراسة تقريبًا متساويًا، حيث كان(50.3%) من المشاركين ذكورًا و(49.7%) إناثًا. كشف توزيع الأعمار أن الغالبية العظمى (44%) كانت تقع ضمن فئة الأعمار 20-30 عامًا، وأن معظم المشاركين يحملون درجة البكالوريوس (60.6%)، وأن معظم المشاركين كانوا من المدن الجنوبية (48.2%). تم التعرف على عدة آثار جانبية بين المشاركين بعد تلقي لقاح كوفيد-19. كانت الأكثر شيوعًا آلام في موقع الحقن (82.9%)، وكانت الأقل انتشارًا مشاكل الانتصاب (1.1%). فيما يتعلق بالجنس، أظهرت الدراسة أن الغثيان كان له ارتباط كبير بالجنس الأنثوي مقارنة بالمشاركين الذكور. بخصوص العمر، لوحظ في الدراسة أن فئة العمر (20-30 عامًا) كانت تتضمن تقارير أكثر بشكل ملحوظ عن الضعف العام. فيما يتعلق بمكان الإقامة، أظهرت الدراسة وجود ارتباط بين الآثار الجانبية التالية: تضخم العقد اللمفاوية، والإغماء، والتفاعلات التحسسية بعد التطعيم ومكان الإقامة. وجد ارتباط كبير بين الطفح الجلدي والمشاركين الذين يعانون من أمراض مزمنة. كما أشارت الدراسة إلى أن المشاركين الذين يعانون من حساسية أبلغوا عن ضعف عام أكثر من أولئك الذين ليس لديهم مثل هذه الحساسيات. وأُبلِغَ عن الإغماء والإسهال بشكل أكبر من قبل المشاركين الذين يستخدمون أدوية مزمنة. لم يتم العثور على ارتباط بين لقاح كوفيد-19 ولقاحات أخرى. وجدت الدراسة ارتباطًا كبيرًا بين العمل في ورديات وآثار اللقاح الجانبية التاليتين لكوفيد-19: الضعف العام والسعال.

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الغثيان، السعال، صعوبة التنفس، ألم أسفل الظهر، وتغييرات في الدورة الشهرية، كل هذه الآثار الجانبية تم الإبلاغ عنها بشكل أكبر من قبل المشاركين الذين تم تشخيصهم بعدوى كوفيد-19 بعد أي جرعة من اللقاح. أظهرت الدراسة أن ألم في موقع الحقن وألم في العضلات والمفاصل كانت الآثار الجانبية الأكثر إبلاغًا بعد الجرعة الأولى من اللقاح، وكان الألم في موقع الحقن والضعف العام الأكثر إبلاغًا بعد الجرعة الثانية من اللقاح، وكان الصداع وألم في موقع الحقن هما الأكثر إبلاغًا بعد الجرعة الثالثة من اللقاح. كان لدى (65.3%) من المشاركين آثار جانبية مماثلة لتلك التي كانت لدي أفراد أسرهم الذين تلقوا التطعيم. أكثرية المشاركين اشتكوا من آثار جانبية في أقل من 24 ساعة بعد التطعيم. من حيث مدى آثار الجانبية، استمرت الأغلبية (58.5%) لمدة ثلاثة أيام. (59.6%) من الآثار الجانبية التي تم الإبلاغ عنها كانت خفيفة. (64.2%) تلقوا علاجًا بسبب آثار اللقاح، واستجاب (78.2%) للعلاج بشكل جيد.

الخلاصة: في الختام، بحثت هذه الدراسة في نطاق الآثار الجانبية للقاح كوفيد-19 بين موظفي مستشفى المقاصد. وشملت الدراسة 203 مشاركا. غالبية الآثار الجانبية، سواء العادية أو الشديدة النادرة، وظهرت بعض العلاقات التبادلية بين بعض الآثار والعوامل الديمغرافية كالجنس، والعمر، والحالة الصحية وغيرها. وبدت الآثار الجانبية السائدة التي أبلغ عنها المشاركون خفيفة إلى متوسطة الشدة، مما يشير إلى أن شدة الإعراض الناتجة من المرض نفسه أكثر، كما ظهرت غالب تلك الأعراض خلال ال24 ساعة التي تلت اللقاح واستمر غالبها ل48 ساعة قبل التلاشي مما يعطي مؤشرا واضحا على كون هذا اللقاح آمن وفعال

من جهة، ويزيد من ثقة الناس في تلقى هذا اللقاح، في وقت لا يزال فيه الفايروس موجودا ويتطور بشكل متذبذب، منتشرا بسرعة حول العالم، ناقلا العدوى من شخص لآخر

Chapter One: Introduction

1.1. Background:

In December 2019, China reported an outbreak of pneumonia of an unknown origin in Wuhan, Hubei Province. The virus was isolated and test results indicated that it was a novel coronavirus, which was later referred to by the scientific community as severe acute respiratory syndrome-related coronavirus 2 or (SARS-CoV-2). SARS-CoV-2 is a member of the beta-coronavirus subgenus Sarbecovirus (Ciotti et al., 2022).

The disease mainly affects the respiratory tract and infection severity can be very mild rhinorrhea to severe acute respiratory distress syndrome and, in some cases, could result in death. There was an association of non-respiratory symptoms with Covid-19 such as anosmia, diarrhea, rash, thromboembolic disorders, myocarditis and vasculitis. However, the median incubation period for the respective virus was estimated to be around 5 days with the majority of symptoms developing during 11.5 days (Koirala et al., 2020)

The World Health Organization (WHO) revealed that Covid-19 was a public health emergency of international concern on January 30th, 2020 and, in March 2020, the Organization became increasingly vocal in characterizing the virus as a global pandemic in an attempt to increase awareness and emphasize urgency for relevant action by all countries worldwide with respect to infection detection and other measures so as to prevent the disease and limit the spread of the virus (Güner, 2020). At the time of writing this research, December 2023, there was over 699,901,408 people infected and 6,958,219 reported deaths worldwide and, in Palestine, the total number of cases was 621,008 and a total of 5,404 deaths (Worldmeters, 2023).

SARS-CoV-2, as is common knowledge in the medical field, is a single strand RNA virus. Corona, which means crown in Latin; hence, the name of this illness was given based on

its appearance under an electron microscope, triggered numerous syndromes in both humans and animals that included: Severe Scute Respiratory Syndrome (SARS-CoV) and the Middle East Respiratory Syndrome (MERS-CoV), as the human to human transmission of SARS-CoV was through droplets while the transmission of the MERS-CoV was not fully understood (Baloch et al., 2020).

The SARS-CoV-2 transmission can occur either by direct contact (human-human droplet transmission) or through indirect contact (contaminated objects and airborne contagions) (Lotfi, 2020). After publishing the genetic sequence of SARS-CoV-2 in January 2020, there was a global concordance on the development and distribution of a Covid-19 vaccine as the most vital step to be taken toward controlling the pandemic, protecting public health, and moving toward a healthier global community (FDA, 2020). The Pfizer-BioNTech vaccine was the first mRNA-based vaccination that was approved the FDA to be used under the Emergency Used Authorizations (EUAs) in December 11, 2020 and, thus, was distributed on a large scale in the United States (FDA, 2020).

Different platforms of the current SARS-CoV-2 vaccine candidates were developed for controlling the Covid-19 pandemic and other future pandemics, one of these candidates was the genetic-type vaccine (namely, DNA and RNA vaccines), as promising results in many pre-clinical studies were reached with a remarkable success with the RNA vaccine against Covid-19 with an efficacy rate of up to 95% of Pfizer-BioNTech vaccine (Nagy & Alhatlani, 2021). While the vaccine plays an important role in controlling the spread of the virus and demonstrated a remarkable efficacy, there was a huge concern as to the possible occurrence of side effects as our understanding of the safety profile of Covid-19 vaccines was, still at that point, lacking.

As such, and as part of a collective effort worldwide to understand the side effects of Covid-19 vaccines, this study has been complied for the sake of studying the side effects of

Pfizer Covid-19 as reported by Al-Makassed Islamic Charitable Hospital employees who have received this vaccine, given the fact that this hospital, out of many others, serves a diverse population and, therefore, presents a unique setting for investigating the side effects of the BioNTech-Pfizer Covid-19 vaccine among its employees, who have received this particular vaccine as soon as it was approved for EUAs by the FDA. Studying the possible side effects of this vaccine is absolutely important for several reasons: first, it can help improve the safety of the concerned employees, increase the people's confidence in and acceptance of the vaccine and provide us with data that might contribute to a better understanding of vaccines and vaccines' safety.

This study, therefore, aims to comprehensively examine and then compare the side effects of the BioNTech-Pfizer Covid-19 vaccine among Al-Makassed Islamic Charitable Hospital employees in Jerusalem, Palestine, aiming to provide critical understanding of vaccine safety.

1.2. Problem statement:

m-RNA vaccines represent a fairly new technology in vaccination; as such, by default, being a new technology, it may result in some unfavorable side effects or complications that might still remain hidden, unknown to us and to those concerned and might go unreported. Globally, however, the administration of Covid-19 vaccines has been key to stopping the spread of the virus. Regardless of the previous fact; meaning, the nations-wide spread of vaccination campaigns, concerns over future possible side effects and adverse reactions still hinder vaccination efforts as many people worldwide still remain hesitant and, therefore, skeptical of the aforementioned technology and the vaccines themselves. As such, investigating the side effects of different Covid-19 vaccines, especially BioNTech-Pfizer, is ingredients is an urgent task that has to be fulfilled.

1.3. Study Justification:

For many, around the world, the numerous, disastrous socio-economic and political crises inflecting countries, internationally, were the real public concern rather than the pandemic itself, as Covid-19 was becoming the greatest threat of the century to global public health (Chakraborty & Maity, 2020). The investigation of Covid-19 vaccine side effects among Al-Makassed Islamic Charitable Hospital employees holds significant importance in ensuring the employees' health and safety, improving the vaccine confidence and acceptance rates, understanding the characteristics and nature of side effects among the employees, aiding in a more comprehensive evaluation of the vaccine's safety across different populations, in link with other studies, and ensuring the best possible care for both employees and patients.

While mRNA still remains to be a completely new approach to vaccine development, which means that side effects might still go unknown for a period of time, calling, thus, for more research to reach a good understanding of this approach including the side effects thereof. In Palestine, vaccination was started with the introduction of various types of vaccines; as such, the study of side effects and their association with other factors such as health status, sociodemographic status, previous infection of Covid-19, will be helpful in the future prevention of complications and ensuring vaccine safety. Hence, this study on Covid-19 vaccine side effects among Al-Makassed Islamic Charitable Hospital employees, is justified by its potential to advance our knowledge of vaccine side effects, improve healthcare practices, and contribute to the broader understanding of vaccine safety.

1.4. Study Outcomes:

1- Highlighting the common side effects of Covid-19 mRNA vaccine:

Accordingly, knowledge about whether such effects are mild, moderate or severe and for how long they last can be regarded as a sign of tolerance to the vaccine among Al-Makassed Hospital employees.

2- Determine the severity and duration of the reported side effects:

This comparison can help in the understanding of whether the side effect align with broader global trends or if there are distinct patterns within the hospital's employee population.

3- Compare the findings with global data through an extensive literature review and a discussion chapter:

By comparing the findings, I could identify any notable differences or similarities. This comparison can contribute to the understanding of whether the side effect align with broader global trends or if there are distinct patterns within the hospital's employee population.

4- Express the influence of demographic and health factors:

The study might reveal how demographic data can impact the severity and occurrence of the side effects among the employees.

5- Provide information about the vaccine safety:

This can provide valuable data on the understanding of the safety of the concerned vaccine.

6- Enhance confidence regarding vaccination programs within the hospital.

7- Formulate relevant recommendations.

8- Provide suggestions for future research.

1.5. Aim of the Study:

Highlighting the side effects of Covid-19 Biotech-Pfizer mRNA vaccine as a new technology authorized under EUAs experienced by the employees at Al-Makassed Hospital.

1.6. Study Objectives:

- Ensuring the employees' health and safety.
- Improving the vaccine confidence and acceptance rates.
- Understanding the characteristics and nature of S/Es among the employees.
- Aiding in a more comprehensive evaluation of the vaccine's safety across different populations in link with other studies.
- Ensuring the best possible care for both employees and patients.

1.7. Research Questions:

1- What are the side effects reported by the employees?

2- What is the severity/intensity of these side effects?

3- Is there is any relationship or correlation between these side effect and the recipient's socio-demographic status?

4- Are there any associations between vaccine recipients' previous health status?

5- Are there more side effects reported after the 1st, 2nd, or 3rd dose?

6- Is there an association with other vaccines like the flu vaccine, for instance?

7- Is there a relationship or similarity between these reported side effects and those of their vaccinated family members?

8- Are there any identifiable stress-related side effects of those with vaccine side effects?

9- What are the side effects suffered by participants who tested positive for covid-19 vaccine post any dose of the vaccine?

Chapter Two:

Literature Review and study conceptual framework

2.1. Introduction

Literature showed that many factors are associated in some form of a relationship with Covid-19 Pfizer vaccine side effects. These factors are mainly classified as socio-demographic and include the following, based on the reviewed literature below: age, gender, number of doses, health status, allergies, Covid-19 infection and work. In this chapter, the literature review concerning these factors is presented in the order given above.

2.2. Covid-19 Vaccines' Most Frequent Side Effects:

Starting with the first common side effect, pain or swelling at the injection site, here I should note that this is one of the most reported side effects by vaccine recipients where the pain is usually mild to moderate in terms of intensity and, typically within a few days, the vaccine recipient is relieved; second, tiredness (fatigue); here, many vaccine recipients reported feeling tired, exhausted or fatigued after having received vaccination; however, this side effect is usually mild to moderate reportedly and lasts temporarily; third, headaches - this side effect, regardless of it being very common, is generally mild and fades away within a few days of the injection; fourth, muscle pain or pain in muscles were often reported, particularly after the second dose and this also is typically mild to moderate and is short-lived; fifth, chills - some recipients of the vaccine experienced chills, often, conjoined with fever; sixth, fever, particularly after the second dose, fever, often mild, was reported as a common side effect; moreover, this has also been usually mild and short-lived; seventh, nausea which has been reported, though in some cases, but it was not as commonly disclosed by vaccine recipients as the other side effects (Haider et al., 2023).

2.3. Sociodemographic Factors

2.3.1. Age

A study, conducted in Korea, surveying vaccine side effects in 2498 healthcare workers, aged 20-65 years, noted that, with regard to age, in the second dose, pain, fever, headache, nausea and or vomiting were more frequent among the younger responders compared to older participants, while both arthralgia and itching were more critical in older responders (Im et al., 2021).

Moreover, another survey-based study, conducted in Singapore, arrived at the following: first, having fever, chills, injection site pain, headache, general bodily aches and feeling unwell were all significantly more common in the younger participants; in this regard, the survey demonstrated that 47.2% of the respondents below 60 years of age reported fever or chills after the first dose and/or second dose, compared to 25% in the respondents aged 60 and above (Lim et al., 2021). A study, conducted in Milan, Italy in 2021, showed that younger people are at a greater risk of developing side effects post vaccination (Borroni et al., 2021).

Another study, from Saudi Arabia, conducted in 2021 on participants who have received either one of or both doses, targeted 455 participants (El-Shitany et al., 2021). The study found out that flu-like symptoms were more frequently reported by participants aged 60, while injection site pain was reported more by recipients who were 60 and above (El-Shitany et al., 2021). The study, in essence, showed no significant difference between those under the age of 60 and suffering from Covid-19 vaccine side effects and those over 60, on one hand; however, on the other, there was a substantial increase in the number of people who reported local side effects and injection site pain over 60, 128 (82.0%) and 126 (80.8%) compared to those under 60, 209 (69.9%) and 205 (68.6%) following each dose (El-Shitany et al., 2021).

Another 2021 study from Saudi Arabia found age as a non-significant negative predictor of the total number of side effects experienced by participants (Mohammad et al., 2021). Also,

another study, from Pakistan in 2021, at the Foundation University College of Islamabad, surveyed 205 participants aged 23-55, found that age was significantly associated with post vaccine side effects which included: gastrointestinal disturbances and flu-like symptoms; nonetheless, it was established that younger respondents were more likely to complain of gastrointestinal disturbances after vaccination compared to older respondents while flu-like side effects were more likely to be reported by younger respondents (Abbas et al., 2021).

Another study, from Saudi Arabia, conducted in 2021 established the following: in terms of side effects, showed a significant increase in participants who reported different flu-like side effects and flu symptoms under 60, 168 (56.2%) after the second dose and 59 (19.7%) following the first dose compared to those over 60, 49 (31.4%) after the second and 10 (6.4%) after the first (El-Shitany et al., 2021).

A study in the Czech Republic also sought to investigate the side effects of the Pfizer vaccine, through a questionnaire where a total of 877 respondents were included in the analyses and the participants were between 19 and 78 years old (Riad et al., 2021). The study reported that the prevalence of side effects was higher in the group ≤ 43 years of age (94.8%) compared to the >43-year-old group (91.5%), with a statistically substantial variation in the case of injection site pain (93.3% - 86.2%), headache (50.7% - 40.2%), fatigue (65.9% - 58.3%), muscle pain (40.9% - 33.2%) and, finally, feeling unwell (26% - 19.8%) (Riad et al., 2021).

Moreover, from March 2021 to September 2021, an online survey was delivered to caregivers to collect side effects data and concluded that younger participants tended to report greater side effects than older participants (Cuschieri et al., 2021).

A study conducted at Birzeit University - Palestine, between December 2021 to March 2022, found that males, aged less than 20 years, were significantly less likely to report side effects (Abukhalil et al., 2023). The study indicated that, in terms of age, survey respondents under 20

years of age (39%) complained of significantly fewer side effects after the first dose than those older (31.2%) (Abukhalil et al., 2023).

A study commenced on the 5th of June and covered the period up to September 2021, at the University of Hail in Saudi Arabia and used an online survey and included 2,530 respondents found that, with regard to age, 88.5% of the participants aged 51 years or older had side effects following vaccination, in comparison with 83.1% of participants aged 35 to 50 years (Almughais et al., 2022).

Another study, that was conducted in Bangladesh based on a cross-sectional anonymous online survey conducted across the country in 2021, demonstrated that participants aged 50-59 years and 60 or above were respectively 2.55 times and 5.47 times more likely to complain of side effects compared to those aged 12 to 29 years (Mohsin et al., 2022).

Another study on the side effects of Covid-19 vaccines in 22 Arab states targeted people who received at least one dose of a Covid-19 vaccine (Hatmal et al., 2022). As such, a total of 10,064 participants from 22 Arab countries were included in this study, among them 56% were female and 59% aged from 20 to 39 years old, with 52.8% having received the Pfizer vaccine (Hatmal et al., 2022). The comparison of age groups showed that participants aged 20 to 39 years were more likely to experience almost all of the post-vaccination side effects (Hatmal et al., 2022).

Another study conducted in the United Arab Emirates between March 2021 and September of the same year was based on an online survey gathering information from 1878 participants (Ganesan et al., 2022). The study found that, 56% of the participants aged below 35 complained of side effects while 73% of the participants aged between 35 and 54 reported side effects compared to 70% of those above 55 who experienced side effects (Ganesan et al., 2022).

In children, a retrospective, cross-sectional investigation was carried out, by Alamer et al, in order to determine the side effects experienced by children after receiving one or two doses of the Pfizer vaccine. The study found that the most commonly reported side effects were: pain

or redness at the site of injection (90 %), tiredness (61%), fever (39%), headache (49%), nausea or vomiting (21%), and chest pain and shortness of breath (18%) (Alamer et al., 2021).

2.3.2. Gender

A study conducted in Milan, Italy in 2021, sought to evaluate the frequency and intensity of side effects pursuant to the second Pfizer dose among healthcare workers in a university hospital one month following their reception of the second vaccine dose and was responded to by 3659 participants (Borroni et al., 2021). The study concluded that females were more likely to complain of more side effects, compared to men (Borroni et al., 2021).

Another study, from Saudi Arabia, conducted in 2021 reported a significant increase in the number of females who suffered from side effects compared to males (El-Shitany et al., 2021). The study found that there was a substantial increase in the number of female participants who complained of different side effects after receiving the vaccine (264, 58%) compared to males (128, 28.1%); furthermore, the number of females who reported no side effects at all (28, 6.2%) was lower than the number of males (35, 7.7%) (El-Shitany et al., 2021).

An additional study, also from Saudi conducted in 2021, confirmed the result arrived at by other studies that the female gender is a significant predictor for a higher number of reported side effects after both doses of the vaccine (Mohammad et al., 2021).

A study, conducted in Jordan in 2021, had a total of 1086 participants - where the largest proportion of respondents received the Pfizer vaccine, reported that there was a substantial increase in the number of females who complained of side effects following the first Pfizer dose compared to males: 92.3% - 85.8% whereas the same is not true of the second dose as no significant increase was noticed (Omeish et al., 2021).

A study at the Foundation University College of Islamabad found that gender was substantially associated with first: soreness at the injection site; second, headache; third, gastrointestinal

issues and, as such, females were more likely to report soreness at the site of injection and headache while male participants were more likely to complain of gastrointestinal disturbances (Abbas et al., 2021).

A study in the Czech Republic, in 2021, reported that injection site swelling was substantially more frequent among the female gender (Riad et al., 2021). The study also reported that headache was significantly more frequent among females and that nausea was substantially more common among females, too (Riad et al., 2021).

Another cross-sectional study, conducted in 2021, established that the female gender had a more significant number of side effects following both vaccine doses compared to males, which figured in other studies as well (Mohammad et al., 2021). Also, a study, from 2021, found that females experienced more side effects than males (95% vs. 78%) (Lee et al., 2021).

A cross-sectional study was conducted to evaluate the side effects of Pfizer vaccination on healthcare professionals in Slovakia, in 2021, and used a self-administered questionnaire to gather data on Covid-19-related anamnesis and side effects associated with this particular vaccination and noted that the difference between females (87.3%) and males (78.3%), in terms of injection site pain, was statistically significant (Riad et al., 2021).

A study that was conducted between December 2021 and March 2022, found that females were substantially more likely to experience side effects such as fever (39.1%), chills (29.8%), headache (41.9%), fatigue (36.8%), myalgia (32.7%), pain and swelling at the site of injection (34.9%), shortness of breath (11.6%), nausea (11.1%), arthralgia (24.1%) and sleep disturbances (8.8%) following the first Pfizer dose (Abukhalil et al., 2023).

A study sought to investigate the side effects of the Pfizer vaccine that was administered to 224 survey participants who received Pfizer and the data continued to be collected over a period of 6 months from July to December, 2021 and established the following based on analysis: males were significantly associated with fever, joint pain, injection site pain, fatigue, and sexual

disturbances; however, females reported swelling at the injection site, redness at the injection site, loss of appetite, and headache (Alzarea et al., 2022).

A different study from Saudi Arabia found that 50% of female participants were more vulnerable to developing post vaccine side effects in comparison with male participants (Almughais et al., 2022).

Another study conducted in Iraq in 2022 sought to investigate the side effects of a number of vaccines including Pfizer where a total of 2202 people participated in the survey out of whom 1,204 (54.7%) were males and 998 (45.3%) were females, and the study was carried out from October 2021 to February 2022 through an online questionnaire (Darweesh et al., 2022). The study found that the side effects associated with the Pfizer vaccine were significantly more prevalent in females than in males (Darweesh et al., 2022).

A study from Bangladesh, where most of the respondents were male (63.89%) and above the age of 50 (65.40%), where only (7.32%) of them had taken Pfizer (Mohsin et al., 2022). The study demonstrated that the odds of experiencing side effects among the female participants were 92% lower than their male counterparts (Mohsin et al., 2022). Another study found that female participants, compared to their male peers, suffered more side effects which also tended to be higher in frequency and intensity (Hatmal et al., 2022).

A study was conducted in the United Arab Emirates through an online survey gathering information from 1878 participants (Ganesan et al., 2022). The study found that, in terms of gender, more females complained of various side effects 69% compared to males who suffered from side effects post vaccination 67% (Ganesan et al., 2022).

An investigative study was conducted on healthy young people from both genders where 81 participants, who received both doses of the Pfizer vaccine, were included in the study and a paper questionnaire was prepared with questions regarding the side effects of each dose of the vaccine (Shailabi et al., 2022). The study revealed a significant difference between the number

of females (96.5%) and males (85%) who reported side effects of the Pfizer vaccine; males had the highest incidence of muscle pain (70%) compared to females (66.1%) while (62.6 %) of females reported feeling fatigued compared to (50%) of males and, for headache, the results also showed a significant difference between females and males; as the percentage of females who suffered from headaches was (60.9%) compared to (35%) for males; finally, no significant difference in fever between females and males was indicated as it came out to be (49.6%) for females and (50%) for males (Shailabi et al., 2022).

An investigative study of the literature review on Covid-19 Pfizer vaccine' side effects reviewed a number of studies (14 studies published in 2021 and 2022) (Dighriri et al., 2022). The total number of participants in those studies was 10632 respondents who reported at least one or more side effects post vaccination where males constituted 30.2%, females made up 69.8% of the total number of included participants (Dighriri et al., 2022). The study concluded with the following: females suffered more side effects, on average, than did their male counterparts (Dighriri et al., 2022). The study held that: according to gender variations, the average side effects occurred in the case of females (69.8%) compared to males (30.2%) (Dighriri et al., 2022). Finally, another study on the side effects in children found that female participants experienced more side effects than male participants, 52 % and 48 %, respectively (Alamer et al., 2021).

2.3.3. Number of Doses

This factor was the focus of most studies and is, therefore, quite extensive compared to other factors.

In a study conducted in Poland in 2021 on the side effects of Pfizer vaccination for Covid-19 among the residents was responded to by 196 who had received Pfizer (Andrzejczak-grzadko et al., 2021). The study reported the following findings: first, among those who were vaccinated with the first Pfizer dose, vaccine side effects were reported by 93.9% of survey participants;

however, the second dose of the Pfizer vaccine caused side effects in most of the responders as indicated here: 54.8% of survey participants had more side effects and 15.8% had experienced fewer side effects compared with the first dose of the same vaccine; 29.4% experienced the same side effects after the first and second doses of Pfizer (Andrzejczak-grzadko et al., 2021). As such, after the second Pfizer dose, more responders reported side effects or tended to report more side effects than after the first dose (Andrzejczak-grzadko et al., 2021).

Another study, conducted in 2021, in Korea, in which researchers surveyed side effects in 2498 healthcare workers, aged 20-65 years, who were vaccinated with Pfizer at a university hospital there (Im et al., 2021). With regard to systemic side effects, fatigue was the most frequently reported side effect as indicated by the following numbers: 52.8% after the first Pfizer dose and 77.0% after the second Pfizer dose, followed by myalgias as the second most frequently reported systemic side effects i.e. 49.0% after the administration of the first dose and 76.1% following the administration of the second, while headache accounted for 28.7% after the first injection and 59.2% following the second dose; nonetheless, chills were reported by 16.7% of the responders after the first dose and 54.0% after the second injection while arthralgia, however, accounted for 11.4% of all responders after the first dose and 39.2% after the second dose; moreover, fever figured only in 1% of responders following the first dose which later substantially increased to 24.7% after the second injection; finally, itching accounted for 12.0% of all responders after the first dose and then 22.7% after the second dose (Im et al., 2021). Therefore, more side effects followed the second dose in general.

A study, published in November 2021 in Bahrain, collected data through an online questionnaire and was answered by 311 respondents who received both doses of one of the four main vaccines: Sinopharm, Pfizer, AstraZeneca and Sputnik (Zahid, 2021). On a general level, the study reports that with respect to all the four vaccines, participants all experienced

more side effects from the first dose, which is particularly true of the Pfizer vaccine, according to this study (Zahid, 2021).

A study from Singapore examined the responses of 1704 healthcare workers at a tertiary hospital who received the first and second Pfizer doses in terms of the side effects they experienced (Lim et al., 2021). The majority of respondents reported having experienced local side effects such as pain at the injection site 57%; however, more experienced such side effects after the second Pfizer dose (70.1%) compared to the first dose (57.2%) (Lim et al., 2021).

Moreover, an additional study, from Saudi Arabia, in 2021, sought to measure the most prevalent to the least reported side effects in 386 respondents to an online questionnaire who were 18 years old and above and indicated that there were more reports of side effects after the second dose than after the first (Mohammad et al., 2021).

Another study, from 2021, where the largest proportion of respondents received the Pfizer vaccine, especially the first dose (40.6%) showed that more people experienced side effects following the first dose than after the second: 89.9% compared 75.9% except for chills, sexual disturbance, and lymph node enlargement (Omeish et al., 2021).

A study, from Saudi Arabia, conducted in 2021 established that there is a significant increase in individuals who reported flu-like side effects after the second dose (112, 90.3%) compared to individuals who reported these side effects after the first dose (77, 32.5%); similarly, there was also a significant increase in individuals who reported flu symptoms after the second dose (36, 29%) compared to those who reported flu symptoms after the first dose (26, 11.0%) and in the number of those who reported fever after the second dose (23, 18.5%) compared to those who complained of fever after the first dose (3, 1.3%) (El-Shitany et al., 2021). As such, in general, more side effects followed the second dose.

A study in the Czech Republic, in 2021, found that, in terms of the number of doses and their significance with regard to side effects, the study noted the following post the first and then

second dose respectively: injection site pain (88%) / (90%), injection site swelling (24%) / (25.7%), injection site redness (8%) / (23.9%), fatigue (60%) / (62.2%), headache (42%) / (46%), nausea (12%) (13.2%), feeling unwell (32%) / (22.6%), muscle pain (36%) / (37.3%), chills (34%) / (33.9%), joint pain (34%) / (27.4%), fever (22%) / (21.9%), lymphadenopathy (16%) / (16.2%) given the first and second doses respectively (Riad et al., 2021). The finding of this study is similar to the one above.

Another cross-sectional study including adults of various ages and genders was carried out by researchers, in 2021, using a questionnaire concluded the following: there were more side effects following the second dose than following the first (Mohammad et al., 2021).

Another study, from 2021, performed a mobile-based survey of the side effects suffered by healthcare workers and received 265 responses, and concluded that side effects occurred at a greater rate following the second dose than after the first (89.1 % vs. 80.1 %) (Lee et al., 2021).

An anonymous survey was conducted to investigate the side effects suffered by people who received both doses of the Pfizer vaccine and included 123 participants where the most frequently reported side effects according to the number of received doses were: pain or swelling at the application site (91.6%) after the first dose compared to (73.17%) following the second, muscle and joint pain (45.53%) after the first dose compared to (56.10%) following the second; moreover, following the first dose, (57.72%) reported feeling weak compared to (74.80%) who reported the same side effect after the second dose, shivers were complained of by (19.51%) after the first dose compared to (37.40%) following the second, fever was suffered by (18.70%) after the first dose compared to (40.56%) after the second, headache was reported by (31.71%) occurring after the first dose, while only (46.34%) reported headache after the second dose, enlargement of lymph nodes was reported by (13.82%) after the first dose compared to (16.26%) following the second dose; finally, dyspnea was complained of by (4.88%) occurring after both the first and second doses (Krótki et al., 2021).

From March to May 2021, some researchers conducted an observational cross-sectional study to examine possible side effects of the Pfizer COVID-19 vaccination among a representative sample of healthcare professionals in Guayaquil, Ecuador, and found that, on average, 79% of participants experienced unpleasant side effects after the first dose, whereas only 75.1% experienced side effects following the second dose (Vanegas et al., 2021). This study showed that more side effects were reported following the first dose.

A study, which used data obtained anonymously from five private health clinics in Italy, aimed to look into each side effect after vaccination with Pfizer between January and March of the year 2021, in which 340 people participated (Lim et al., 2021). The study reported that most side effects following the first dose were: pain, redness, and swelling at the injection site (77.9%), fatigue (19.4%), headache (15.3%), fever (1.5%), chills (5.9%) and sleep disorders (2.4%) whereas most reported side effects following the second dose included: pain, redness, and swelling at the injection site (56.6%), fatigue (39.7%), headache (28.8%), fever (13.5%) and sleep disorders (5.9%); as such, side effects were reported by 279 (82%) and 281 (82.6%) individuals after the first and second doses, respectively, indicating that more side effects were experienced post the second dose (Lim et al., 2021).

The Occupational Health Clinic at the National University Hospital in Singapore gathered data on staff side effects 30 minutes post vaccination and then performed a cross-sectional research targeting vaccinated health workers through an online survey, and found that the reported side effects in the survey were, given the number of doses received: injection site reactions (including: rash, redness, swelling, pain) following the first dose 57.2% compared to 70.1% after the second, feeling unwell in general (including: fatigue, tiredness, weakness) after the first dose 36.7% compared to 66.1% after the second, aches and pains (including for instance: joint pain, muscle pain, body ache) after the first dose 30.1% compared to 51.9% after the second, headache after the first dose which came at 18.8% compared to 41.7% after the second

dose and fever or chills after the first dose 9.3% compared to 44.7% after the second dose, indicating that more side effects were reported following the second dose (Lim et al., 2021).

A study conducted in Palestine, between December 2021 to March 2022, found that reported side effects were significantly higher following the second dose than after the first (Abukhalil et al., 2023). The study highlighted that, generally speaking, survey respondents who received more than one dose of the vaccine experienced, on average, more side effects than participants who had only one or two doses (Abukhalil et al., 2023).

A study conducted in Iraq in 2022 sought to investigate the side effects of a number of vaccines including Pfizer where a total of 2202 people participated in the survey and the study was carried out from October 2021 to February 2022 through an online questionnaire (Darweesh et al., 2022). The study found that most side effects were significantly less prevalent in the second dose compared to the first dose.

Another study on the side effects of Covid-19 vaccines in 22 Arab states, from 14 June to 31 August 2021, targeted people who received at least one dose of a Covid-19 vaccine (Hatmal et al., 2022). Based on this study, the second Pfizer dose, as other studies have proven, was associated with more side effects, in particular, the following effects: fever, injection site pain, headache, diarrhea, chills, myalgia, sleepiness and laziness while those who complained of severe side effects have all received the second dose and, as such, their severe side effects showed immediately after that (Hatmal et al., 2022).

A study was conducted in the United Arab Emirates between March 2021 and September 2021 based on an online survey gathering information from 1878 participants found that participants reported more side effects following the second Pfizer dose 86.6% (Ganesan et al., 2022). In addition, another study found that side effects were more prevalent following the second dose in children (Alamer et al., 2021).

Finally, a study sought to investigate the side effects of the Pfizer vaccine in a number of studies and included 14 studies published either in 2021 or 2022. (Dighriri et al., 2022). The study concluded that, following the second dose, there were greater side effects than after the first Pfizer dose -where average side effects were 79% after the first and 84% after the second dose, respectively (Dighriri et al., 2022).

2.3.4. Health Status (co-morbidities)

Another study conducted in Bangladesh based on a cross-sectional anonymous online survey demonstrated that, in terms of health conditions, as a demographic factor, participants with low blood pressure were 3.33 times more likely to experience side effects; obese individuals were 1.31 times more likely; those suffering from chronic respiratory diseases were 3.10 times more likely; those suffering from anemia were 4.6 times more likely than the participants without such underlying conditions (Mohsin et al., 2022).

Another study on the side effects of Covid-19 vaccines in 22 Arab states, from 14 June to 31 August 2021, found that, with regard to chronic diseases, they were reported by around 28% of the survey respondents (2799) and, as such, the most commonly reported diseases were: hypertension, obesity, and diabetes; 10% (979), 8% (797) and 6% (600), in order (Hatmal et al., 2022). The study found that those suffering from chronic diseases also tended to suffer more side effects (Hatmal et al., 2022).

A study conducted in the United Arab Emirates between March 2021 and September of the same year based on an online survey, found that, with regard to comorbid conditions, 73% of those with such conditions experienced side effects compared to 66% of those without such conditions who reported side effects (Ganesan et al., 2022).

2.3.5. Allergies

A study, conducted in Milan, Italy in 2021, showed that people with an allergy history were at a greater risk of developing side effects following vaccination (Borroni et al., 2021). Moreover, another study from Saudi Arabia, conducted in 2021, found that a significant predictor of a higher occurrence of side effects was the presence of allergies (Mohammad et al., 2021).

A study from in 2021 reported that injection site redness was substantially more frequent among respondents with allergies (Riad et al., 2021).

A study conducted between December 2021 to March 2022, in Palestine, employed a questionnaire-based method and, for data collection, used a university website and social media platforms and, also, in-person interviews established that participants with a previous history of allergy prior to vaccination had a substantially higher tendency for post vaccination allergic side effects (Abukhalil et al., 2023). The study reported that participants with food and drug related allergies experienced more side effects following the first dose such as: fever (47.6%), chills (16.7%), headache (48.2%), increased heart rate (18.3%), shortness of breath (20.7%), a persistent cough (13.4%), chest pain (12.2%), voice hoarseness (10.4%), dizziness (26.2%), nausea (15.2%), vomiting (6.7%) diarrhea (8.5%), myalgia (39.6%) and sleep disturbances (13.4%) (Abukhalil et al., 2023).

Another study that was conducted in Bangladesh based on a cross-sectional anonymous online survey demonstrated that those suffering from severe allergies were 4.17 times more likely to develop side effects post vaccination (Mohsin et al., 2022). Moreover, another study on the side effects of Covid-19 vaccines in 22 Arab states, from 14 June to 31 August 2021, found that participants with allergies had more side effects (Hatmal et al., 2022).

2.3.6. Covid-19 Infection

As concluded by a study from Poland, a previous history of Covid-19 disease did not correlate with the incidence of vaccine side effect; meaning, side effects, post vaccination, were reported by both participants who had no Covid-19 and those who were previously infected (Andrzejczak-grzadko et al., 2021).

Another study, from Italy in 2021, showed that healthcare workers who have recently contracted Covid-19 were at a lower risk of developing side effects, on one hand, while those who had tested positive to Covid-19 more than six months prior to vaccination were at a greater risk of experiencing side effects (Borroni et al., 2021).

Another study, from Saudi Arabia, in 2021, reported that difficulty of breathing was more reported by respondents who had previously been infected with Covid-19 in comparison with those who had not been infected previously (El-Shitany et al., 2021). The study established that 89% of participants who had a previous infection were suffering from some side effects, compared to 86% of those who had not been infected previously; however, of those previously infected, 73.7% reported local side effects, while those who had not been previously infected with Covid-19 experienced the same side effects and 71.9% reported local side effects, demonstrating a substantial increase in the number of respondents who had a previous infection and suffered from a difficulty in breathing after vaccination compared to respondents who had no previous infection (El-Shitany et al., 2021).

A study, from Pakistan in 2021, found that with regard to previous Covid-19 history, participants with a previous Covid-19 experience were found to be less likely to have experienced soreness at the injection site, fever or headache or fatigue and, gastrointestinal disturbances and, also, flu-like side effects following vaccination (Abbas et al., 2021).

A study from the Czech Republic, in 2021, reported that injection site swelling was substantially more frequent among those previously infected with Covid-19 (Riad et al., 2021). The study also found that muscle pain was significantly more frequent among those previously infected with Covid-19 (Riad et al., 2021).

A study from 2022 found that survey respondents, infected with Covid-19 prior to vaccination, were significantly associated with side effects such as: fever (43.3%), chills (31.5%), headache (43%), shortness of breath (16.5%), a persistent cough (12.1%), chest pain (12.8%), abdominal pain (10.3%), joint pain (27.7%), menstrual cycle changes (17.8%), voice hoarseness (8.4%) and myalgia (33.6%) (Abukhalil et al., 2023). The study showed that participants with Covid-19 history had lower odds of side effects following vaccination (Almughais et al., 2022).

A study from on the 5th of June to September 2021, at the University of Hail in Saudi Arabia, found that side effects following vaccination were reported by 88.7% of participants without a prior history of Covid-19, compared to 82.2% among participants who have had a history of Covid-19 infection (Almughais et al., 2022).

A study conducted in Iraq in 2022 sought to investigate the side effects of a number of vaccines including Pfizer where a total of 2202 people participated in the survey and was carried out from October 2021 to February 2022 through an online questionnaire (Darweesh et al., 2022). The study found that in terms of previous Covid-19 history, while a total of 1,246 participants received Pfizer, 37.2% of them reported previous Covid-19 infection prior to receiving the vaccine, but no significant correlations were drawn or concluded (Darweesh et al., 2022).

Another study on the side effects of Covid-19 vaccines in 22 Arab states, from 14 June to 31 August 2021, targeting people who received at least one dose of a Covid-19 vaccine, showed that survey respondents with a past history of Covid-19 infection had more side effects (Hatmal et al., 2022).

A study conducted in the United Arab Emirates between March 2021 and September of the same year based on an online survey, found that, with respect to previous Covid-19 infections, the study found that 75.4% of those with previous Covid-19 infections suffered from side effects compared to 66.9% of those without such history (Ganesan et al., 2022).

2.3.7. Work

Another study on the side effects of Covid-19 vaccines established that surveyed general workers showed a statistically more significant rate of occurrence of particular side effects like: fever, haziness, lack of clarity in eyesight, swollen ankles and feet, abdominal pain, diarrhea, etc. compared to healthcare workers which could be attributed to the 'positive' attitudes of health care workers to vaccinations in general versus the less positive attitude of the general public towards Covid-19 vaccines (Hatmal et al., 2022).

2.4. Pfizer's Most Reported Side Effects – Mild to Moderate

The most reported side effects resulting from Pfizer Covid-19 vaccine included the following: injection site pain, swelling and redness or rash at the injection site, shoulder pain, arm pain, joint pain (arthralgia), muscle pain (myalgia), headaches, chills, fevers, general bodily weakness (feeling unwell in general), nausea, vomiting, drowsiness, diarrhea, dizziness, itching, loss of appetite, sexual disturbances, shortness of breath, hypersensitivity, persistent cough, chest pain, voice hoarseness, sleep disturbances, sweating, brain fogging, tingling, nasal stuffiness, abdominal pain, lymphadenopathy, ear ache, swelling in the mouth and or throat, disorders related to urination, appetite related disorders, changes in blood pressure, reduced mental clarity, lethargy, intolerance to heat and cold, swollen ankles and feet, inconsistent heartbeat, nosebleeds, bleeding gums and, with regard to psychological side effects, some reported the following: depression, psychological stress, anxiety, decreasing memory and behavioral changes. I should note, here, that the most reported or the most frequently reported side effects among the above were: injection site pain, joint pain, headache, fever, chills, fatigue

and nausea. This serves to indicate that the other side effects were not really that frequent in terms of occurrence but, nonetheless, they were reported or complained of by a lot of participants. Moreover, we can also deduce the following: severe side effects such as anaphylaxis, blood clotting and lymphadenopathy were so extremely rare.

2.5. Extremely Rare Side Effects

Finally, a rather very rare severe side effect, namely anaphylaxis, was reported in one study by a very small number of participants in the United States where anaphylaxis was reported as a side effect (Shimabukuru & Nair, 2021). While all required some sort of medical intervention, none resulted in death (Shimabukuru & Nair, 2021). Other severe side effects were not noted by the other studies in this literature review.

2.6. Vaccine Hesitancy and Acceptance among HCWs

A review of some of the available literature on Covid-19 vaccine hesitancy and or acceptance among healthcare workers revealed that medical staff, in particular, are the least hesitant toward Covid-19 vaccines compared to other healthcare workers. For instance, a study from France examined the responses of 1965 respondents and arrived at the following conclusions: first, 73.1% of the participants revealed that they are in favour of receiving a Covid-19 vaccine, 23.1% said that they were hesitant regarding the vaccine while 3.9% were against taking the vaccine (Paris et al., 2021). The study noted that 90.1% of medical staff were in favour of the vaccine, 76.2% of nurses and other care-related staff were in favour of the vaccine, 89.2% of health executives and 69.9% of pharmacy and laboratory staff were also in favour of taking the vaccine (Paris et al., 2021). The study concludes that the more attached a health worker is to medical practice, the more favourable he/she might be of receiving a vaccine (Paris et al., 2021).

Another study from Iraq investigated the reasons behind the hesitancy of some healthcare workers toward the Covid-19 vaccines and noted the following: out of all participants (2202), 29.9% were hesitant due to insufficient knowledge concerning the emerging vaccines at the time of the study, 27.6% reported the speedy development of Covid-19 vaccines while 27.1% expressed their lack of trust in the vaccines that were being produced (Darweesh et al., 2022). Nevertheless, the same study reported that the acceptance rate among the participants was 89.97% while only 10.03% expressed hesitancy toward the vaccines (Darweesh et al., 2022). In this study, it is noted, on one hand, that females had higher hesitancy compared to male healthcare workers 63.8% compared to 36.2%; on the other, hesitancy toward the vaccines decreased with the increasing age of participating healthcare workers -meaning, the older the participants, the less likely they are to be hesitant (Darweesh et al., 2022).

A different study sought to measure the acceptance of Covid-19 vaccines among healthcare workers in the United States and analyzed the responses of 3479 participants and found that 36% were willing to take the vaccine, 56% were not exactly sure or else would rather wait for more data to become available while only 8% did not plant to get vaccinated at all (Shekhar et al., 2021). The study noted that vaccine hesitancy decreased and, as such, vaccine acceptance increased with increase in the following factors: age, education, income level and direct contact with Covid-19 patients (Shekhar et al., 2021). Moreover, the study found that safety, effectiveness of the vaccines and the speedy development thereof were among the most reported reasons for vaccine hesitancy (Shekhar et al., 2021).

A study from Indonesia concerning Covid-19 acceptance among healthcare and other workers noted that out of 1359 respondents, 93.3% reported that they would like to get vaccinated is a vaccine had 95% efficacy while 67% declared that they would likely accept a vaccine with a 50% efficacy (Harapan et al., 2020). Nonetheless, the study found that being a healthcare worker and having a high risk of contracting the Covid-19 virus were associated with higher

acceptance (Harapan et al., 2020). Another study from Kuwait noted that while 2368 people participated in the study, about 53.1% were willing to accept being vaccinated (Alqudeimat et al., 2021). Moreover, the majority of males were more willing to accept the vaccines compared to females (58.3% of males vs. 50.9% of females) (Alqudeimat et al., 2021). In terms of the nature of their work, 49% were nonhealthcare workers and among them 51.9% declared that they would not accept a Covid-19 vaccine while the other participants who worked in healthcare either as physicians and nonphysicians constituted 14.5% and were notably more welcoming of a Covid-19 vaccine as follows: 48.5% for nonphysicians and 75.6% for physicians (Alqudeimat et al., 2021).

2.7. By Way of Conclusion

While the studies arrived at different results and had varying findings, at times, and, at others, arrived at completely contradictory findings, all of them seemed to be motivated by the following questions: how safe is the vaccine? what are the side effects thereof? what severe side effects could result from vaccination? And how severe are they? - to which the answers were: the vaccine is safe; hence, this could lead to increased vaccine acceptance among people, there are many side effects to vaccination, but they -more or less- ranged from mild to moderate and disappeared in a matter of hours to days, severe side effects were extremely rare and, therefore, did not pose a threat to people's health. Finally, in terms of terminology, the literature reviewed in this thesis used a variety of terms all referring to 'side effects'; as such, I sought to unify terminology for the sake of clarity. The terms used included: side reactions, adverse reactions, adverse effects, adverse events, symptoms, adverse responses, aftereffects, post-vaccination reactions, post-vaccine responses among others. As such, I intentionally sought to disregard other terms and use 'side effects' instead.

Table 2.1: Literature on the Association between Age and Side Effects

Authors	Location and date	Study design	Conclusion
Im et al 2021	South Korea, 2021	Questionnaire	Most side effects were more prevalent in younger participants. The rest were more critical in older participants.
Lim et al 2021	Singapore, 2021	Survey-based	Most side effects were more prevalent in younger participants. The rest were more reported by older participants.
Borroni et al 2021	Italy, 2021	Survey-based	Younger people are at a greater risk of developing side effects.
El-shitany et al 2021	Saudi Arabia, 2021	Questionnaire	No significant difference between those below 60 and those above. A substantial increase in the number of participants above 60 who reported local side effects compared to those under 60.
Mohammad et al 2021	Saudi Arabia, 2021	Questionnaire	Age was found to be a non-significant negative predictor of the total number of side effects.
Abbas et al 2021	Pakistan, 2021	Survey-based	Age was significantly associated with side effects. Gastrointestinal disturbances and flu-like side effects more frequently reported by younger participants.
El-shitany et al 2021 (2)	Saudi Arabia, 2021	Questionnaire	A significant increase in participants who reported flu-like side effects under 60 compared to those above 60.
Riad et al 2021	Czech Republic, 2021	Questionnaire	The study reported that the prevalence of side effects was higher in the group ≤ 43 years of age compared to the >43-year-old group, with a statistically substantial variation in the case of injection site pain, headache, fatigue, muscle pain and, finally, feeling unwell.

Cuschieri et al 2021	Italy, 2021	Survey-based	Younger participants tended to report greater side effects than older participants.
Abukhalil et al 2023	Palestine, 2023	Questionnaire	Participants under 20 complained of significantly fewer side effects.
Almughais et al 2022	Saudi Arabia, 2022	Survey-based	88.5% of participants aged 51 or older had side effects compared to 83.1% of those aged 35 to 50.
Mohsin et al 2022	Bangladesh, 2022	Survey-based	Participants aged 50-59 and 60 or above reported were 2.55 times and 5.47 times more likely to report side effects, respectively, compared to younger participants under 30.
Hatmal et al 2022	22 Arab States, 2022	Survey-based	Participants aged 20 to 39 were more likely to experience most side effects.
Ganesan et al 2022	United Arab Emirates, 2022	Survey-based	The older the participants were, the more side effects they reported.
Alamer et al 2021	Not specified in the study, 2021	Survey-based	Children suffered from the following side effects: fever, tiredness, headache, nausea, vomiting, chest pain, shortness of breath, and pain or redness at the injection site.

Table 2.2: Literature on the Association between Gender and Side Effects

Authors	Location and date	Study design	Conclusion
Borroni et al 2021	Italy, 2021	Questionnaire	Females were more likely to complain of more side effects than males. Females are at a greater risk of developing side effects.
El-shitany et al 2021	Saudi Arabia, 2021	Questionnaire	A substantial increase in the number of female participants suffering side effects compared to male participants. The number of females who reported no side effects was less compared to that of males.
Mohammed et al 2021	Saudi Arabia, 2021	Questionnaire	The female gender is a significant predictor of a higher number of reported side effects. Female participants had more side effects following both doses compared to male participants.
Omeish et al 2021	Jordan, 2021	Questionnaire	More female participants reported side effects following the first dose. More male participants reported side effects following the second dose.
Abbas et al 2021	Pakistan, 2021	Survey-based	Gender was substantially associated with soreness at the injection site and headache for females and gastrointestinal disturbances for males.
Riad et al 2021	Czech Republic, 2021	Survey-based	Nausea, headache and injection site swelling more frequent among female participants compared to males.
Lee et al 2021	Japan, 2021	Questionnaire	Females experienced more side effects than males.

Riad et al 2021	Slovakia, 2021	Questionnaire	A statistically significant difference between females and males with regard to pain at the injection site.
Abukhalil 2023	Palestine, 2023	Questionnaire	Females were substantially more likely to experience side effects.
Alzarea et al 2022	Not specified, 2022	Questionnaire	More side effects were reported by male participants compared to females.
Almughais et al 2022	Saudi Arabia, 2022	Survey-based	Female participants were more vulnerable to side effects compared to males.
Darweesh et al 2022	Iraq, 2022	Questionnaire	Side effects were significantly more associated with females compared to males.
Mohsin et al 2022	Bangladesh, 2022	Survey-based	The odds of female participants experiencing side effects were significantly lower than their male counterparts.
Hatmal et al 2022	22 Arab States, 2022	Questionnaire	Female participants suffered more side effects, higher in frequency and intensity compared to males.
Ganesen et al 2022	United Arab Emirates, 2022	Survey-based	More female participants suffered more side effects than did male participants.
Shailabi et al 2022	Not specified, 2022	Paper Questionnaire	Significantly more female participants complained of side effects compared to male participants.
Dighriri et al 2022	14 studies from various countries, 2022	Cross-sectional, Questionnaires	Female participants suffered more side effects.

Table 2.3: Literature on the Association between Number of Doses and Side Effects

Authors	Location and date	Study design	Conclusion
Andrzejczak-grzadko et al 2021	Poland, 2021	Questionnaire	More side effects post second dose.
Hyoung Im et al 2021	South Korea, 2021	Questionnaire	More side effects post second dose.
Zahid et al 2021	Bahrain, 2021	Questionnaire	More side effects post first dose.
Lim et al 2021	Singapore, 2021	Diary-based	More side effects post second dose.
Mohammad et al 2021	Saudi Arabia, 2021	Questionnaire	More side effects post second dose.
Omeish et al 2021	Jordan, 2021	Questionnaire	More side effects post first dose.
El-shitany 2021	Saudi Arabia, 2021	Questionnaire	More side effects post second dose.
Riad et al 2021	Czech Republic, 2021	Questionnaire	More side effects post second dose.
Lee et al 2021	Japan, 2021	Questionnaire	More side effects post second dose.
Krotki et al 2021	Not specified.	Survey-based	More side effects post second dose.
Vanegas et al 2021	Not specified.	Questionnaire	More side effects post first dose.
Abukhalil et al 2023	Palestine, 2023	Questionnaire	More side effects post second and third doses.
Darweesh et al 2022	Iraq, 2022	Questionnaire	More side effects post first dose.
Hatmal et al 2022	22 Arab States, 2022	Questionnaire	More side effects post second dose.
Ganesan et al 2022	United Arab Emirates, 2022	Survey-based	More side effects post second dose.
Dighriri et al 2022	14 studies from various countries, 2022	Cross-sectional, Questionnaires	More side effects post second dose.

2.4: Literature on the Association between Health Status and Side Effects

Authors	Location and date	Study design	Conclusion
Mohsin et al 2022	Bangladesh, 2022	Survey-based	participants with low blood pressure were 3.33 times more likely to experience side effects; obese individuals were 1.31 times more likely; those suffering from chronic respiratory diseases were 3.10 times more likely; those suffering from anemia were 4.6 times more likely than the participants without such underlying conditions
Hatmal et al 2022	22 Arab States, 2022	Cross-sectional, Questionnaires	Participants suffering from chronic diseases such as diabetes were more likely to suffer side effects.
Ganesan et al 2022	United Arab Emirates, 2022	Survey-based	Participants suffering from comorbid conditions were more likely to suffer side effects.

2.5: Literature on the Association between Allergies and Side Effects

Authors	Location and date	Study design	Conclusion
Borroni et al 2021	Italy, 2021	Questionnaire	Participants with a history of allergy were at a greater risk of developing side effects.
Mohammad et al 2021	Saudi Arabia, 2021	Questionnaire	The presence of allergies was a significant predictor of a higher occurrence of side effects.
Riad et al 2021	Czech Republic, 2021	Questionnaire	Participants with allergies were substantially more prone to side effects.
Abukhalil et al 2023	Palestine, 2023	Questionnaire	Participants with drug and food related allergies were more vulnerable to vaccine side effects.
Mohsin et al 2022	Bangladesh, 2022	Survey-based	Participants suffering from severe allergies were 4.17 times more likely to develop side effects.
Hatmal et al 2022	United Arab Emirates, 2022	Questionnaire	Participants with allergies had more side effects.

2.6: Literature on the Association between Covid-19 Infection and Side Effects

Authors	Location and date	Study design	Conclusion
Andrzejczak-grzadko et al 2021	Poland, 2021	Questionnaire	No Significant difference was noted.
Borroni et al 2021	Italy, 2021	Questionnaire	Participants who had tested positive to Covid-19 more than six months prior to vaccination were at a greater risk of experiencing side effects.
El-shitany et al 2021	Saudi Arabia, 2021	Questionnaire	Participants with a past infection suffered more from some side effects.
Abbas et al 2021	Pakistan, 2021	Survey-based	Participants with a past infection were found to be less likely to have experienced soreness at the injection site, fever or headache or fatigue and, gastrointestinal disturbances and, also, flu-like side effects following vaccination.
Riad et al 2021	Czech Republic, 2021	Questionnaire	Injection site pain and muscle pain were substantially more prevalent among participants with a past infection.
Almughais et al 2022	Saudi Arabia, 2022	Questionnaire	Participants with a history of Covid-19 infection had lower odds of developing side effects.
Darweesh et al 2022	Iraq, 2022	Questionnaire	No correlations were drawn.
Hatmal et al 2022	22 Arab States, 2022	Cross-sectional, Questionnaires	Participants with a past infection suffered more from some side effects.
Ganesan et al 2022	United Arab Emirates, 2022	Survey-based	Participants with a past infection suffered more from some side effects.

2.7: Literature on the Association between Work and Side Effects

Authors	Location and date	Study design	Conclusion
Hatmal et al 2022	22 Arab States, 2022	Cross-sectional, Questionnaires	General workers developed significantly more side effects than health care workers.

2.8.Conceptual Framework:

The study fixated on exploring the effects of Covid-19 vaccination among the employees of Al-Makassed Islamic Charitable Hospital. This investigation delved into the potential side effects experienced by the hospital employees following their vaccination against Covid-19. The hospital, as a vital healthcare institution, initiated a vaccination program for its staff to safeguard their health and ensure the continuity of essential healthcare services. In essence, the investigation focused on how various sociodemographic factors might have influenced the occurrence and severity of these side effects among the hospital's employees. The study concentrated on several independent key variables that might have influenced the severity and occurrence of vaccine side effects among the examined employees:

- Demographic Factors: such as age, gender, health status, Covid-19 infection among others.
- Health Status and Medical History: chronic diseases, allergy, chronic medications, acute illness during vaccination and diagnosis of covid-19 infection after any dose of the vaccine.
- Other vaccines received one month prior to covid-19 vaccination.
- Work-related stress levels, like night shifts and working double-shifts.

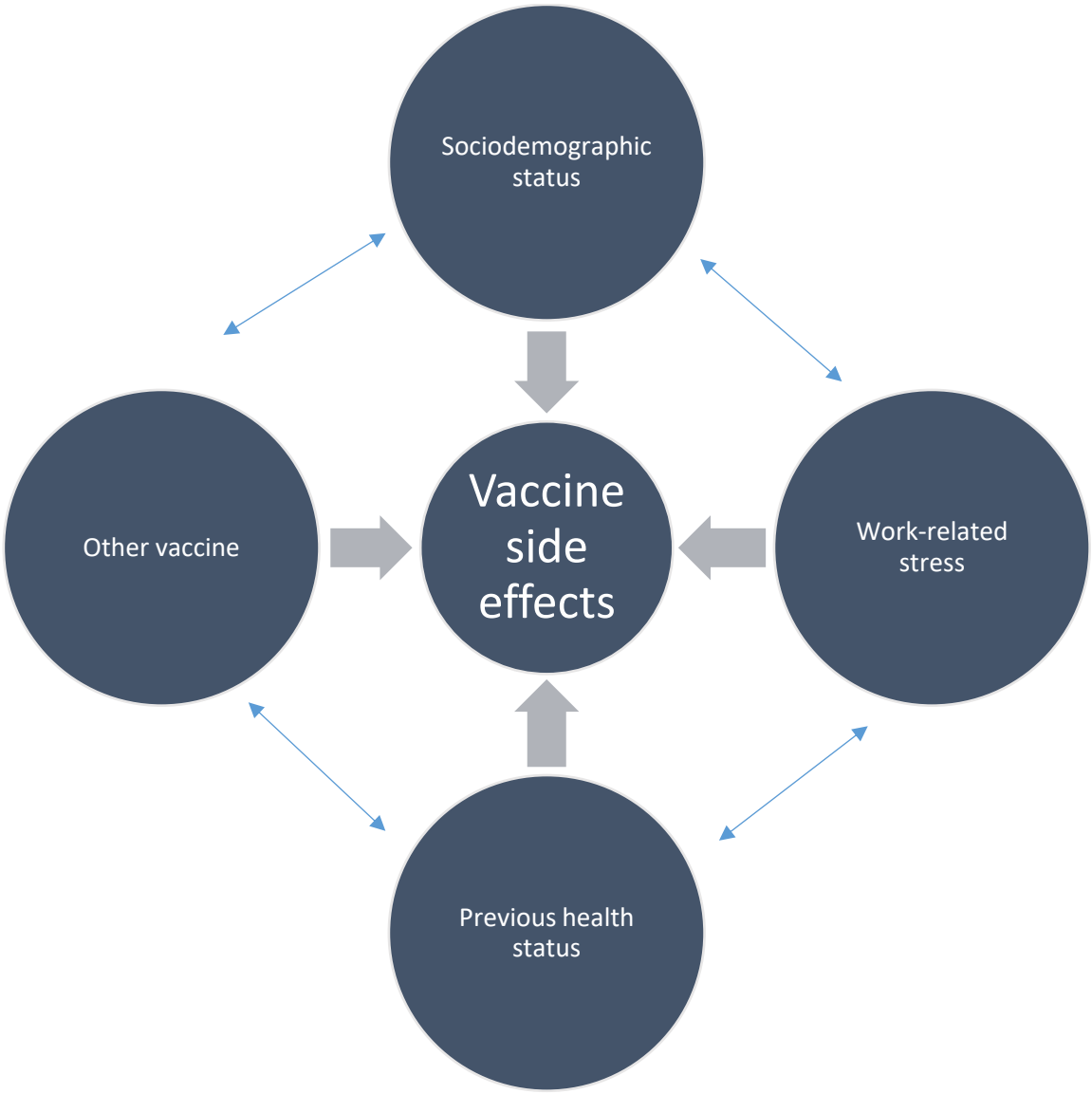

Figure 2.1: Conceptual framework.

Chapter Three: Methodology

3.1. Introduction:

In this chapter, the researcher presents the methodology of the study, study population and sample, instruments of the study, their validity, reliability, procedures used, and then data analysis. The data were collected through an online questionnaire which was distributed to the study population and gathered a number of responses which, in turn, formed the sample for the present cross-sectional study.

3.2. Study variables and their operational definitions:

The study variables were divided into various sets of factors: Demographic Factors such as age, gender, city of residence, educational level, type of job. Health Status and Medical History related Factors such as: chronic diseases suffered by vaccine recipients, existing allergies which could interfere with the vaccine, chronic medications taken by vaccine recipients, acute illness during Covid-19 vaccination and diagnosis of covid-19 infections following any dose of the administered Pfizer vaccine, other vaccines received one month prior to the administration of covid-19 Pfizer vaccination, work-related stress levels, such as working night shifts and double-shifts.

3.3. Population of the Study:

The population of the study is all staff at Al-Makassed Islamic Charitable Hospital, which include (529) male and (396) female who received any dose of the vaccine according to the HR data - of year 2023.

3.4. Sample of the Study:

The sample of the study consists of 215 male and female employees from Al-Makassed Islamic Charitable Hospital with a percentage of (23.2%) from the overall community - based

on (Krejci and Morgan Table, 1977) according to which the appropriate and representative sample size for the study population was determined, by equation:

$$n = \frac{z^2 \times p(1-p)}{e^2}$$

$$n = \frac{1.7^2 \times 0.5(1-0.5)}{0.05^2} = 216$$

z is the z score = 1.7 (Confidence Level 0.9)

e is the margin of error =0.05

N is the population size = 925

p is the population proportion 0.5

The sample is divided according to the following variables: gender, age, city, living area, education/job title, health status in terms of allergies and Covid-19 infections.

- The researcher, also, excluded (12) of the participants who did not complete the answers to the questionnaire questions and others whose answers were deemed inaccurate.

The final sample size, therefore, was (203) employees - who had experienced any side effects following Covid-19 vaccination.

3.5. Study Design:

In this study, the researcher employed the descriptive method, using quantitative research instruments (questionnaires) to gather numerical explanations for the data which he obtained. The researcher adopted this method, owning to its relevance to and suitability for the purpose of the present study.

A descriptive cross-sectional study design, as such, was utilized to test the research questions. The intention was to gather quantitative data on a number of employees from Al-

Makassed Islamic Charitable Hospital. The use of this design, also, facilitated the identification of interrelationships between socio-demographic status, previous health status, on one hand and side effects, on the other. Moreover, other demographic and professional variables were also examined to explore their relationship/correlation with specific side effects.

3.6. Instruments of the Study

The researcher developed a questionnaire in a primary form, targeting participant employee from Al-Makassed Hospital who experienced side effects post Covid-19 vaccination. The questionnaire consisted of four sections as follows: [see Appendix 1].

The first section concerned general information such as (gender, age, city, living area, education, job title) while the second section highlighted medical history including (chronic diseases, allergy, chronic medications, other vaccines received [one month prior to covid-19 vaccine], allergy to other vaccines, suffering from an acute illness during covid-19 vaccination, diagnosis with a covid-19 infection after any dose of the vaccine). Nonetheless, the third section focused on experienced side effects (18 listed side effects, other side effect, side effects that were suffered after the first, second or third dose of the vaccine, most severe side effects ensuant to which dose out of the three) and the fourth and last section of the questionnaire emphasized the onset of side effects (duration of side effects, severity of side effects, treatment received, response to treatment).

3.7. Validity of Study Instruments:

The questionnaire was presented to a group of examiners who estimated that the questionnaire's questions were appropriate for the purpose of the study and present a valid measurement instrument.

To ensure a high level of validity, the questionnaire was referred to a number of experts, from Al-Quds University, for evaluation. These experts kindly presented their views on the

questionnaire in terms of the content, clarity of items, meaning and suitability thereof. They, also, proposed what they deemed as necessary for the modification of particular questionnaire items in order to avoid any possible misunderstanding and to make sure that the questionnaire meets the aims of the study. Hence, the final copy of the questionnaire was modified according to the experts' recommendations.

3.8. Reliability of the Study Instruments:

The researcher verified the suitability of the questionnaire by applying it to an exploratory sample from the study population, not included in his final sample, which amounted to (17) Al-Makassed Hospital employees and redistributed the questionnaire to them after 15 days. The results showed that the correlation coefficient for the different sections of the questionnaire ranged from (0 .75) to (0.91), indicating, thus, a high degree of reliability.

3.9. Data Collection:

The researcher implemented the following procedures in carrying out his study.

1. After determining the statement of the problem, the population and the sample of the study, the researcher prepared the study instrument, which was basically a questionnaire to gather data on the side effects of Covid-19 vaccine experienced by his study sample.
2. The study instrument was presented to a group of expert examiners for their observations and suggestions with regard to the content and construction of the questionnaire.
3. Obtaining a facilitative permission from Al-Quds University.
4. Obtaining a letter of approval from Research Ethics Subcommittee from the faculty of Educational Sciences.
5. Verifying validity of the questionnaire by presenting it them to a number of academics and experts in the field. Finally, testing the reliability of the questionnaire by using Pearson Correlation Coefficient.
6. Collecting data through distributing the respective questionnaire to the sample of the study.

3.10. Data Analysis:

Data were analyzed by using the Statistical Package for Social Sciences (SPSS) software. Before the analysis of the collected data, all data were entered, checked, and cleaned [excluding 22 questionnaire responses]. Frequencies, percentages, were used to describe the employees' demographic characteristics/factors. Employees' data were analyzed and presented in terms of frequencies, percentages, means. To examine the bivariate analysis, Chi-square test was used at p value < 0.05.

3.11. Ethical Considerations:

The proposal was submitted to Al-Quds University-School of public health research ethics committee for discussion [see appendix 2]. The permission to conduct the study was obtained from the Al-Makassed Hospital continuous education and infection control committee. Every participant in this study received a clarification concerning the aim of the data collection and he/she had the choice to either accept or refuse to participate. Each partipcants had to sign a consent form. Names of participants are not shown in this study.

Chapter Four: Results:

4.1. Introduction:

The main purpose of this study was to determine Covid-19 vaccine side effects among Al-Makassed Islamic Charitable Hospital employees. Descriptive analyses, including frequencies and percentages of categorical variables were calculated to describe the study sample. Chi-square was conducted to investigate the relationships among demographic variables in link with side effects and to answer the research questions.

4.2. Sample Distribution: Gender, Age, City

Of the 215 sample size, 203 employees participated in this study with a response rate of (89.8%), as shown in the following table below, out of whom (49.7%) were female and (50.3%) were male, the majority of participants aged 20-30 years (44%), most participants hold a BA degree (60.6%), most participants were from southern cities (48.2%). The incidence rate for side effects post vaccination was 95.1%; meaning, the overwhelming majority of participants complained of side effects versus 4.9% who did not report any side effects.

Table [4.1]: Sample Distribution according to Gender, Age, City, Education, and Job.

Study Sample			
Characteristics	Level	Frequency	Percentage
Gender	Male	97	50.3%
	Female	96	49.7%
Total		**193**	**100%**
Age	20-30 y	85	44%
	31-40 y	73	37.8%
	41-50 y	24	12.4%
	51 y ≥	11	5.8%
Total		**193**	**100%**

Cities	Northern	45	23.3%
	Central	55	28.5%
	Southern	93	48.2%
Total		**193**	**100%**
Education	Less than Secondary	9	4.7%
	Secondary	12	6.2%
	Diploma	14	7.3%
	BA	117	60.6%
	MA	37	19.2%
	PhD	4	2.1%
Total		**193**	**100%**
Job	Doctor	17	8.8%
	Nurse	107	55.4%
	Laboratory technician	5	2.6%
	Radiology technician	5	2.6%
	Midwife	7	3.6%
	Nursing assistant	10	5.2%
	Non-medical staff	42	21.8%
Total		**193**	**100%**

4.3. Side Effects:

While side effects could be divided into local and systemic side effects, the following table below reveals the most common side effects based on this division:

Common Side Effects	Extremely Rare Side Effects
Pain and/or swelling at the injection site. (local).	***Severe allergic reactions (anaphylaxis). (allergic).***

General weakness (fatigue). (systemic).	***Blood clotting disorders. (allergic).***
Headache. (systemic).	***Heart inflammation (myocarditis or pericarditis). (allergic).***
Muscle pain. (systemic).	***Lymphadenopathy. (allergic).***
Chills. (systemic).	Note that while the above allergic reactions remain extremely rare across the literature, none of them was reported by the study's participants.
Fever. (systemic).	
Nausea. (systemic).	

In this study, participating employees were asked (20) yes/no questions, measuring side effects which the participants experienced after the respective Covid-19 vaccine. The answers are as follows:

Table [4.2]: Frequencies of Side Effects

	Frequency			
Side Effects:	**yes#**	**%**	**no#**	**%**
Pain in the site of injection	160	82.9%	33	17.1%

Joint pain	133	68.9%	60	31.1%
Headache	132	68.4%	61	31.6%
Muscle pain	130	67.4%	63	32.6%
General weakness	125	64.8%	68	35.2%
Chills	112	58.0%	81	42.0%
Redness at the site of injection	90	46.6%	103	53.4%
Fever	87	45.1%	106	54.9%
Swelling at the site of injection	71	36.8%	122	63.2%
Diarrhea	67	34.7%	126	65.3%
Allergic reaction after vaccine	53	27.5%	140	72.5%
Cough	49	25.4%	144	74.6%
Difficulty of breathing	48	24.9%	145	75.1%
Nausea	47	24.4%	146	75.6%
Syncope	22	11.4%	171	88.6%
Lymph node enlargement	19	9.8%	174	90.2%
Low back pain	16	8.3%	177	91.7%
Rashes	8	4.1%	185	95.9%
Menstrual cycle changes (Females)	41	42.7%	55	57.3%
Problems in erection (Males)	1	1.1%	96	98.9%

As table (4.2) shows, the most reported side effects following Covid-19 vaccination were: pain in the site of injection (82.9%) followed next by joint pain (68.9%), followed by headache (68.4%), then muscle pain with a percentage of (67.4%), and then there was general weakness amounting to (64.8%) followed finally by chills with a percentage of (58%), on one hand.

On the other, fewer side effects concerned erectile dysfunction in males accounting for (1.1%) of male respondents, followed by skin rashes (4.1%), low back pain (8.3%) and lymph node enlargement (9.8%).

4.4. Relationship between Side Effects and the Recipients' Socio-demographic Status:

The researcher checked each socio-demographic factor in terms of its relationship with particular side effects as follows:

4.4.1. With Regard to Gender:

Table (4.3) Relationship between gender and vaccine side effects

	Side Effects	Male		Female		Person Chi-square X^2	P-value
		Yes	No	Yes	No		
1	**Pain in the site of injection**	78.4%	21.6%	87.5%	12.5%	2.849	0.091
2	**General weakness**	60.8%	39.2%	68.8%	31.3%	1.003	0.249
3	**Headache**	64.9%	35.1%	71.9%	28.1%	1.071	0.301
4	**Muscle pain**	62.9%	37.1%	71.9%	28.1%	1.773	0.183
5	**Chills**	55.7%	44.3%	60.4%	39.6%	0.446	0.504
6	**Joint pain**	68.0%	32.0%	69.8%	30.2%	0.069	0.793
7	**Fever**	46.4%	53.6%	43.8%	56.3%	0.136	0.712
8	**Swelling at the site of injection**	32.0%	68.0%	41.7%	58.3%	1.955	0.162
9	**Redness at the site of injection**	44.3%	55.7%	49.0%	51.0%	0.415	0.519
10	**Rashes**	3.1%	96.9%	5.2%	94.8%	0.543	0.461
11	**Nausea**	17.5%	82.5%	31.3%	68.8%	4.933	0.026*
12	**Lymph node enlargement**	8.2%	91.8%	11.5%	88.5%	0.560	0.454
13	**Syncope**	10.3%	89.7%	12.5%	87.5%	0.229	0.632
14	**Cough**	26.8%	73.2%	24.0%	76.0%	0.206	0.650
15	**Diarrhea**	36.1%	63.9%	33.3%	66.7%	0.161	0.688
16	**Difficulty of breathing**	24.7%	75.3%	25.0%	75.0%	0.020	0.967
17	**Low back pain**	7.2%	92.8%	9.4%	90.6%	0.296	0.587
18	**Allergic reaction after vaccine**	18.6%	81.4%	36.5%	63.5%	3.762	0.067
19	**Menstrual cycle changes**	0.0%	0.0%	42.7%	57.3%	-	-
20	**Problems in erection**	1.0%	99.0%	0.0%	0.0%	-	-

**Significant at p=≤0.05*

Table (4.3) presents the Chi-square test to assess the association between vaccination side effect in terms of gender. A chi-square test indicated no association, in terms of gender, with pain in the site of injection (p=0.091), general weakness (p=0.249), headache (p=0.301), muscle pain (p=0.183), chills (p=0.504), joint pain (p=0.793), fever (p=0.712), swelling at the site of injection (p=0.162), redness at the site of injection (p=0.519), rashes (p=0.461), lymph node enlargement (p=0.454), syncope (p=0.632), cough (p=0.650), diarrhea (p=0.688), difficulty of breathing (p=0.967), low back pain (p=0.587) and allergic reaction after vaccine (p=0.067).

However, a significant association was found in nausea (X2= 4.933, p=0.026). This means that nausea is more associated with females than males.

4.4.2. With Regard to Age:

Table (4.4) Relationship between age and vaccine side effects

	Side Effects	20-30		31-40		41-50		51<		Person Chi-square X^2	P-value
		yes	no	yes	no	yes	no	yes	no		
1	**Pain in the site of injection**	85.9%	14.1%	80.8%	19.2%	79.2%	20.8%	81.8%	18.2%	1.001	0.801
2	**General weakness**	71.8%	28.2%	67.1%	32.9%	54.2%	45.8%	18.2%	81.8%	**13.65**	**0.003**
3	**Headache**	75.3%	24.7%	64.4%	35.6%	62.5%	37.5%	54.5%	45.5%	3.777	0.287
4	**Muscle pain**	75.3%	24.7%	61.6%	38.4%	62.5%	37.5%	54.5%	45.5%	4.598	0.204
5	**Chills**	65.9%	34.1%	53.4%	46.6%	54.2%	45.8%	36.4%	63.6%	5.055	0.168
6	**Joint pain**	71.8%	28.2%	65.8%	34.2%	62.5%	37.5%	81.8%	18.2%	1.979	0.577
7	**Fever**	50.6%	49.4%	42.5%	57.5%	33.3%	66.7%	45.5%	54.5%	2.851	0.461
8	**Swelling at the site of injection**	38.8%	61.2%	38.4%	61.6%	29.2%	70.8%	27.3%	72.7%	1.256	0.74
9	**Redness at the site of injection**	47.1%	52.9%	50.7%	49.3%	41.7%	58.3%	27.3%	72.7%	2.382	0.497
10	**Rashes**	5.9%	94.1%	2.7%	97.3%	0.0%	100.0%	9.1%	90.9%	2.724	0.436

11	**Nausea**	29.4%	70.6%	17.8%	82.2%	25.0%	75.0%	27.3%	72.7%	2.935	0.402
12	**Lymph node enlargement**	10.6%	89.4%	11.0%	89.0%	8.3%	91.7%	0.0%	100.0%	1.418	0.701
13	**Syncope**	9.4%	90.6%	11.0%	89.0%	16.7%	83.3%	18.2%	81.8%	1.507	0.681
14	**Cough**	28.2%	71.8%	19.2%	80.8%	20.8%	79.2%	54.5%	45.5%	7.05	0.07
15	**Diarrhea**	31.8%	68.2%	31.5%	68.5%	45.8%	54.2%	54.5%	45.5%	3.876	0.275
16	**Difficulty of breathing**	28.2%	71.8%	20.5%	79.5%	20.8%	79.2%	36.4%	63.6%	2.232	0.526
17	**Low back pain**	9.4%	90.6%	5.5%	94.5%	12.5%	87.5%	9.1%	90.9%	1.468	0.69
18	**Allergic reaction after vaccine**	30.6%	69.4%	19.2%	80.8%	37.5%	62.5%	36.4%	63.6%	4.583	0.205
19	**Menstrual cycle changes**	23.5%	44.7%	20.5%	13.7%	20.8%	25.0%	9.1%	9.1%	4.736	0.192
20	**Problems in erection**	1.2%	30.6%	0.0%	65.8%	0.0%	54.2%	0.0%	81.8%	2.62	0.454

*Significant at p=≤0.05

Table (4.4) presents the Chi-square test assessing the association between vaccination side effect and age. A chi-square test indicated no association with regards to pain in the site of injection (p=0.801), headache (p=0.287), muscle pain (p=0.204), chills (p=0.168), joint pain (p=0.577), fever (p=0.461), swelling at the site of injection (p=0.740), redness at the site of injection (p=0.497), rashes (p=0.436), lymph node enlargement (p=0.701), syncope (p=0.681), cough (p=0.070), diarrhea (p=0.275), difficulty of breathing (p=0.526), low back pain (p=0.690) and allergic reaction after vaccine (p=0.205).

However, a significant association was found with respect to general weakness.

General weakness:

Table (4.4) shows that there are significant differences between the age groups of the study sample in terms of their experience of side effects, as the table shows (X2= 13.645, p=0.003)

and this side effect was reported more by the age group ranging from (20) – (30) years of age with a frequency of (64 yes [71.8%]).

4.5. With Regard to City:

Table (4.5) Relationship between location of residence and vaccine side effects

	Side Effects	North-		Cent-		South-		Person Chi-square X^2	P-value
		yes	no	yes	no	yes	no		
1	**Pain in the site of injection**	84.4%	15.6%	89.1%	10.9%	78.5%	21.5%	2.836	0.242
2	**General weakness**	62.2%	37.8%	72.7%	27.3%	61.3%	38.7%	2.148	0.342
3	**Headache**	66.7%	33.3%	76.4%	23.6%	64.5%	35.5%	2.325	0.313
4	**Muscle pain**	68.9%	31.1%	76.4%	23.6%	61.3%	38.7%	3.634	0.163
5	**Chills**	57.8%	42.2%	58.2%	41.8%	58.1%	41.9%	0.015	0.985
6	**Joint pain**	75.6%	24.4%	74.5%	25.5%	62.4%	37.6%	3.602	0.165
7	**Fever**	48.9%	51.1%	43.6%	56.4%	44.1%	55.9%	0.347	0.841
8	**Swelling at the site of injection**	33.3%	66.7%	43.6%	56.4%	34.4%	65.6%	1.567	0.457
9	**Redness at the site of injection**	46.7%	53.3%	54.5%	45.5%	41.9%	58.1%	2.208	0.331
10	**Rashes**	2.2%	97.8%	7.3%	92.7%	3.2%	96.8%	1.971	0.373
11	**Nausea**	28.9%	71.1%	32.7%	67.3%	17.2%	82.8%	5.176	0.075
12	**Lymph node enlargement**	2.2%	97.8%	18.2%	81.8%	8.6%	91.4%	**7.415**	**0.025***
13	**Syncope**	17.8%	82.2%	16.4%	83.6%	5.4%	94.6%	**6.495**	**0.039***
14	**Cough**	24.4%	75.6%	32.7%	67.3%	21.5%	78.5%	2.325	0.313
15	**Diarrhea**	37.8%	62.2%	43.6%	56.4%	28.0%	72.0%	3.992	0.136
16	**Difficulty of breathing**	28.9%	71.1%	30.9%	69.1%	19.4%	80.6%	2.976	0.226
17	**Low back pain**	6.7%	93.3%	16.4%	83.6%	4.3%	95.7%	5.818	0.063

18	**Allergic reaction after vaccine**	31.1%	68.9%	38.2%	61.8%	19.4%	80.6%	**6.542**	**0.038***
19	**Menstrual cycle changes**	15.6%	28.9%	25.5%	34.5%	21.5%	24.7%	0.741	0.690
20	**Problems in erection**	0.0%	55.6%	0.0%	40.0%	1.1%	52.7%	0.950	0.622

**Significant at p=≤0.05*

Table (4.5) presents the Chi-square assessing the association between vaccination side effect with respect to cities. A chi-square test indicated no association with regards to pain in the site of injection (p=0.242), general weakness (p=0.342), headache (p=0.313), muscle pain (p=0.163), chills (p=0.985), joint pain (p=0.165), fever (p=0.841), swelling at the site of injection (p=0.475), redness at the site of injection (p=0.331), rashes (p=0.373), nausea (p=0.075) cough (p=0.313), syncope, diarrhea (p=0.136), difficulty of breathing (p=0.226), low back pain.

However, a significant association was found with the following: lymph node enlargement, syncope and allergic reaction after vaccine.

Lymph node enlargement:

Table (4.5) shows that there is a significant association between the cities of residence (northern, central, southern) of the study participants in terms of their experience of side effects following vaccination. The table shows that (X2=7.415, P=0.025) and, therefore, these side effects were reported more often by participants from central cities (Jerusalem, Ramallah, Jericho) accounting for (22.2%) [10 yes, 45 no], versus (2%) [1yes, 44 no] for northern cities and (9%) [8 yes, 85 no] for southern cities.

Syncope:

Table (4.5) shows presents a significant association between cities of residence (northern, central, southern) of the study participants with respect to their experience of side effects, as

the table shows that (X2=6.495, P=0.039). Hence, these side effects were reported by participants from northern cities (21.6%) [8 yes, 37 no], central cities (19.5%) [9 yes, 46 no] versus (5.6%) [5 yes, 88 no] for southern cities.

Allergic reaction post vaccination:

Table (4.5) shows that there is a significant association between cities (northern, central, southern) of the participants in terms of their experience of side effects post Covid-19 vaccination, as the table shows that (X2=6.542, P=0.038) and this particular side effect appeared more among participants from northern cities (45.1%) [14 yes, 31 no], central cities (61.7%) [21 yes, 34 no] versus (24%) [18 yes, 75 no] for southern cities.

4.6. Vaccine Recipients' Previous Health Status and Covid-19 Vaccine Side Effects

4.6.1. Chronic Diseases:

Table (4.6) shows the relation between study participants with chronic diseases, those without such diseases and the side effects they experienced after receiving the vaccine.

	Side Effects:	**With** chronic **diseases** **29%**		**Without** chronic **diseases** **71%**		**Person Chi-square X^2**	**P-value**
		yes	**no**	**yes**	**no**		
1	**Pain in the site of injection**	80.4%	19.6%	83.9%	16.1%	0.360	0.548
2	**General weakness**	64.3%	35.7%	65.0%	35.0%	0.008	0.929
3	**Headache**	60.7%	39.3%	71.5%	28.5%	2.152	0.142
4	**Muscle pain**	69.6%	30.4%	66.4%	33.6%	0.187	0.665
5	**Chills**	53.6%	46.4%	59.9%	40.1%	0.644	0.422
6	**Joint pain**	69.6%	30.4%	68.6%	31.4%	0.020	0.888
7	**Fever**	41.1%	58.9%	46.7%	53.3%	0.511	0.475
8	**Swelling at the site of injection**	41.1%	58.9%	35.0%	65.0%	0.623	0.430
9	**Redness at the site of injection**	41.1%	58.9%	48.9%	51.1%	0.980	0.322

10	**Rashes**	8.9%	91.1%	2.2%	97.8%	**4.543**	**0.033***
11	**Nausea**	19.6%	80.4%	26.3%	73.7%	0.950	0.330
12	**Lymph node enlargement**	7.1%	92.9%	10.9%	89.1%	0.649	0.421
13	**Syncope**	10.7%	89.3%	11.7%	88.3%	0.037	0.848
14	**Cough**	23.2%	76.8%	26.3%	73.7%	0.197	0.657
15	**Diarrhea**	28.6%	71.4%	37.2%	62.8%	1.314	0.252
16	**Difficulty of breathing**	23.2%	76.8%	25.5%	74.5%	0.116	0.734
17	**Low back pain**	10.7%	89.3%	7.3%	92.7%	0.610	0.435
18	**Allergic reaction after vaccine**	28.6%	71.4%	27.0%	73.0%	0.049	0.825
19	**Menstrual cycle changes**	28.6%	44.6%	18.2%	21.9%	0.397	0.529
20	**Problems in erection**	0.0%	26.8%	0.7%	59.1%	0.185	0.667

**Significant at p=≤0.05*

Table (4.6) presents the Chi-square test assessing the association between vaccination side effect in terms of chronic diseases. A chi-square test indicated no association with regards to pain in the site of injection (p=0.584), general weakness (p=0.929), headache (p=0.142), muscle pain (p=0.665), chills (p=0.422), joint pain (p=0.888), fever (p=0.475), swelling at the site of injection (p=0.430), redness at the site of injection (p=0.322), nausea (p=330), lymph node enlargement (p=0.421), syncope (p=0.848), cough (p=0.657), diarrhea (p=0.252), difficulty of breathing (p=0.734), low back pain (p=0.435) and allergic reaction after vaccine (p=0.825). However, a significant association was found with regards to rashes.

The chronic diseases that the respondents have are:

- Diabetes Mellitus.
- Chronic hepatitis B.
- Hypertension (HTN).
- Hypothyroidism.
- Osteoarthritis.

Rashes:

Table (4.6) shows that there is a significant association between study participants who have chronic diseases and those who do not with regards to their experience of rashes, as the table shows that (X2=4.543, P=0.033) as this side effect was reported more by participants with chronic diseases with (9%) [5 yes, 51 no] versus (2%) [3 yes, 134 no) for study respondents who do not have chronic health conditions such as diseases.

4.6.2. Allergies:

Table (4.7) Relationship between allergies and vaccine side effects

	Side Effects:	Having Allergy		Not Having Allergy		Person Chi-square X^2	P-value
		yes	no	yes	no		
1	**Pain in the site of injection**	80.0%	20.0%	83.4%	16.6%	0.211	0.646
2	**General weakness**	83.3%	16.7%	61.0%	38.7%	**5.366**	**0.021***
3	**Headache**	76.7%	23.3%	66.5%	33.1%	1.125	0.289
4	**Muscle pain**	80.0%	20.0%	64.6%	35.0%	2.582	0.108
5	**Chills**	60.0%	40.0%	57.3%	42.3%	0.057	0.812
6	**Joint pain**	83.3%	16.7%	65.9%	33.7%	3.448	0.063
7	**Fever**	36.7%	63.3%	46.3%	53.4%	1.015	0.314
8	**Swelling at the site of injection**	36.7%	63.3%	36.6%	63.2%	0.013	0.975
9	**Redness at the site of injection**	40.0%	60.0%	47.6%	52.1%	0.628	0.428
10	**Rashes**	6.7%	93.3%	3.7%	96.3%	0.568	0.451
11	**Nausea**	23.3%	76.7%	24.4%	75.5%	0.020	0.887
12	**Lymph node enlargement**	10.0%	90.0%	9.8%	90.2%	0.011	0.988
13	**Syncope**	16.7%	83.3%	10.4%	89.6%	0.976	0.323
14	**Cough**	30.0%	70.0%	24.4%	75.5%	0.399	0.528
15	**Diarrhea**	40.0%	60.0%	33.5%	66.3%	0.438	0.508
16	**Difficulty of breathing**	26.7%	73.3%	24.4%	75.5%	0.061	0.804
17	**Low back pain**	13.3%	86.7%	7.3%	92.6%	1.188	0.276

18	**Allergic reaction after vaccine**	26.7%	73.3%	27.4%	72.4%	0.011	0.916
19	**Menstrual cycle changes**	16.7%	30.0%	22.0%	28.2%	0.328	0.567
20	**Problems in erection**	0.0%	53.3%	0.6%	49.1%	0.200	0.655

**Significant at p=≤0.05*

Table (4.7) presents the Chi-square test assessing the association between vaccination side effect in terms of allergy. A chi-square test indicated no association with regards to pain in the site of injection (p=0.646), headache (p=0.289), muscle pain (p=0.108), chills (p=0.812), joint pain (p=0.063), fever (p=0.314), swelling at the site of injection (p=0.975), redness at the site of injection (p=0.428), rashes (p=0.451), nausea (p=0.887), lymph node enlargement (p=0.988), syncope (p=0.323), cough (p=0.528), diarrhea (p=0.508), difficulty of breathing (p=0.804), low back pain (p=0.276) and allergic reaction after vaccine (p=0.916). However, a significant association was found with regards to general weakness.

The allergies that the respondents have are:

- Wheat allergy.
- Seasonal allergy.
- Dust allergy.
- Penicillin.
- Cephalosporin.
- Unknown drug allergy.
- Bee stings.
- Diclofenac.
- Sulfa.
- Tavanic.

General weakness:

Table (4.8) shows that there is a significant association between study respondents who have allergies and those who do not in their experience of side effects following Covid-19 vaccination, as the table shows that (X2=5.366, P=0.021) and this side effect, therefore, appeared more among participants who have allergies (83.3%) [25 yes, 5 no] versus (61.3%) [100 yes, 63 no] for participants who have no allergies.

4.6.3. Chronic Medications:

Table (4.9) Relationship between chronic medications and vaccine side effects

	Side Effects:	With medications 11.4%		Without medications 88.6%		Person Chi-square X^2	P-value
		yes	no	yes	no		
1	**Pain in the site of injection**	81.8%	18.2%	83.0%	17.0%	0.021	0.886
2	**General weakness**	63.6%	36.4%	64.9%	35.1%	0.014	0.906
3	**Headache**	68.2%	31.8%	68.4%	31.6%	0.001	0.982
4	**Muscle pain**	77.3%	22.7%	66.1%	33.9%	1.110	0.292
5	**Chills**	54.5%	45.5%	58.5%	41.5%	0.124	0.725
6	**Joint pain**	81.8%	18.2%	67.3%	32.7%	1.931	0.165
7	**Fever**	45.5%	54.5%	45.0%	55.0%	0.001	0.970
8	**Swelling at the site of injection**	54.5%	45.5%	34.5%	65.5%	3.367	0.067
9	**Redness at the site of injection**	45.5%	54.5%	46.8%	53.2%	0.014	0.906
10	**Rashes**	9.1%	90.9%	3.5%	96.5%	1.529	0.216
11	**Nausea**	27.3%	72.7%	24.0%	76.0%	0.115	0.735
12	**Lymph node enlargement**	9.1%	90.9%	9.9%	90.1%	0.016	0.900
13	**Syncope**	27.3%	72.7%	9.4%	90.6%	**6.195**	**0.013***
14	**Cough**	40.9%	59.1%	23.4%	76.6%	3.158	0.076
15	**Diarrhea**	54.5%	45.5%	32.2%	67.8%	**4.308**	**0.038***
16	**Difficulty of breathing**	40.9%	59.1%	22.8%	77.2%	3.418	0.064

17	**Low back pain**	18.2%	81.8%	7.0%	93.0%	3.196	0.074
18	**Allergic reaction after vaccine**	31.8%	68.2%	26.9%	73.1%	0.237	0.627
19	**Menstrual cycle changes**	13.6%	27.3%	22.2%	28.7%	0.357	0.550
20	**Problems in erection**	0.0%	59.1%	0.6%	48.5%	0.156	0.693

**Significant at p=≤0.05*

Table (4.8) presents the Chi-square test assessing the association between vaccination side effect in terms of chronic medications. A chi-square test indicated no association with respect to pain in the site of injection (p=0.886),general weakness (p=0.906), headache (p=0.982), muscle pain (p=0.292), chills (p=0.725), joint pain (p=0.165), fever (p=0.970), swelling at the site of injection (p=0.067), redness at the site of injection (p=0.906), rashes (p=0.216), nausea (p=0.735), lymph node enlargement (p=0.900), cough (p=0.076), difficulty of breathing (p=0.064), low back pain (p=0.074) and allergic reaction after vaccine (p=0.627). However, a significant association was found with regards to syncope and diarrhea.

The chronic medications that the respondents take are:

- Steroidal anti inflammatory
- Anti-Hypertensive medications.
- Aspirin.
- Eltroxin.
- Insulin.
- Oral Anti-hyperglycemic agents.
- Cortisone, Ventolin fumigation.

Syncope:

Table (4.9) shows that there is a significant association between study participants who take chronic medications and those who do not in their experience of side effects following their Covid-19 vaccine, as the table shows that (X2=6.195, P=0.013). Such side effects appeared more among participants who use chronic medications (27.3%) [6 yes, 16 no] versus (9.3%) [16 yes, 155 no) for study respondents who do not take medications.

Diarrhea:

Table (4.9) shows that there is a significant association between study respondents who take chronic medications and those who do not in their experience of side effects post Covid-19 vaccination, as the table shows that (X2=4.308, P=0.038); therefore, such side effects were reported more by participants who take chronic medications (54.5%) [12 yes, 10 no] versus (32.1%) [55 yes, 116 no] for study respondents who do not take such medications.

4.6.4. Other Vaccines (1 month before covid-19 vaccine):

Table (4.10) Relationship between other vaccine taken and vaccine side effects

	Side Effects:	Do take 5.7%		Don't take 94.3%		Person Chi-square X^2	P-value
		yes	no	yes	no		
1	**Pain in the site of injection**	81.8%	18.2%	83.0%	17.0%	0.010	0.922
2	**General weakness**	72.7%	27.3%	64.3%	35.7%	0.324	0.569
3	**Headache**	72.7%	27.3%	68.1%	31.9%	0.101	0.750
4	**Muscle pain**	63.6%	36.4%	67.6%	32.4%	0.073	0.786
5	**Chills**	45.5%	54.5%	58.8%	41.2%	0.758	0.384
6	**Joint pain**	63.6%	36.4%	69.2%	30.8%	0.152	0.697
7	**Fever**	27.3%	72.7%	46.2%	53.8%	1.494	0.222
8	**Swelling at the site of injection**	27.3%	72.7%	37.4%	62.6%	0.454	0.500
9	**Redness at the site of injection**	36.4%	63.6%	47.3%	52.7%	0.494	0.482
10	**Rashes**	9.1%	90.9%	3.8%	96.2%	0.718	0.397
11	**Nausea**	27.3%	72.7%	24.2%	75.8%	0.054	0.816
12	**Lymph node enlargement**	9.1%	90.9%	9.9%	90.1%	0.007	0.931
13	**Syncope**	9.1%	90.9%	11.5%	88.5%	0.062	0.804
14	**Cough**	18.2%	81.8%	25.8%	74.2%	0.320	0.572
15	**Diarrhea**	9.1%	90.9%	36.3%	63.7%	3.379	0.066
16	**Difficulty of breathing**	18.2%	81.8%	25.3%	74.7%	0.279	0.597
17	**Low back pain**	9.1%	90.9%	8.2%	91.8%	0.010	0.921

18	**Allergic reaction after vaccine**	18.2%	81.8%	28.0%	72.0%	0.504	0.478
19	**Menstrual cycle changes**	36.4%	27.3%	20.3%	28.6%	0.643	0.423
20	**Problems in erection**	0.0%	36.4%	0.5%	50.5%	0.043	0.835

**Significant at p=≤0.05*

Table (4.10) presents the Chi-square test assessing the association between vaccination side effects in terms of other vaccines received (one month before receiving the covid-19 vaccine). A chi-square test indicated no association factor with pain in the site of injection (p=0.922),general weakness (p=0.569), headache (p=0.750), muscle pain (p=0.786), chills (p=0.384), joint pain (p=0.697), fever (p=0.222), swelling at the site of injection (p=0.500), redness at the site of injection (p=0.482), rashes (p=0.397), nausea (p=0.816), lymph node enlargement (p=0.931), cough (p=0.572), difficulty of breathing (p=0.597), low back pain (p=0.921) and allergic reaction after vaccine (p=0.478).

Other vaccines that the respondents had received prior to the Covid-19 vaccine:

- Hepatitis B booster.
- Influenza vaccine.
- Tetanus.

4.7. With Regards to Work Shifts:

Table (4.11) Differences between work shifts and vaccine side effects

	Side Effects:	**Working in shifts**		**Not working in shifts**		**Person Chi-square X^2**	**P-value**
		yes	**no**	**yes**	**no**		
1	**Pain in the site of injection**	84.5%	15.5%	79.7%	20.3%	0.698	0.404
2	**General weakness**	69.8%	30.2%	54.7%	45.3%	**4.263**	**0.039***
3	**Headache**	67.4%	32.6%	70.3%	29.7%	0.163	0.686
4	**Muscle pain**	71.3%	28.7%	59.4%	40.6%	2.775	0.096
5	**Chills**	58.1%	41.9%	57.8%	42.2%	0.002	0.965
6	**Joint pain**	69.0%	31.0%	68.8%	31.3%	0.03	0.953

7	**Fever**	44.2%	55.8%	46.9%	53.1%	0.125	0.724
8	**Swelling at the site of injection**	35.7%	64.3%	39.1%	60.9%	0.213	0.644
9	**Redness at the site of injection**	44.2%	55.8%	51.6%	48.4%	0.935	0.333
10	**Rashes**	4.7%	95.3%	3.1%	96.9%	0.251	0.617
11	**Nausea**	22.5%	77.5%	28.1%	71.9%	0.740	0.390
12	**Lymph node enlargement**	10.9%	89.1%	7.8%	92.2%	0.445	0.504
13	**Syncope**	10.9%	89.1%	12.5%	87.5%	0.115	0.735
14	**Cough**	20.2%	79.8%	35.9%	64.1%	**5.625**	**0.018***
15	**Diarrhea**	30.2%	69.8%	43.8%	56.3%	3.449	0.063
16	**Difficulty of breathing**	21.7%	78.3%	31.3%	68.8%	2.086	0.149
17	**Low back pain**	7.0%	93.0%	10.9%	89.1%	0.883	0.347
18	**Allergic reaction after vaccine**	24.0%	76.0%	34.4%	65.6%	2.298	0.130
19	**Menstrual cycle changes**	24.0%	24.8%	15.6%	35.9%	3.163	0.075
20	**Problems in erection**	0.8%	50.4%	0.0%	48.4%	0.475	0.491

**Significant at p=≤0.05*

Table (4.11) presents the Chi-square test assessing the association between vaccination side effect in terms of work shifts. A chi-square test indicated no association with pain in the site of injection (p=0.404), headache (p=0.686), muscle pain (p=0.096), chills (p=0.965), joint pain (p=0.953), fever (p=0.724), swelling at the site of injection (p=0.644), redness at the site of injection (p=0.333), rashes (p=0.617), nausea (p=0.390), lymph node enlargement (p=0.504), syncope (p=0.735), diarrhea (p=0.063) difficulty of breathing (p=0.149), low back pain (p=0.347) and allergic reaction after vaccine (p=0.130).

However, a significant association was found with regards to general weakness and cough.

General weakness:

Table (4.11) shows that there is a significant association between study participants who work in shifts versus those who do not in terms of their experience of side effects post Covid-19 vaccination, as the table shows that (X2=4.263 ,P=0.039) and this side effect, therefore,

appeared more among participants who work in shifts with a percentage of (69.7%) [90 yes, 39no] versus (54.6%) [35 yes, 29 no] for the remaining participants who do not work in shifts.

Cough:

Table (4.11) shows that there is a significant association between study participants who work in shifts and those who do not in regards to their experience of side effects following the Covid-19 vaccine, as the table shows that (X2=5.625, P=0.018) and this side effect, as such, appeared more among participants who don't work in shifts with a percentage of (36%) [23 yes, 41 no] versus (25.2%) [26 yes, 103 no) for the remaining participants who work in shifts.

4.8. Diagnosis of Covid-19 Infection Following Any Dose of the Vaccine:

Table (4.12) Relationship between diagnosis with a covid-19 infection after any dose of the vaccine and side effects

	Side Effects:	Diagnosed 28%		Not diagnosed 72%		Person Chi-square X^2	P-value
		yes	no	yes	no		
1	**Pain in the site of injection**	83.3%	16.7%	82.7%	17.3%	0.010	0.921
2	**General weakness**	66.7%	33.3%	64.0%	36.0%	0.119	0.731
3	**Headache**	72.2%	27.8%	66.9%	33.1%	0.508	0.476
4	**Muscle pain**	72.2%	27.8%	65.5%	34.5%	0.807	0.369
5	**Chills**	68.5%	31.5%	54.0%	46.0%	3.386	0.066
6	**Joint pain**	77.8%	22.2%	65.5%	34.5%	2.751	0.097
7	**Fever**	53.7%	46.3%	41.7%	58.3%	2.253	0.133
8	**Swelling at the site of injection**	35.2%	64.8%	37.4%	62.6%	0.083	0.774
9	**Redness at the site of injection**	37.0%	63.0%	50.4%	49.6%	2.774	0.096
10	**Rashes**	3.7%	96.3%	4.3%	95.7%	0.037	0.848
11	**Nausea**	40.7%	59.3%	18.0%	82.0%	**10.931**	**0.001***
12	**Lymph node enlargement**	9.3%	90.7%	10.1%	89.9%	0.029	0.865
13	**Syncope**	18.5%	81.5%	8.6%	91.4%	3.763	0.059

14	**Cough**	42.6%	57.4%	18.7%	81.3%	**11.715**	**0.001***
15	**Diarrhea**	40.7%	59.3%	32.4%	67.6%	1.201	0.273
16	**Difficulty of breathing**	37.0%	63.0%	20.1%	79.9%	**5.940**	**0.015***
17	**Low back pain**	14.8%	85.2%	5.8%	94.2%	**4.198**	**0.040***
18	**Allergic reaction after vaccine**	33.3%	66.7%	25.2%	74.8%	1.298	0.255
19	**Menstrual cycle changes**	31.5%	22.2%	17.3%	30.9%	**4.300**	**0.038***
20	**Problems in erection**	0.0%	46.3%	0.7%	51.1%	0.351	0.554

**Significant at p=≤0.05*

As Table (4.12) presents the Chi-square test assessing the association between vaccination side effect in terms of diagnosis of Covid-19 infection. A chi-square test did not indicate an association with pain in the site of injection (p=0.921), general weakness (p=0.731), headache (p=0.476), muscle pain (p=0.369), chills (p=0.066), joint pain (p=0.097), fever (p=0.133), Swelling at the site of injection (p=0.774), redness at the site of injection (p=0.096), rashes (p=0.848), lymph node enlargement (p=0.865), syncope (p=0.059), diarrhea (p=0.273) and allergic reaction after vaccine (p=0.255).

However, a significant association was found with respect to nausea, cough, difficulty of breathing, low back pain and menstrual cycle changes.

Nausea:

Table (4.12) shows that there is a significant association between study participants who were diagnosed with a covid-19 infection after any dose of the vaccine and those who were not in their experience of the side effects of the Covid-19 vaccine, as the table shows that t-value was (3.386) and P-value was (0.001) and these side effects, as such, appeared more among study respondents who were diagnosed with a covid-19 infection with a percentage of (40.7%) [22 yes, 32 no] versus (18%) [25 yes, 114 no) for the participants who were not diagnosed.

Cough:

Table (4.12) shows that there is a significant association between study respondents who were diagnosed with a covid-19 infection after any dose of the vaccine and those who were not in terms of their experience of the side effects of the Covid-19 vaccine, as the table shows that t-value was (3.513) and P-value was (0.001). These side effects appeared, thus, more among participants who were diagnosed with a covid-19 infection a with percentage of (42.6%) [23 yes, 31 no] versus (18.7%) [26 yes, 113 no) for other respondents who were not diagnosed with Covid-19.

Difficulty of breathing:

Table (4.12) shows that there is a significant association between study respondents who were diagnosed with a covid-19 infection after any dose of the vaccine and those who were not in their experience of the side effects of the Covid-19 vaccine, as the table shows that t-value was (2.463) and P-value was (0.015) and these side effects, therefore, were reported more by study subjects that were diagnosed with a covid-19 infection with a percentage of (37%) [20 yes, 34 no] versus (20.5%) [28 yes, 111 no) for participants who were not diagnosed.

Low back pain:

Table (4.12) shows that there is a significant association between study respondents who were diagnosed with a covid-19 infection after any dose of the vaccine and those who were not in their experience of the side effects of the Covid-19 vaccine, as the table shows that t-value was (2.061) and P-value was (0.041) and these side effects, as such, were complained of more by participants who were diagnosed with a covid-19 infection with a percentage of (15%) [8 yes, 46 no] versus (5.7%) [8 yes, 131 no) for respondents who were not diagnosed.

Menstrual cycle changes:

Table (4.12) shows that there is a significant association between study respondents who were diagnosed with a covid-19 infection after any dose of the vaccine and those who were not in their experience of the side effects of the Covid-19 vaccine, as the table shows that t-value was (2.099) and P-value was (0.038) and these side effects, hence, appeared more among participants who were diagnosed with a covid-19 infection with a percentage of (58.6%) [17 yes, 12 no] versus (35.8%) [24 yes, 43 no) for study respondents who were not diagnosed.

4.9. Side Effects Reported after the 1st, 2nd, or 3rd Doses:

Table (4.13) Side effects experienced after receiving the Covid-19 vaccine following the 1st, 2nd, or 3rd doses

	Side Effects:	1st dose		2nd dose		3rd dose		All doses	
		yes	no	yes	no	yes	no	yes	no
1	**Pain in the site of injection**	75.4%	24.6%	90.7%	9.3%	75.7%	24.3%	88.9%	9.3%
2	**General weakness**	61.4%	38.6%	74.1%	25.9%	62.2%	37.8%	60.0%	33.3%
3	**Headache**	64.9%	35.1%	66.7%	33.3%	78.4%	21.6%	66.7%	27.8%
4	**Muscle pain**	68.4%	31.6%	66.7%	33.3%	73.0%	27.0%	62.2%	31.5%
5	**Chills**	52.6%	47.4%	53.7%	46.3%	59.5%	40.5%	68.9%	25.9%
6	**Joint pain**	68.4%	31.6%	68.5%	31.5%	70.3%	29.7%	68.9%	25.9%
7	**Fever**	49.1%	50.9%	33.3%	66.7%	51.4%	48.6%	48.9%	42.6%
8	**Swelling at the site of injection**	33.3%	66.7%	38.9%	61.1%	40.5%	59.5%	13.3%	53.7%
9	**Redness at the site of injection**	47.4%	52.6%	46.3%	53.7%	40.5%	59.5%	51.1%	40.7%
10	**Rashes**	3.5%	96.5%	3.7%	96.3%	8.1%	91.9%	2.2%	81.5%
11	**Nausea**	22.8%	77.2%	14.8%	85.2%	45.9%	54.1%	20.0%	66.7%
12	**Lymph node enlargement**	10.5%	89.5%	9.3%	90.7%	16.2%	83.8%	4.4%	79.6%
13	**Syncope**	8.8%	91.2%	9.3%	90.7%	21.6%	78.4%	8.9%	75.9%
14	**Cough**	22.8%	77.2%	13.0%	87.0%	43.2%	56.8%	28.9%	59.3%

15	**Diarrhea**	29.8%	70.2%	24.1%	75.9%	43.2%	56.8%	46.7%	44.4%
16	**Difficulty of breathing**	21.1%	78.9%	18.5%	81.5%	35.1%	64.9%	28.9%	59.3%
17	**Low back pain**	5.3%	94.7%	13.0%	87.0%	8.1%	91.9%	6.7%	77.8%
18	**Allergic reaction after vaccine**	22.8%	77.2%	29.6%	70.4%	29.7%	70.3%	28.9%	59.3%
19	**Menstrual cycle changes**	5.3%	17.5%	31.5%	37.0%	40.5%	48.6%	13.3%	13.0%
20	**Problems in erection**	0.0%	77.2%	0.0%	31.5%	0.0%	10.8%	2.2%	57.4%
Total		57 (29.5%)		54 (27.9%)		37 (19.2%)		45 (23.4%)	

As table (4.13) shows, we find that (29.5%) of all respondents experienced side effects for Covid-19 vaccine after the first dose, (27.9%) of them experienced side effects after second dose and finally (19.2%) experienced side effects after the third dose.

First dose:

We can clearly see from table (4.13) that the most frequently reported side effects after the first dose are:

- Pain in the site of injection (75.4%) [by all respondents who experienced side effects after the 1st dose]
- Muscle & joint pain with a percentage of (68.4%) [by all respondents who experienced side effects after the 1st dose].

Second dose:

We can clearly see from table (4.13) that the most reported side effects after the second dose are:

- Pain in the site of injection (90.7%) [by all respondents who experienced side effects after the 2nd dose]

- General weakness with a percentage of (74%) [by all respondents who experienced side effects after the 2nd dose].

Third dose:

We can clearly see from table (4.13) that the most reported side effect after third dose are:

- Headache (78.4%) [by all respondents who experienced side effects after the 3rd dose]
- Pain in the site of injection with a percentage of (75.6%) [by all respondents who experienced side effects after the 3rd dose].

4.10. Is there any similarity between the side effects reported by the employees and those of their vaccinated family members?

The answers of the employees regarding the similarity between their felt side effects and those of their vaccinated family members were divided into two categorical answers as follows:

Table (4.14) Similar side effects:

Similar Side Effects:	Frequency:	Percentage:
Yes	126	%65.3
No	67	%34.7

The data in Table (4.14) indicate that the employees who had similar side effects with their vaccinated family members were (65.3%) versus (34.7%) who did not have similar side effects.

4.11. Onset of Side Effects:

The answers of the participating employees regarding the onset of side effects varied and were, therefore, divided into four answers as follows:

Table (4.15) Onset of Side Effects

Onset of Side Effects:	Frequency:	Percentage:
Less than 24 hours	153	79.3%

24 hours - 48 hours	30	15.5%
After 48 hours - a week	6	3.1%
after a week	4	2.1%

The data in table (4.15) indicate that the onset of side effects among responding employees was within less than 24 hours, for the most part, with a percentage of (79.3%). However, the results in the previous table indicate that (%15.5) of the reported side effects appeared within 24-48 hours following vaccination.

4.12. Duration of Side Effects:

The answers of the employees regarding the duration of side effects varied and were, thus, divided into four answers as follows:

Table (4.16) duration of side effects

Duration of Side Effects:	**Frequency:**	**Percentage:**
One day	24	12.4%
Two days	34	17.6%
Three days	113	58.5%
More than three days	22	11.4%

The data in table (4.17) indicate that the duration of side effects among the participating employees was three days, for the most part, with a percentage of (58.5%). Also, the results shown in the previous table above indicate that (11.4%) of the participants reported side effects that lasted more than three days.

4.13. Severity of Side Effects:

The answers of the employees regarding the severity of side effects varied and were, thus, divided into three main categorical answers as follows:

Table (4.17) Severity of side effects

Severity of Side Effects:	Frequency:	Percentage:
Mild	115	59.6%
Moderate	63	32.6%
Severe	15	7.8%

The data in Table (4.17) indicate that the severity of side effects among the participating employees was mostly mild, with a percentage of (59.6%). Also, the results from the previous table indicated that (32.6%) of the side effects experienced by the responding employees were moderate.

4.14. Treatment Received for the Side Effects:

The answers of the employees regarding the received treatment were divided into two answers as follows:

Table (4.18) shows the received treatment.

Received Treatment:	Frequency:	Percentage:
Yes	124	64.2%
No	69	35.8%

The data in table (4.18) indicate that employees who received treatment were (64.2%) verses (35.8%) who did not receive treatment.

The treatments received by the employees were classified into:

- Pain Killers.
- Non-steroidal Anti-inflammatory Drugs.
- Antibiotics.
- Cough Suppressants.

4.15. Responding Well to Treatment:

The answers of the employees concerning responding well to the treatment were divided into two answers as follows:

Table (4.19): responding well to treatment.

Responding Well to Treatment:	Frequency:	Percentage:
Yes	97	78.2%
No	27	21.8%

The data in Table (4.19) indicate that (78.2%) responded well to treatment while (21.8%) did not respond well.

Chapter five: Discussion, conclusions and recommendations

5.1. Introduction

In this chapter, study results are summarized and compared with other studies' results. The results are interpreted and discussed in light of other studies' findings. At the end of this chapter, the study's conclusions and recommendations are presented.

5.2. 5.2 Summary of the results

The analysis of this study revealed some associations between study sample socio-demographic factors and some Covid-19 side effects, representing some significant differences, as will be summarized down below.

5.2.1. The most reported side effects post-vaccination

The study revealed the following side effects as being the most reported post-vaccine administration: pain in the injection site, joint pain, headache, muscle pain, general weakness, and chills.

5.2.2. Socio-demographic factors and covid-19 side effects

Gender: Females composed 49.7% of our study sample and with regards to associations between gender, as a socio-demographic variable, and covid-19 side effects, the study found that nausea presented a significant association with the female gender compared to male participants. While male and female participants are expected to reacte differently to vaccines due to hormonal differences, most of the literature states that females suffered significantly more side effects than did their male counterparts (Borroni et al, 2021; El-shitany et al, 2021; Mohammed et al, 2021; Omeish et al, 2021; Abbas et al, 2021; Riad et al, 2021[Czech Republic]; Lee et al, 2021; Riad et al, 2021[Slovakia]; Abukhalil et al, 2023; Almughais et al, 2022; Darweesh et al, 2022; Hatmal et al, 2022; Ganesen et al, 2022; Shailabi et al, 2022; and Dighriri et al, 2022). Nevertheless, part of the literature states the complete opposite of the

above: that males tended to suffer significantly more side effects than their female counterparts (Alzarae et al, 2022; Mohsin et al, 2022).

Age: A significant association was found, in relation to Covid-19 vaccine side effects, between age on one hand and general weakness on the other. The study observed that the age group (20-30 years old) had, significantly, more reports of general weakness as a side effect post vaccination by 71.7%. Nevertheless, the literature states that most side effects were more prevalent in the younger participants while the rest were more critical in older participants (Im et al, 2021; Lim et al, 2021). Other studies noted that participants aged 20 – 39 were more likely experience more side effects while others indicated that young participants were less likely to develop side effects (Hatmal et al, 2022; Mohsin et al, 2022). Moreover, while some studies reported that participants under 20 complained of significantly fewer side effects, others reported that young people are at a greater risk of developing side effects post vaccination (Abukhalil et al, 2023; Borroni et al, 2021; Cushieri et al, 2021). However, part of the literature also indicated that the older the participants, the more side effects they are expected to experience (Ganesan et al, 2022).

City of Residence: The study revealed a significant difference in terms of association between the cities of residence of the study sample and the following Covid-19 vaccine side effects: lymph node enlargement, syncope and allergic reactions after vaccination. With regards to lymph node enlargement, a significant association was found with participants from central cities (Jerusalem, Ramallah and Jericho). Participants from these cities often reported lymph node enlargement as a side effect more than participants from other cities, northern and southern. Syncope, however, was reported as a side effect by participants from northern and central cities more often than by participants from southern cities. The association between cities of residence and syncope is significant with regards to both northern and central cities. Finally, in this regard, the study found that an association could be drawn between allergic

reactions post vaccination and cities of residence as follows: participants from central and northern cities respectively tended to report this particular side effect significantly more often than participants from southern cities. Nevertheless, the literature did not highlight this variable.

Chronic Diseases: In terms of this specific socio-demographic factor, the study showed that it had a significant association with rashes as a side effect of the Covid-19 vaccine. This means that participants with chronic diseases such as diabetes mellitus, chronic hepatitis b, hypertension, hypothyroidism and osteoarthritis had more reports of rashes as a side effect of the said vaccine compared to study participants without such diseases. Nevertheless, the literature agrees that the existence of chronic disease correlates with more side effects (Mohsin et al, 2022; Hatmal et al, 2022; Ganesen et al, 2022).

Allergies: The study discovered that participants with allergies such as wheat allergy, seasonal allergy, dust allergy, penicillin, cephalosporin, unknown drug allergy, bee stings, diclofane, sulfa and tavanic presented a significant association with general weakness as a side effect. Participants with allergies had far more reports of general weakness compared to those without such allergies, as the study pointed out. Nonetheless, the literature states that the existence of allergies is associated with more side effects (Borroni et al, 2021; Mohammed et al, 2021; Riad et al, 2021; Abukhalil et al, 2023; Mohsin et al, 2022; Hatmal et al, 2022).

Chronic Medications: It was revealed through the study that participants using chronic medications such as steroidal anti-inflammatory, anti-hypertensive medications, aspirin, eltroxin, insulin, oral anti-hyperglycemic agents, cortisone and ventolin fumigation presented a significant association with syncope and diarrhea. With regards to syncope, participants with chronic medications suffered from syncope more significantly than did other participants without such medications. With respect to diarrhea, the same is true; the association is significant as well and, thus, participants using chronic medications reported diarrhea as a side

effect post vaccination significantly more than participants without such medications. Nevertheless, the literature did not highlight this variable.

Other Vaccines (1 month prior to covid-19 vaccine): The study revealed that no significant associations were observed between this specific socio-demographic variable and covid-19 vaccine side effects, regardless of the type of vaccine received one month prior to the administration of the covid-19 vaccine. Nevertheless, the literature did not highlight this variable.

Work Shifts: The study found a significant association between this variable (work shifts) and the following two covid-19 vaccine side effects: general weakness and cough. Participants who worked in shifts, significantly speaking, suffered more from the above-mentioned two side effects compared to participants who did not work in shifts. About work, a study found that general workers developed significantly more side effects than healthcare workers (Hatmal et al, 2022).

Diagnosis of Covid-19 Infection Post any Dose of the Vaccine: This particular socio-demographic factor is interesting as the study established that it had significant associations with the following side effects of the covid-19 vaccine: nausea, cough, difficulty of breathing, lower back pain, and menstrual cycle changes. For all these side effects, participants who were diagnosed with an infection of COVID-19 post any dose of the vaccine had significantly more instances of the said side effects compared to participants who were not. Nevertheless, the literature investigated any associations between a previous injection with covid-19 and side effects post-vaccination. Some of the literature states that more side effects were reported by participants with a past infection of covid-19 (Ganesen et al, 2022; Hatmal et al, 2022; El-shitany et al, 2021; Borroni et al, 2021). Some studies noted that participants with a past history of covid-19 experienced less side effects (Abbas et al, 2021; Almughais et al, 2022). Finally, other studies noted that a past history of covid-19 did not pose any correlations with side effects

being more or less compared to participants without such history (Darweesh et al, 2022; Andrzejczak-grzadko et al, 2021).

Side Effects Reported after the 1st, 2nd and 3rd Doses: The study showed that pain in the injection site and muscle and joint pain were among the most reported side effects following the first vaccine dose. Moreover, pain in the injection site and general weakness were among the most reported side effects post the second vaccine dose while headache and pain in the injection site were the most reported following the third dose of the vaccine. Nevertheless, most of the literature checked for side effects post both the first and second doses while very few studies considered checking for side effects following the third dose. As such, most studies concluded that more side effects were reported post the second dose of the vaccine (Dighriri et al, 2022; Ganese et al, 2022; Hatmal et al, 2022; Krotki et al, 2021; Lee et al, 2021; Riad et al, 2021; El-shitany et al, 2021; Mohammed et al, 2021; Lim et al, 2021; Im et al, 2021; Andrzejczak-grzadko et al, 2021). However, some studies concluded that the first dose caused more side effects in participants (Zahid et al, 2021; Omeish et al, 2021; Vanegas et al, 2021; Darweesh et al, 2022). Finally, one study observed that more side effects occurred in participants following the second and third doses (Abukhalil et al, 2023).

Similarity of Participants' Side Effects with Vaccinated Family Members: The study observed that 65.3% of participants had similar side effects to those of their vaccinated family members while 34.7% did not share similar side effects with their vaccinated family members.

The onset of Side effects: The overwhelming majority of participants complained of side effects in less than 24 hours post-vaccination (79.3%) while (15.5%) of the participants reported experiencing side effects within 24 – 48 hours following vaccination.

Duration of Side Effects: The study found that, in terms of the duration of side effects, 58.5% lasted for three days while 11.4% lasted beyond three days. However, only 12.4% lasted for a day while 17.6% lasted for two days.

Severity of Side Effects: The study found that 59.6% of the reported side effects were mild, 32.6% were moderate and 7.8% were marked as severe.

The Treatment Received: The study revealed that 64.2% received treatment as a result of vaccine side effects while 35.8% did not. However, also, the study also revealed the different sorts of treatment received: pain-killers, non-steroidal anti-inflammatory drugs, antibiotics and cough suppressants.

Response to Treatment: The study observed that 78.2% of participants responded well to treatment while 21.8% did not experience the same outcome.

5.3. Limitations

- Limited Causality Inference as a cross-sectional study only provides a snapshot of a single point of time which is not very dependable so as to establish a firm causative link.
- Potential Recall Bias, in which employees might recall their vaccine side effects inaccurately as their memories of side effects could be affected by various factors, leading to underreporting or overreporting certain side effects compared to others.
- Certain groups of employees might have participated more than others, or paid more attention to their answers than other participants; thus, impacting the representation of the entire employee population which could possibly lead to a selection bias.
- Limited representative sampling due to varying work schedules, work departments, or degree of willingness to participate.

5.4. Conclusions

This thesis investigated the spectrum of covid-19 vaccine side effects among Al-Makassed Hospital employees. The study encompassed 203 participants. The majority of side effects, whether common or rare, are consistent across the board. Some correlations were found drawing, thus, several associations with common demographic factors such as gender, age, and health status among others. The predominance of side effects, reported by the participants, appeared to be mild to moderate in severity, appearing within 24 hours following vaccination and lasting, for the most part, up to 48 hours, indicating that the vaccine itself is safe and effective, highlighting, therefore, the need for vaccination and enhancing people's confidence toward the vaccine itself, as the virus still lurks around, not so much in disguise, as new variants of the virus have come out and spread globally with the virus still infecting people.

5.5. Recommendations

- Development of educational materials or sessions to inform Al-Makassed employees about potential side effects after Covid-19 vaccination and the safety of the vaccine.
- Offering resources, advice, and support services to manage symptoms and alleviate concerns about vaccine side effects and safety.
- Reinforcing the benefits of vaccination despite mild to moderate side effects and continuously promoting vaccination to encourage employees and increase confidence in the vaccine's efficacy and overall benefits in preventing the development of severe illness.
- Utilizing the data for future vaccination programs and using the study's findings to inform future vaccination programs within the hospital and the community at large.
- Sharing the data with public health authorities and vaccination experts to stay updated on vaccines safety profiles.

- Fostering future research exploring the potential correlations between Pfizer covid-19 vaccination and hormonal changes in females.

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Appendix:

Appendix1: The Study Questionnaire

عنوان الدراسة: الآثار الجانبية للقاح كورونا (**COVID**-19) بين موظفي مستشفى المقاصد الإسلامية.
Covid-19 Vaccine Side Effects among Al-Makassed Islamic Charitable Hospital Employees.

إسم الباحث الرئيسي: محمد هشام محمد خلاف

إسم المشرف على البحث: د. ربيع عدوان

عزيزي المشارك/ة:

هذا البحث متطلب للحصول على درجة الماجستير في برنامج الوقاية وضبط الأمراض المعدية-جامعة القدس للطالب محمد هشام محمد خلاف، الهدف منه معرفة الأعراض الجانبية الناتجة عن لقاح كورونا بين موظفي مستشفى المقاصد الإسلامية.

سيتم توزيع استبيان بين الموظفين لتعبئته عبر الإنترنت عن طريق استخدام موقع جوجل (**google forms**)، نرجو من حضرتك/ي الموافقة على المشاركة في هذا البحث وذلك بتعبئة الاستبيان بإجابات دقيقة على الأسئلة المطروحة من قبل الباحث.

نضمن لحضرتك/ي السرية التامة للمعلومات التي سيتم الحصول عليها من خلال البحث كما أنه لا داعي لذكر الأسماء، وأن لك الحرية التامة في عدم المشاركة في هذا البحث.

يمكنك التواصل مع الباحث محمد هشام محمد خلاف عن طريق (رقم الهاتف: 0599582004) أو عنوان البريد الإلكتروني (**mohammad.khallaf@students.alquds.edu**) إذا كانت لديك بعض الأسئلة عن الدراسة.

`

الجزء الأول: معلومات الأفراد

الجنس:

1.ذكر 2. أنثى

العمر:

1. 20-30 سنة 2. 31-40 سنة 3. 41-50 سنة 4. 51-60 سنة 5. أكثر من 60 سنة

المحافظة الأصل:

1.القدس 2. جنين 3. طولكرم 4. طوباس 5. قلقيلية 6. نابلس 7. سلفيت 8.رام الله والبيرة
9.أريحا 10. بيت لحم 11. الخليل 12. قطاع غزة 13. مدن الداخل المحتل

مكان السكن الحالي:

1.مدينة 2. قرية

الدرجة العلمية:

1.ما دون الثانوية 2.ثانوية 3. دبلوم 4. بكالوريوس 5. ماجستير 6.دكتوراة

الوظيفة:

1.طبيب 2. ممرض 3. فني مختبر 4. فني أشعة 5. قابلة 6.مساعد تمريض 7. كادر غير طبي

هل تعمل بنظام الورديات (A,B,N)؟

1.نعم 2.لا

الجزء الثاني: التاريخ المرضي

أمراض مزمنة:

1. ضغط 2. سكري 3. غير ذلك (حدد)

حساسية:

1.نعم (حدد) 2. لا

`

أدوية دائمة:

1.نعم (حدد) 2. لا

لقاحات أخرى (قبل شهر من تلقي لقاح كورونا):

1.نعم (حدد) 2. لا

حساسية للقاحات سابقة:

1.نعم (حدد) 2. لا

هل كنت تعاني من مرض غير مزمن (حاد)خلال تلقي اللقاح الخاص بكورونا؟

1.نعم (حدد) 2. لا

هل تم تشخيصك بالإصابة بفايروس الكورونا بعد أخذ أحد جرعات اللقاح؟

1.نعم 2.لا

الجزء الثالث: الأعراض الجانبية

هل عانيت من أي من التالي؟

ألم في مكان تلقي اللقاح:

1.نعم 2.لا

هزال عام:

1.نعم 2.لا

ألم في الرأس:

1.نعم 2. لا

ألم عضلات:

1.نعم 2. لا

قشعريرة:

1.نعم 2.لا

ألم مفاصل:

1.نعم 2.لا

حرارة عالية:

1.نعم 2.لا

انتفاخ في مكان تلقي اللقاح:

`

1.نعم 2.لا

احمرار في مكان تلقي اللقاح:

1.نعم 2. لا

طفح جلدي:

1.نعم 2.لا

غثيان:

1.نعم 2.لا

تورم في العقد اللمفاوية:

1.نعم 2.لا

إغماء:

1.نعم 2.لا

سعال:

1.نعم 2.لا

إسهال:

1.نعم 2.لا

صعوبة في التنفس:

1.نعم 2.لا

آلام أسفل الظهر:

1.نعم 2.لا

رد فعل تحسسي بعد اللقاح:

1.نعم 2.لا

اضطرابات هرمونية (مشاكل وعدم انتظام في الدورة الشهرية):

1.نعم 2.لا

مشاكل في النشاط الجنسي (مشاكل في الانتصاب):

1.نعم 2.لا

إذا كان هناك علامات وأعراض غير التي تم ذكرها الرجاء كتابتها

:الأعراض التي عانيت منها حدثت بعد تلقي:

1.الجرعة الأولى 2.الجرعة الثانية 3.الجرعة الثالثة 4.بعد كل الجرعات

أشد الأعراض كانت بعد أي جرعة؟

هل تشابهت الأعراض التي عانيت منها مع أعراض ظهرت على أحد أفراد عائلتك ممن تلقوا اللقاح؟

1.نعم 2.لا

الجزء الثالث:

بداية ظهور الأعراض:

1. أقل من 24 ساعة 2. 24 ساعة – 48 ساعة 3. بعد 48 ساعة – أسبوع 4.بعد أسبوع

مدة إستمرارية الأعراض بالأيام

1. يوم واحد 2. يومين 3. ثلاثة أيام 4. أكثر من ثلاثة أيام .

خطورة الأعراض

1. طفيفة 2. متوسطة 3. شديدة.

هل تلقيت علاج للأعراض؟

نعم 2. لا

إذا كانت إجابتك بنعم ما هو العلاج؟

هل استجبت جيدا للعلاج؟

1.نعم 2. لا

Appendix 2: Approval of the Scientific Research Ethics Committee – Al-quds University

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ:2022/3/19

عزيزي الطالب محمد خلاف المحترم
برنامج ماجستير: الوقاية وضبط الامراض المعدية

الموضوع: موافقة لجنة اخلاقيات البحث العلمي

قامت اللجنة الفرعية لأخلاقيات البحث التابعة لكلية الصحة العامة بمراجعة مشروع الرسالة

بعنوان:
" COVID-19 vaccine side effects among Al-Makassed Hospital employees"

المقدم من (مشرف الرسالة/ د. ربيع العدوان).
يعتبر مشروعك مستوفيًا لمتطلبات أخلاقيات البحث في جامعة القدس.
نتمنى لكم كل التوفيق في تسيير المشروع.

رئيسة لجنة اخلاقيات البحث
د. نهى الشريف

نسخة/ أعضاء لجنة البحث
نسخة/ الملف

Jerusalem Branch/Telefax 02-2700234

Appendix 3: Approval of the Research Ethical Committee – Al-maksssed Hospital

Al-Quds University
Jerusalem
School of Public Health

جـامـعـة الـقـدس
القدس
كلية الصحة العامة

التاريخ19/3/2022:

عزيزي الطالب محمد خلاف المحترم
برنامج ماجستير: الوقاية وضبط الامراض المعدية

الموضوع: موافقة لجنة اخلاقيات البحث العلمي

قامت اللجنة الفرعية لأخلاقيات البحث التابعة لكلية الصحة العامة بمراجعة مشروع الرسالة
بعنوان:
" COVID-19 vaccine side effects among Al-Makassed Hospital employees"

المقدم من (مشرف الرسالة/ د. ربيع العدوان).
يعتبر مشروعك مستوفيًا لمتطلبات أخلاقيات البحث في جامعة القدس.
نتمنى لكم كل التوفيق في تسيير المشروع.

رئيسة لجنة اخلاقيات البحث
د. نهى الشريف

نسخة/ أعضاء لجنة البحث
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