

Impact of a Health Education Program on COVID Related Knowledge, Attitudes and Practices among Assiut International Airport Staff

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Abstract:

Background: International airport staff play a crucial role in preventing the international spread of infectious diseases. Adequate knowledge, positive attitudes and appropriate practices (KAP) are essential for effective implementation of infection prevention and control measures. Just a simple health education intervention could make a difference in improving awareness and daily preventive behaviours among airport staff which must be evaluated.

Objective: to evaluate the impact of a health education program on COVID knowledge, attitudes and practices among Assiut International airport staff and to identify predictors of post-intervention KAP scores.

Methods: An intervention study was conducted among 229 staff members at Assiut International Airport, Egypt. Data were collected using a structured interviewer- administered questionnaire consisted of socio-demographic characteristics, history of COVID infection and KAP regarding COVID and infection prevention and control measures.

Results: The mean age of participants was 37.40 ± 9.09 years, with 84.7% were males. Nearly 60% had direct contact with travellers during work. The mean knowledge, attitude, and practice scores improved significantly following the intervention (P-value < 0.001). Educational level, occupation and pre-intervention knowledge score independently predicted post-intervention knowledge. Pre-intervention attitude score was the only predictor of post-intervention attitude, whereas educational level and pre-intervention practice score independently predicted post-intervention practice.

Conclusion and recommendations: the health education significantly improved COVID related knowledge, attitudes and practices among airport staff. Educational interventions should be integrated into routine occupational health programs to strengthen preparedness for future infectious disease outbreaks at points of entry.

Keywords: COVID; Health education; Knowledge; Attitude; Practice; Airport staff; Pre–post study; Infection prevention and control.

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Introduction:

Although the acute phase of the COVID-19 pandemic has subsided, the disease and its long-term consequences remain significant public health and occupational health concerns (1). Post-COVID condition is characterized by a broad spectrum of persistent physical, psychological and cognitive symptoms that can adversely affect individuals' work performance and overall quality of life (2).

Consequently, WHO has shifted its focus toward strengthening preparedness for future respiratory

pathogen pandemics through the Preparedness and Resilience for Emerging Threats (PRET) initiative, emphasizing the importance of maintaining effective IPC measures, continuous workforce training and resilient health systems (3).

Infection prevention and control (IPC) measures play a fundamental role in reducing the transmission of infectious diseases, specially at international points of entry (POEs) such as airports (4).

During the COVID-19 pandemic, airport workers were considered one of the occupational groups at

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increased risk of infection because of their frequent interactions with travellers and their work in crowded settings, which facilitated disease transmission. Therefore, effective implementation of preventive measures together with appropriate health education was crucial for reducing the risk of infection and ensuring the continuity of safe airport operations (5, 6).

Health education plays a key role in the prevention and control of infectious diseases. Adequate knowledge of the disease and its preventive measures can positively influence individuals' attitudes and practices toward infection prevention. Furthermore, educational interventions contribute to correcting misconceptions, promoting adherence to preventive measures, and improving preparedness for public health emergencies (7).

Although several studies have assessed COVID related knowledge, attitudes and practices among different populations and the pivotal role of airports in combating disease transmission, few interventional studies have evaluated the impact of health-education programs on COVID related knowledge, attitude and practice among airport workers, particularly in Egypt.

Therefore, this study aimed to evaluate the impact of a health education program on COVID knowledge, attitudes and practices among Assiut International airport staff and to identify predictors of post-intervention KAP scores.

Participants and methods:

Study design and setting

An intervention study was conducted among employees at Assiut International Airport, Egypt, between March and August 2023. The airport is one of the major airports in Upper Egypt and serves as an important POE under the International Health Regulations (2005). It accommodates more than one million passengers and approximately 3,500 flights annually.

Study participants

The study targeted employees from different occupational categories working at Assiut International Airport, including customs officers, passport control staff, quarantine personnel, security officers and ground operation workers. A convenience sample was used due to administrative restrictions as rotating work shifts and limited access

to some operational areas. Of approximately 400 airport employees, 229 workers who were available and agreed to participate were enrolled in the study.

Data collection tools

Data were collected using a pre-designed structured Arabic questionnaire developed after reviewing relevant literature and previously validated instruments. The questionnaire consisted of five sections: socio-demographic characteristics, history of COVID infection, knowledge regarding COVID and infection prevention and control measures, attitudes toward COVID and infection control, and preventive practices related to COVID and infection control. Questions were guided by previous studies (8-15).

Content validity was established through expert review by specialists in public health and infection prevention and control. Internal consistency of the questionnaire was assessed using Cronbach's alpha and showed good reliability for the knowledge (0.859), attitude (0.798), and practice (0.833) domains.

Scoring system:

Knowledge scores (26 questions) were categorized as high (>70%), moderate (50–70%), or low (<50%). Attitudes score (13 statements) were assessed using a five-point Likert scale, with higher scores indicating more positive attitude. Practice scores (24 questions) were classified as good when participants achieved at least two-thirds of the total score, some questions had more than one correct answer, and score was calculated as one point per correct answer (8, 14).

A pilot study involving 30 participants from different occupational categories was conducted to evaluate the clarity and applicability of the questionnaire. As no modifications were required, pilot participants were included in the final analysis.

Study procedure

A baseline assessment was conducted using the pre-designed questionnaire before implementation of the educational intervention. Following the baseline assessment, participants attended a structured health education program designed to improve their knowledge, attitudes and preventive practices regarding COVID and infection prevention and control (IPC).

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Participants were divided into small groups of approximately 10–15 individuals to facilitate interaction and discussion. A total of 20 educational sessions were conducted according to employees' rotating work schedules. Each group attended a single educational session lasting approximately two hours, which consisted of two consecutive lectures. The first lecture covered COVID, including its aetiology, modes of transmission, clinical manifestations, risk factors, preventive measures, vaccination and management of suspected cases. The second lecture focused on infection prevention and control measures, including hand hygiene, the appropriate use of face masks and personal protective equipment, cough etiquette, environmental cleaning and waste disposal.

The educational program also included instructional videos demonstrating the correct hand hygiene technique and proper face mask use. At the end of each session, participants received an educational brochure summarizing the key messages discussed during the program.

One month after completion of the educational intervention, participants were reassessed using the same questionnaire to evaluate changes in knowledge, attitudes, and practices.

Ethical considerations

The study was approved by the Research Ethics Committee, Faculty of Medicine, Minia University (Approval No. 640/2023). Administrative permissions were obtained from Assiut International Airport and Assiut Health Directorate. Informed written consent was obtained from all participants before enrolment and confidentiality of collected data was maintained throughout the study.

Statistical analysis

Data were entered and analysed using IBM SPSS Statistics version 23. Descriptive statistics were presented as frequencies, percentages, means, and standard deviations. Paired t-tests were used to compare pre- and post-intervention mean knowledge, attitude, and practice scores. Independent t-tests and one-way ANOVA were performed to assess associations between participants' characteristics and KAP scores when appropriate. Multiple linear regression analysis was conducted to identify independent predictors of post-intervention KAP scores. A p-value <0.05 was considered statistically significant.

Results:

Table (1): Socio-demographic characteristics of the study participants:

Characteristics	Frequency (N=229)	Percentage (%)
Age		
Less than or equal to 20	10	4.4
21-30	36	15.7
31-40	94	41.1
41-50	72	31.4
More than 50	17	7.4
Mean $\pm$ SD (Range)	37.40 $\pm$ 9.09 (17-58)	
Sex		
Male	194	84.7
Female	35	15.3
Residence		
Assiut	164	71.6
Minia	24	10.5
Cairo	16	7.0
Sohag	13	5.7
Others*	12	5.2
Educational level		
Illiterate	3	1.3
Read and write	5	2.1
Basic education	18	7.9
Secondary education	45	19.7
Above secondary education (2-year institute)	50	21.8
University education	81	35.4
Post-graduate	27	11.8
Occupation		
Egyptian airports company staff	88	38.4
Quarantine department	35	15.3
Ground service workers	34	14.8
Security	24	10.5

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Airline employees	23	10.0
Customs	15	6.6
Insect control (private company)	6	2.6
Passport control officers	4	1.8

*Others include New Valley, Qena, Qalyubia and Giza governorates

Table (1) shows the socio-demographic characteristics of the Assiut international airport staff who participated in the study. The study included 229 participants; their mean age was 37.40 ± 9.09 and ranged between 17 and 58 years and most of them were males (84.7%). Most of the study participants were from Assiut governorate (71.6%) and the rest of them were from: El Minia (10.5%), Cairo (7%) and Sohag (5.7%) governorates. Only very few of them were from The New Valley, Qena, Qalyubia and Giza governorates. Regarding the educational level, 35.4% had university education, 21.8% of the study participants had above secondary education and 19.7% had secondary education while 11.3% had below secondary education. The majority of the study participants were working in the Egyptian airports company (38.4%).

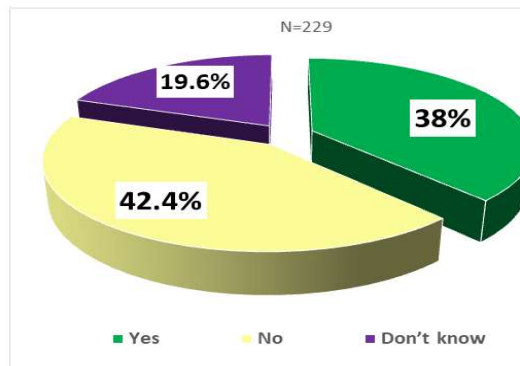


Figure (1): Frequency of having COVID infection among the study participants

Figure (1): shows that 38% of the study participants said that they had COVID infection and about 20% were not sure they had COVID or not.

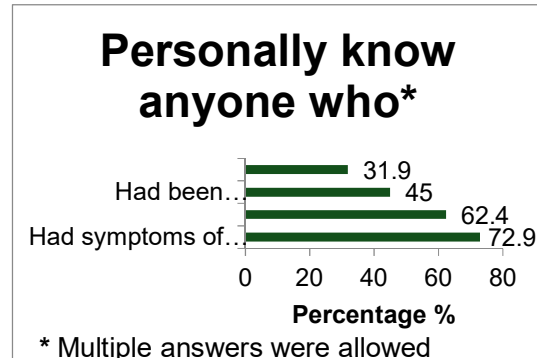


Figure (2): Percentage of Respondents Who Personally Knew Someone Affected by COVID (Symptoms, Diagnosis, Hospitalization, or Death)

Figure (2): shows that 72.9% of the study participants personally know someone who showed symptoms of COVID, 62.4% knew someone who had been diagnosed, 45% knew someone who had been hospitalized and 31.9 % know someone who died due to COVID.

Table (2): Comparison of total KAP scores pre- and post-intervention among the study participants:

	Pre-intervention	Post-intervention	P-value	T
	Mean $\pm$ SD	Mean $\pm$ SD		
Knowledge score	26.66 $\pm$ 9.66	34.61 $\pm$ 8.55	P<0.001	14.98
Attitudes score	44.08 $\pm$ 4.96	47.18 $\pm$ 5.44	P<0.001	7.42
Practices scores	13.92 $\pm$ 7.27	15.93 $\pm$ 6.14	P<0.001	4.99

Table (2): shows paired t-test results to compare the total KAP scores before and after the intervention. The mean knowledge score elevated from 26.66 ± 9.66 to 34.61 ± 8.55 with P-value <0.001. A significant increase in the mean attitudes score from 44.08 ± 4.96 to 47.18 ± 5.44 ($t = 7.42$, P-value <0.001). The mean practice score increased from 13.92 ± 7.27 to 15.93 ± 6.14 ($t = 4.99$, P-value <0.001).

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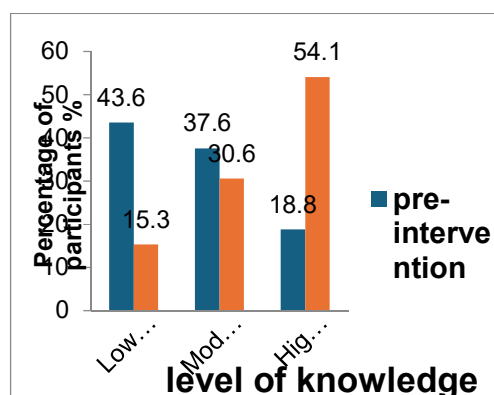


Figure (3): Level of knowledge pre- and post-intervention among the study participants

Figure (3): shows an improvement in participants' knowledge levels after the intervention. The proportion of participants with high knowledge increased from 18.8% to 54.1%, while those with low knowledge decreased from 43.6% to 15.3%.

Table (3): Socio-demographic factors affecting post-intervention KAP scores:

Char acteri stics	Known d ge		Attitude		Practice	
	Mea n ± SD	P va lu e	Me an ± SD	P valu e	Me an ± SD	P valu e
Age group						
Less than or equal to 20	24.7 ±6.7	0. 00 2 f= 4. 24	44.6 ±5.5	0.19 4 f=1. 53	9.9± 3.4	0.00 4 f=3. 92
21-30	34.6 ±9.2		47.1 ±4.4		15.2 ±6.8	
31-40	34.9 ±8.8		47.3 ±5.7		16.5 ±5.9	
41-50	36.0 ±7.4		46.8 ±5.6		16.9 ±5.8	
More than 50	33.0 ±8.3		49.7 ±4.6		13.8 ±6.2	
Sex:						
Male	34.5 ±8.5		47.2 ±5.6	0.92 7	15.9 ±6.2	0.62 7

Female	35.3 ±8.9	0.613 t=0.506	47.3 ±4.2	t=0.092	16.4 ±6.0	t=0.487
Educational level						
Illiterate	20.7 ±6.1	P ≤0.001 f=12.82	50.7 ±1.2	0.353 f=1.12	7.3± 1.5	P<0.001 f=13.25
Read and write	25.0 ±3.3		44.2 ±4.6		8.4± 2.7	
Basic education	24.2 ±6.9		45.3 ±5.2		9.4± 4.1	
Secondary education	32.7 ±8.0		46.7 ±5.6		13.7 ±5.9	
Above secondary education	35.0 ±7.3		47.7 ±5.7		16.1 ±5.4	
University education	37.8 ±7.4		47.3 ±5.2		18.3 ±5.6	
Post-graduate	37.7 ±7.9		48.2 ±5.1		19.3 ±4.4	
Direct contact with travellers						
Yes	35.3 ±8.3	0.14	47.4 ±5.4	0.422 (t=0.804)	17.1 ±5.9	0.001 (t=3.25)
No	33.6 ±8.9	6 (t=1.459)	46.8 ±5.5		14.4 ±6.2	
Occupation group						
Quarantine	38.9 ±6.6	P<0.001 f=9.524	46.9 ±5.1	0.415 f=1.025	19.3 ±6.7	P < 0.001 f=6.735
Security	32.3 ±8.4		47.8 ±5.2		15.1 ±5.6	
Aviation	35.1 ±8.3		47.6 ±5.7		16.7 ±5.5	
Egyptian airport	36.9 ±7.5		47.9 ±5.8		16.6 ±5.6	

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orts com pan y					
Cust oms	34.5 ±7.7		47.3 ±6.1		16.4 ±4.1
Pass port cont rol offic ers	37.5 ±3.3		46.3 ±3.3		20.8 ±2.2
Gro und serv ice wor kers	26.7 ±7.1		45.5 ±4.9		11.1 ±5.7
Inse ct cont rol	26.3 ±12. 8		44.0 ±3.2		11.5 ±5.6

Table (3) demonstrates the relationship between participants' socio-demographic characteristics and their post-intervention knowledge, attitude, and practice scores. Knowledge scores showed a statistically significant association with age group ($p = 0.002$), educational level ($p=0.0001$), and occupation group ($p= 0.0001$). Participants aged 41–50 demonstrated the highest knowledge mean (36.0 ± 7.4), and those with university or postgraduate education achieved substantially higher scores (37.8 ± 7.4 , 37.7 ± 7.9) compared to lower educational levels. Also, occupation group was significantly associated with knowledge scores with the highest knowledge mean among quarantine staff (38.9 ± 6.6). Practice scores were also significantly associated with age ($p=0.004$), educational level ($p=0.0001$), occupation group ($p=0.0001$) and contact with travellers, with better practices observed among those aged 41–50 years (16.9 ± 5.8), higher education (19.3 ± 4.4) and those who had direct contact with travellers (17.1 ± 5.9). However, no statistically significant differences were found in attitude scores across any of the demographic factors.

Table (4): Association between COVID related exposure and post-intervention KAP scores

Post - intervention	Knowledge		Attitude		Practice	
Factors	Mean ± SD	P value	Mean ± SD	P value	Mean ± SD	P value
Personally know anyone who had symptoms of COVID						
Yes	35.4±8.3	0.002 t=2.335	47.1±5.4	0.705 t=0.379	16.2±6.2	0.334 t=0.968
No	32.5±8.9		47.4±5.6		15.3±6.1	
Personally know anyone who had been diagnosed with COVID						
Yes	36.1±7.9	0.001 t=3.356	47.2±5.5	0.834 t=0.211	17.0±5.9	P<0.001 t=3.565
No	32.2±9.0		47.1±5.4		14.1±6.1	
Personally know anyone who had been hospitalized due to COVID						
Yes	35.9±9.0	0.032 t=2.163	47.7±5.7	0.237 t=1.187	16.0±6.6	0.867 t=0.167
No	33.5±8.0		46.8±5.2		15.9±5.8	

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Personally know anyone who died from COVID						
Yes	37.2±7.8	0.001 t=3.241	47.8±5.7	0.232 t=1.198	17.3±6.4	0.022 t=2.304
No	33.4±8.6		46.9±5.3		15.3±5.9	
Previous COVID						
Yes	35.9±8.5	0.201 f=1.616	47.4±5.4	0.766 f=0.267	16.1±6.1	0.192 f=1.664
No	34.1±8.4		47.2±5.2		16.5±5.6	
Don't know	33.3±9.1		46.7±5.9		14.5±7.1	

Table (4) demonstrates the relationship between participants' exposure to COVID cases and their post-intervention KAP scores. Knowledge scores were significantly higher among participants who personally knew someone who had symptoms ($p = 0.02$), had been diagnosed with COVID-19 ($P = 0.001$), had been hospitalized ($P = 0.032$), or had died due to COVID ($P = 0.001$), compared to those who did not. Practice scores also showed statistically significant differences based on personal exposure. Participants who knew someone diagnosed with COVID ($P=0.0001$) or who had died from the disease ($p = 0.022$) had significantly higher practice scores. In contrast, attitude scores were not significantly associated with any of the exposure variables.

Table (5): Multiple linear regression analysis for factors associated with post-intervention knowledge, attitudes and practices scores

Post-intervention	Knowledge score		Attitude score		Practice score	
	β^*	P-value	β	P-value	β	P-value
Age group	-0.002	0.977	0.041	0.560	0.005	0.933
Sex	0.025	0.634	0.016	0.815	-0.031	0.551
Educational level	0.189	0.004	0.051	0.469	0.272	$P<0.001$
Occupation group	-0.160	0.012	-0.072	0.348	-0.090	0.148
Direct contact with travellers	0.092	0.097	0.010	0.888	-0.056	0.312
Previous COVID	-0.058	0.267	-0.037	0.572	-0.042	0.420
Personally know anyone who had symptoms of COVID	-0.054	0.309	0.082	0.224	0.003	0.958
Personally know anyone who had been diagnosed with COVID	0.019	0.737	0.026	0.715	-0.034	0.540

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Person ally know anyone who had been hospita lized due to COVI D	- 0.0 80	0.16 9	- 0.0 64	0.38 2	0.0 20	0.73 4
Person ally know anyone who died from COVI D	- 0.0 66	0.26 4	- 0.0 27	0.71 2	- 0.0 68	0.25 1
Pre- knowle dge scores	0.4 30	P<0. 001	—	—	—	—
Pre- attitude s scores	—	—	0.2 51	P<0. 001	—	—
Pre- practic es scores	—	—	—	—	0.4 04	P<0. 001

* Standardized Coefficients

Table (5) presents the results of multiple linear regression analysis to identify independent predictors of post-intervention knowledge, attitudes and practice scores. For knowledge scores, educational level ($\beta = 0.189$, P-value = 0.004), occupation group ($\beta = -0.160$, P-value = 0.012) and pre-intervention knowledge scores ($\beta = 0.430$, P = 0.0001) were significant predictors. The negative β coefficient for the occupation group indicates that, compared with the reference category (quarantine staff), other occupational groups had lower post-intervention knowledge scores. For attitudes scores, only pre- intervention attitudes score ($\beta = 0.251$, P = 0.0001) was significant predictor. Whereas educational level ($\beta = 0.272$, P = 0.0001) and pre-intervention practices score ($\beta = 0.404$, P = 0.0001) were significant predictors of post- intervention practice score.

Discussion:

Effective implementation of COVID infection prevention and control measures, including physical distancing, hand hygiene, facemask use and personal protective equipment, is essential for reducing disease spread. However, poor knowledge, unfavourable attitudes, and inappropriate practices may compromise the effectiveness of these measures and increase the likelihood of COVID-19 transmission (16).

The present study demonstrated that a structured health education program significantly improved COVID related knowledge, attitudes, and practices among Assiut International Airport workers. These findings highlight the effectiveness of workplace-based educational interventions in strengthening infection prevention and control measures among employees (17)

The study population was predominantly middle-aged and male (**Table 1**), which is consistent with the workforce profile reported among quarantine department staff at Egyptian airports (4). However, unlike an international study conducted among airport employees, where the distribution of male and female workers was more balanced, males represented the majority of participants in the current study (18). This difference may reflect variations in workforce composition and occupational roles across different airport settings.

This study included participants from a wide range of age categories and diverse occupational sectors within the airport environment such as health team, customs, security, administration and airline employees, passport control, ground services and insect control. Unlike many previous studies (7, 19, 20) that focused on narrowly defined populations, such as university students, healthcare workers, or specific age groups, the present study examined a heterogeneous workforce representing multiple occupational roles within the airport setting (18). This diversity enhances the generalizability of the findings to similar airport work environments.

In the present study, 38% of participants reported previous COVID infection. This proportion may be underestimated because laboratory confirmation was not available for all suspected cases, particularly during the early stages of the pandemic, and some individuals may have been reluctant to report infection because of social stigma associated with the disease. A lower prevalence of previous COVID infection (15.6%) was reported among healthcare workers at Cairo University Children's

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Hospital, which may be explained by differences in study populations, occupational exposure, and infection control practices (20).

In the current study, 72.9% of participants personally knew someone who showed symptoms of COVID and about 30% knew someone who died due to it. This could indicate that although exposure to COVID was common, severe illness and death were less frequent. This finding was consistent with a previous Egyptian study that reported widespread community exposure to COVID among Egyptian adults (21).

The educational intervention was associated with statistically significant improvements in participants' knowledge, attitudes, and practices (Table 2), highlighting its effectiveness in enhancing COVID-19-related awareness and promoting positive health behaviours among airport staff. These findings suggest that educational programs can improve not only knowledge and attitudes but also self-reported preventive practices. Nevertheless, sustaining behavioural changes over time may require continued education, periodic reinforcement, and organizational support. Similar improvements in KAP following educational interventions have been reported among paramedical students in Egypt (7) and healthcare workers in Yemen (22).

Consistent with the improvement in mean knowledge scores, the proportion of participants with a high level of knowledge increased markedly after the intervention, whereas the proportion with poor knowledge declined substantially (Figure 3). This finding further confirms the effectiveness of the educational program in enhancing participants' understanding of COVID and infection prevention measures. Similar results have been reported in recent evidence demonstrating that structured health education interventions significantly improve COVID related knowledge and encourage appropriate preventive behaviours (23).

In the present study, post-intervention knowledge scores were significantly associated with age, educational level and occupation, while practice scores were significantly associated with age, educational level, direct contact with travellers, and occupation. However, no significant association was found between socio-demographic characteristics and post-intervention attitude scores (Table 3). These findings suggest that educational background and the nature of work may influence the

effectiveness of health education interventions. Participants with higher educational levels may be better able to understand and apply health information, while those working in occupations with greater exposure to infection prevention measures may have more opportunities to translate knowledge into practice. Similar findings have been reported among hospital employees, where educational level and occupational characteristics were significant determinants of COVID related knowledge and preventive practices, whereas attitude scores showed no significant association with most socio-demographic characteristics (24).

The present study also showed that participants who personally knew someone with COVID, particularly those who knew someone who had been diagnosed, hospitalized, or died from the disease, had significantly higher post-intervention knowledge scores. Better practice scores were also observed among participants who knew someone diagnosed with or deceased from COVID, whereas attitude scores were not significantly associated with previous exposure (Table 4). Personal exposure to COVID may increase risk perception and motivate individuals to seek reliable health information and adhere to preventive measures. Similar findings have been reported in a recent study showing that COVID related experiences were positively associated with knowledge and preventive practices, while their effect on attitudes was less consistent (25).

Multiple linear regression analysis confirmed that educational level remained a significant independent predictor of post-intervention knowledge and practice scores. Occupation and pre-intervention knowledge score were significant predictors of knowledge and pre-intervention practice score was a significant predictor for practice score. For attitude score pre-intervention attitude score was the only significant predictor. These findings indicate that educational level and occupation play an important role in determining the effectiveness of health education interventions. Individuals with higher educational attainment are more likely to understand and retain health information, while occupational differences may influence both access to health information and opportunities to implement infection prevention measures. Similar findings have been reported in recent studies that identified educational level and occupation as important predictors of COVID related knowledge and preventive practices (26, 27).

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In the current regression model, individuals with a previous history of COVID infection had lower knowledge scores. Although this appears counterintuitive, this pattern has been reported in other studies. Some researchers suggested that people who have already experienced COVID may rely on personal experience rather than updated scientific information, leading to misconceptions or incomplete knowledge (10, 27). Moreover, mild or asymptomatic cases may underestimate the seriousness of the disease, which reduces their motivation to seek further information.

Strengths and limitations:

This study has several strengths. It is among the few intervention studies that evaluated the impact of a structured health education program on knowledge, attitude, and practice regarding COVID among airport workers, a population that plays a critical role in preventing the cross-border spread of infectious diseases. In addition, the study included participants from different occupational groups and used a standardized interviewer-administered questionnaire with pre- and post-intervention assessment.

However, this study has several limitations. First, the use of a one-group pre-post design without a control group limits the ability to establish a causal relationship between the educational intervention and the observed improvements. Second, the study was conducted using a convenience sample, which may limit the generalizability of the findings. Third, participants' practices were assessed using self-reported questionnaires, which are subject to recall and social desirability biases and may not fully reflect actual preventive behaviours. Finally, outcomes were evaluated one month after the intervention, limiting the evaluation of the long-term sustainability of the observed improvements in knowledge, attitude, and practice. Future studies employing randomized controlled designs, objective measures of preventive practices, multicentre recruitment, and longer follow-up periods are warranted to confirm and extend these findings.

Conclusion and recommendations:

The health education program was associated with significant improvements in COVID related knowledge, attitudes, and practices among Assiut Airport workers. Educational level, occupation and pre-intervention knowledge score were significant predictors of post-intervention knowledge. Pre-

intervention attitude score was the only significant predictor of post-intervention attitude, while educational level and pre-intervention practice score independently predicted post-intervention practice. These findings support the implementation of regular, targeted health education programs in airport settings to strengthen infection prevention practices and improve preparedness for future public health emergencies.

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