Perception of Adults toward Covid-19 Vaccination

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Abstract

Background: Perception toward covid-19 vaccine among the adults appears to have a decisive role in the successful control of the pandemic. **Aim of the study:** Assess the perception of adults toward covid-19 vaccination. **Design:** A descriptive design was used to conduct this study. **Setting:** The study was conducted in outpatient clinics at Desouk public hospital in Kafr El Sheikh governorate. Total outpatient clinic in this hospital are 16 clinic included in the study except the pediatric clinic. **Sample**: A purposive sample composed of 425 adults, were selected according to age from 18-65 years, both gender, and with or without chronic or autoimmune disease. **Tools of data collection:** four tools were used to collect the data, **1ˢᵗ tool:** Structured Interviewing Questionnaire as Socio demographic characteristics of the adults, The knowledge of adults toward covid-19 disease and vaccination, and The Reported practices of the adult toward covid-19 vaccination. **2ⁿᵈ tool:** Observational Chick List of Adult toward Preventive measures of Covid-19 Disease. **3ʳᵈ tool:** Attitude of adults toward covid-19 vaccination. **4ᵗʰ tool:** physical examination assessment sheet. **Results:** more than three quarters had unsatisfactory knowledge, almost three quarters incorrect done reported practice, more than three quarters incorrect done observational check list, and more than half quarters had negative attitude toward covid-19 vaccination. **Conclusion:** There is highly statistically significant relation between the following knowledge and reported practice, observational check list, and attitude of the studied sample, reported practice and attitude, and observational check list and attitude of the studied sample. **Recommendations:** implement health education programs to increase adult awareness toward covid-19 vaccinations and preventive measures of covid-19 disease.

Key wards: Covid-19 Disease, Vaccination, Adults, and Perception.

Introduction

Coronavirus disease 2019 (COVID-19 disease) is an ailment caused by a novel coronavirus now known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly known as 2019-nCoV), which was initially detected in Wuhan City, Hubei Province, China, during an outbreak of respiratory sickness cases (**Li et al, 2020**).

The first week of January 2021, with more than 89 million COVID-19 cases confirmed and almost 2 million COVID-19 confirmed deaths worldwide , the start of the COVID-19 vaccination was a beacon of hope for normal life to return. The emergence of the pandemic led to the race to discover a vaccine to achieve herd immunity and curtail the damaging effects of COVID-19. Currently، the

efforts to develop a vaccine are paying off. Some vaccine candidates have shown worthy results and roll-outs have begun across nations (**Francis et al, 2022**).

There have also been massive efforts geared towards finding safe and effective vaccines. By July 2021 there were 184 COVID-19 vaccine candidates in pre-clinical development, 105 in clinical development, and 18 vaccines approved for emergency use by at least one regulatory authority(**Ndwandwe & Wiysonge, 2021**).

These vaccines include whole virus live attenuated or inactivated, protein-based, viral vector, and nucleic acid vaccines. By mid-2021 three billion doses of COVID-19 vaccine have been administered around the world, mostly in

high-income countries. COVID-19 vaccination provides hope for an end to the pandemic, if and only if there would be equal access and optimal uptake in all countries around the world **(Ndwandwe and Wiysonge, 2021).**

Vaccine process, influenced by a wide range of contextual, individual and group, and vaccine-specific factors, including communication and media, historical influences, religion/culture/gender/socioeconomic, politics, geographic barriers, experience with vaccination, risk perception, and design of the vaccination program **(Soares et al, 2021).**

Understanding the perception of the adults and their willingness to be vaccinated are crucial for improving vaccination rates. In this context, a recent study revealed that college and above educational level, access to mass media, and urban residency were significantly associated with awareness about COVID-19 vaccines. Furthermore, the WHO strongly encourages governments to provide accurate and reliable knowledge about COVID-19 vaccination. To undertake most effective vaccination strategy, we need to know the adult people's attitudes, knowledge, and practices regarding COVID-19 vaccines **(Abrams & Greenhawt, 2020).**

The community health nurses play a great role in delivering vaccinations and advocating for immunization programs is pivotal to the ongoing health of all population from birth to old age , and they are participation in all areas of vaccines, especially in providing vaccine information, is critical to raising immunization rates and lowering predicted vaccine reluctance , Furthermore the nurses were actively providing information and support for the development of educational resources and tools related to the importance of vaccination COVID-19: infection prevention and control**(Hoekstra & Margolis, 2016)** .

Significant of study

Covid-19 is a deadly disease which continues to affect many countries in the world ,

COVID-19 pandemic is far from over, and vaccines remain our most important tool for helping every country overcome it and get on the path to recovery**,** so this disease has become serious public health concern worldwide **(Trotsenburg, 2022).**

this pandemic affected on 223 countries, with more than 104.37 million confirmed cases and 22.71 million deaths recorded globally **,** and In Egypt , from 3 January 2020 to 19 May 2021, there have been 248,078 confirmed cases of covid-19 with 14,441 deaths reported to WHO and in 11 May 2021 , a total of 1,371,976 vaccines doses have been administered**.** Therefore, when improving and developing the body's immunity through vaccination by increasing people's perception of the importance and necessity of vaccination, this will lead to a lower risk of disease and its consequences on all economic, social and other aspects**(WHO, 2021)**.

Aim of this study

This study aiming to assess perception of adults toward covid-19 vaccination through:

1-Assessing knowledge of adults regarding covid-19 vaccination.
2- Assessing attitude of adults regarding covid-19 vaccination.
3- Assessing practices of adults regarding covid-19 vaccination.

Research question:
1-What is the knowledge of adults regarding covid-19 vaccination?
2-What is the practices of adults regarding covid-19 vaccination?
3- Is there relation between knowledge and attitudes regarding covid-19 vaccinations?
4- Is there relation between knowledge and practice regarding covid-19 vaccinations ?
5- Is there relation between practice and attitude regarding covid-19 vaccination ?

Subject and method:
The study portrayed under the four main designs as the following:

I. Technical design
II. Operational design
III. Administrative design
IV. Statistical design

I. Technical Design:

Technical design for this study included description of research design, setting, subjects, and tools of data collection.

Research Design:

A descriptive design was used to conduct this study. Descriptive research is a type of quantitative research which an appropriate choice when the research aim is to identify characteristics, trends, and categories**(Scribbr,2020)**

Study Setting:

The study was conducted in outpatient clinics at Desouk public hospital in Kafr El Sheikh governorate.

Sample type:

A purposive sample composed of 425 adults client, were selected according to the following **inclusive criteria:** age from 18-65 years, both gender, and with or without chronic or autoimmune disease. **Exclusion criteria:** health care providers and the people who have been vaccinated with covid-19 vaccine.

Sample size:

The estimated sample size is 425 adults client out from 18122 individual who attend the mentioned setting monthly.

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

Which:
n= sample size
N= total size
Z= 1.96
d= error level 5%
p= 0.5.

Tools for data collection:

The data for this study were collected through the following four tools:

1st tool: Structured Interviewing Questionnaire designed by the investigator and written in simple Arabic language to gather data which concern the aim of study and consists of the following three parts:

Part 1: Socio demographic characteristics of the adults, it includes: (age, sex, marital status, education level, type of work, family income, and Place Residence**).** It included 7 closed ended questions from Q1 to Q7.

Part 2: The knowledge of adults toward covid-19 disease and vaccination**(Islam, et al, 2021)** , as the following:

A- Knowledge toward Covid-19 Disease: As (definition of disease, signs and symptoms, incubation period, modes of transmission, diagnostic measures, high risk people, and complications). it included 7 closed ended questions from Q8 to Q14.

❖ **Scoring system of covid-19 disease:**
It consisted of 7 questions, this questions consists of 3 scale score ranged from complete correct answer= 2, incomplete correct answer= 1, and incorrect answer= zero. Full score of all questions= 14 grade.

B- Knowledge about Covid-19 Vaccinations: As (definition of vaccine, types, doses, Methods of administering, benefits, people should receive vaccine, immunity acquired, appropriate time to receive the vaccine for infected people, appropriate time to receive the covid-19 vaccine for people vaccinated with other vaccines, side effects, vaccine complications, necessary to take the same type of covid-19 vaccine every time, vaccine produce antibodies, and source of information). it included 13 closed ended questions Q15 to Q27.

❖ **Scoring system of covid-19 vaccination:**

It consisted of 13 questions, this questions consists of 3 scale score ranged from complete correct answer= 2, incomplete correct

answer= 1, and incorrect answer= zero. Full score of all questions= 26 grade.

❖ **Scoring system of knowledge:**

It consisted of 20 questions, this questions consists of 3 scale score ranged from complete correct answer= 2, incomplete correct answer= 1, and incorrect answer= zero. Full score of all questions= 40 points. these scores were summed up and converted into a percent score ≥ 50% (from ≥20: 40) grade considered satisfactory, and < 50% (from 0: < 20 grade) considered unsatisfactory.

Part 3: The Reported practice of the adult toward covid-19 vaccination **(ETI, 2020)**, as the following:

A- Reported Practices toward Preventive Measures of Covid-19 Disease: As (methods of hand washing, methods of greeting, methods of sneezing or coughing, wearing and takeoff mask, cleaning, disinfection and Sharing personal equipment, personal protective equipment, and social isolation and medical care). it included 6 closed ended questions from Q29 to Q34.

❖ **Scoring system of preventive measures of covid-19 disease:**

It consisted of 6 questions, this questions consists of 2 scale score ranged from correct answer= 1, incorrect answer= zero. Full score of all questions= 6 grade.

B- Reported Practices before Taking Covid-19 Vaccination: As (register, action when high temperature occurs, using analgesics, Drinking enough fluids, Eating a balanced, rest and sleep, exercising). it included 7 closed ended questions from Q35 to Q41.

❖ **Scoring system Practices before taking covid-19 vaccination :**

It consisted of 7 questions, this questions consists of 2 scale score ranged from correct

answer= 1, incorrect answer= zero. Full score of all questions= 7 grade.

Total Scoring System of Reported practice :

It consisted of 13 questions, this questions consists of 2 scale score ranged from correct answer= 1, incorrect answer= zero. Full score of all questions= 13 grade. these scores were summed up and converted into a percent score ≥ 50% (from 7: 13) grade considered satisfactory, and < 50% (from 0:6) grade considered unsatisfactory.

2nd tool : Observational Chick List of Adult toward Preventive measures of Covid-19 Disease. It was developed by the investigator, written in simple Arabic language after reviewing the related literature. It consisted of the following:

A- Observational Chick List Toward Hand-Washing Practice **Bender, (2020)**: It included 10 items from 1 to 10 items.

B- Observational Chick List toward Wearing and Take-off Mask **WHO, (2019)** : It included 8 items from 11 to 18 items.

C-Observational Chick List Toward Cough etiquette **Chavis and Ganesh, (2020)** : it included 3 items from 19 to 21 items.

❖ **Scoring system** :

It consisted of 21 items. Each adults response was scored as done= 1, and not done= zero for all practice items. Full score of all items= 21 grade. total score of practice were categorized following 60% and more from (12:21) grade considered correct done, and less than 60% from(0: < 12) grade considered incorrect done.

3rd tool : It concerned with the attitude of adults toward covid-19 vaccination **Kumari, et al, (2021)**, As (ready to take the vaccine, protect from disease without taking a vaccine, vaccination should be given free of charge, take a vaccine, even if I have to pay to get it, acquire immunity from infection better than

vaccination, recommend my family and friends to get vaccine, asocial distance lead negatively effect on infected cases, protection from disease by strong immunity only, traditional remedies protect from disease, sufficient data on safety and efficacy of vaccines, no harm from the vaccine, doctor recommended to take vaccine, Benefits of vaccine outweigh the potential risks, vaccination is a social responsibility, a lot of people are getting vaccine, taken vaccine following the example of community leaders, vaccine is not available, vaccine may cause serious side effects, vaccine may cause serious complications years after taking it, vaccine may be defective or counterfeit, vaccine was developed and approved quickly, and vaccine is promoted for commercial) . it included 22 closed ended questions from Q1 to Q22.

❖ **Scoring system** :

The likert scale consists of 22 questions including 3 scale ranged from agree = 2, not sure = 1, and disagree = zero . total score of 60% and above from(22: 44) grade considered positive attitude, and less than 60% from (0: < 22) grade considered negative attitude.

4ᵗʰ tool: It was concerned with physical examination assessment sheet **Kumar, et al, (2019)**, it consisted of the following :

A-Past Medical History As suffered today or during the past ten days from (fever, cough, shortness of breath, body aches, diarrhea, nausea, sore throat, runny nose), infected during the past three months, chronic diseases, For women **-** Is there a pregnancy at the present time or planning in the future, and breastfeed a child less than 6 months. It consisted of 5 question from Q1 to Q5.

B- Family's past medical history as family member contracted covid-19 disease, death in the family as complications from disease, and hospitalized or underwent surgery. It consisted from 4 questions from Q6 to Q9.

C- The medications taking as immunosuppressive drugs, other medical drugs,

and received any vaccinations within 14 days. It consisted from 3 questions from Q10 to Q12.

D- Physical Examination As general condition, body position, Skeleton and limbs, Skin color, joints condition, neck veins, thyroid gland , eyes, and breathing. It consisted of 9 question from Q13 to 21.

Content validity :

To achieve the criteria of trustworthiness of the tool of data collection in this study. It was tested and evaluated for face and content validity by a jury group consisting of the five expertise in community nursing department of faculty of nursing , Ain-shams University for comprehensiveness, ascertain relevance, clarity and completeness of the tools the experts elicited responses that either agree or disagree regarding the face and content validity.

Reliability Statistics

Items	Cronbach Alpha	N. of Items
knowledge of Adults toward Covid-19 Vaccinations	0.821	20
Reported Practices of Adults towards Covid-19 Vaccination.	0.796	13
Observational Chick List of Adults toward Preventive Measures of Covid-19 Disease.	0.818	21
The Attitude of Adults toward Covid-19 Vaccination	0.869	22
Physical Examination of the Studied Sample.	0.805	21

Operational design:

The operational design included preparatory phase, validity, reliability, ethical consideration, pilot study, and field work.

Preparatory phase:

It included reviewing of past , current , national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines were done to develop tools of data collection.

III. Administrated design:

Permission for conducting the study was submitted from faculty of nursing Ain Shams university, under secretary of ministry of health , general director of outpatient clinics , and director of Desouk public hospital in Kafr El-Sheikh governorate, this letter included the aim of the study and the study tool to get permission and help for data collection.

Ethical consideration:

The research approval was obtained from the faculty ethical committee affiliated to Ain shams University to carry out this the study . written or oral consent were used to obtain agreement of the adults to participate in the study, after explaining the aim of the study. privacy and confidentiality were assured . ethics , values, culture, and beliefs respected . In addition , participations were ensured that they have the right to withdrawal from the study at any time without given any reasons.

pilot study:

A pilot study was carried out on 10% (42) of adult's client at outpatient clinics in desouk public hospital in Kafr El Sheikh governorate, to test clearly of the included questions and statement, feasibility, applicability, and practicability of the tools and the time needed to filling the tools. these were in the form of reviewing some items to increase their clarity, the tool was then finalized. the time needed to fill out the tool was about 15:20 minutes. the pilot study was included in study sample. **Field work :**

-Approvals was obtained from the research and ethical committee at faculty of nursing Ain-shams University, also an official permission was sent to directorate of Desouq public hospital to conduct the study.

- The actual field work of the study was carried out by investigator was completed the tool by interview the adults during 3 days' week to complete tools of data collection.

-The investigator was visited outpatient clinics on (Sunday, Monday, and Thursday) of each week during the morning from the (8AM to 1PM) by rotation, and was take time for each client of15 to 20 minutes for one questionnaire.

-It took about 3 months from the beginning of January 2022 to March 21/3/2022 at outpatient clinics of Desouq public hospital.

-The investigator introduced herself firstly to each adult, and explained the purpose of the study was done before each interview.

-Each adult is interviewed individually after the oral approval for participant in the study according ethical issues.

-The investigator role in completing the questionnaire was to facilitate the understanding of any confusing or difficult question for the adult.

IV. Statistical design:

Data collected from the studied sample was revised, coded and entered using the computer. Data entry and statistical analysis were achieved using statistical package for social sciences (SPSS) version 20, data was presented using qualitative statistics in the form of frequencies, percentages, means, standard deviation, chi-square test, and r test.

The confidence interval was set to 95% and the margin of error accepted was set to 5%.

Level of significance was accepted at P-value:

- P-value > 0.05 was considered not significant.
- P-value ≤ 0.05 was considered significant.
- P-value < 0.01 was considered highly significant

Results:

Table (1): shows that, 50.4% of the studied sample their age is 30-<40 years, the Mean SD of age is 38.05±10.90 years. As regard gender and marital status, 69.4% and 72% of the studied sample were male and married, respectively. Also, 56.5% of them were intermediate education. Moreover, 36.0%

of them were working at private sector. Furthermore, 48.5% of the studied sample were insufficient income. Likewise, 55.3% of them residing at rural areas.

Figure (1): shows that, 75.1% of the studied sample were unsatisfactory level of total knowledge about covid-19 vaccinations. While, 24.9% of them were satisfactory level.

Figure (2): shows that, 74.1% of the studied sample were incorrect done reported practice toward covid-19 vaccination. While, 25.9% of them were correct done reported practice.

Figure (3) : shows that, 76.9% of the studied sample were incorrect practices toward the covid-19 vaccination. While, 23.1% of them were correct practices.

Figure (4) : displays that, 57.6% of the studied sample were negative attitude toward the covid-19 vaccination. While, 42.4% of them were positive attitude.

According to Research question (n=4): Is there Relation between Knowledge and Total reported practices regarding Covid-19 Vaccination?

Table (2): shows that, there is highly statistically significant relation between total knowledge of the studied sample and their total reported practices toward covid-19 vaccination at ($P < 0.001$).

According to Research question (n=4): Is there Relation between Knowledge and Total practices (Observational Check List) Regarding Covid-19 Vaccination?

Table (3): shows that, there is highly statistically significant relation between total knowledge of the studied sample and their total practices (Observational Check List) toward covid-19 vaccination at ($P < 0.001$).

According to Research question (n=3): Is there Relation between Knowledge and Attitude Regarding Covid-19 Vaccination?

Table (4): displays that, there is highly statistically significant relation between total knowledge of the studied sample and their total attitude toward covid-19 vaccination at ($P < 0.001$).

According to Research question (n=5): Is there Relation Between reported practices and Attitude Regarding Covid-19 Vaccination?

Table (5): shows that, there is highly statistically significant relation between total reported practices of the studied sample and their total attitude toward covid-19 vaccination at ($P < 0.001$).

According to Research question (n=5): Is there Relation between Total practices (Observational Check List) and Attitude Regarding Covid-19 Vaccination?

Table (6): shows that, there is highly statistically significant relation between total practices of the studied sample and their total attitude toward covid-19 vaccination at ($P < 0.001$).

Table (1): Frequency Distribution of the Studied Sample According to their Socio-Demographic Characteristics **(n =425).**

Items		N	%
Age (years)			
< 20		25	5.9
20-<30		55	12.9
30-<40		**214**	**50.4**
40-<50		66	15.5
50-<60		36	8.5
≥ 60		29	6.8
Mean±SD	38.05±10.90		
Gender			
Male		**295**	**69.4**
Female		130	30.6
Marital status			
Single		74	17.4
Married		**306**	**72**
Widowed		25	5.9
Divorced		20	4.7
Educational level			
Illiterate		32	7.5
Read and write		35	8.2
Intermediate education		**240**	**56.5**
University degree		99	23.3
Post-University Education		19	4.5
Type of work			
Government employee		100	23.5
Private sector		**153**	**36.0**
Professional work		42	9.9
Housewife		110	25.9
Pension		20	4.7
Family income			
Enough		95	22.4
To some extent		124	29.2
Not enough		206	48.5
Residence			
Urban		190	44.7
Rural		235	55.3
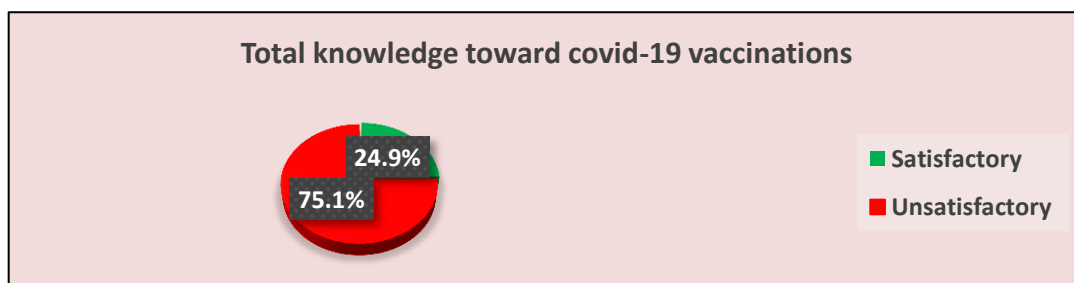
Figure (1): Percentage Distribution of the Studied Sample According to their Total Knowledge score toward Covid-19 Vaccinations **(n = 425).**
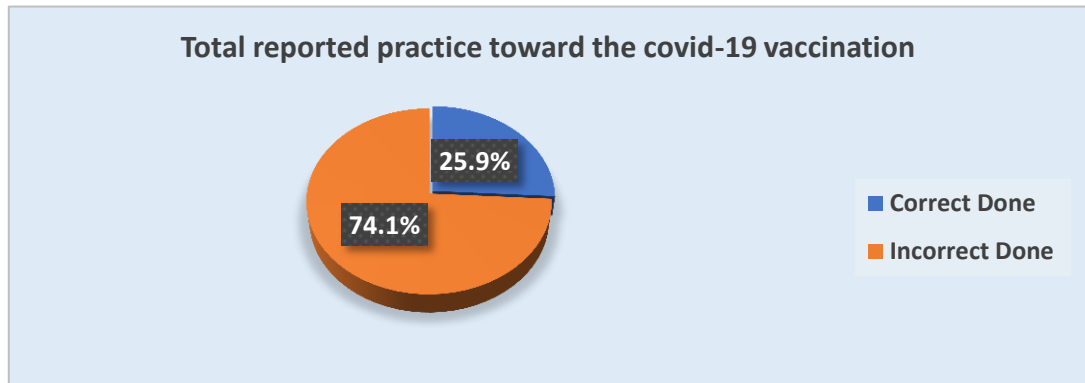
Figure (2): Percentage Distribution of the Studied Sample According to their Total Practice (Preventive Measures and Practices Before Taking Vaccine) toward Covid-19 **(n = 425).**
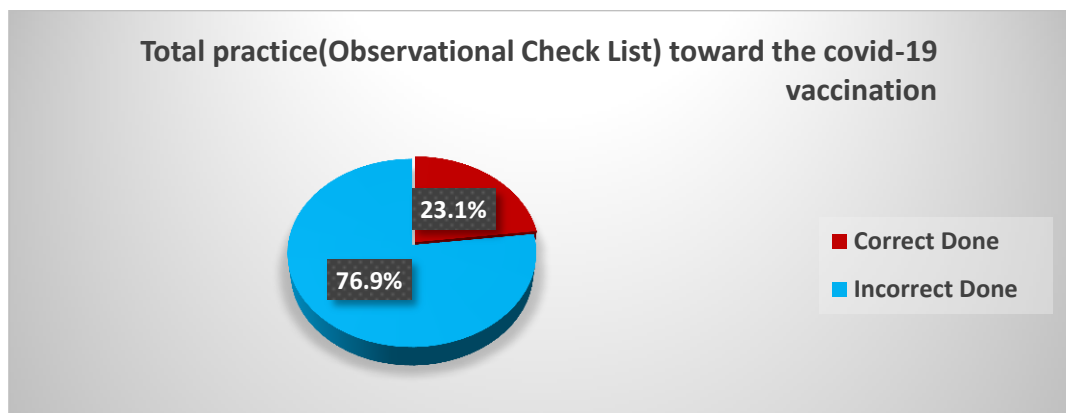

Figure (3): Percentage Distribution of the Studied Sample According to their Total Practices (Observational Check List) toward Covid-19 Vaccination **(n = 425).**
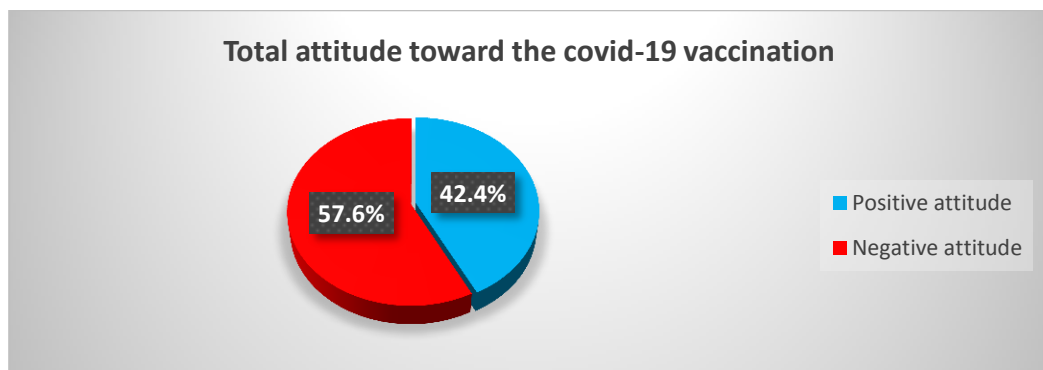

Figure (4): Percentage Distribution of the Studied Sample According to their Total Attitude toward Covid-19 Vaccination **(n = 425).**

Table (2): Statistical Relation Between Total Knowledge Score Level of the Studied Sample and their Total Reported Practices toward Covid-19 Vaccination **(n=425).**

Total Reported Practices	Total Knowledge				X^2	P-Value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Correct Done	100	94.3	10	3.1	31.00	0.000**
Incorrect Done	6	5.7	309	96.9		

**Highly statistically significant at p ‹ 0.001.

Table (3): Statistical Relation Between Total Knowledge Score Level of the Studied Sample and their Total Practices (Observational Check List) toward Covid-19 Vaccination **(n=425).**

Total Practices (Observational Check List)	Total Knowledge				X^2	P-Value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Correct Done	90	84.9	8	2.5	25.96	0.000**
Incorrect Done	16	15.1	311	97.5		

**Highly statistically significant at p ‹ 0.001.

Table (4): Statistical Relation between Total Knowledge Score Level of the Studied Sample and their Total Attitude toward Covid-19 Vaccination **(n=425).**

Total Attitude	Total Knowledge				X^2	P-Value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Positive	106	100.0	74	23.2	62.97	0.000**
Negative	0	0.0	245	76.8		

**Highly statistically significant at p ‹ 0.001.

Table (5): Statistical Relation Between Total Reported Practices Score Level of the Studied Sample and their Total Attitude toward Covid-19 Vaccination **(n=425).**

Total Attitude	Total Reported Practices				X^2	P-Value
	Correct done		Incorrect done			
	No.	%	No.	%		
Positive	110	100.0	70	22.2	56.70	0.000**
Negative	0	0.0	245	77.8		

**Highly statistically significant at p ‹ 0.001.

Table (6): Statistical Relation Between Total Practices (Observational Check List) Score Level of the Studied Sample and their Total Attitude toward Covid-19 Vaccination **(n=425).**

Total Attitude	Total Practices (Observational Check List)				X^2	P-Value
	Correct Done		Incorrect Done			
	No.	%	No.	%		
Positive	98	100.0	82	25.1	50.40	0.000**
Negative	0	0.0	245	74.9		

**Highly statistically significant at p ‹ 0.001.

Discussion

Coronavirus Disease 2019 (COVID-19) is an ongoing global pandemic that was declared a global pandemic by the World Health Organization on the 12 March 2020. It is expected that COVID-19 pandemic will continue to impose several burdens of morbidity and mortality, impacting societies and economies worldwide **WHO, 2021 b**. Notably, with the high transmission rates, new variants of SARS-CoV-2 have emerged causing a new

challenge in controlling this ongoing pandemic **Tregoning et al., 2021.**

Regarding socio-demographic characteristics of the studied sample, the current study revealed that, about half of the studied sample their age was 30-<40 years, with the mean SD of age was 38.05±10.90 years **Table (1).** This result was similar to a study in Malaysia conducted by **Mohamed et al, 2021**, entitled "Knowledge, acceptance and perception on COVID-19 vaccine among Malaysians" and reported that the mean age of the studied sample was 37.07 years. On the other hand, a study carried out by **Alamer et al, 2021** in Saudi Arabia to assess "Knowledge, attitudes and perception toward COVID-19 vaccines among adults in Jazan Province, Saudi Arabia" and found that the mean age for the study participants was 23 years old. This discrepancy may be related to the difference between both study samples.

Concerning gender of the study sample, the present study displayed that more than two thirds of the studied sample were male **Table (1)**. This finding was in the same context of **Mahmud et al, 2021** who conducted a study in Bangladesh about "Knowledge, beliefs, attitudes and perceived risk about COVID-19 vaccine and determinants of COVID-19 vaccine acceptance in Bangladesh" and mentioned that nearly two thirds(62.15%) of the studied sample were male.

Regarding the educational level of the studied sample**,** the current study represented that more than half of them had intermediate education **Table (1)**. This finding was supported by **Raciborski et al, 2021** who conducted a study in Poland about "Changes in attitudes towards the COVID-19 vaccine and the willingness to get vaccinated among adults in Poland" and found that, the more than half of the studied participants (55%) had intermediate education.

Regarding type of work, the present study finding showed that more than one third of them were working at private sector **Table (1)**. In contrast, **Alzahrani et al, 2021**who

carried out a study in Saudi Arabia, entitled "Attitudes toward the SARS-CoV-2 vaccine: results from the Saudi Residents' Intention to Get Vaccinated against COVID-19 (SRIGVAC) study" and found that less than one fifth of the studied sample (17.4%) employed Private/self-employed. This difference may be related to socioeconomic differences between both study samples.

Furthermore, the current study sample declared that almost half of the studied sample had insufficient income **Table (1)**. This result was in the same line with **Bari et al, 2021**who conducted a study in Bangladeshi to assess "Knowledge, perception, and willingness towards immunization among Bangladeshi population during COVID-19 vaccine rolling period" and reported that nearly half of the studied respondents (47.6%) had insufficient monthly family income.

According to the studied samples' total knowledge score toward Covid-19 vaccinations, the present study displayed that about three quarters of them had unsatisfactory level of total knowledge about covid-19 vaccinations, while slightly. less than one quarter of them had satisfactory level **Figure (1)**. This result was in harmony with a study carried out by **Bhartiya et al, 2021** in West India to assess "Knowledge, attitude and practice towards COVID-19 vaccination acceptance in West India" and stated that the largest proportion of the studied sample (64.5%) had poor level of total knowledge about covid-19 vaccinations. On the other hand, a study conducted by **Abebe et al, 2021** in Ethiopia about "knowledge, attitude, acceptance, and determinates of COVID-19 vaccine acceptance among adult population in Ethiopia" and reported that the level of good knowledge towards the COVID-19 vaccine is found to be almost three quarters (74%) in this study. And so, a study conducted by **Islam et al, 2021** who mentioned that the largest proportion of the studied participants (62.1%) had good knowledge about COVID-19 vaccine. From the research investigator point of view, the disparity in the methodology used and research setting, socio-demographic features of

the participants in the study and the availability and accessibility of health service infrastructures may be the possible reason.

According to the studied sample' total reported practice (preventive measures and practices before taking vaccine) toward Covid-19 vaccination, the present study portrayed that almost three quarters of them had incorrect done reported total practice toward covid-19 vaccination. While, slightly more than one quarter of them had correct done reported total practice. This may be due to inadequate knowledge regarding vaccination, low education background and poor socioeconomic status **Figure (2)**. These results were congruent with **Juin et al, 2022** who carried out a study in Singapore to assess "Knowledge, Attitudes, and Practices of COVID-19 Vaccination among Adults in Singapore" and found that nearly three quarters of the studied sample (73.3%) had in adequate level of total practice Covid-19 vaccination. In contrast, a study in Ontario, conducted by **Syan et al, 2021,** entitled "COVID-19 Vaccine Perceptions and Differences by Sex, Age, and Education in 1,367 Community Adults in Ontario" and mentioned that most of participants (82.8%) had good level of practice regarding COVID-19 Vaccination. The discrepancy in the practice level could be attributed to the fact that both studies were conducted at different times, different samples and settings.

Concerning the studied sample' total practices (observational check list) toward covid-19 vaccination, the present study revealed that more than three quarters of them had incorrect practices toward the covid-19 vaccination, while less than one quarter of them had correct practices **Figure (3)**. Similarly, a study carried out by **Asmelash et al, 2020** who carried out a study in Ethiopia about "Knowledge, attitudes and practices toward prevention and early detection of COVID-19 and associated factors among religious clerics and traditional healers in Gondar Town, Northwest Ethiopia" and clarified that most of the studied participants (84.4%) had poor practices toward COVID-19. In contrast, a

study conducted by **Ngwewondo et al, 2020** who conducted a study in Cameroon entitled "Knowledge, attitudes, practices of/towards COVID 19 preventive measures and symptoms: A cross-sectional study during the exponential rise of the outbreak in Cameroon" and reported that the largest proportion (60.8%) of the studied sample had good practice towards COVID-19. This discrepancy may be related to the difference between both study subjects as regards their demographic characteristics, level of knowledge and socioeconomic status.

According to the studied sample' total attitude toward covid-19 vaccination, the present study indicated that more than half of them had negative attitude toward the covid-19 vaccination, while less than half of them had positive attitude **Figure (4)**. This result was in agreement with **Alobuia et al, 2020** who conducted a study in USA entitled "Racial disparities in knowledge, attitudes and practices related to COVID-19 in the USA" who mentioned that more than half of the studied subjects (52%) had negative attitude. In contrast, a study carried out by **Danabal et al, 2021** in India entitled "Attitude towards COVID 19 vaccines and vaccine hesitancy in urban and rural communities in Tamil Nadu, India–a community based survey" and reported that more than (55%) of the respondents had positive attitudes towards the COVID 19 vaccines. Also, a study in Egypt conducted by **Abdelhafiz et al, 2020** to assess "Knowledge, perceptions, and attitude of Egyptians towards the novel coronavirus disease (COVID-19)" and mentioned that nearly three quarters of participants (73.0%) had positive attitude towards COVID-19 protective measures. From the research investigator point of view, negative attitude towards COVID 19 may be due to false information about the vaccine, lack of sufficient credible information, lack of trust in the health system, and lack of trust in the vaccine's safety and effectiveness.

Concerning Relation between Total Knowledge of the Studied Sample and their Total Reported Practices toward Covid-19 Vaccination, the current study indicated that

there was highly statistically significant relation between total knowledge of the studied sample and their total reported practices toward covid-19 vaccination **Table (2)**. This result was consistent with **Lin et al, 2022,** who conducted a study in China entitled "Relationship between knowledge, attitudes, and practices and COVID-19 vaccine hesitancy: A cross-sectional study in Taizhou, China" was relation between knowledge and practices of the studied sample regarding Covid-19 Vaccination. Also, a study conducted by **Ali et al, 2020** in Egypt about "Public Knowledge, Attitudes, and Practices towards COVID-19 Pandemic among Egyptian Citizens: A Descriptive Study" and reported that there was highly significant relation between knowledge of the studied sample toward Covid-19 and their practices. This can be explained as the level of practice regarding Covid-19 Vaccination depends on individuals' level of knowledge.

According to Relation between Total Knowledge of the Studied Sample and their Total Practices (Observational Check List) toward Covid-19 Vaccination**,** the current findings clarified that there was highly statistically significant relation between total knowledge of the studied sample and their total practices (Observational Check List) toward covid-19 vaccination **Table (3)**. This finding matched with a study conducted by **Al-Qerem et al, 2022** in Iraq to assess "Knowledge, Attitudes, and Practices of Adult Iraqi Population towards COVID-19 Booster Dose: A Cross-Sectional Study" and found that there was relation between knowledge and practices of the studied participants regarding Covid-19 Vaccination. Also, a study carried out by **Afzal et al, 2021** and reported that the knowledge toward Covid-19 of the studied participants was positively correlated with practices.

Regarding Relation between Total Knowledge of the Studied Sample and their Total Attitude toward Covid-19 Vaccination, the present study illustrated that there was there is highly statistically significant relation between total knowledge of the studied sample and their total attitude toward covid-19

vaccination **Table (4)**. This result was supported by **Mannan & Farhana, 2020** who carried out a study in Australia about "Knowledge, attitude and acceptance of a COVID-19 vaccine: A global cross-sectional study" and mentioned that there was a significant relation between respondents' level of knowledge and their attitude toward covid-19 vaccination. This can be interpreted as knowledgeable individuals are more likely to have positive attitude towards covid-19 vaccination.

Concerning Relation between Total Reported Practices of the Studied Sample and their Total Attitude toward Covid-19 Vaccination, the current study illustrated that there was highly statistically significant relation between total reported practices of the studied sample and their total attitude toward covid-19 vaccination **Table (5)**. This result was congruent with **Bhartiya et al, 2021** who reported that there was relation between practices of the studied participants and their attitude toward covid-19 vaccination. This can be explained as adult individuals who have positive attitude towards Covid-19 are significantly associated to have high practice scores.

As regard Relation between Total Practices (Observational Check List) of the Studied Sample and their Total Attitude toward Covid-19 Vaccination, the present study illustrated that there was highly statistically significant relation between total practices of the studied sample and their total attitude toward covid-19 vaccination **Table (6)**. This result agreed with **Rahman et al, 2020** who carried out a study in Bangladeshi about "Assessment of knowledge, attitudes and practices towards prevention of coronavirus disease (COVID-19) among Bangladeshi population" and found that practices of the studied sample are significantly associated with their attitude toward covid-19 vaccination.

Conclusion

More than half of the adults was in the age group 30<40 years with Mean SD of age is

38.05±10.90 years. More than three quarters of adults had unsatisfactory knowledge toward covid-19 vaccinations, almost three quarters of the adults had incorrect done of reported practice toward the covid-19 vaccination, more than three quarters of the adults had incorrect observational check list toward covid-19 vaccination, and more than half quarters had negative attitude toward covid-19 vaccination. Moreover, there is a significant relation between covid-19 vaccinations knowledge of the adults and their age, education, and place of residence. There is highly statistically significant relation between knowledge, reported practice, observational check list, and attitude of the studied sample and their socio-demographic characteristics as education level and family income. There is highly significant positive correlation between total knowledge, total reported practice, total practice (observational check list) and total attitude toward covid-19 vaccination among studied sample.

Recommendations

Based on the results of the present study and research questions the following recommendations are suggested:

1- Conduct health education programs to develop the adult awareness toward covid-19 vaccinations and preventive measures.
2- Increase community awareness toward covid-19 vaccination through mass media.
3- Activating the role of the health care provider in the health care centers in rural area to increase public awareness toward covid-19 disease and vaccination.

Future research conducting about

Comparative study to assess perception of adults toward covid-19 vaccination in urban and rural area.

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