HBSRA Conference Proceedings 2023

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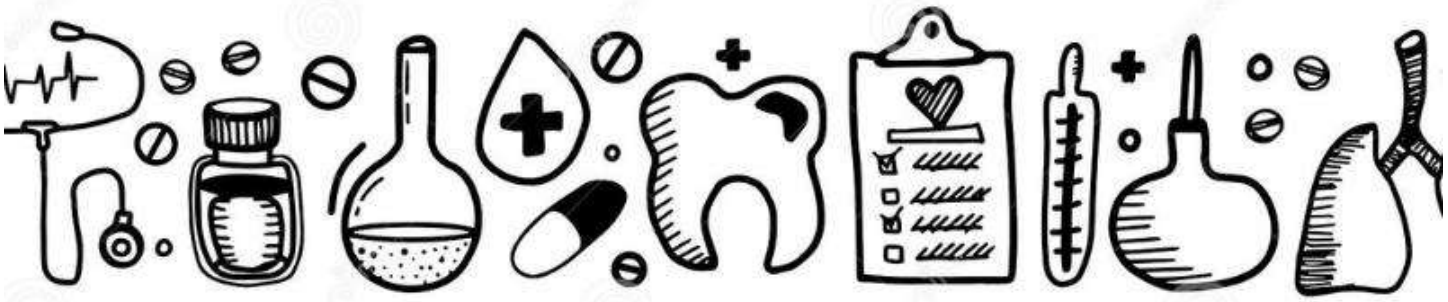

Presidential Note

We are currently observing a high development in science and innovations associated to biology, life-sciences, and healthcare. To update knowledge and to develop skills on these areas it is critical for professionals, academics, and researchers to participate in international conferences such as the ones promoted by the Healthcare and Biological Sciences Research Association (HBSRA). The participation in HBSRA conferences brings diverse benefits, e.g., enables the development of international networks for collaborations, the acquisition and sharing of knowledge and ideas, to take part in debates, and to promote the development of new visions such as how science and the community can contribute further on these areas, towards the benefit of society. The Proceedings associated to HBSRA conferences are therefore an important tool to resume the work conducted along these events. We invite all the stakeholders on these areas to be an active member of our community, and especially to participate on HBSRA conferences, taken advantages of all opportunities associated with it.

Dr. Cecília R.C. Calado

President

ISEL-Instituto Superior de Engenharia de Lisbon, Portugal

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ISSN: 2454-5872
DOI: https://doi.org10.20319/icrlsh. 2022.v3

HBSRA Full Name: Healthcare & Biological Sciences Research Association

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E-mail: convener@eurasiaresearch.info Conference website-

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Table of Content:

Particulars

Healthcare and Biological Sciences Research Association (HBSRA) is an international community of researchers, practitioners, students, andprofessionals for the development and spread of ideas in the field of healthcare and life sciences.
HBSRA is promoted by Eurasia Research. HBSRA aims to bring together worldwide researchers and professionals, encourage intellectual development, and create opportunities for networking and collaboration. These objectives are achieved through academic networking, meetings, conferences, workshops, projects, research publications, academic awards,and scholarships.
The driving force behind this association is its diverse members and advisory board, who provide inspiration, ideas, efforts and drive collaborations. Scholars, Researchers, Professionals are invited to become a member of HBSRA and join this ever-growing network, working for benefit of society and research with the spirit of sharing and mutual growth.

Salient Features:

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Preface:

Healthcare and Biological Sciences Research Association (HBSRA) is an international forum of researchers, academicians, and practitioners for sharing knowledge and innovation in the field of healthcare and life sciences. HBSRA aims to bring together worldwide researchers and professionals, encourage intellectual development, and providing opportunities for networking and collaboration. This association meets its objectives through academic networking, meetings, conferences, workshops, projects, research publications, academic awards, and scholarships. HBSRA strives to enrich its diverse group of advisory members. Scholars, Researchers, Professionals are invited to freely join HBSRA and become a part of a diverse academic community, working for benefit of academia and society through collaboration and vision.

For this conference around 20 Participants from around 7different countries have submitted their entries for review and presentation.

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The proceeding is a book of abstracts, all the abstracts are published in our conference proceedings a day before the conference.

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Our mission is to make continuous efforts in transforming the lives of people around the world through education, application of research & innovative ideas.

Editor: Dr. Davis Lazarus

Publication Process:

All accepted original research papers in the English Language will be published in selected journals as per the publication policy, as available on the conference website. Once you receive the Invitation/ Acceptance letter,that means your full paper is also accepted for publication in an International Journal, if you follow the communicated editorial instructions/ guidelines.

The journal publication will be peer-reviewed, checked for plagiarism, indexed, archived, open access, referenced by CrossRef and will carry ISSN number and DOI.

Even if your full paper is not yet ready, you may participate in the desired conference with your abstract. The abstract must contain the following:

Article Title
Full Names/ Emails/ Affiliations of the authorsAbstract in 100-300 words
3-7 Keywords
You may update your submitted abstract/ title/ co-authors/ submit your full-paper on a later stage (before the conference).

You may submit your full original paper for publication in the conference journal, when it is complete, till the conference date. The last date of submission is the conference day itself. While submitting the full paper, please provide the following in the email:

Full paper in MS Word format. (Ideally, a research paper should be 2500-3000 words).
Details of 2 reviewers with their names, affiliations, contact numbers and email IDs (If possible, send two emailsfor each reviewer).
Duly filled and scanned the 'Consent to Publish' form with a handwritten signature.
We follow the following steps for publication in our associated International Journals. The publication processtakes around 70 days, starting from the end of the conference.

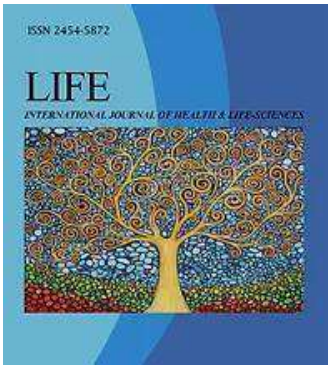
A list of registered papers is sent to all the participants of the conference within a week's time after the conference. Please see, if your paper is included in the list. If not, please write back to us for inclusion. This list would also mention for any deficiency/incompleteness found in the submitted paper. You would be given 10 days to return your complete papers/ required information.
After this, the editorial team would send all complete papers for review (usually 5-7 reviewers). The review process takes around 30 days.
Following this, our editor would send the editorial comments/ suggestions to the corresponding author. Please improve the paper as indicated in the review and send it back to us within 10 days.
If the paper received is complete in all regards as per the comments/ suggestions, it would be sent for final publication, else we would send it again to you and finally, 5 days would be given to you for its improvement. Finally, the paper is published and the authors are informed about the published paper by email, which contains the paper URL, DOI, Citation, and other related information.
If you fail to meet the deadlines/ correct the paper as per review comments, the paper may be rejected or it will be postponed for publication in the next issue. Normally, the entire process takes around 70 days.

Authors may request the conference secretariat for withdrawing their paper, for publishing it elsewhere (in the journal of their choice). In such cases, the requested papers are removed from the publication process. The withdrawal requests may be given to the conference secretariat before the commencement of the publication process (7 days after the conference).

Acknowledgements

Our sincere thanks go to our outstanding supporters who made this great and interesting
conference possible.

Publishing



HBSRA Institutional Members

Some special thanks go to our outstanding Key-Note speakers, not only for their inspiring and highly interesting presentations but also for their input and contributions in the discussions andQ&A sessions during the conference:

KEYNOTE SPEAKERS 2022

Topic: Work Engagement and Work-family Interface; which one is more influential on nurses' intention to leave work?

Dr. Yoshiko Yamaguchi has received her Ph.D. at. Kyushu University during the period of 2013-2016. Currently, she is working as a research associate in Home Care Nursing, at the Faculty of Nursing, Kwassui Women's University, Japan. She has successfully completed her responsibilities as a reviewer of eighty-one research articles in twenty- four journals from 2016-present. And she has been serving as an editorial board member of two journals; LIFE: International Journal of Health and Life-Sciences and Journal of Practical and Professional Nursing and has been delegated vice president of the Healthcare and Biological Sciences Research Association (HBSRA).

Dr. Yoshiko YamaguchiHome Care Nursing, Faculty of Nursing,
Kwassui Women's University, Japan

Topic: Brown algae as a rich source of novel alginate-lyase producing bacteria to combat biofilm-related infection

Dr. Stalis Norma Ethica M.Si. (Orcid ID: 0000-0002-0853-0423) is a lecturer and researcher with an industrial experience background. She specializes in the use of bacterial cells and enzymes for their possible benefits as bioremediation, therapeutic or diagnostic agents, supported by encapsulation and genetic engineering technologies. Dr. Ethica earned her bachelor's and master's degrees in Chemistry from Universitas Gadjah Mada, Indonesia. Her doctorate majoring in Biotechnology was also obtained from the same university in 2014. In 2018 she obtained the advanced course on Next Generation Sequencing Bioinformatics (EMBL-EBI) in Wellcome Genome Campus, Cambridge, UK. She joined the Undergraduate Program of Medical Laboratory Technology of Universitas Muhammadiyah Semarang as a lecturer in 2015. From 2019 to present she has been serving as a full-time lecturer (assistant professor) at the Postgraduate Program of Magister of Clinical Laboratory Science of the same institution. Her projects related with the development of bioremediation agent of hospital wastewater from indigenous bacteria and the development of antithrombosis and antibiofilm agents from marine bacterial enzymes received supports from Indonesian Ministry of Research and Higher Technology.

Dr. Stalis Norma Ethica, M.Si.
Magister Program of Clinical Laboratory Science Universitas Muhammadiyah Semarang Semarang, Central Java, Indonesia

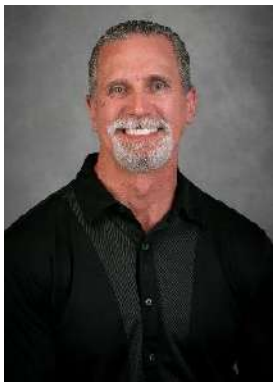
Topic: Mathematical Models for Disease Modelling

Dr. (Mrs.) W. G. Samanthi Konarasinghe, an award-winning Scientist has served as a Statistical Consultant and a Lecturer for more than two decades. She has developed various Mathematical and Statistical techniques to the world. The Circular Model (CM) and the Sama Circular Model (SCM) are two of the widely applied techniques whilst the Damped Circular Model (DCM) and Forced Circular Model (FCM) are the recently developed models. Dr. Samanthi has won the Best Paper Award from the International Conference on Advances in Mathematics, Computers & Physical Sciences and the International Conference on Business, Economics, and Social Sciences & Humanities for her research findings. She was awarded the "IMRF BEST SCIENTIST AWARD, INDIA" for her invaluable contribution to the field of Statistics. She has been in constant demand due to her new findings, gets an invitation from various destinations to share her knowledge as the keynote speaker, invited speaker, etc. at

international research forums in Thailand, Singapore, Malaysia, India, Australia, and many other countries. Also, she was the guest of honour and the chief guest of many International research forums. Dr. Samanthi is a multi-disciplinarian; has obtained a Bachelor of Science Degree in Mathematics; Postgraduate Diploma in Industrial Mathematics; Master of Science in Applied Statistics, Master of Business Administration (MBA), and Doctor of Philosophy in Statistics, Doctor of Philosophy in Statistics. Also has the Diploma in Classical Music. She is a member of; the American Statistical Association (ASA), Statistical Society Australia (SSA), Institute of Applied Statistics, Sri Lanka (IASSL), and National Science Foundation (NSF), Sri Lanka. She is the Editor in Chief of, Journal of New Frontiers in Mathematics & Statistics; Journal of New Frontiers in Economics & Business; Journal of New Frontiers in Healthcare & Biological Sciences; Journal of New Frontiers in Education & Social Sciences, published by the Institute of Mathematics and Management of Sri Lanka. Also, an Editorial board member of the American Journal of Theoretical and Applied Statistics (AJTAS). She is an Advisory Member Technical/ Scientific Conference Committee member of the Scientific and Technical Research Association (STRA). Most interestingly, Dr. Samanthi is not only a Scientist but also an Artist; a Violinist, Painter, Writer, Drama producer, and actress. The membership magazine of the American Statistical Association; "AMSTATNEWS" wrote two testimonials on her.

Dr. (Mrs.) W. G. Samanthi Konarasinghe
Academic Director, Statistical Consultant,
Institute of Mathematics and Management,
Sri Lanka

Topic: Smart Education and Smart Universities: Benefiting Students with and without Disabilities



Jeffrey P. Bakken, is Professor of Special Education at Bradley University. He teaches in the online Doctor of Education – Higher Administration program. He has a Bachelor's Degree in Elementary Education from the University of Wisconsin-La Crosse, and graduate degrees in the area of Special Education-Learning Disabilities from Purdue University. Dr. Bakken has received the College of Education and the University Research Initiative Award, the College of Education Outstanding College Researcher Award, the College of Education Outstanding College Teacher Award, and the Outstanding University Teacher Award from Illinois State University. His specific areas of interest include: learning disabilities, emotional and behavioral disorders, reading comprehension, response to intervention, collaboration, transition, teacher effectiveness, assessment, learning strategies, assistive technology, Smart Classrooms and Smart Universities. He has published over 200 works that include books, chapters, and journal articles, proceedings at international conferences, audio tapes, encyclopedia articles, newsletter articles, book reviews, a monograph, a manual, and one publisher website. He has also made over 260 presentations at International/National and Regional/State conferences. Lastly, he has authored or co -authored numerous grants totaling over $1,000,000.00.

Jeffrey Bakken
Department of Education,
Counseling and Leadership
Professor of Special Education

Presenters

Assessment of the COVID-19 Vaccines Third Dose Recipients in Jordan

Aisheh Al Khalaileh
Royal Medical Services, Hashemite University, Amman, Jordan

Omar Al Refai
Industrial Engineering Department, the Hashemite University Jordan

Aseel Hindi
Industrial Engineering Department, the Hashemite University Jordan

Mohammed Suliman Alkhawaldeh
Royal Medical Services. Jordan

Abstract: Background: COVID-19 Vaccines stages increased from one to the third dose, increasing worries regarding the safety of coronavirus vaccinations.
Objective: Assess the influence of COVID-19 vaccine third dose recipients in Jordan.

Methodology: A cross-sectional study was conducted by distributing a questionnaire among 614 participants (57.2%) males and (42.8%) females of the COVID-19 vaccine third dose recipients in Jordan, (69.9%) of the sample given Pfizer-Biontech vaccine (25.7%) Sinopharm vaccine, and the AstraZeneca (2.3%), Sputnik V (2.01%), and Moderna (0.0%). They analyzed data statistically to assess the severity of side effects using SPSS version 28.

Results: Participants generally reported that (17. 6%) had different side effects after receiving the third dose of the vaccines. Statistical analysis indicated that (50.3%) of people who received the third dose had fewer side effects than the first and second doses. In this study (63.50%), females were more likely to suffer from the side effects of the COVID-19 vaccine than males . There are side effects significantly associated with genders, such as nausea ($p = 0.02$), chills ($p = 0.04$), hair loss ($p < 0.001$), blurred vision or red eyes ($p < 0.001$), and Hyperosmia ($P=0.05$). As for the side effects after receiving the third dose related to vaccine type were revealed to be significantly associated with muscle pain ($P=0.047$).

Conclusion: COVID-19 Vaccine Third Dose significantly decreased the side effects, which were non-threatening to human life. The research finding will raise awareness of vaccine benefits, increase the number of third-dose recipients, reduce the risk of pandemic effects, and help better coved -19 management in Jordan.

Significance: This paper comprehensively describes vaccines' side effects and efficacy after receiving the third dose in Jordan. That provides a valuable benchmark for increasing public knowledge of COVID-19 vaccines in Jordan, increasing public confidence in the safety of COVID-19 injections, and accelerating the vaccination program in Jordan.

Keyword: COVID-19, Vaccines, Third Dose Vaccine, Post-Vaccination, Side Effects, COVID-19 Vaccines

Introduction: The mysterious disease began to emerge in China, and the first case of the Covid-19 virus was announced in late 2019, specifically in Wuhan. After that, it spread at a breakneck speed worldwide,

causing widespread fear and global concern (Fang et al. , 2020; BANKO, 2020; Stawicki et al., 2020) . Despite adopting the appropriate precautions, many countries could not manage and diminish the virus, and as a result, it spread throughout the entire world and destroyed numerous industries (Spennemann & Whitsed, 2021; Verma & Gustafsson, 2020). From this perspective, the World Health Organization described it as a severe global pandemic that may be represented by the emergence of new diseases, such as diseases that affect the respiratory system, which was recently called the Coronavirus (Ryalino, 2020). Furthermore, it was quickly recognized as a new virus with structural similarities to the virus that causes severe acute respiratory syndrome (SARS) that broke out in the last 18 years (Rodriguez et al., 2020; Coleman et al., 2016). Due to the rapid swell of the coronavirus disease worldwide, most nations, including Jordan, have taken all necessary precautions to reduce and prevent it (Alnazly et al., 2021). These precautions include adhering to quarantine and self-isolation, wearing masks, social distancing, staying at home, imposing curfews, using disinfectant substances, and implementing e-learning for schools and universities (Liu et al., 2020; Teslya et al., 2020). However, these preventive measures are insufficient in confronting this epidemic and limiting its transmission, so it is necessary to reach treatments and preventative solutions to reduce infection with the virus and eliminate it (Khuroo et al., 2020). The Food and Drug management licensed the first coronavirus vaccine from Pfizer-Biontech in December 2020 (Bernardini et al. 2022; Fortner & Schumacher, 2021). After that, the Jordanian Ministry of Health announced the national vaccination campaign and granted everyone on Jordanian soil the right to receive the Corona vaccine free of charge. It will be distributed without authorization or fees on January 13, 2021. So far, the number of those who received the third dose of the coronavirus vaccine in Jordan has reached 657,256 doses (the Jordanian Ministry of Health, 2023). Many rumors have arisen due to the rapid production of COVID-19 vaccines (Cleve, 2021). There are rumors that COVID-19 vaccines are associated with various post-vaccination side effects, such as infertility; this is still circulating and disputed on social media platforms (the Jordanian Ministry of Health, 2023). Jordanians' ability to participate in COVID-19 vaccinations has been studied previously. According to the data, only 36.1 percent of people were interested in participating in immunization clinical trials (Abu-Farha et al., 2020). Another study discovered that misinformation about COVID-19 and conspiracy theories harm vaccine fears among Jordanians. It may be a significant obstacle to the effective management of the epidemic. So Intimidation and anxiety about vaccines have been linked to reliance on social media for information regarding COVID-19 vaccines (Sallam et al., 2021; Almomani & Al-Qur'an, 2020). As a result, since different vaccines are used in the Jordan National Immunization Program, monitoring side effects and post-vaccination opinions is crucial to address vaccine hesitation and rumors. So, the study aims to look at the side effects that persons in Jordan reported after getting the third dosage of various COVID-19 vaccines, as well as their impressions.

Literature Review: The literature review results indicated a helpful criterion for increasing public knowledge of COVID-19 vaccines. These findings suggest that government and health agencies should implement appropriate educational strategies to increase community consciousness of the value of vaccines in preventing viral infection. In December 2020, Pfizer-Biontech received FDA approval for its first coronavirus vaccine (Fortner & Schumacher, 2021). Intimidation and concern about vaccines have emerged (Sallam & et al., 2021). Previous studies have confirmed that side effects are consistent with those reported during clinical trials, demonstrating that both vaccines have safety profiles (Hatmal et al., 2021). Another study revealed; those coronavirus vaccines are well tolerated, risk-free, and generate an immune response against the virus most of the time. Most post-vaccine adverse effects were mild to moderate, showing that the body develops immunity to provide protection (Elgendy et al., 2022). The manufacturer's statistics and the distribution of adverse effects among Czech healthcare professionals were quite similar, particularly regarding the latter's association with the second dose and younger age groups. Compared to the manufacturer's report, some local and systemic adverse effects were generally more common (Riad et al., 2021). These studies may help reduce concerns about the resulting vaccines; By disproving myths and ideas about adverse vaccine effects after vaccination, these findings may increase public confidence in the safety of COVID-19 injections and accelerate the world's vaccination program.

Summary Table:

Paper title	Author	Result
Public Willingness to Participate in COVID-19 Vaccine Clinical Trials: A Study from Jordan	Fortner & Schumacher, 2021	In December 2020 Pfizer-Biontech received FDA approval for the first coronavirus vaccine.
High Rates of COVID-19 Vaccine Hesitancy and Its Association with Conspiracy Beliefs: A Study in Jordan and Kuwait among Other Arab Countries	Sallam et al. 2021	Intimidation and anxiety about vaccines
Human mobility restrictions and the spread of the Novel Coronavirus (2019-nCoV) in China	Fan et al. 2020	The first case of the Covid-19 virus was announced in late 2019, specifically in Wuhan.
Side Effects and Perceptions Following COVID-19 Vaccinationin Jordan: A Randomized, Cross-Sectional Study Implementing Machine Learning for Predicting Severity of Side Effects	Hatmal et al. 2021	Participants who received the Oxford-AstraZeneca and Pfizer-BioNTech vaccines reported side effects that were consistent with those reported during clinical trials, demonstrating that both vaccines have safety profiles.
Side Effects and Efficacy of COVID-19 Vaccines among the Egyptian Population	Elgendy et al. 2022	Coronavirus vaccinations were well-tolerated, risk-free, and generated an immune response against the virus majority of the time of the majority of post-vaccine adverse effects were mild to moderate, which showed that the body was developing immunity to provide protection.
Prevalence of COVID-19 Vaccine Side Effects among Healthcare Workers in the Czech Republic	(Riad et al. 2021)	The manufacturer's statistics and the distribution of adverse effects among Czech healthcare professionals were quite similar, particularly in terms of the latter are correlation with the second dose and younger age groups. Compared to the manufacturer's report, some local and systemic adverse effects were more common overall.

Methodology: Study Design and Participants: A cross-sectional study (online survey) involving subjects vaccinated with the third dose of vaccines was conducted in Jordan (Pfizer Biontec, Sinopharm, AstraZeneca, Sputnik V, Moderna) regardless of nationalities, race, occupations, and places of residence. Adults (18 years and over) were asked to participate in this survey - data was collected from March 13 to July 26, 2022.

Study Tool: After studying the extensive literature, the questionnaire was generated using Google Forms and disseminated via social media. Participants were asked if they had received their third dose of the COVID-19 vaccines (Pfizer Biontec, Sinopharm, AstraZeneca, Sputnik V, and Moderna). Participants were granted a brief overview of the study and told that all responses were voluntary and would remain confidential. This survey discovered and treated many potential side effects after getting a booster dose. They added Several additional questions to collect participant data and assess their general health status before and after vaccination. Prepared a list form for this study, and the questionnaire consisted of: The first part: includes the primary data of the study sample and consists of the demographic characteristics of the model (age group, marital status, age and gender, educational level, work sector, and health status). Part Two: Contains information about receiving the third dose of the coronavirus (COVID 19) vaccine, including the type of COVID-19 vaccine that survey participants received. The last part of the survey concentrated on the participants who visited hospitals after taking the third dose. It consisted of three parts, each part included a set of paragraphs to study the side effects on recipients of the third dose of the Corona virus vaccine, and the first part included the primary data of the study sample and included the demographic characteristics of the sample. The second part includes information about receiving the third dose of the Corona Virus (Covid-19) vaccine. And in the third part, contains an assessment of side effects after receiving the third dose of Coronavirus.

Sample Volume: The usual sample size as of March 13, 2022, based on a 50% response rate, 95% confidence interval, and 5% margin of error, was calculated from the online sample size calculator. A total of 668,749 residents of Jordan were vaccinated at the end of the study period (COVID-19 Statistical Report - Jordan, 2022). Therefore, the required sample size was 384. The current study received 614 responses, an increase of 59.9%, indicating sample accuracy.

Survey Credibility and Reliability: A panel of referees and academics with relevant experience reviewed the questions and paragraphs of the questionnaire for correctness and good writing. Finally, the information was collected using the study sample after taking notes and confirming the final image of the questionnaire. Finally, we calculated Cronbach's alpha reliability coefficient to test the availability of stability and internal consistency between answers to questionnaire questions. It reached (70.9%), indicating a high degree of credibility and inner strength for the solutions that can be relied upon in completing the study procedures and testing hypotheses, knowing that the acceptable alpha coefficient value is 60% or more.

Statistical Analysis: Statistical methods were selected in line with the nature of the study hypotheses, using the Statistical Package for Social Sciences (SPSS version 28.0) to analyze the data collected. Use descriptive statistics such as ratios and frequencies to comprehensively describe the answers of the sample members to the various elements of the questionnaire; On the inferential side, a chi-square test was performed to display categorical and continuous variables.

Results and Discussion: This study evaluates side effects and detailed characterization after the third dose of COVID-19 vaccination in Jordan. Based on the papers of previous studies' findings, the coronavirus vaccine is relatively safe, and the side effects are mild and temporary. However, many side effects appear after receiving the Corona vaccine (Hatmal et al., 2021; Omeish et al., 2022). The most common side effects of the COVID-19 vaccines are fever, headache, fatigue, insomnia, muscle discomfort, decreased appetite, diarrhea, chills, increased sweating, body aches, pain, hair loss, nausea, memory loss, blurred vision, red eyes, and increased sensitivity to odors, abdominal pain, skin sensitivity, or itching. Moreover, the long-term side effects of vaccines are still indistinct (World Health Organization, 2021 Kostoff et al., 2020). In this paper's findings, there was more male (57.2%) participants in this study than female (42.8%) participants. The age range of 30 to 39 years had the most participants. High blood pressure (8.1%), diabetes (6.0%), arthritis (3.9 %), thyroid problems (3.9%), obesity (3.4%), and respiratory diseases (2.3%)

were the most prevalent chronic conditions among individuals. Many adverse reactions have been noted after receiving the third dosage of the COVID-19 vaccine, including fatigue, headaches, and flu-like symptoms. The results showed that the side effects in females were almost more than in males (Table 5). regardless of the type of vaccine, side effects have been reported after taking the third dose, and the results of this study showed that the symptoms after taking the third dose were mild compared to symptoms of the first and second doses (Hatmal et al., 2021). After receiving the corona vaccine, side effects are considered normal due to the start of prevention and protection in the immune system (Elgendy et al., 2022). However, this study found a significant association between the resulting side effects of COVID-19 vaccines between males and females; Side effects tend to be more noticeable after the third dose (Hause et al., 2021). Table 6 shows the side effects reported after receiving vaccinations related to the type of vaccine. It turns out that many people were Infected after the third dose (72.1 %) of Pfizer-BioNTech compared to other vaccines. According to Omeish et al. (2022), most of the people in Jordan's side effects were associated with the AstraZeneca vaccine, followed by the Pfizer vaccine, and the next one is the Sinopharm vaccine. At this point, when comparing our study with previous studies, we find the side effects related to the types of the vaccine in the third dose less than in the first and second dose; this means the third dose is effective, safe for the body, and leads to reducing the percentage of infected. This study aimed to assess the influence of COVID-19 vaccine third dose recipients in Jordan; in light of the statistical treatment of the study data, it reached the following results:

Demographic Data: The study included demographic information about a sample of 614 participants registered based on gender, age, educational level, marital status, and workplace, as most participants were males (57.2%). The scientific level is high, as most participants had a Bachelor's degree, constituted about (51.8%) of the research sample, and about (57.0%) of the employed work in the public sector. In addition, the participants were of different age groups (Table 1). Participants' Health Information Reported that two-thirds of the participants (68.6 %) were of average weight, that (45.9 %) of the study sample were non-smokers, and it seemed that (78.8 %) did not suffer from chronic diseases. Furthermore, the study sample shows that (95.0 %) do not suffer from allergies to any food. It also appears (that 95.1%) are not allergic to any medication (Table 2).

Table 1: *Classification of participants involved in the study based on their demographic data (N = 614)*

cc		**N**	**N %**
Age (years)	18-29	202	32.9%
	30-39	238	38.8%
	40-49	87	14.2%
	50-59	63	10.3%
	>=60	24	3.9%
Gender	Female	263	42.8%
	Male	351	57.2%
Educational level	High school or less	136	22.1%
	Diploma	95	15.5%
	Bachelor	318	51.8%
	Postgraduate	65	10.6%
Marital status	Single	205	33.4%
	Married	409	66.6%
Working place	Public sector	350	57.0%
	Private sector	230	37.5%
	Don't work	34	5.50%

Table 2: *Classification of study participants based on participants' health information (N=614)*

Variable		**N**	**N %**
weight	slim	126	20.5%
	Average	421	68.6%
	Fat	67	10.9%
Do you smoke?	No	282	45.9%

	cigarettes	147	23.9%
	hookah	164	26.7%
	Electronic cigarettes	60	9.8%
Do you suffer from any chronic diseases?	No	481	78.6%
	diabetes	37	6.0%
	high blood pressure	51	8.3%
	Cardiovascular disease	6	1.0%
	Chronic respiratory diseases	14	2.3%
	obesity	21	3.4%
	arthritis	24	3.9%
	Osteoporosis	9	1.5%
	autoimmune diseases	7	1.1%
	Thyroid disorder	24	3.9%
	cancer	2	0.3%
Do you suffer from an allergy to any type of foods mentioned?	no	566	92.2%
	Peach, kiwi	8	1.3%
	Dairy products	4	0.7%
	Legumes	4	0.7%
	Guava	7	1.1%
	strawberry	6	1.0%
	black sesame	2	0.3%
Do you suffer from an allergy to any kind of medication mentioned?	no	584	95.1%
	Voltaren + ibuprofen	11	1.8%
	Irvine	1	0.2%
	penicillin	13	2.1%
	Amoclan	5	0.8%

Receiving the Third Dose of the Corona Virus (Covid-19) Vaccine: Participants reported having had COVID-19 before vaccination (51.0 %), and only (28.0%) reported receiving their annual influenza vaccination. The results show that the most significant percentage (48.2 %) was for those who received the PfizerBiotech vaccine from the first and second doses, followed by the Sinopharm, the vaccine with (37.3 %) of the second dose. As for the complete immunization, they received (69.9%) of the Pfizer-BioN-Tech vaccine, and he received (25.7%) of the Sinopharma vaccine from the study sample. They discovered that (17.6%) of the study sample contracted the virus after taking the third dose (Table 3).

Table 3: *Percentages of the study sample's responses to the information questionnaire of receiving the third dose of the Corona Virus (Covid 19) vaccine*

Variable		**N**	**N %**
Have you received the seasonal flu shot?	Yes	172	28.0%
	No	442	72.0%
Did you receive the vaccine outside Jordan?	Yes	37	6.0%
	No	575	94.0%
Did you have COVID-19 before being immunized with the coronavirus vaccines?	Yes	313	51.0%
	No	301	49.0%
Did you get COVID-19 after the third dose vaccination?	Yes	108	17.6%
	No	506	82.4%
Would you advise others to receive the booster dose?	Yes	350	57.0%
	No	264	43.0%
	Pfizer Biontech	296	48.2%
What type of vaccine did you receive in the first dose?	Sinopharm.	229	37.3%
	Astrazeneca	61	9.9%
	Sputnik V	20	3.3%
	Moderna	4	0.7%

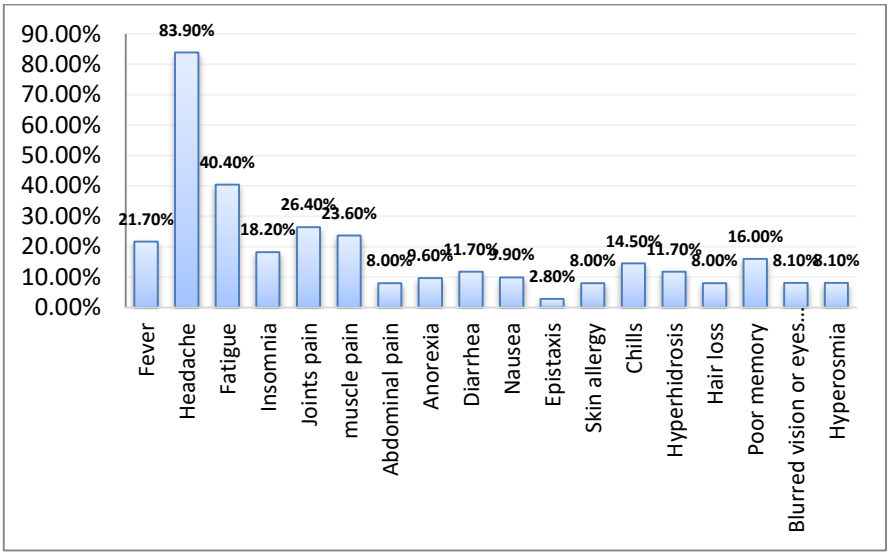
	Johnson & Johnson	4	0.7%
What type of vaccine did you receive in the second dose?	Pfizer Biontech	296	48.2%
	Sinopharm.	229	37.3%
	Astrazeneca	59	9.6%
	Sputnik V	22	3.6%
	Moderna	5	0.8%
	Johnson & Johnson	3	0.5%
What type of vaccine did you receive in the third dose?	Pfizer Biontech	425	69.2%
	Sinopharm.	159	25.9%
	Astrazeneca	6	1.0%
	Sputnik V	13	2.1%
	Moderna	7	1.1%
	Johnson & Johnson	4	0.7%

Side Effects after Receiving the Third Dose. The results appeared that (3.6%) of the study sample was diagnosed with low platelets. Moreover, it turns out that (50.3%) had fewer symptoms after receiving the third dose than the symptoms of the first and second doses. Moreover, only (9.8%) of study participants reported having increased drug and food sensitivity after receiving the third dose. Most of the participants felt more reassured (53.7%) after receiving the third dose, and also (36.3%) of the respondents believed that maintaining preventive measures is still necessary after vaccination (Table 4).

Table 4: *The Side Effects after Receiving the Third Dose*

Variable		**N**	**N %**
Did the third dose increase your sense of protection?	Ye	33.	53.7%
	N	248	40.3%
Are you still wearing a mask after receiving the third	Ye	223	36.3%
	N	391	63.7%
Did the drug or food sensitivity increase after receiving the third dose?	Ye	60	9.9%
	N	554	90.2%
Were the symptoms after receiving the third dose less than the symptoms of the first and second dose?	Ye	309	50.3%
	N	305	49.7%
Have you been diagnosed with any type of clot (blood clot)?	Ye	26	4.3%
	N	588	95.8%
Have you been diagnosed with a low platelet count?	Ye	22	3.6%
	N	592	96.4%

Post Vaccination Side effects: The most common side effects were headache (83.9%), tiredness and fatigue (40.4%), joint pain (26.4%), muscle pain (23.6%), fever (21.7%), insomnia (18.2%), poor memory (16.0%), respectively. As for others, side effects were less common among the vaccinated participants (Figure 1).



The Potential Applications of US mRNA Vaccines in China and Implications for a "Universal" Covid Vaccine

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Abstract: The resurgence of Covid outbreak in China at the start of 2023 with the new XBB variants made people question the effectiveness of the Sinopharm vaccine. In this paper, I tried to investigate the applicability of the US mRNA vaccinations in the Chinese population, and the implication of the development of a universal Covid vaccine. I blasted the selected BA.2.12.1 strain's genome and spike protein sequences of China's, Japan's and the US's (NY, CA, WA, AZ) strains from the NCBI SARS-CoV-2 database. Blast results showed a high percentage (>0.95) of alignment among the complete genome and spike protein sequences from all the selected regions, which supported the ideas of the applications of one mRNA vaccine to target the dominant strain in different countries. On the other hand, the identification of certain point mutations (R343T, G679R) in the functional and structural part of the spike protein underlined the high mutability of the virus as it spreads across continents. These findings suggested that while mRNA vaccines could be more effective for the prevailing strain in China and potentially the rest of the world, in order to make a firm conclusion and medical plan for the implementation, it still required additional trials and research with more data.
Keywords: mRNA vaccines, COVID-19, Universal Covid Vaccine

1. Introduction:

1.1 History and Development of SARS-CoV-2: Coronavirus 19 (COVID-19) originating in Wuhan, China in 2019, is caused by the severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2). The first ever Covid case identified was in Wuhan, China at a seafood market, and it was often proclaimed that the Covid-19 virus was brought to humans from consuming bats. SARS-CoV-2 virus is a single-stranded RNA virus with both structural (S, E, M, N) and nonstructural protein (nsp 1, nsp3, nsp 12, nsp13, nsp14, etc.) (Li et.al., 2020). S (surface or spike) protein that covers the surface of SARS-CoV-2 is responsible for the binding and infection of host cells. As a result, given the importance of the spike protein, many companies and academic institutions studied and created RNA vaccines based on the S glycoprotein, these newly developed vaccines have demonstrated their ability to generate neutralizing antibodies and have been deemed effective in fighting against the virus (Daniel Martínez-Flores et. al, 2021). During 2020, the highly infectious Alpha and Beta strains were the major strains. The Alpha strain (B.1.1.7) was the first of the highly publicized variants that appeared in Great Britain in November 2020 and spread worldwide that

caused infections to surge in December of that year. The strain was identified as a Variant of Concern by CDC at the end of 2020 when it was 30% to 50% more contagious than the original covid strain identified in Wuhan, China. Variant of Concern (VOC) is a level of classification by the CDC which helps them to monitor and classify different variants into different levels of alert and concern. Variants designated as VOC demonstrate characteristics such as high transmissibility, severe symptoms that lead to hospitalization or death, and reduction in the effectiveness of treatments or vaccines (CDC, 2023). The Beta strain was first identified in South Africa at the end of 2020, and it had a similar infectiousness compared to the contemporary Alpha strain (Yale Medicine). In 2021, the most severe variant was identified as the Delta Variant with unprecedented mutations. The Delta variant was more contagious than both the Alpha and Beta variants and caused a resurgence of covid cases worldwide from June to December 2021. According to a study from the Lancet, the number of hospitalization risks in England doubled over the summer of 2021 than the number of hospitalizations from the Alpha variants. After the prevalence of the Delta variant worldwide, another new mutation-derived variant was found in the US, which was named the Omicron variant. The Omicron variant became predominant in 2022 and resulted in another resurgence of covid cases in multiple countries and regions such as the US, China and the UK. Compared to the previous mutated strains, the Omicron sub-variant was less lethal with a much lower mortality rate. On the other hand, the omicron strain had a much higher infectious rate and a larger area of impact, which is shown by the large number of infected cases from almost every country worldwide (Catherine Hyams et. al, 2022). At the end of 2022, the covid cases had reached a peak with the on-going Omicron strain and a large range of regions were being affected with covid cases and death counts. In March 2023, regions like China, Singapore, and Indian experienced another resurgence of covid cases brought by the XBB recombinant strain, which was mutated from 2 other highly contagious Omicron sub-variants (Low De Wei, 2023). Due to the minimal harm done by the XBB variant and the relaxation of covid policy, most infected people in China underwent no covid test, which resulted in a lack of data in China for XBB.

1.2 Vaccine development: Since the identification of the SARS-CoV-2 virus, countries and institutions have created various vaccines to target the major strains and reduce infection and mortality rate.

Table 1: *Summary of Covid-Vaccines Developed and Used By China and the USA*

Name	Types	Countries of development	Efficacy	Source
Pfizer	RNA	USA	88%	(CDC, 2021)
Moderna	RNA	USA	93%	(CDC, 2021)
NovaVex	Subunit Protein Vaccine	USA	90%	(WHO, 2022)
Johnson & Johnson	Protein Vector	USA	72%	(WHO, 2022)
AstraZeneca	Viral Vector	USA	72%	(WHO, 2022)
CoronaVac	Inactivated virus vaccine	China	86.4%/92.9% for 2 doses	(Yuchen Wei et. al, 2023)
Sinopharm	Inactivated virus vaccine	China	67%	(Hafez Al-Momani et. al, 2022)

China uses the inactivated virus vaccine, and the most dominant usage of vaccination is the Sinopharm vaccine, which is a type of Covid vaccination that injects dead or weak virus into the recipient's body in

order to stimulate immune system response. Such vaccination is effective for specific variants such as the Delta or Omicron variant but won't be much more effective if encountered with mutated variants. The Sinopharm vaccine requires two dosages in order to become effective, which was recorded in a study that showed a 79% efficacy against hospitalization. According to WHO, the vaccine efficacy in individuals aged 60 years and older against symptomatic disease after 213 days was 80% (95% CI: 5–98%), which proved to be effective in the population (WHO, 2022). In the US, there were a variety of vaccinations that were created to combat the pandemic, which resulted in the different usage of vaccinations in different countries compared to China. The US developed a different type of covid-19 vaccination which is the mRNA vaccination that injects not viral bodies but mRNA sequences that may stimulate the development of antibodies in the patients. The mRNA vaccine provides instructions for the cells on how to make the spike proteins found on the surface of the Covid-19 virus, which causes the body to produce antibodies that target the covid-19 virus. The antibodies serve as a marker for the pathogens which once the patient is again exposed to such a virus, the immune system would recognize the pathogen and alert the body for immune responses. The mRNA vaccine was mainly provided by Pfizer and Moderna, and it has a higher efficacy (Pfizer-BioNTech: 88%; 95% CI = 85%–91%; Moderna: 93%, [CI] = 91%–95%) compared to the Sinopharm vaccine used in China (CDC, 2021). Another widely used covid-19 vaccine in the US is the vector vaccine made by the Johnson & Johnson and AstraZeneca company, which is a type of vaccine that places a modified version of the virus in order to trigger immune system responses. Similar to the mRNA vaccine, the viral vector vaccine triggers the immune system to create antibodies and defensive white blood cells, which are helpful when fighting the viral infection after exposure. The viral vector vaccine has an efficacy of 71% (95% CI = 56%–81%) with only 1 dosage and the efficacy can be improved to 94% after the application of 2 dosages (WHO, 2022). The major difference between China and the US in terms of vaccination development is that the US was rapidly improving their medication and updating the currently existing vaccination for better protection against the newly mutated virus. In the US, approximately after the outbreak of the omicron variants in the country, the bivalent vaccine booster was developed and put into use by the general public. This vaccine specifically targets Omicron sub-variants BA.4 and BA.5 (FDA, 2023). The updated vaccine can more effectively combat the Omicron outbreak and provide a higher level of protection against exposure and infection. In contrast, in China, the Sinopharm vaccine was used for the entire population from the beginning of the Delta outbreak to the XBB outbreak in the beginning of 2023, which lasted in a span of 2 years without any improvement or target oriented developments. As shown in Figure 1, China experienced very few reported data based on the firstly developed "zero covid policy", which was an attempt to eliminate covid cases throughout the country and hospitalize the potential exposure population. Such policy was effective in terms of controlling the covid cases but with a huge amount of monetary cost and human effort, which eventually led to the fully "open-up" policy without any restriction to the covid exposure and vaccinations. However, the inverting of the situation immediately caused spikes in covid cases throughout the entire country, which indicate the ineffectiveness of the previously designed vaccination against the latest mutated virus (Megha, 2023). This study investigated the necessity for China to acquire new vaccines such as Pfizer, Moderna, or the bivalent vaccine due to the low efficacy of its own vaccines. In the paper, I chose to analyze the data retrieved from the Omicron outbreak in both the US and China, from June 2021 to December 2022 because of the availability of large amounts of data and studies regarding the massive outbreak. By identifying and analyzing the dominant strains in the US and China, I wanted to infer the applicability of US vaccines to Chinese citizens based on the effectiveness and the similarities between the covid strains identified in both regions. In the paper, I chose to analyze the sequencing data retrieved from the Omicron outbreak in both the US and China, from June 2021 to December 2022 because of the availability of large amounts of data and studies regarding the massive outbreak. In addition, I decided to compare the data and sequence of the latest covid samples recorded in China in 2023 with BA.4 and BA.5 to see the applicability of bivalent vaccines for the current outbreak.

2. Method: In order to investigate the applicability of US produced vaccines (Pfizer, Moderna and Bivalent booster) in regions like China where it previously used its own vaccine, I wanted to compare the genome

and protein sequence of the dominant strains found in these regions, which would be targeted by the vaccines. I wanted to investigate if the same covid strain would mutate as it spread in different regions, which would potentially affect the vaccine usage. I utilized the NCBI SARS-COV-2 database and blasting software to identify and compare the selected covid strains in our regions of interest. For the graphical representations, they were done by python Jupyter Notebook with the instruction and help from my mentor. Based on the public data on covid strains and the time of outbreak, in the span from April 2021 to December 2022, one of the most prevailing strains was the BA.2.12.1 covid strain, which is a sub-variant of the Omicron virus. For the purpose of the study, I selected nucleotide sequences from China, Japan, and 4 states in the US (NY, CA, WA, AZ), and blasted them with each other to compare their similarities and differences. Only 2 complete sequences from China and 4 complete sequences from Japan were selected due to the lack of data. In comparison, due to the large sequencing efforts of covid strains, there were many available sequences from the US. I was able to select 10 complete sequences of the BA.2.12.1 covid strain in the span of 2022 in each selected state. The four states were chosen based on the availability of the sequencing data, their large populations and regional variations in the US. Japan, which had been using US produced vaccines, was included in the analysis as another potential region of covid mutation. In addition, I cross blasted the spike proteins amino acid (AA) sequence. Point mutations were identified by looking at the blasting results. For each region, multiple complete sequences of BA.2.12.1 were selected for blasting to eliminate the random mutations. Only mutations that occur for over 90% of the results were identified. For investigating the latest outbreak in China, I first looked at the newest reported case of BF.7.14 strain in the US which is the OQ978950 strain reported on May 14, 2023, and compared the specific strain with the previously found strains to see if any mutations or changes have occurred to the virus. Then, I used the NCBI website to find ten different BA.5 samples and ten different BA.4 samples of nucleotide sequences, blasted with the OQ978950 sample, and recorded the percentage of similarities and their standard deviation. After comparing the nucleotide sequences of the viral genome, I specifically targeted the spike protein (surface glycoprotein) sequences using FY.3.1 sample WKL08853 and BF.7.14 sample WHA34978 on NCBI website. The two protein sequences were blasted against 10 different BA.4 and BA.5 surface glycoprotein sequences separately. The percentages of alignment were recorded in the table, and after all, the average percentage of alignment with standard deviation was calculated as representation of the data strains.

3. Result: For BA.2.12.1, the blast results showed almost identical (0.99) similarities between the sequence of the entire genome of the strains from different regions. On the other hand, there were slight regional differences between the sequence of the spike protein. The results were displayed in Table 2 and visualized in the heatmap (figure 2). In general, all of the comparison data showed a higher than 0.90 similarity between the spike protein. For regions like China, Japan, and CA, they demonstrated almost identical spike protein sequences (0.99-1). The lowest blast alignment (0.93) was between the WA and AZ with NY strains respectively. For WA, it has a 0.93 similarity compared to AZ which is also relatively low. Consequently, I analyzed point mutations that repeatedly occurred in the blast results between strains (Table 3). The identified mutations were N161K and G679R for China and Japan's strains. The differences among the spike protein sequences among the US's strains were mostly due to incomplete sequencing. In addition, other mutations such as deletions and additions that cause large frame shifts were not considered for the study. For the latest outbreak in China, BF.7.14 had an average 0.95±0.06 alignment with BA.5 and 0.99±0.028 alignment with BA.4. Furthermore, the blasting of spike protein sequences showed potential differences between these strains. The latest FY.3.1 sample (WKL08853) showed 0.95±0.013 alignment with BA.4 spike proteins and 0.985±0.005 with BA.5 spike proteins. Meanwhile, the latest BF.7.14 sample collected on January 2, 2023, showed 0.955±0.01 with BA.4 spike proteins and 0.96±0.003 with BA.5 spike proteins. The low standard deviation in the data underlined the consistency of the blast results.

4. Discussion: From the beginning of the pandemic to the latest covid-19 outbreak in China in the beginning of 2023, the variants of concern had always been changing and rapidly mutating as result of the

promptly developed vaccination and differences in between situation and circumstances of countries. Starting from the Alpha and Beta variants in China and the UK to the Omicron spikes in the US, the variants all present differences in their genetic expression and viral protein, which led to variation in their infection and mortality rates in different regions. In this study, for the period of interest, the most commonly found and infectious sub-variant BA.2.12.1 (Omicron) was put into comparison in between the strains and samples found in the US, China, and Japan. The blast results showed a high percentage of alignment in between the local strains. The average spike protein sequence alignment exceeded 0.92. The high alignment of the protein and genetic sequences provided evidence for the argument of the utilization of US-produced vaccination in other regions like China and Japan, these vaccines would be beneficial to people when fighting against the newly mutated strains, since the lack of improved vaccination left the Chinese citizens with a much higher risk of exposure and danger after infection. Spike protein sequences were studied across different local strains to compare similarities and differences. In SAR-CoV-2, spike protein is around the size of 180-200kDA with an extracellular N-terminus, a transmembrane domain, and an intracellular C-terminus (Bosch et.al., 2003). The extracellular domain binded to the surface receptor, angiotensin-converting enzyme 2 (ACE2) in human cells for viral entry (Huang, et.al 2020). The blast results between the protein sequences of BA.2.12.1 spike protein from China, Japan and the US showed a high percentage of similarity (Table 2), with certain point mutations (N161K, G679R) unique to the Asian strains. Based on the spike protein model, the protein is composed of 1273 amino acids. There are 2 large subunits in the protein: S1 (14-685 residues) for receptor binding and S2 (686-1273 residues) for membrane fusion. Both N161K and G679R were in the S1 subunit of spike proteins for receptor binding but not in the functional domain (Table 5). Some other mutations were also identified (F2X, R343T, A876V), but none of the mutations were found consistently in the protein. The lack of regional mutations of the strain, especially in the RBD, would support the use of US mRNA vaccines in China and Japan. Nonetheless, the effects of the mutations in the structural part of the protein shouldn't be overlooked that they could potentially affect the receptor binding ability and decrease the vaccine effectiveness. Moreover, these mutations highlight the high mutability of the virus as it spreads across continents. For example, R343T was a mutation in the RBD of the protein and might contribute to changes in the RBD with other mutations. Consequently, when comparing BF.7.14 and FY.3.1 strains with BA.5 and BA.4 strains, the spike protein alignment all exceeded 0.95, even higher than some of the alignment between regional BA.2.12.1 strains. While this similarity cannot guarantee the certainty of the effectiveness of bivalent vaccine on the current outbreak in China, such high uniformity would be great indications for the likelihood of applications of the vaccine. Nonetheless, further studies would be required for consolidating the results. Overall, the close alignment of China and the US provides good evidence and possibility of the applicability of the US vaccines in China. In addition, Japan had always been using US RNA vaccines for combating covid. Given the similarities between China and Japan's strains, the implementation of US vaccinations such as the Pfizer and Moderna mRNA vaccine and the bivalent boosters would possess high likelihood of success and effectiveness in the Chinese citizens. On the other hand, the study had revealed that local strains could develop mutations in the structural and potentially the functional part of spike protein. As a result, a decrease in vaccine efficacy of USA vaccines would be expected when used in China or other countries even when all regions share the same dominant strain.

5. Conclusion: After combating the pandemics for over two and a half years, most of the world have called for the end of the pandemic by reopening countries' borders and removing covid-19 regulations. Nonetheless, the virus is still in the air. With the reduction of lethality but high transmission rate and mutability, SARS-Cov-2 is still a major public health concern. In addition, the potential overlapping of influenza and covid outbreak in the future may further burden the public health care system. As a result, the need for vaccine and treatment development is still high for new strains. Global efforts and cooperation are necessary in dealing with highly transmissible diseases. Scientists have been trying to develop the so-called "universal" influenza vaccine (Nachbagauer & Krammer, 2017). This concept shall also be considered for covid vaccine development due to the fast transmission of virus from one country to another and not all countries have the ability to manufacture their own vaccines in time to combat the

virus. This study supported this idea by showing the low regional variability of dominant strain as it spread across continents. Nonetheless, potential mutations may still undermine the effectiveness of vaccines. Therefore, necessary sanitary actions like wearing masks and frequent hand washing during the covid and influenza seasons are still highly encouraged. Introducing foreign vaccinations would need to go through a series of trial and error in order to establish the most fundamental safety issues, but these vaccinations would provide a strengthened baseline for the global population against the pandemic. In addition, the mRNA vaccine has proven to be effective and efficient for all age groups to combat highly mutable SARS-Cov-2 viruses when compared to more traditional vaccines. Countries such as China should be more active towards the development of the mRNA vaccines. Meanwhile, this study also highlighted the need for more sequencing and public health data, such as the number of infections and vaccinations, to fully examine the mutations in the virus genome and the corresponding phenotypical changes. For example, there is a lack of sequencing data from China for the recent covid outbreak, which hinders the scientific community from analyzing the major strain. These data,which should be made more transparent and accessible, are important for developing future vaccines, especially mRNA vaccines.

6. Tables:

Table 2: *Percent Similarity between Regional BA.2.12.1 Strains with Standard Deviation.*

Regions	China	Japan	USA NY	USA CA	USA WA	USA AZ
# of strains	2	4	10	10	10	10
China	-	1	0.98±0.014	0.99	0.97 ±0.033	0.98 ±0.017
Japan	1	-	0.98±0.014	0.99	0.97 ±0.033	0.98 ±0.017
USA NY	0.98±0.014	0.98±0.014	-	0.98±0.014	0.93 ±0.036	0.94 ±0.021
USA CA	0.99	0.99	0.98±0.014	-	0.97 ±0.033	0.98 ±0.017
USA WA	0.97 ±0.033	0.97 ±0.033	0.93 ±0.036	0.97 ±0.03	-	0.93 ±0.034
USA AZ	0.98 ±0.017	0.98 ±0.017	0.94 ±0.021	0.98 ±0.017	0.93 ±0.034	-

Table 3: *Position of Point Mutations. Point Mutations in the Spike Protein Regions Identified From the Cross Blasting Between Different Strains. Only Point Mutations, Appearing In 90% Of The Results, Were Shown.*

Regions	China	Japan	USA NY	USA CA	USA WA	USA AZ
# of strains	2	4	10	10	10	10
China	-	-	N161K, G679R	N161K, G679R	N161K, G679R	N161K, G679R
Japan	-	-	N161K, G679R	N161K, G679R	N161K, G679R,	N161K, G679R
USA NY	N161K, G679R	N161K, G679R	-	-	-	-
USA CA	N161K, G679R	N161K, G679R	-	-	-	-
USA	N161K, G679R,	N161K, G679R,	-	-	-	-

WA						
USA AZ	N161K, G679R	N161K, G679R	-	-	-	-

Table 4: *Percent Comparison of BA.4 and BA.5 protein sequence with the Latest FY.3.1 and BF.7.14 spike protein in China. Blasting results of the 2 different spike protein sequences of the latest prevalent FY.3.1 and BF.7.14 strain found in China to BA.4 and BA.5 in the US. Individual blasting results were listed with the average and standard deviation at the last row.*

BA.4 Sample of spike protein	% Similarity with sample WKL08853	% Similarity with sample WHA34978	BA.5 Sample of spike protein	% Similarity with sample WKL08853	% Similarity with sample WHA34978
WKT27639	0.99	0.99	WHS89080	0.96	0.95
WJP81058	0.99	0.98	WKF16943	0.96	0.96
WJJ47712	0.98	0.98	WJP60339	0.96	0.96
WII99904	0.98	0.99	WIJ09769	0.96	0.96
WIJ04758	0.99	0.98	WJP34028	0.96	0.96
WGO72935	0.98	0.99	WII99796	0.96	0.96
WGS90790	0.99	0.99	WIJ30834	0.96	0.96
WGV36408	0.95	0.98	WID10437	0.93	0.96
WHL52108	0.97	0.98	WAN07672	0.95	0.96
WGH55563	0.98	0.99	WGL13173	0.95	0.96
Average	0.95±0.013	0.985±0.005	Average	0.955±0.017	0.96±0.003

Table 5: *The Domain And Functions Are Residues Of Spike Protein (Huang Et.Al, 2020).*

Subunit	Residue	Domain and functions
S1	1-13	N -terminus signal peptide
	14-305	N-terminal domain
	319-541	Receptor-binding domain (RBD)
S2	788-806	Fusion peptide (FP)
	912-984	Heptapeptide repeat sequence 1 (HR1)
	1163-1213	Heptapeptide repeat sequence 2 (HR2)
	1213-1237	Transmembrane domain (TM)
	1237-1273	Cytoplasm domain

7. Figures:

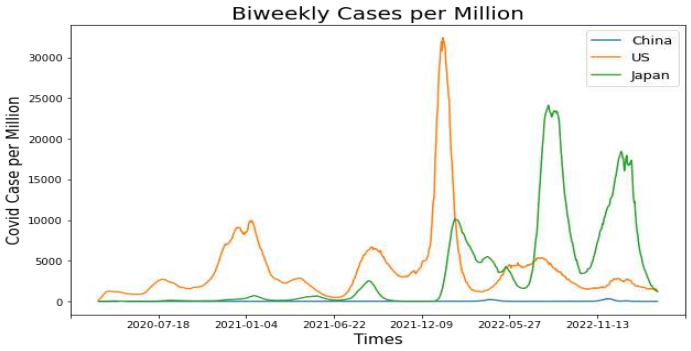

Figure 1: A line plot of the biweekly cases by million in each country from April 2021 to December 2022. The blue line was China, the orange line was the US, and the green line was Japan. The number on the y-axis is the recorded average number of covid cases in every one million people per two weeks.

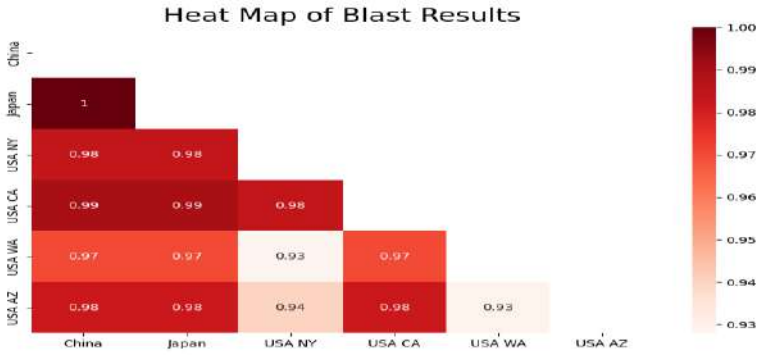

Figure 2: A heat map representation of the blast results of the BA.2.12.1 omicron subvariant strains in different countries and regions (Table 1). The blast result shows the percentage of similarity in the protein sequence of the spike protein. All the results recorded in the heat map are the average taken from blasting 10 different strains in one region with the other 10 different strains in the other region. Except for China, there are only two strains recorded so they are used as the target sequence and blasted with the others. A result of 1 represents no difference between the sequence in both regions such as Japan and California.

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Employing Evidence-Based Approaches for Digital Health Communication Policies and Practices

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Abstract: **Background**: Digital health communication refers to the use of technology and digital tools to promote health and wellness, facilitate communication between patients and healthcare providers, and improve the overall quality of healthcare. Evidence-based solutions are important to ensure that digital health communication is effective and safe.

Objective: The goal of this research program is to create gold-standard solutions for patients and public to help them access credible health knowledge from the web and facilitate patient-provider communication.

Methodology: The research program includes the following methods: 1) systematic reviews, 2) content analysis, 3) focus groups, 4) surveys, and 5) RCT.

Research Outcomes: Through this multi-phase project, new knowledge has been generated to support the creation of patient-friendly quality standards and policy frameworks. The interventions derived from this

project will establish best practices and policies for disseminating trustworthy health information on the web. This will reduce disparities in access to health knowledge and combat online misinformation. Furthermore, we anticipate that the resulting interventions will serve as gold standard for developing similar interventions that are tailored to specific contexts and patient populations.
Keywords: Digital Health, Health Communication, Health Literacy, Reliability, Benchmark, Framework

Prevalence and Risk Factors of Overweight and Obesity and Physical Activity Patterns among Elderly Individuals in Southern Thailand: A Community Cross-Sectional Study

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Abstract: **Objective**: To investigate the prevalence of overweight and obesity and physical activity (PA) patterns and to assess the factors associated with obesity among elderly individuals in the southernmost province of Thailand.

Materials and Methods: An epidemiological community-based cross-sectional study was conducted among elderly individuals aged 60 years and older. The eligible participants completed a face-to-face inquiry of the study's questionnaire related to personal characteristics and PA. Local assistant researchers collected these data. BMI was categorized according to the Asian-Pacific cut-off points. Statistical computing was performed with RStudio, and a p-value of less than 0.05 was considered significant.

Results: The prevalence of overweight was 20.3%, and that of obesity was 35.2%. The overweight prevalence and obese prevalence among male and female elderly individuals were 22.7% and 30.3%, and 18.6% and 28.6%, respectively. The obesity prevalence was non-significantly high in the female group. The majority of the elderly participants were non-working. The share of non-working participants was the highest among females and increased with age. The prevalence of lack of exercise was the highest among females. Daily physical activity hours (DPAH) and vigorous-intensity exercise decreased among the female group and the elderly group. Only 47.8% of the present study participants met the PA sufficiency criteria. The 70 to 79, and older than 80 years age group were less likely to be obese than the earlier-stage elderly group (adjusted OR 0.56, 0.31). Furthermore, personal income of 4,001 to 6,000 Baht per month and smokers had a lower likelihood of being obese than the poor elderly group and those who were not smokers (adjusted OR 0.55, 0.37).

Conclusion: The prevalence of overweight in these areas was moderate, and that of obesity was quite

high. The male overweight and obese prevalence were analogous to those of female elderly individuals. The majority of the elderly participants were non-working. Most were females and increased with age. The majority met PA insufficiency criteria. Personal and health habit factors were associated with obesity among elderly individuals.

Keywords: Elderly; Overweight and obesity; Physical activity patterns

Physical Activity and Healthy Aging in the Elderly

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Abstract: This study aimed to give information about the physical activities applied in the elderly and healthy aging. In the study, research findings and reports on physical activity in the elderly were used. The decrease in birth rates and increase in life expectancy around the world causes an increase in the number of the elderly population. Increasing life expectancy brings with it many health problems. It is essential to promote a healthy lifestyle and develop and maintain functional ability in order to reduce/prevent the health problems of the elderly and ensure their healthy aging. There is a need for older adults who participate actively and healthily in life. In this respect, adequate and balanced nutrition and active physical life come to the fore as a healthy lifestyle for elderly individuals. Maintaining physical health and functional capacity is of great importance to facilitate the activity and daily activities of the elderly. Regular physical activity is one of the most important protectors of active and healthy aging. Exercise types recommended for the elderly include aerobic/endurance, strengthening/resistance, balance, flexibility exercises, and multi-component physical activities. As a result of the studies, it seems possible to increase the physical activity intensity of older adults, as well as to provide active aging by improving the cognitive, mental, and functional aspects of older adults.

Keywords: Elderly, Physical Activity, Healthy Aging.

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