

Preventive Behaviors Following COVID-19 Vaccine among a Sample of Egyptians: A Cross-Sectional Study

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Abstract

Preventive behaviors against COVID-19 infection remained the significant way to prevent the disease spread. With the increase of vaccination coverage, it is expected to detect reluctance in the preventive behaviors. This may lead to another pandemic; which created the need to study such changes and explore the underlying factors. The aim of this study was to assess the adherence to preventive behaviors after the vaccination era.

Methods: This is a cross-section analytical study, using an online questionnaire including socio-demographic questions and COVID-19 preventative behaviors questions.

Results: Among the 509 participants with mean age of 33 ± 12 years, 81.7% were females, 67% were university graduates and 90% were living in urban residence. Following preventative behaviors wasn't affected by the socio-demographic background of the participants where there was **no** statistically significant difference shown. However it was affected significantly with the risk perception towards COVID-19 as it was significantly higher in fear control group than danger control group.

Conclusion: In conclusion, the present research flourishes our understanding of the connections between fear of COVID-19 and preventive health behaviors. Our results revealed that the fear of COVID-19 could serve as a protective function by elevating preventive health behaviors as they were significantly higher in fear control group than danger control group but following preventative behaviors wasn't affected by the socio-demographic background of the participants.

Key words: COVID-19, precautionary measures, COVID-19 vaccine, Egypt.

Introduction

Coronavirus is responsible for the highly transmissible COVID 19 disease, which is a highly contagious severe infection named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Efforts were exerted to limit the spread of the disease. Measures were directed to preventive behaviors including face masks, social distancing and contact tracing as transmission, infection, prevention and treatment aspects remained unclear [Wiersinga et al., 2020].

However, antiviral drugs and emergency use of COVID 19 vaccines had been approved; yet the significant way to prevent COVID 19 spread remained the preventive behaviors [CDC, 2020a]. As

stated by the CDC, adherence to washing hands, using hand sanitizer, wearing a face mask, and social distancing, should continue even if the person was fully vaccinated [CDC, 2021].

Programs of vaccination could impact lifestyle of vaccinated individuals, attitude, and behaviors due to protection they received. Vaccinated persons may begin to contact more people and be exposed to situations where non-vaccinated persons are more likely to get infected [Wilde 1982-Hedlund, 2000]. Persons who have been vaccinated could harbor the virus in their bodies without any symptoms, which can then spread the infection to other people, which may cause another wave of the pandemic [Burmpus, 2021]. Despite being vaccinated, everyone should follow precautionary measures, not just for himself, but for the individuals around [Loomba et al., 2021]. The fear that the immunized people could be super-spreaders indeed, awakens our attention. Therefore, the effect of COVID-19 vaccination on immunized people must be studied [Hossain et al., 2022].

Several studies investigated COVID-19 vaccine-taking hesitancy [Burmpus, 2021-Hossain et al., 2022- Daria and Islam 2021-Hossain et al., 2021]. But, for our knowledge; no study explored the attitude, and behavior changes of vaccinated persons in Egypt. This study not just determines the changes in behavior in vaccinated people but also tries to explore the factors behind the changes.

Aim of the study:

The aim of this study was to assess the adherence to preventive behaviors after the vaccination era of COVID 19.

Specific objectives:

1. Determine COVID-19 related preventative behaviors among Egyptians after the vaccination era, according to their socio-demographic characteristics.
2. Assess the preventative behaviors among groups of different risk perception (danger and fear control group).

Volunteers and Methods

Study design: observational cross-sectional analytical study.

Sample type: convenient sample (easy access)

Sample size and Sampling technique: In a view of a study done in Iran [Jahangiry et al., 2020] which estimated that 56.4% of participants were engaged in danger control -preventive behavior) while the remaining 43.6% were engaged in fear control (non-preventive behavior) process, the sample size was calculated using www.openepi.com, with 95% confidence interval, and assuming the non-response rate is 35%. The minimum sample size was 500.

The inclusion criteria of participants were adult Egyptians ≥ 18 years old and willing to participate.

Data collection tool

A pre-tested 2- pages (screen) e- questionnaire was used to collect data from the study participants. It included three sections:

Socio-demographic characteristics: age in years, sex, education, occupation, residence, chronic diseases, history of COVID-19 infection, and COVID-19 vaccination status.

COVID-19 risk perception based on the extended parallel process model (EPPM) [Jahangiry et al., 2020]: 21 validated questions, 13 Efficacy questions (perceived self-efficacy and perceived response efficacy), and 8 Perceived threats questions (susceptibility and severity). All the 21 questions were rated on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) for each item

COVID-19 preventative behaviors: 16 questions measuring the adherence to COVID-19 preventative behaviors collected from Alfawaz et al., (2021) & CDC, (2021) including questions like mask wearing, social distancing, avoiding crowds, avoiding poorly ventilated places, hand washing etc. The questions were translated by two language experts into Arabic and back translated to English by another two independent language experts. A pilot test was conducted among 40 participants (not included in the study results) to assess the clarity of the questions.

Data collection technique: A Google form was created, and participants were invited through personal communication with the researchers to complete the form and submit it.

Data analysis:

All the collected data was revised for completeness and logical consistency. The data was extracted from the Google form to Microsoft Office Excel Software Program, 2019, then was transferred and analyzed into the Statistical Package of Social Science Software program, version 26 (SPSS) for statistical analysis.

COVID-19 risk perception questions were used to score the following:

1. COVID-19 risk perception 21 questions were rated on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) for each item, danger control and fear control: subtracted the perceived threat score from the perceived efficacy score (self- plus response-efficacy divided by two), resulting in a discriminating value. The discriminating value could be either positive or negative. A positive value meant that a person was engaging in danger control processes because their perceived efficacy was stronger than their threat perceptions. In other words, a person was likely to engage in some level of protective behaviors with regard to the specific health threat. A negative value meant that a person was engaging in fear control processes because their threat perceptions were stronger than their perceptions of efficacy. In these cases, a person was likely to engage in fear control processes and was probably not protecting himself or herself against the specific health threat [Jahangiry et al., 2020].

Quantitative variables were described as mean, SD, median, minimum and maximum, compared using independent t test and Mann Whitney U test for 2 independent groups, where significant p value at $p \leq 0.05$. Qualitative variables were described as frequency and percentage. Comparison for qualitative variables was by using chi square test and fisher exact test, where significant p value at $p \leq 0.05$.

Ethical considerations

The study protocol was approved by the scientific committee of the Public health department, Faculty of medicine, Cairo University and from the Ethical committee faculty of medicine, Cairo University (N-8-200) date of approval 16/2/2022. Participants were informed that this is an anonymous survey and participation is optional. Only those who agreed were included in the study. All procedures

for data collection were treated with confidentiality according to the Helsinki Declarations of biomedical ethics.

Results

The study included 509 participants with mean age of 33 ± 12 years, median age 33 , age range from 18-83, 81.7% were females, 67% were university graduates, around 52% were working, medical background was found in 42.8% of the participants, 90% were living in urban areas, 64.2% have satisfying income, more than two thirds were not suffering from chronic diseases.



Figure (1): Descriptive pie chart of danger and fear control group.

Figure (1) shows the percentages of danger control group and fear control group where it was found that the danger control group constitutes more than 80%.

Table (1) illustrates the danger control group and fear control group by the socio-demographic characteristics of the study participants; there was **no** statistically significant difference shown.

Table (1):

Danger and fear control by demographic characteristics of the study participants (N=509)

	Danger control		Fear control		p value
	N	(%)	N	(%)	
Age					
<30	191	88.0%	26	12.0%	0.081
30-60	230	83.6%	45	16.4%	
>60	12	75.0%	4	25.0%	
Gender					
Male	82	88.2%	11	11.8%	0.353
Female	351	84.4%	65	15.6%	
Education					
Below University education	37	90.2%	4	9.8%	0.619
University	289	84.8%	52	15.2%	
Postgraduate	107	84.3%	20	15.7%	
Income					
It is not enough and we have a big debt	9	81.8%	2	18.2%	0.449
It is not enough and we have a small debt	24	88.9%	3	11.1%	
Just enough	123	85.4%	21	14.6%	
Enough	277	84.7%	50	15.3%	
Residence					
Urban	388	84.7%	70	15.3%	0.584
Rural	45	88.2%	6	11.8%	
Occupation					
Working	221	83.7%	43	16.3%	0.373
Not working	212	86.5%	33	13.5%	

Figure (2) is a bar chart that grouped the participants into fear and danger control groups in relation to the precautionary measures against COVID-19, it was found that precautionary measures (social distancing, avoiding poorly ventilated places, washing hands, cleaning surfaces daily, monitoring health daily, care about healthy eating and taking multivitamins) were significantly higher in fear control group than danger control group (0.011, 0.027, 0.026, 0.001, 0.012, 0.029 and 0.03 respectively).

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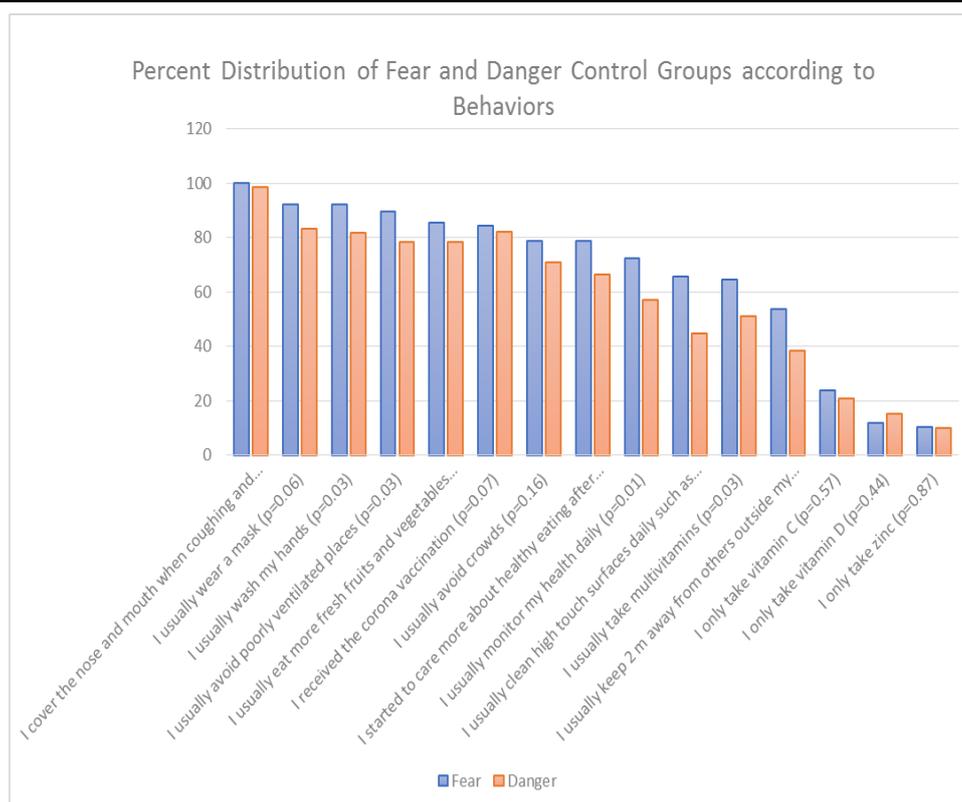


Figure (2):
Percent distribution of danger and fear control groups according to preventive behaviors

Table (2):
Percent distribution of danger and fear control groups according to preventive behaviors

Preventive behaviors	Danger control		Fear control		p value
	Frequency	Column N %	Frequency	Column N %	
I received the corona vaccination	356	82.2%	64	84.2%	0.07
I usually wear a mask	363	83.8%	70	92.1%	0.06
I usually keep 2 m away from others outside my home	166	38.3%	41	53.9%	0.01
I usually avoid crowds	308	71.1%	60	78.9%	0.16
I usually avoid poorly ventilated places	340	78.5%	68	89.5%	0.03
I usually wash my hands	354	81.8%	70	92.1%	0.03
I cover the nose and mouth when coughing and sneezing	427	98.6%	76	100.0%	0.30
I usually clean high touch surfaces daily such as tables and doorknobs	193	44.6%	50	65.8%	0.00
I usually monitor my health daily	247	57.0%	55	72.4%	0.01
I started to care more about healthy eating after corona	287	66.3%	60	78.9%	0.03
I usually eat more fresh fruits and vegetables	339	78.3%	65	85.5%	0.15
I usually take multivitamins	221	51.0%	49	64.5%	0.03
I only take vitamin C	90	20.8%	18	23.7%	0.57
I only take vitamin D	66	15.2%	9	11.8%	0.44
I only take zinc	43	9.9%	8	10.5%	0.87

Discussion

Our study showed that young people (<30years) showed a greater likelihood to adopt a sedentary lifestyle and risky behavior after being immunized. This finding is consistent with the study of **Rahamim-Cohen et al., (2021)**; where he found that younger people were more reluctant to follow precautionary measures. However, a study by SPI-B; **[Scientific Pandemic Insights Group on Behaviours, (2021)]** found that in UK, people aged 18–24 are more close to maintain safety measures following vaccination. Elderly have a stronger desire to protect themselves even after being vaccinated **[Day, 2021]**.

Our results revealed that respondents from urban areas are more likely to follow preventive measures following vaccination compared to rural residents (15% versus 11%). Since most urban people tend to be more educated **[Islam and Mia, 2007]**, they might be more careful about their health. Also urban people are more exposed to information sources and the internet **[Miller et al., 2012]**. It's not surprising that people with high level of education (e.g., graduation and post-graduation) are more likely to follow a healthy behavior after vaccination. Surprisingly, just enough and enough income people hold a greater likelihood of risky behavior after being vaccinated. Despite the fact that higher income peoples more concerned about their health and safety **[Woolf et al., 2016]**.

Precautionary measures were statistically present in fear control group than danger control group which is consistent with a study conducted by **Quadros et al.,(2021)** that states the influence of COVID-19 fear on an individual's participation in daily life activities and follow up with the guidelines introduced by the government. Also similar to a study done by **Şuriņa et al., (2021)** showing that threat appraisal and fear of COVID 19 is closely associated with preventive behaviors. Another study conducted in the US, the UK, and Germany by **Kuper-Smith et al., (2021)** found a similar effect of the fear of corona virus in determining social distancing and hand washing

On the contrary, our results are inconsistent with a study done by **Jahangiry et al.,(2020)** where it was found that the respondents in the danger group were more likely to engage in preventive behaviors while those in the fear group were more likely to delay recommended responses for preventing themselves from the COVID-19, this finding could be explained by the timing of the current study, being conducted during the post-vaccination period; the participants might considered themselves more protected being vaccinated.

Also conversely in another study done **Kaim et al., (2021)** they found that who were vaccinated mentioned stricter adherence to protective behavior which might be explained as an individual acceptance of vaccination suggested a higher general awareness towards the risk of the virus, and consequently this awareness can offer potential pathways for higher levels of engagement in additional protective behavior.

Unlike this study results regarding the use of multivitamins, the supplementation pattern among COVID-19 patients in Teheran was analyzed by **Bagheri et al., (2020)**, none of the patients declared the usage of multivitamins. Currently, there are quite few studies available on the impact of the pandemic on lifestyles and nutrition. However, there are some studies dealing with COVID-19 and

dietary supplement intake. To the best of our knowledge, our study is the first to assess the consumption of dietary supplements after vaccination era.

Overall, the study explored a change in behavior after vaccination, participants reporting a move to risky behavior. On the other hand; participants in another study were willing to follow precautionary measures even after being vaccinated [*World Economic Forum, 2021*], the difference could be explained that participants in this study had completed full doses of vaccination giving them the feeling of being protected from infection.

References

Alfawaz, H. A., Khan, N., Aljumah, G. A., Hussain, S. D., & Al-Daghri, N. M. (2021).

Dietary intake and supplement use among Saudi Residents during COVID-19 lockdown. *International journal of environmental research and public health*, 18(12), 6435.

Bagheri, M., Haghollahi, F., Shariat, M., Jafarabadi, M., Aryamloo, P., & Rezayof, E. (2020).

Supplement usage pattern in a group of COVID-19 patients in Tehran. *Journal of Family & Reproductive Health*, 14(3), 158.

Burmpus N (2021).

What's safe after your Covid-19 Vaccine? Available at: <https://www.hopkinsmedicine.org/health/conditionsanddiseases/coronavirus/whats-safe-after-your-covid19-vaccine> [accessed 2021 July 24].

Centers for Disease Control and Prevention (2020a).

COVID-19: How to Protect Yourself. Available at: <https://www.cdc.gov/coronavirus/2019ncov/prepare/prevention.html>

Centers for Disease Control and Prevention (2021).

When You've Been Fully Vaccinated. Available at: https://www.cdc.gov/coronavirus/2019ncov/vaccines/fully_vaccinated.html

Centers for Disease Control and Prevention (2021).

How to Protect Yourself & Others. Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting_sick/prevention.html [accessed 2021 Dec 13].

Daria, S., & Islam, M. R. (2021).

The second wave of COVID-19 pandemic in Bangladesh: an urgent call to save lives. *Asia Pacific Journal of Public Health*, 33(5), 665-666.

Day, M. (2021).

Covid-19: Stronger warnings are needed to curb socialising after vaccination, say doctors and behavioural scientists.

Hedlund, J. (2000).

Risky business: safety regulations, risk compensation, and individual behavior. *Injury prevention*, 6(2), 82-89.

Hossain, E., Rana, J., Islam, S., Khan, A., Chakroorty, S., Ema, N. S., & Bekun, F. V. (2021).

COVID-19 vaccine-taking hesitancy among Bangladeshi people: knowledge, perceptions and attitude perspective. *Human Vaccines & Immunotherapeutics*, 17(11), 4028-4037.

Hossain, M. E., Islam, M. S., Rana, M. J., Amin, M. R., Rokonuzzaman, M., Chakroorty, S., & Saha, S. M. (2022).

Scaling the changes in lifestyle, attitude, and behavioral patterns among COVID-19 vaccinated people: insights from Bangladesh. *Human Vaccines & Immunotherapeutics*, 18(1), 2022920.

Islam, M. R., & Mia, A. (2007).

The role of education for rural population transformation in Bangladesh. *International Journal of Work-Integrated Learning*, 8(1), 1.

Jahangiry, L., Bakhtari, F., Sohrabi, Z., Reihani, P., Samei, S., Ponnet, K., & Montazeri, A. (2020).

Risk perception related to COVID-19 among the Iranian general population: an application of the extended parallel process model. *BMC public health*, 20(1), 1-8.

Kaim, A., Siman-Tov, M., Jaffe, E., & Adini, B. (2021).

From isolation to containment: Perceived fear of infectivity and protective behavioral changes during the COVID-19 vaccination campaign. *International Journal of Environmental Research and Public Health*, 18(12), 6503.

Kuper-Smith, B. J., Doppelhofer, L. M., Oganian, Y., Rosenblau, G., & Korn, C. W. (2021).

Risk perception and optimism during the early stages of the COVID-19 pandemic. *Royal Society Open Science*, 8(11), 210904.

Loomba, S., de Figueiredo, A., Piatek, S. J., de Graaf, K., & Larson, H. J. (2021).

Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. *Nature human behaviour*, 5(3), 337-348.

Miller, C., Rainie, L., Purcell, K., Mitchell, A., & Rosenstiel, T. (2012).

How people get local news and information in different communities. *Pew Research Center*, 1-73.

Quadros, S., Garg, S., Ranjan, R., Vijayasarithi, G., & Mamun, M. A. (2021).

Fear of COVID 19 infection across different cohorts: a scoping review. *Frontiers in Psychiatry*, 12, 708430.

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Rahamim-Cohen, D., Gazit, S., Perez, G., Nada, B., Moshe, S. B., Mizrahi-Reuveni, M., ... & Patalon, T. (2021).

Survey of behaviour attitudes towards preventive measures following COVID-19 vaccination. *Med Rxiv*, 2021-04.

Scientific Pandemic Insights Group on Behaviours. (2021).

SPI-B: Possible impact of the COVID-19 vaccination programme on adherence to rules and guidance about personal protective behaviours aimed at preventing spread of the virus, 17 December 2020. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950723/s0978-spi-b-possible-impact-covid-19-vaccination-programme-adherence-to-rules-guidance.pdf [accessed 2021 September 5]

Šuriņa, S., Martinsone, K., Perepjolkina, V., Kolesnikova, J., Vainik, U., Ruža, A., ... & Rancans, E. (2021).

Factors related to COVID-19 preventive behaviors: a structural equation model. *Frontiers in Psychology*, 12, 676521.

Wiersinga, W. J., Rhodes, A., Cheng, A. C., Peacock, S. J., & Prescott, H. C. (2020).

Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): a review. *Jama*, 324(8), 782-793.

Wilde, G. J. (1982).

The theory of risk homeostasis: implications for safety and health. *Risk analysis*, 2(4), 209-225.

Wolf, S. H., Aron, L. Y., Dubay, L., Simon, S. M., Zimmerman, E., & Luk, K. (2016).

How are income and wealth linked to health and longevity?.

World Economic Forum (WEF). (2021).

How will behavior change after vaccination? New survey reveals post-pandemic trends available at: <https://www.weforum.org/agenda/2021/07/ipsos-behaviour-change-covid-vaccine/>. [accessed 2021 July 21].

السلوكيات الوقائية بعد توافر التطعيم بين عينة من المصريين، دراسة مقطع عرضي

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الملخص العربي

ظلت السلوكيات التي يمكن الوقاية منها ضد عدوى COVID-19 هي الطريقة المهمة لمنع انتشار المرض. مع زيادة تغطية التطعيم ، من المتوقع اكتشاف الإحجام عن السلوكيات الوقائية. قد يؤدي هذا إلى جائحة أخرى ؛ مما خلق الحاجة إلى دراسة مثل هذه التغييرات واستكشاف العوامل الأساسية. الهدف من هذه الدراسة هو تقييم الالتزام بالسلوك الوقائي بعد عصر التطعيم.

هذه دراسة تحليلية مقطع عرضي ، باستخدام استبيان عبر الإنترنت يتضمن الأسئلة الاجتماعية والديموغرافية وأسئلة السلوك الوقائي لـ COVID-19.

من بين المشاركين البالغ عددهم 509 مشاركًا بمتوسط عمر 33 ± 12 عامًا، كان 81.7% من الإناث و 67% من خريجي الجامعات و 90% يعيشون في السكن الحضري. لم يتأثر اتباع السلوكيات الوقائية بالخلفية الاجتماعية والديموغرافية للمشاركين حيث لم يمكنها كفرق معتد به إحصائيًا. ومع ذلك، فقد تأثر بشكل كبير مع إدراك المخاطر تجاه COVID-19 حيث كان أعلى بشكل ملحوظ في مجموعة الخوف مجموعة الخطر.