World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 7.409

COVID VACCINATION STATUS OF PATIENTS COMING IN A TERTIARY CARE HOSPITAL

Shaguftha Nooreen[1*], Hafsa Noorien[1] and Syeda Asma Banu[1]

[1]Department of Pharmacy Practice, Sultan-Ul-Uloom College of Pharmacy, Hyderabad.

***Corresponding Author: Shaguftha Nooreen**

Department of Pharmacy Practice, Sultan-Ul-Uloom College of Pharmacy, Hyderabad.

Article Received on 05/09/2024 **Article Revised on 25/09/2024** **Article Accepted on 15/10/2024**

INTRODUCTION

The emergence of the COVID-19 pandemic has presented an unprecedented challenge to global healthcare systems, necessitating swift and effective responses to mitigate its impact. Central to these responses has been the development and deployment of COVID-19 vaccines to achieve widespread immunity and control the spread of the virus. As vaccination campaigns have gained momentum, it becomes imperative to understand the perspectives and choices of individuals regarding vaccination.

This dissertation delves into a specific dimension of the broader vaccination narrative – the COVID-19 vaccination status of patients seeking healthcare services in a tertiary care hospital. Tertiary care hospitals play a pivotal role in managing severe cases and providing specialized medical attention, making them a focal point for studying the vaccination landscape among individuals with diverse health needs.

COVID-19 vaccines and their respective booster shots include

1. **Pfizer – Bio N Tech (Comirnaty)**
- **Vaccine:** Two-dose mRNA vaccine.
- **Booster:** An additional booster dose was recommended for certain populations, especially as a response to merging variants.

2. **Moderna**
- **Vaccine:** Two-dose mRNA vaccine.
- **Booster:** Like Pfizer, Moderna has recommended a booster shot for increased protection, particularly against new variants and over time.

3. **Johnson & Johnson's Janssen**
- **Vaccine:** Single-dose viral vector vaccine.
- **Booster:** Booster shots are recommended, usually administered several months after the initial dose to enhance and prolong immunity.

4. **AstraZeneca**
- **Vaccine:** Viral vector vaccine, often used globally, especially in low- and middle-income countries.
- **Booster:** Booster shots may be recommended, depending on evolving health guidelines.

5. **Sinopharm and Sinovac**
- **Vaccines:** Inactivated virus vaccines widely used in various countries.
- **Boosters:** Booster shots have been administered in some regions, especially in response to waning immunity or emerging variants.

6. **Sputnik V**
- **Vaccine:** Viral vector vaccine developed in Russia.
- **Booster:** Booster doses have been used to enhance immunity and address concerns related to variants.

7. **Novavax**
- **Vaccine:** Protein subunit vaccine.
- **Booster:** Booster shots may be considered, as with other vaccines, to extend immunity over time.

8. **COVAXIN (Bharat Biotech)**
- **Vaccine:** Inactivated virus vaccine developed in India.
- **Booster:** Guidelines regarding booster doses may vary, and decisions are often based on evolving data.

AIM AND OBJECTIVES

AIM: To analyze the covid vaccination status of patients coming in a tertiary care hospital.

Objectives: To create a questionnaire for collecting information.
To intervene with doctors and patients for counseling.

To provide an outcome for vaccination status for visiting patients.

METHODOLOGY

Type of study: This is an observational cross-sectional study on All-comers' patients, who are on any lipid lowering pharmacological therapy will be excluded Study Center: Mythri Multi-specialty Hospital, Mehdipatnam, Hyderabad.
Sample Size: 200 samples are used.
Study time: 6 months for the study.
Source of data: Case report form Prescriptions, Standard questionnaires, etc.
Statistical analysis: Data are shown as number, percentages or mean standard deviation. To analyze the data appropriate statistical software were used like Graph pad prism, SPSS software to identify the results that are statistically significant or insignificant.

Research Methodology

Participants in the study will complete a questionnaire and be interviewed in their own language.
Questionnaire will be used for vaccination status in patients.

Inclusion criteria: All patients who are visiting the hospital and are willing to involve and participate in the study.

Exclusion criteria: All patients who are not visiting the hospital or are not willing to involve and participate in the study. Data analysis using SPSS will be followed by a descriptive statistics summary utilising frequency tables, charts, and percentages.

Study procedure

1) Throughout the research period, as well as during follow-up visits to the hospital will be collected regularly.
2) The information gathered will be entered into data collecting forms intended for documenting just those variables/parameters essential to determining the study's goals.
3) The results will be retrieved when the necessary data, numbers, and percentages have been filtered out.

RESULTS

HAVE YOU TAKEN THE COVID-19 VACCINE.

Table: Vaccination Status.

Vaccination Status	Number of Patients
Both Doses	135
First Dose	68
Not Vaccinated	97

This table categorizes patients into those who have taken both doses, those who have taken the first dose, and those who have not been vaccinated. The numbers represent the count of patients in each category based on their vaccination status.

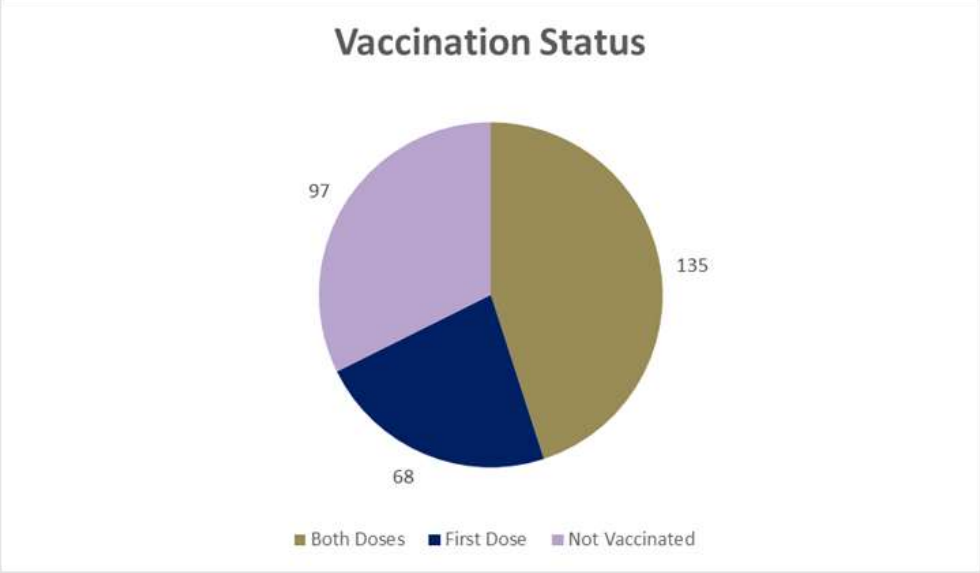

Figure: Vaccination Status.

WHICH VACCINE DID YOU TAKE?

Table: Vaccine Type.

Vaccine Type	Number of Patients
COVISHIELD	69
COVAXIN	47
OTHERS	19

This table categorizes patients based on the type of vaccine they took. The numbers represent the count of patients for each vaccine type, including COVISHIELD, COVAXIN, and OTHERS.

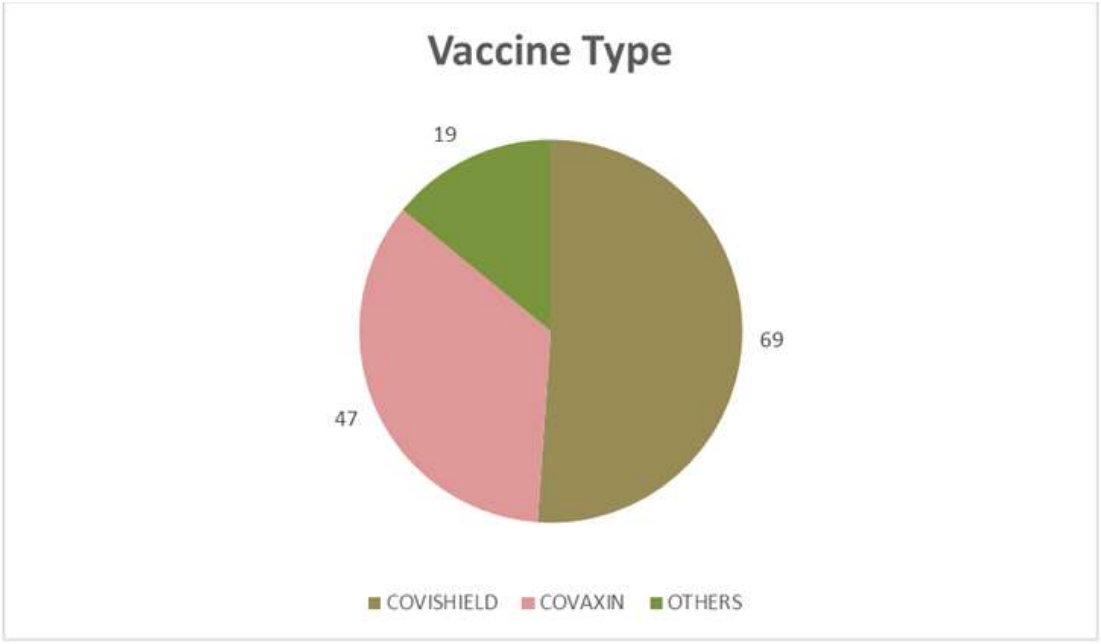

Figure: Vaccine Type.

HAVE YOU TAKEN A BOOSTER SHOT?

Table: Booster Shot Status.

Booster Shot Status	Number of Patients
NO	122
YES	38

This table categorizes patients based on whether they have taken a booster shot or not. The numbers represent the count of patients for each category, including those who have not taken a booster shot (NO) and those who have taken a booster shot (YES).

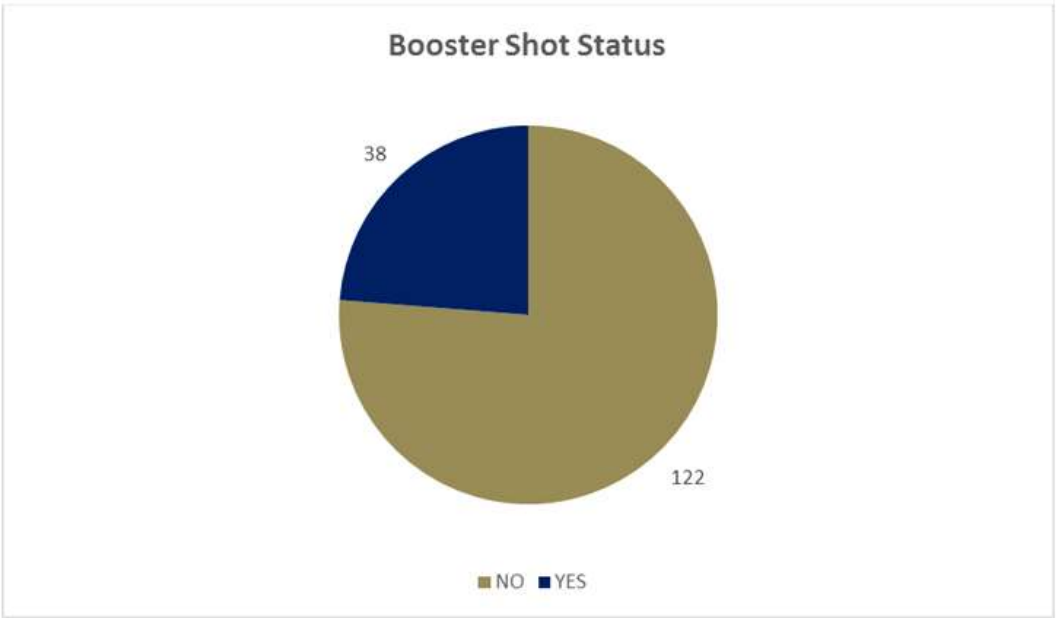

Figure: Booster Shot Status.

IF YES, YOU TOOK A BOOSTER DOSE WAS IT THE SAME VACCINE

Table: Booster Dose Same as Original Vaccine.

Booster Dose Same as Original Vaccine	Number of Patients
No	67
Yes	30
Maybe	25

This table categorizes patients based on whether they took a booster dose and if it was the same as the original vaccine. The numbers represent the count of patients for each category.

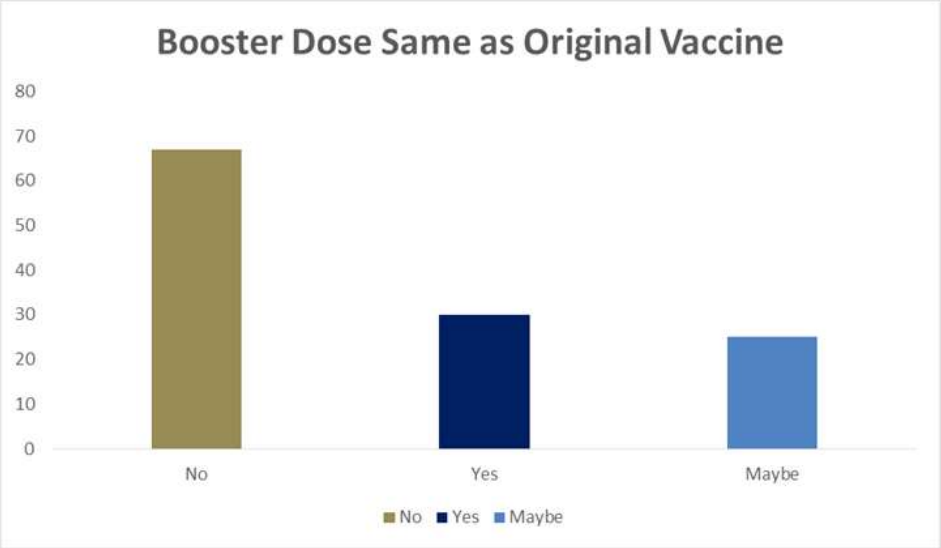

Figure: Booster Dose Same as Original Vaccine.

DID YOU GET THE VACCINE FOR FREE OR DID YOU PAY EITHER FOR FIRST & SECOND DOSE/BOOSTER SHOT

Table: Vaccination Payment Status.

Vaccination Payment Status	Number of Patients
Yes	63
No	65
Maybe	23

This table categorizes patients based on whether they received the vaccine for free (Yes), paid for either the first and second dose or booster shot (No), or are uncertain about the payment status (Maybe). The numbers represent the count of patients for each category.

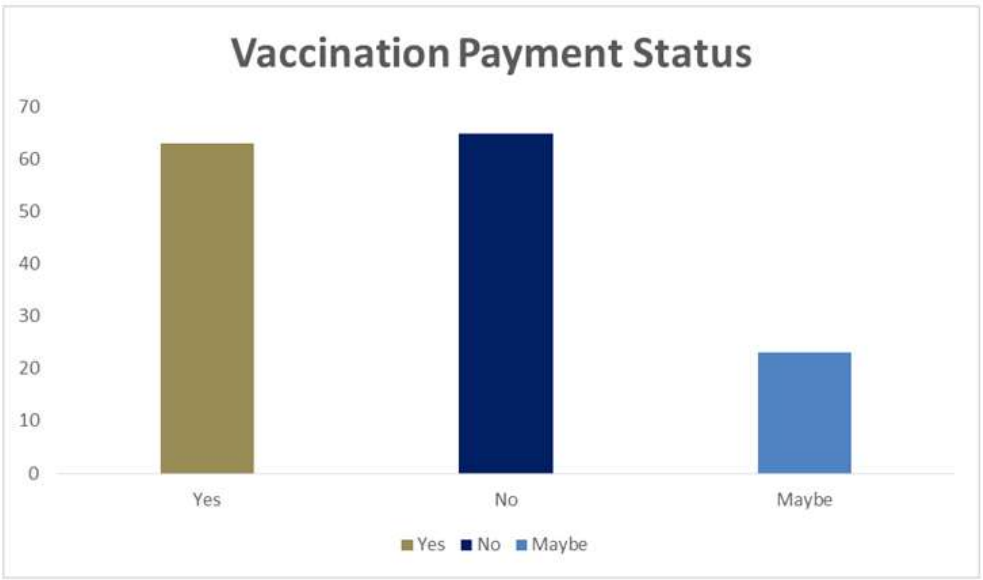

Figure: Vaccination Payment Status.

DID YOU HAVE ANY SYMPTOMS OF COVID-19

Table: Symptoms Status.

Symptoms Status	Number of Patients
No	65
Yes with Mild Symptoms	39
Yes with No Symptoms	41
Yes, I had suspected symptoms but didn't verify with a doctor	55
Maybe	4

This table categorizes patients based on their reported COVID-19 symptoms. The numbers represent the count of patients for each category.

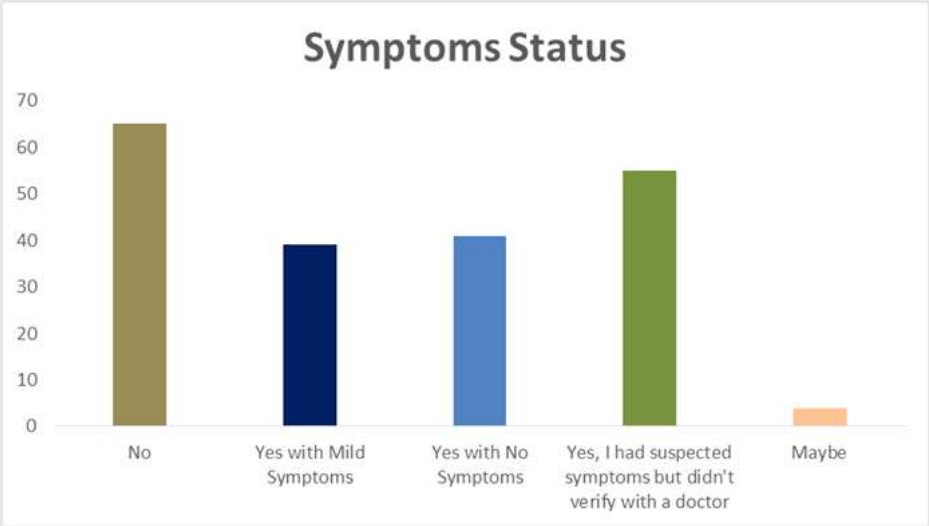

Figure: Symptoms Status.

DO YOU HAVE ANY OF THE FOLLOWING CONDITIONS (SELECT ALL THAT APPLY)

Table: Existing Conditions.

Existing Conditions	Number of Patients
Pulmonary Disease	28
Rheumatological Condition	16
Diabetes (Type 1&2)	91
Cardiovascular Disease	59
Nothing	110

This table categorizes patients based on their reported existing conditions, and the numbers represent the count of patients for each category.

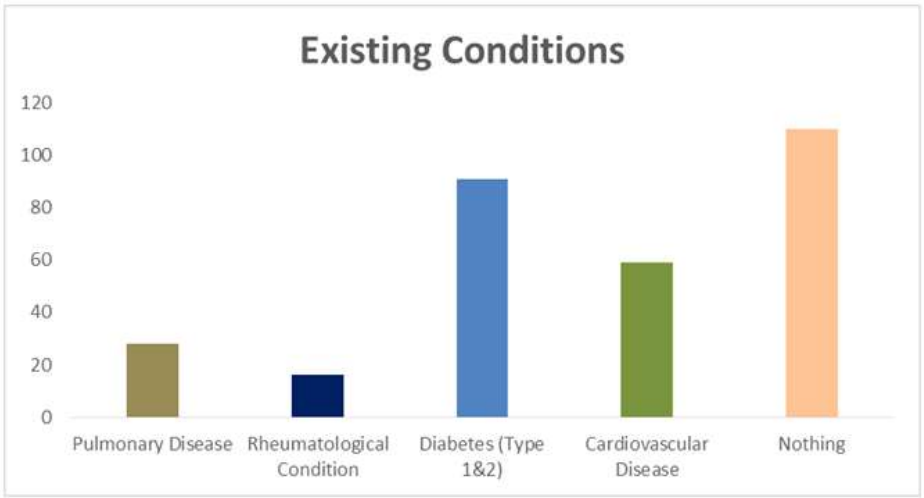

Figure: Existing Conditions.

HAVE YOU REFUSED A VACCINE IN THE PAST THAT WAS RECOMMENDED BY A HEALTHCARE PROVIDER?

Table: Refusal Reasons.

Refusal Reasons	Number of Patients
Concerned about side effects	34
Never refused	83
Not safe	32
Did not think the vaccine was effective	63
Did not think it was needed	75
Others	23

This table categorizes patients based on their reported reasons for refusing a vaccine in the past, and the numbers represent the count of patients for each category.

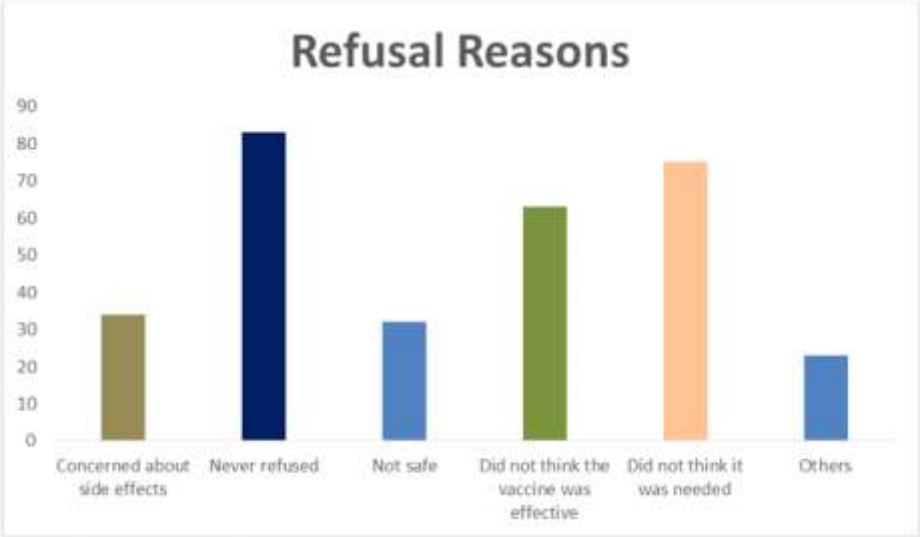

Fig: Refusal Reasons.

HOW CONCERNED ARE YOU OF CONTRACTING COVID-19 AT WORK

Table: Level of Concern.

Level of Concern	Number of Respondents
Very Concerned	57
Somewhat Concerned	78
A Little Concerned	54
Not Concerned	34

This table categorizes respondents based on their reported levels of concern about contracting COVID-19 at work, and the numbers represent the count of respondents for each category.

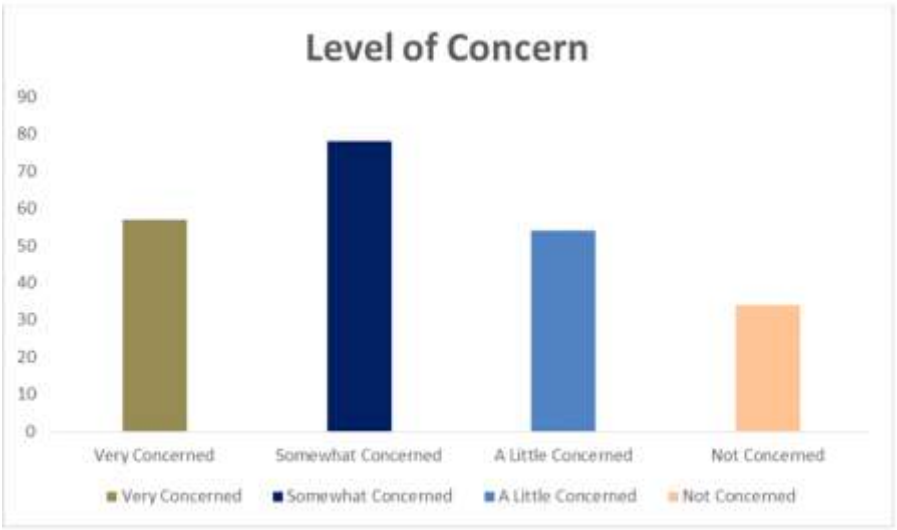

Figure: Level of Concern.

WHICH OF THE FOLLOWING WAS THE REASON FOR YOU TO CHOOSE TO TAKE THE VACCINE?

Table: Reasons for Choosing to Take the Vaccine.

Reasons for Choosing to Take the Vaccine	Number of Respondents
Stopping Spread of COVID	57
Resuming Normal Life	76
Reducing Mortality	35
Bringing Pandemic to an End	68
All of the Above	124

This table categorizes respondents based on the reasons they chose to take the vaccine, and the numbers represent the count of respondents for each category. Many respondents cited multiple reasons, with "All of the Above" being a common choice.

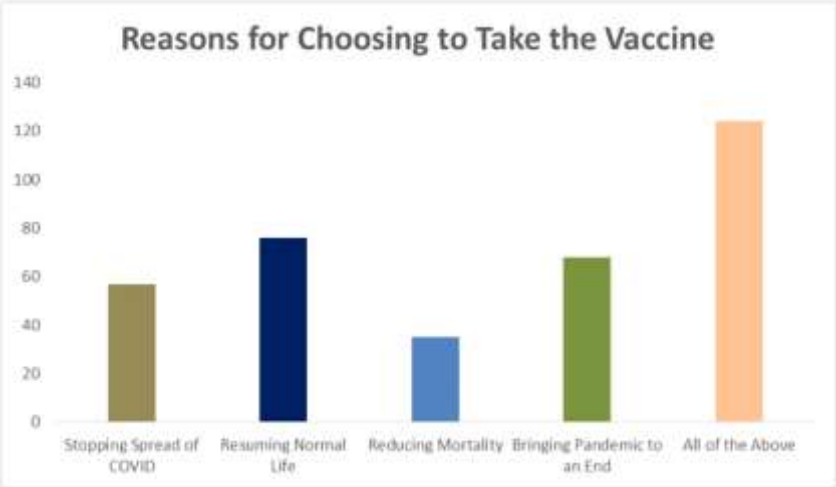

Figure: Reasons for Choosing to Take the Vaccine.

I WILL RECOMMEND MY FAMILY, FRIENDS WHO ARE NOT VACCINATED TO GET THE VACCINE?

Table: Recommendation to Get the Vaccine.

Recommendation to Get the Vaccine	Number of Respondents
Strongly Agree	54
Agree	62
Neutral	45
Disagree	25
Strongly Disagree	23

This table categorizes respondents based on their willingness to recommend the vaccine, and the numbers represent the count of respondents for each category. The majority of respondents are either in favor (Strongly Agree and Agree) or neutral, with a smaller number expressing disagreement.

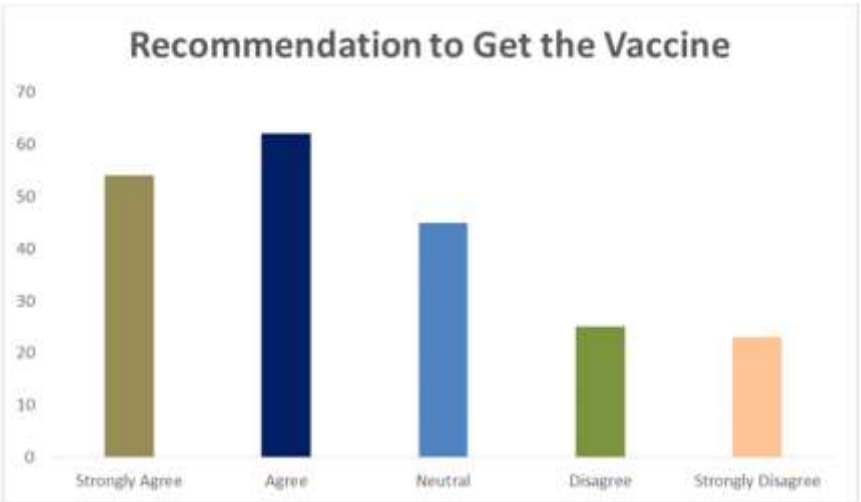

Figure: Recommendation to Get the Vaccine.

AFTER GETTING COVID-19 VACCINE I DON'T NEED TO FOLLOW PREVENTIVE MEASURES SUCH A WEARING A MASK?

Table: Preventive Measures.

Belief Regarding Preventive Measures	Number of Respondents
Strongly Disagree	68
Disagree	62
Neutral	54
Agree	42
Strongly Agree	20

This table categorizes respondents based on their beliefs about the need for preventive measures after receiving the COVID-19 vaccine. The majority either strongly disagree or disagree, indicating that they still believe in the importance of following preventive measures even after vaccination. There's a smaller number of respondents who are neutral or agree with the statement.

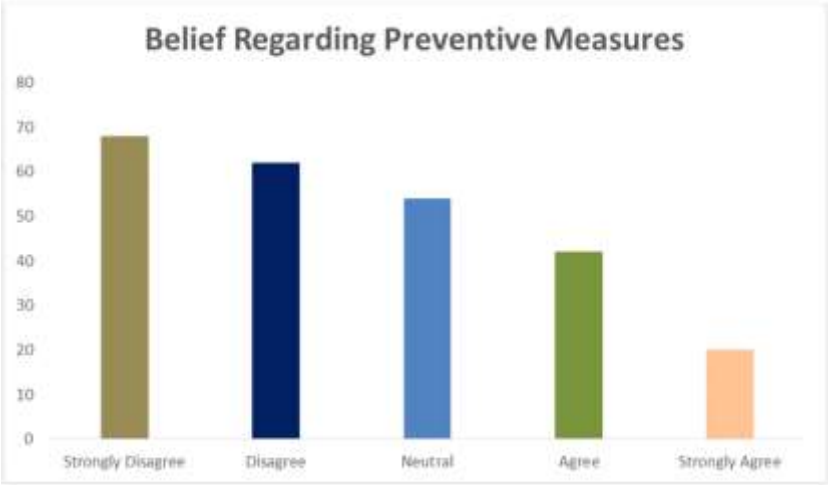

Figure: Preventive Measures.

IN THE PRESENT ERA THERE ARE MULTIPLE SOURCES OF INFORMATION REGARDING VACCINES WHICH PARTICULAR INFLUENCED YOUR OPINION?

Table: Source of Information.

Source of Information	Number of Mentions
Health Care Provider	66
Social Media - WhatsApp	47
News/TV/Radio	38
Family & Friends	36
Government Agencies	31
Instagram	31
Facebook	14

This table shows the sources of information that have influenced people's opinions about vaccines. Health care providers are the most commonly mentioned source, followed by social media platforms like WhatsApp and Instagram, and traditional media like news, TV, and radio. Family and friends, as well as government agencies, also play a significant role in shaping opinions about vaccines.

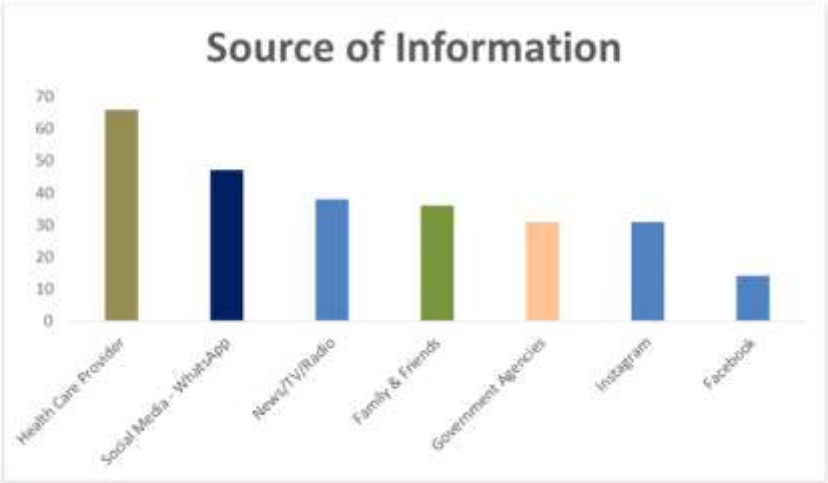

Figure: Source of Information.

I WILL PREFERABLY ACQUIRE IMMUNITY AGAINST COVID-19 NATURALLY (BY HAVING DISEASE OR INFECTION) RATHER BY VACCINATION?

Table 18: Immunity Acquisition.

Preference for Immunity Acquisition	Number of Responses
Prefer Natural Immunity	85
Neutral	72
Prefer Vaccination	41

This table represents the preferences of respondents regarding how they would like to acquire immunity against COVID-19. The majority express a preference for natural immunity (through having the disease or infection), followed by those who are neutral on the matter. A smaller group prefers acquiring immunity through vaccination.

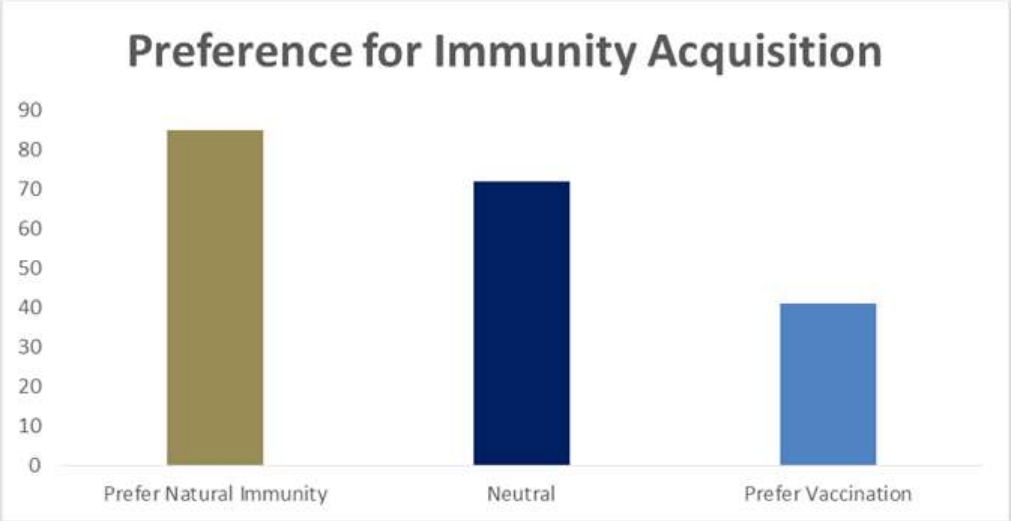

Figure: Immunity Acquisition.

I FEEL PEOPLE ARE DYING YOUNG DUE TO VACCINE?

Table: Perception of Vaccine Impact.

Perception of Vaccine Impact on Young Mortality	Number of Responses
Strongly agree	64
Agree	61
Neutral	49
Disagree	28
Strongly disagree	22

This table represents the respondents' feelings about whether they believe people are dying young due to the COVID-19 vaccine. The majority express agreement or strong agreement, followed by those who are neutral on the issue. A smaller group disagrees or strongly disagrees with this perception.

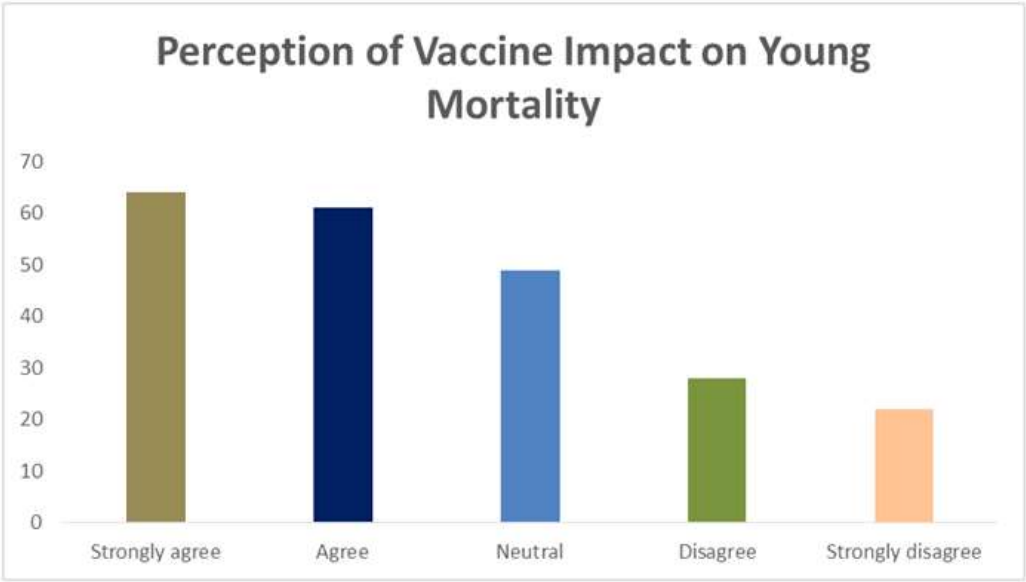

Figure: Perception of Vaccine Impact.

IF YOU COULD CHANGE YOUR DECISION TO GET VACCINATED TODAY? WOULD YOU?

Table: Decision to Change Vaccination.

Decision to Change Vaccination	Number of Responses
Yes	135
Maybe	60
No	55

This table represents the respondents' openness to changing their decision regarding COVID-19 vaccination. The majority are open to changing their decision (Yes), followed by those who are uncertain (Maybe), and a smaller group is not willing to change their decision (No).

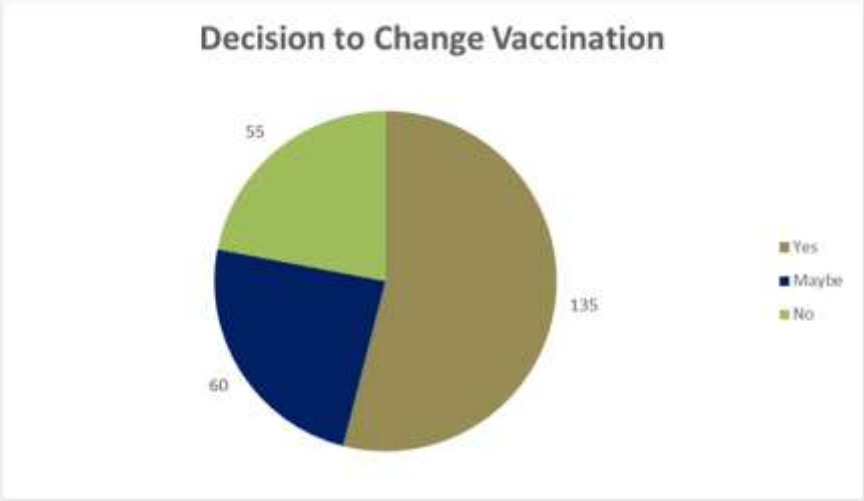

Figure: Decision to Change Vaccination.

IF YES WHY?

Table: Reasons for Vaccination Decision.

Reasons for Vaccination Decision	Number of Responses
Safety Concerns	87
Fear of Sudden Death	75
Fear of Conspiracy	32
Cost of Hospitalization	22

This table represents the reasons mentioned by respondents for their decision on COVID-19 vaccination. The majority cited safety concerns, followed by fear of sudden death, fear of conspiracy, and concerns about the cost of hospitalization.

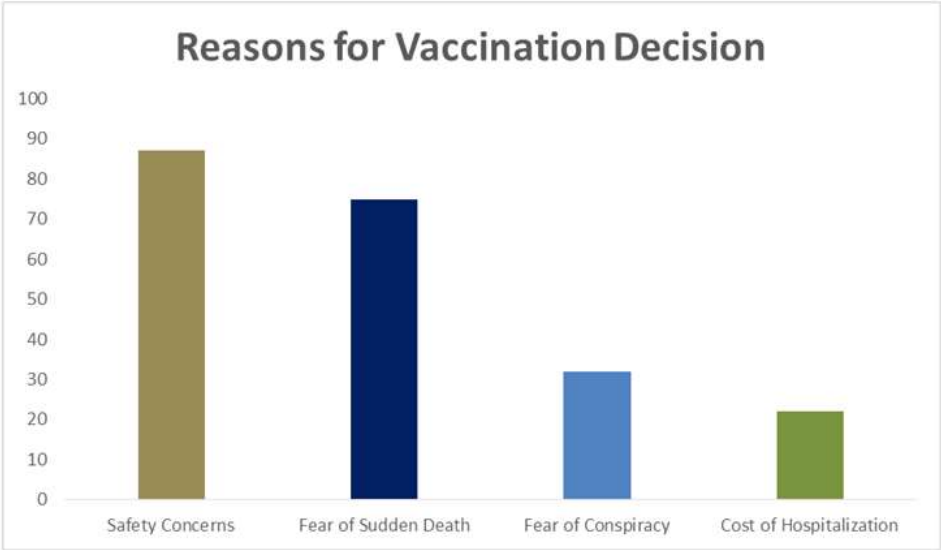

Figure: Reasons for Vaccination Decision.

CONCLUSION

In conclusion, the data provides valuable insights into the complex landscape of COVID-19 vaccination decisions. Crafting targeted interventions based on demographic trends, vaccination status, and health beliefs is crucial for optimizing vaccine coverage and fostering public confidence in vaccination programs.

BIBLIOGRAPHY

1. Rasheed, A., & Farhat, R. (2013). Combinatorial chemistry: A review. International Journal of Research in Pharmaceutical Sciences, 4: 2502–2516.
2. Rasheed, A., & Ahmed, O. (2017). UPLC method optimisation and validation for the estimation of sodium cromoglycate in pressurized metered dosage form. International Journal of Applied Pharmaceutical Sciences and Research, 2(2): 18-24. https://doi.org/10.21477/ijapsr.v2i2.7774.
3. Rasheed, A., & Ahmed, O. (2017). UPLC method development and validation for the determination of chlophedianol hydrochloride in syrup dosage form. International Journal of Applied Pharmaceutical Sciences and Research, 2(2): 25-31. https://doi.org/10.21477/ijapsr.v2i2.7775

4. Rasheed, A., & Ahmed, O. (2017). Validation of a forced degradation UPLC method for estimation of beclomethasone dipropionate in respules dosage form. Indo American Journal of Pharmaceutical Research, 7(05).
5. Rasheed, A., & Ahmed, O. (2017). Validation of a UPLC method with diode array detection for the determination of noscapine in syrup dosage form. European Journal of Pharmaceutical and Medical Research, 4(6): 510-514.
6. Rasheed, A., & Ahmed, O. (2017). Stability indicating UPLC method optimisation and validation of triamcinolone in syrup dosage form. World Journal of Pharmaceutical and Life Sciences, 3(4): 200-205.
7. Rasheed, A., & Ahmed, O. (2017). Stability indicating UPLC method optimisation and validation of pholcodine in bulk dosage form. European Journal of Biomedical and Pharmaceutical Sciences, 4(6): 572-579.
8. Rasheed, A., & Ahmed, O. (2017). Analytical method development and validation for the determination of codeine in syrup dosage form using UPLC technology. World Journal of Pharmaceutical and Life Sciences, 3(5): 141-145.
9. Rasheed, A., & Ahmed, O. (2017). Analytical stability indicating UPLC assay and validation of fluticasone propionate in nasal spray inhaler dosage form. World Journal of Pharmaceutical and Life Sciences, 3(5): 168-172.
10. Rasheed, A., & Ahmed, O. (2017). Stability indicating UPLC method optimisation and validation of acetylcysteine in syrup dosage form. European Journal of Pharmaceutical and Medical Research, 4(7): 485-491.
11. Rasheed, A., & Ahmed, O. (2017). Analytical stability indicating UPLC assay and validation of ciclesonide in dry powder inhaler dosage form. European Journal of Pharmaceutical and Medical Research, 4(7): 523-529.
12. Rasheed, A., & Ahmed, O. (2017). Analytical stability indicating UPLC assay and validation of dextromethorphan in syrup dosage form. European Journal of Pharmaceutical and Medical Research, 4(7): 548-554.
13. Rasheed, A., & Ahmed, O. (2017). Analytical development and validation of a stability-indicating method for the estimation of impurities in budesonide respules formulation. International Journal of Applied Pharmaceutical Sciences and Research, 2(3): 46-54. https://doi.org/10.21477/ijapsr.v2i3.8100
14. Rasheed, A., & Ahmed, O. (2017). Analytical separation and characterisation of degradation products and the development and validation of a stability-indicating method for the estimation of impurities in ipratropium bromide respules formulation. International Journal of Applied Pharmaceutical Sciences and Research, 2(3): 55-63. https://doi.org/10.21477/ijapsr.v2i3.8101
15. Joffe S. Evaluating SARS-CoV-2 Vaccines After Emergency Use Authorization or Licensing of Initial Candidate Vaccines. JAMA; 2021 Jan 19; 325(3): 221-222.
16. Baden LR, El Sahly HM, Essink B, Kotloff K, Frey S, Novak R, Diemert D, Spector SA, Rouphael N, Creech CB, McGettigan J, Khetan S, Segall N, Solis J, Brosz A, Fierro C, Schwartz H, Neuzil K, Corey L, Gilbert P, Janes H, Follmann D, Marovich M, Mascola J, Polakowski L, Ledgerwood J, Graham BS, Bennett H, Pajon R, Knightly C, Leav B, Deng W, Zhou H, Han S, Ivarsson M, Miller J, Zaks T., COVE Study Group. Efficacy and Safety of the mRNA-1273 SARS-CoV-2 Vaccine. N Engl J Med; 2021 Feb 04; 384(5): 403-416.
17. Polack FP, Thomas SJ, Kitchin N, Absalon J, Gurtman A, Lockhart S, Perez JL, Pérez Marc G, Moreira ED, Zerbini C, Bailey R, Swanson KA, Roychoudhury S, Koury K, Li P, Kalina WV, Cooper D, Frenck RW, Hammitt LL, Türeci Ö, Nell H, Schaefer A, Ünal S, Tresnan DB, Mather S, Dormitzer PR, Şahin U, Jansen KU, Gruber WC., C4591001 Clinical Trial Group. Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. N Engl J Med; 2020 Dec 31; 383(27): 2603-2615.
18. Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ, Tan KS, Wang DY, Yan Y. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak - an update on the status. Mil Med Res; 2020 Mar 13; 7(1): 11.
19. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. Acta Biomed, 2020 Mar 19; 91(1): 157-160.
20. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL); Jan 9 2023; Features, Evaluation, and Treatment of Coronavirus (COVID-19).
21. Kuhn JH, Li W, Choe H, Farzan M. Angiotensin-converting enzyme 2: a functional receptor for SARS coronavirus. Cell Mol Life Sci., 2004 Nov; 61(21): 2738-43.
22. Zheng YY, Ma YT, Zhang JY, Xie X. COVID-19 and the cardiovascular system. Nat Rev Cardiol, 2020 May; 17(5): 259-260.
23. Dong M, Zhang J, Ma X, Tan J, Chen L, Liu S, Xin Y, Zhuang L. ACE2, TMPRSS2 distribution and extrapulmonary organ injury in patients with COVID-19. Biomed Pharmacother, 2020 Nov; 131: 110678.
24. Sanyaolu A, Okorie C, Marinkovic A, Patidar R, Younis K, Desai P, Hosein Z, Padda I, Mangat J, Altaf M. Comorbidity and its Impact on Patients with COVID-19. SN Compr Clin Med., 2020; 2(8): 1069-1076.
25. Leung JM, Yang CX, Tam A, Shaipanich T, Hackett TL, Singhera GK, Dorscheid DR, Sin DD. ACE-2 expression in the small airway epithelia of smokers and COPD patients: implications for COVID-19. Eur Respir J., 2020 May; 55(5).

26. Padda I, Khehra N, Jaferi U, Parmar MS. The Neurological Complexities and Prognosis of COVID-19. SN Compr Clin Med; 2020; 2(11): 2025-2036.
27. Babapoor-Farrokhran S, Gill D, Walker J, Rasekhi RT, Bozorgnia B, Amanullah A. Myocardial injury and COVID-19: Possible mechanisms. Life Sci; 2020 Jul 15; 253: 117723.
28. Shi S, Qin M, Cai Y, Liu T, Shen B, Yang F, Cao S, Liu X, Xiang Y, Zhao Q, Huang H, Yang B, Huang C. Characteristics and clinical significance of myocardial injury in patients with severe coronavirus disease 2019. Eur Heart J., 2020 Jun 07; 41(22): 2070-2079.
29. Pei G, Zhang Z, Peng J, Liu L, Zhang C, Yu C, Ma Z, Huang Y, Liu W, Yao Y, Zeng R, Xu G. Renal Involvement and Early Prognosis in Patients with COVID-19 Pneumonia. J Am Soc Nephrol, 2020 Jun; 31(6): 1157-1165.
30. Raza A, Estepa A, Chan V, Jafar MS. Acute Renal Failure in Critically Ill COVID-19 Patients With a Focus on the Role of Renal Replacement Therapy: A Review of What We Know So Far. Cureus, 2020 Jun 03; 12(6): e8429.
31. Agarwal A, Chen A, Ravindran N, To C, Thuluvath PJ. Gastrointestinal and Liver Manifestations of COVID-19. J Clin Exp Hepatol, 2020 May-Jun; 10(3): 263-265.
32. Kopel J, Perisetti A, Gajendran M, Boregowda U, Goyal H. Clinical Insights into the Gastrointestinal Manifestations of COVID-19. Dig Dis Sci; 2020 Jul; 65(7): 1932-1939.
33. Tanne JH. Covid-19: FDA panel votes to approve Pfizer BioNTech vaccine. BMJ; 2020 Dec 11; 371: m4799.
34. Tanne JH. Covid-19: Pfizer-BioNTech vaccine is rolled out in US. BMJ; 2020 Dec 14; 371: m4836.
35. Thompson MG, Stenehjem E, Grannis S, Ball SW, Naleway AL, Ong TC, DeSilva MB, Natarajan K, Bozio CH, Lewis N, Dascomb K, Dixon BE, Birch RJ, Irving SA, Rao S, Kharbanda E, Han J, Reynolds S, Goddard K, Grisel N, Fadel WF, Levy ME, Ferdinands J, Fireman B, Arndorfer J, Valvi NR, Rowley EA, Patel P, Zerbo O, Griggs EP, Porter RM, Demarco M, Blanton L, Steffens A, Zhuang Y, Olson N, Barron M, Shifflett P, Schrag SJ, Verani JR, Fry A, Gaglani M, Azziz-Baumgartner E, Klein NP. Effectiveness of Covid-19 Vaccines in Ambulatory and Inpatient Care Settings. N Engl J Med; 2021 Oct 07; 385(15): 1355-1371.
36. Haas EJ, Angulo FJ, McLaughlin JM, Anis E, Singer SR, Khan F, Brooks N, Smaja M, Mircus G, Pan K, Southern J, Swerdlow DL, Jodar L, Levy Y, Alroy-Preis S. Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations, and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. Lancet, 2021 May 15; 397(10287): 1819-1829.
37. Ioannou GN, Locke ER, O'Hare AM, Bohnert ASB, Boyko EJ, Hynes DM, Berry K. COVID-19 Vaccination Effectiveness Against Infection or Death in a National U.S. Health Care System : A Target Trial Emulation Study. Ann Intern Med, 2022 Mar; 175(3): 352-361.
38. Kaur SP, Gupta V. COVID-19 Vaccine: A comprehensive status report. Virus Res; 2020 Oct 15; 288: 198114.
39. Ura T, Yamashita A, Mizuki N, Okuda K, Shimada M. New vaccine production platforms used in developing SARS-CoV-2 vaccine candidates. Vaccine, 2021 Jan 08; 39(2): 197-201.
40. Chien KR, Zangi L, Lui KO. Synthetic chemically modified mRNA (modRNA): toward a new technology platform for cardiovascular biology and medicine. Cold Spring Harb Perspect Med; 2014 Oct 09; 5(1): a014035.
41. Heaton PM. The Covid-19 Vaccine-Development Multiverse. N Engl J Med; 2020 Nov 12; 383(20): 1986-1988.
42. Mascellino MT, Di Timoteo F, De Angelis M, Oliva A. Overview of the Main Anti-SARS-CoV-2 Vaccines: Mechanism of Action, Efficacy and Safety. Infect Drug Resist, 2021; 14: 3459-3476.
43. Twentyman E, Wallace M, Roper LE, Anderson TC, Rubis AB, Fleming-Dutra KE, Hall E, Hsu J, Rosenblum HG, Godfrey M, Archer WR, Moulia DL, Daniel L, Brooks O, Talbot HK, Lee GM, Bell BP, Daley M, Meyer S, Oliver SE. Interim Recommendation of the Advisory Committee on Immunization Practices for Use of the Novavax COVID-19 Vaccine in Persons Aged ≥18 years - United States, July 2022. MMWR Morb Mortal Wkly Rep., 2022 Aug 05; 71(31): 988-992.
44. Goyal L, Zapata M, Ajmera K, Chaurasia P, Pandit R, Pandit T. A Hitchhiker's Guide to Worldwide COVID-19 Vaccinations: A Detailed Review of Monovalent and Bivalent Vaccine Schedules, COVID-19 Vaccine Side Effects, and Effectiveness Against Omicron and Delta Variants. Cureus, 2022 Oct; 14(10): e29837.
45. Choi KR. A Nursing Researcher's Experience in a COVID-19 Vaccine Trial. JAMA Intern Med., 2021 Feb 01; 181(2): 157-158.