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Research Article

Prevalence of SARS-CoV-2 antigen among Dawadmi applied medical science college students through Rapid antigen test.

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Abstract

Introduction: *Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) represent major challenges for health care workers whom directly contact with the infected persons. Objective: This study aimed to assess presence of antigen using oral and nasal rapid test.* ***Methods:*** *Subjects and Setting: All female students of Dawadmi Applied Medical Science College who were willing to participate in the study. Design: Cross-sectional design.* ***Results;*** *table 1: There was 53.1% from subjects were aged 21-23 and (60.9%) in medical laboratories. Respectively in Figure one: More than three third of subjects have not any hereditary disease (79%) and in figure two; the majority don't receive any medication for a continuous period (92). In Table 3; 60% of them don't catch Covid before, 93% took Corona virus vaccine and 71.5% took three doses of the Corona virus vaccine. 86.6% of them wear aware of the nature of the virus and contact with the infected person as a method of transmission reported by 50.3%. In Table 4; 60.3% know the World Health Organization's announcement about pandemic. In Table 5; Majority of them washed their hands regularly with soap and water for at least 20 seconds (90.5%), 92.2% adhered to preventive measures if they experienced symptoms associated with Covid-19, (97.8%) from them staying away from those infected with the disease and 96.6% were negative for virus antigen analysis.* ***Conclusion:*** *Because of the low incidence CoV-2 Antibodies among the studied subjects the study hypothesis was accepted. Recommendations: Educational intervention covering all preventive practice aspects should be conducted with continuous screening to discover new cases to provide effective intervention and decrease disease incidence.*

INTRODUCTION

COVID-19 is a highly contagious respiratory disease caused by SARS-CoV-2. There are over 500 million cases and over 6 million deaths worldwide and there have been nearly 800,000 cumulative cases of COVID-19 and over 9000 COVID-19 deaths in the Kingdom of Saudi Arabia. COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 which has become a global pandemic in recent times. Currently, the transmission rate has slowed significantly, but the definite pathological reason behind this is still unknown. Therefore, the prevalence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) antibody must be studied to establish relationship between the rate of transmission and antibody presence [1,2].University students, are at a higher risk of contracting SARS-CoV-2 but are less likely to develop severe COVID-19 [3]. Universities present a unique epidemiological scenario, with the daily movement of students to and from densely populated academic locations posing the risk of introducing viruses into student populations and spillover into their local communities; college and family members [4]. Seroprevalence studies to estimate the true prevalence of asymptomatic COVID-19 and not been reported in clinical investigation [5]. Saudi Arabia studies the prevalence of SARS-CoV-2 in the population using serum samples from healthy blood donors, non-COVID patients, healthcare workers, and COVID-19 patients. The general seroprevalence of COVID-19 was found as 11%, with prevalence ranging from 1.78% - 24.45% in different regions [6]. Future governmental intervention actions are based on these figures and the dependency on the local scientific community to continue providing insightful COVID-19 data through prevalence studies in different communities [7]. With a potentially increased likelihood of asymptomatic infection and lower vaccination coverage, students are at risk of seeding outbreaks among their social groups and exposing the local community and non-term-time contacts [3]. COVID-19 has becomes public focus shifts from stopping transmission to preventing severe illness and diagnostic testing should emphasize the use of the best tests to identify infections in persons who would benefit from treatment. Healthcare workers (HCWs) are at an increased risk of SARS-CoV-2 infection persists despite the implementation of vaccination [8]. Rapid detection of SARS-CoV-2 is of the utmost importance for maintaining a safe hospital environment with low rates of healthcare-associated infections. Indeed, rapid SARS-CoV-2 detection allows the implementing of effective patient cohorting protocols and the isolation of infected healthcare providers [9]. Early patients' identification is essential to contain a pandemic and to keep the college secure. Rapid antigen tests are a quick and easy diagnostic measure to identify infected persons; early, rapid detection is essential for the protection and improvement of care provided [10]. Testing strategies using rapid antigen tests to detect current infection have the potential to increase access to testing, speed detection of infection, and reduce disease transmission [11]. For SARS-CoV-2 detection, specimens such as nasopharyngeal swab and throat swab were collected in viral transport medium using aseptic techniques. Each specimen was initially screened for SARS-CoV-2 N-Ag [12]. This provides results within 15 minutes. This study revealed a positively rate of 3.5%. A follow-up of individuals who tested positive for COVID-19 was further confirmed by RT-PCR to detect the viral genome [13], in which all students and staff member were negative for antigen [14]. Rapid antigen testing is a useful tool for diagnosing, in settings where timely diagnosis and isolation are crucial. The test detects viral antigens in respiratory secretions and typically provides results in 15 -30 min which are particularly useful in hospitals, clinics, schools, and workplaces [10]. Testing led to the isolation of students positive for COVID-19, thereby lowering the risk of transmission [15].Tests have relatively higher sensitivity through seven days of the appearance of symptoms [16] and are reliable and suitable during the pandemic when diagnostic capacity is crucial. This can assist in screening healthcare staff and professionals in institution setting such as

medical colleges or universities. The tests may produce false-negative and false-positive results in areas with low-prevalence. The accuracy of the test can also be affected by sample quality, and new variants of the virus may not be detected [17]. Rapid detection of covid-19 control the spread of the virus provides effective treatment and care [18] and informs public health measures and policy decisions makers, to implement quarantine measures, restrict travel, and allocate resources [19]. The sensitivity of testing by Ag-RDTs was 91.7 % for nasal swab and 96.8 % for nasopharyngeal swab, and the specificity was 100 %. The positive predictive value of both swabs was 100 %, and the negative predictive values of both swabs were 96.4 % and 96.6 %, respectively [20].

Study implications; The prevalence of SARS-CoV-2 antigens in a population is an important consideration in health practice, as it helps to understand the extent of active or recent infections, identify at-risk groups, and inform public health strategies. Health staff plays a critical role in the detection, and management of the disease. By understanding how antigen testing into the larger picture of infection control, patient care, and public health, health staff can help mitigate the spread of the virus, protect vulnerable populations, and support patients through their recovery. Health carrier students who will provide care should understand the significance of prevalence rates in their communities, especially as it relates to the risk of transmission. They may be involved in administering antigen tests and interpreting or reporting results, especially in high-risk settings such as hospitals, long-term care facilities, or schools. Knowing the current prevalence in a given area helps to assess the likelihood of outbreaks and prioritize testing, quarantine, and isolation protocols. Health staff are often on the front lines of identifying and managing patients with COVID-19 symptoms. The increased prevalence of SARS-CoV-2 antigens in the community or healthcare facilities has been increased the importance of stringent infection control practices. If antigen tests show positive results, it is crucial in ensuring that appropriate isolation and quarantine measures are implemented for both patients and staff. This helps to reduce the spread of infection in healthcare settings. Health staff members are often responsible for delivering test results to patients. Educating patients, the importance of vaccination, wearing mask, and hand hygiene to reduce transmission. They should also address any concerns or misconceptions about the virus and the antigen testing process. Health staff in health care settings must be particularly vigilant and ensure that residents are regularly tested and that appropriate infection control measures are in place. They should remain informed about the global and local prevalence of SARS-CoV-2 and its variants. Surveillance data can be used to inform their practice.

Study significance: Although COVID-19 is no longer a pandemic, the health system is still grappling with its long-term effects. Many survivors of COVID-19, particularly those who were severely infected, experience long COVID. This article focuses on the continued importance of healthcare resources for those living with long-term COVID symptoms and the research needed to better understand the condition and provides important insights into the current status of the virus, even if it is no longer classified as a pandemic. SARS-CoV-2 is still an important disease, infection with the disease affects health person and medical students are still liable to catch infection in their wok and training places. Assess the presence of SARS-CoV-2 antigens among students add to local data available about COVID-19 statues, contribute to information needed by public health authorities to make intervention policies, and help inform university about the current situation of students' health and identification of infected students to contain progression of the disease and keep students, working personal and staff secure also prevent transmission inside and outside the college to families, community and finally start the pandemic again which has psychological consequences and an economic burden on the hospital and all Saudi Arabia. Currently, the transmission rate has slowed significantly, but the definite pathological

reason behind this is still unknown. Therefore, the prevalence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) antibody must be studied to establish relationship between the rate of transmission and antibody presence [21]. Study significance rated the prevalence of COVID-19 as an infectious disease that reflects knowledge and awareness among studied subjects as a health personal contact with many patients in different heath settings through their training and working after that. Article provide critical insights into the prevalence of diseases to mitigate the spread of the virus. They guide public health policies, inform healthcare practices, and shape government decisions regarding lockdowns, travel restrictions, and vaccine distribution.

Study aim: To assess the presence of SARS-CoV-2 antigen among female students of Dawadmi Applied Medical Science college.

Hypothesis: Low incidence of SARS-CoV-2 antigen among the study subjects.

Subjects: All female students of Dawadmi Applied Medical Science College, Shaqra University, Saudi Arabia who were willing to participate in the study and did not attain a similar study was included in the study, their number were 179 subjects. Subjects who were unwilling to participate or who participate in a similar study were excluded.

Setting The study was conducted in Dawadmi Applied Medical Science College female branch, Dawadmi, Saudi Arabia.

RESEARCH METHODOLOGY

Design: Cross-sectional study design was used in this study.

Study tool: Based on study aims, relevant literature, and current needs, questionnaire sheet was developed in consultation from epidemiology and researchers to cover; subjects' characteristics, medical history, knowledge and preventive practice. Questionnaire sheet validity and reliability was assessed by two experts in medical specialty who assess tool's Content validity and Cronbach's alpha for testing reliability was 0.85.

Pilot Study: It was conducted on 10% of sample removed from main study. Informed consent was obtained from each participant prior to participation.

Methods of SARS-Cov-2 Rapid Testing: Post infection, viral antigens are present in respiratory secretions, nasal swabs , throat swabs, saliva, and sputum. Commercially available COVID-19 detection tests can be broadly divided into two categories: molecular assays and serological and immunological assays. Molecular assays detect SARS-CoV-2 viral RNA using PCR-based techniques and RT-PCR testing for viral RNA in Oro-tracheal secretions is the standard diagnostic test for detecting SARS-CoV-2. Serological and immunological assays largely rely on detecting antibodies produced by individuals as a result of exposure to the virus or on the detection of antigenic proteins in infected individuals [22]. Since RT-PCR is expensive and involves many steps, antigen-associated tests are qualitative and relatively faster among the three viral testing methodologies. Antigen testing mainly utilize viral proteins, including nucleocapsid, phosphoprotein, and spike protein which found are in the oral cavities of patients, the nucleocapsid and spike proteins of the COVID-19-causing virus have been used to develop rapid antigen commercial tests. It has also been reported that nucleocapsid-based antigen tests are more sensitive than spike proteins [23,24].

Ethical approval: It was obtained from scientific deanship of Shaqra university; participation is voluntary and subjects' responses was confidential used only for research purpose. Informed consent was obtained from each participant before participation in the study.

Data collection: Data was collected from February 2023 – December 2024. All subjects was informed that their participation was voluntary and they have the right to exit at any time and not

complete the study without discussing their causes. Data was collected in four sessions in the college lab; in 1st session researchers introduce themselves, get subjects' expectations, illustrate the study's aim, and arrange a meeting time with each participant, second session was used to assess subjects'; characteristics, medical history, knowledge and preventive practice. Third session was used to obtain Nasopharyngeal swab form each subject and a rapid antigen test was performed by researchers to detected presence of virus antigen and fourth session was used to end the study, answering subjects questions and informing them about the result of the test and hygienic practice required to protect them from catching infection. Each session was about thirty minutes arranged according to each subject free studying schedule during the university day.

Data analysis techniques: SPSS version 26 was used to analyses the collected data and test the research hypotheses and descriptive statistical techniques including Frequencies, percentages, means, and standard deviations were used along with an independent-sample t-test.

RESULT

Table 1: Characteristics of subjects.

Items		Frequency	Percent
Age.	18-20	79	44.1
	21-23	95	53.1
	24-26	5	2.8
Department.	Nursing	70	39.1
	Medical laboratories	109	60.9
Academic year.	Second	67	37.4
	Third	77	43
	Fourth	35	19.6

Table 1; Studied subjects were 179 students, 53.1% aged 21-23 years, 60.9% was medical laboratories department and 39.1% was nursing department, 43% in third and 37.4% in second, and 19.6% in fourth year.

Table 2: Descriptive Statistics of subjects.

Items	**Descriptive Statistics** (N=179)			
	Mean	Std. Deviation	Minimum	Maximum
Age	2.5866	.54776	2.00	4.00
Academic year	1.8212	.73546	1.00	3.00
Medical Department	1.6089	.48936	1.00	2.00

In table 2: Age has a mean of 2.58, academic year has a mean of 1.82 and a medical department has a mean of 1.61.

Fig 1; Hereditary history.

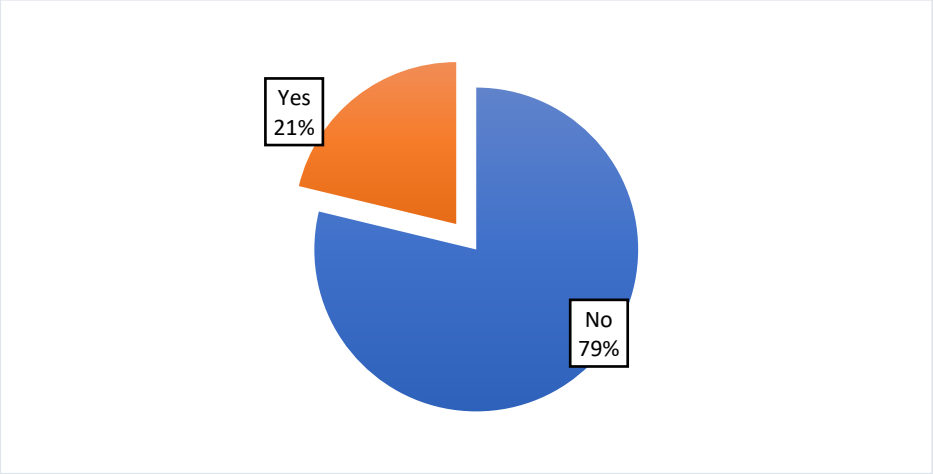

Figure 1; More than three third of studied subjects have not any hereditary history as mentioned by 79% from them they haven't any heredity history for any chronic disease.

Figure 2; Subjects' receive any medication.

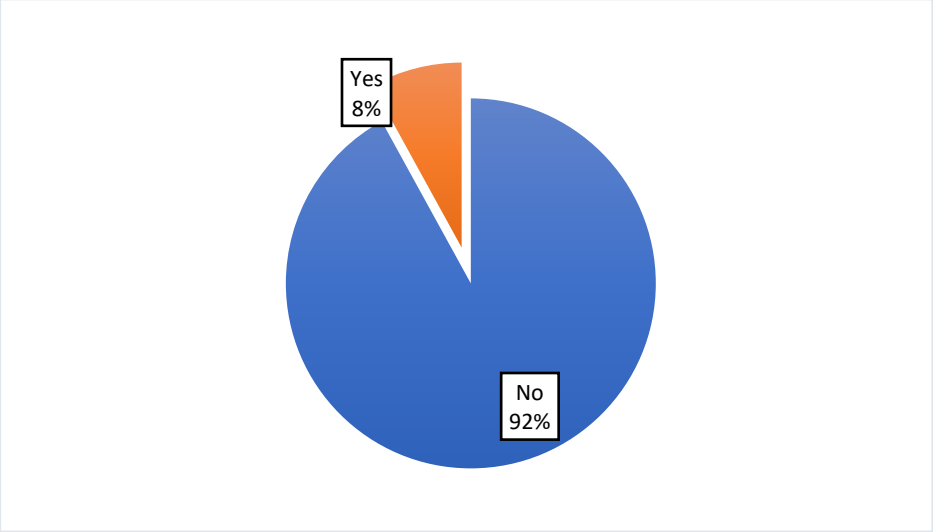

Figure two: Majority of subjects don't receive any medication for a continuous period of time (92%).

Table 3: Medical History of studied subjects.

Items		Frequency	Percent	Mean	Std. Deviation
Had Covid before?	Yes	72	40	1.5843	0.527
	No	107	60		
Number of previous Covid infection?	0	107	59.8	0.5196	0.744
	1	56	31.3		
	2	12	6.7		

	3	3	1.7		
	4	1	0.6		
Have complications from Covid?	Yes	28	15.6	1.8436	0.364
	No	151	84.4		
Complications of Covid?	N0	156	87.2	0.1955	0.551
	Sinusitis	12	6.7		
	Headache	10	5.6		
	Fever	1	0.6		
Take Corona vaccine?	Yes	166	93.0	1.0847	0.317
	No	13	7.0		
If yes, how many doses?	1	20	11.2	2.6257	0.694
	2	29	16.2		
	3	128	71.5		
	4	2	1.1		

Table 3: 60% of subjects don't catch Covid before, 31.3 % had Covid one time, 87.2% had no complications , 93% took the vaccine and 71.5% took three doses of the vaccine.

Table 4: Subjects' Knowledge.

Items		Frequency	Percent	Mean	Std. Deviation
Define Covid-19	A virus causes gastrointestinal infection	15	8.4	3.659	0.90
	It causes diarrhoea	7	3.9		
	It causes constipation	2	1.1		
	Causes upper /lower respiratory infection.	155	86.6		
Methods of Covid-19 transmission.	Contact with infected person	90	50.3	1.7542	0.95
	Contact with contaminated surfaces	60	33.5		
	Talking with infected	12	6.7		
	All of the above	17	9.5		
Most common symptoms of Covid-19.	Cough, fever, shortness of breathing	93	52	1.7039	0.90
	Itching and fatigue	60	33.5		
	Headache, nausea and vomiting	12	6.7		
	All of the above	14	7.8		
Knowing Complications of Covid-19.	Know	100	55.9	1.600	0.80
	Don't know	79	44.1		
	Yes	90	50.3	1.570	0.5

Aware about strain of Covid-19.	No	89	49.7		
World Health Organization announcement about end of pandemic.	Know	108	60.3	1.401	0.5
	Don't know	71	39.7		

Table 4: Majority of subjects were aware about the nature of the virus, 86.6% answered that Covid-19 is a virus affect respiratory tract, contact with infected person is method of transmission of the virus reported by 50.3% and Cough, fever, and shortness of breath is a common symptom as mentioned by 52%. Also 55.9% know complications post infection, 50.3 % know that there more than one strain of Covid-19 and 60.3% known World Health Organization's announcemen.

Table 5: Subjects' preventive Practices.

Items		Frequency	Percent	Mean	Std. Deviation
Wear a mask in college?	Yes	91	50.8	1.51	0.50
	No	88	49.2		
Obligated to wear a mask in public places.	Yes	101	56.4	1.43	0.49
	No	78	43.6		
Wash hands regularly with soap and water for 20 seconds.	Yes	162	90.5	1.09	0.29
	No	17	9.5		
Adhere to social distancing inside home.	Yes	76	42.5	1.57	0.49
	No	103	57.5		
Adhere to social distancing all times.	Yes	100	55.9	1.44	0.49
	No	79	44.1		
Drink plenty of fluids?	Yes	140	78.2	1.22	0.41
	No	39	21.8		
Adhere to preventive measures if had symptoms.	Yes	165	92.2	1.07	0.27
	No	14	7.8		
Stay away from infected?	Yes	175	97.8	1.02	0.15
	No	4	2.2		
Eating healthy food , rise immunity.	Yes	143	79.9	1.2	0.4
	No	36	20.1		
College curricula contain Corona lectures ?	Yes	93	52	1.48	0.5
	No	86	48		
Coronavirus antigen results.	Positive	6	3.4	1.9663	0.18
	Negative	172	96.6		

Table 5: 50.8% of subjects reported they obligated to wear a mask in college and 56.4% obligated in public places. The majority of participants washed their hands regularly with soap and water for at least 20 seconds (90.5%), 57.5% not adhere to social distancing inside the home when dealing with family members but adhere to social distancing at all times reported by 55.9%. 78.2 % drink plenty of fluids to strengthen immune system and 92.2% adhere to preventive measures if they experience Covid

symptoms, (97.8%) of them stay away from infected additionally, 79.9% eat healthy food that increases their immunity and 96.6% negative to (Coronavirus antigen analysis).

Table 6: Mann-Whitney test

Test Statistics		
	Age	Academic year
Mann-Whitney U	2939.000	2263.000
Wilcoxon W	8934.000	8258.000
Z	-2.961	-4.945
Asymp. Sig. (2-tailed)	.003	.000
a. Grouping Variable: Medical Department		

Table 6: Mann-Whitney test; There is statistically significant difference in all sections (Mann-Whitney = - 4.945) accordingly, we will reject the null hypothesis, there is no statistically significant difference in low incidence SARS-CoV-2 antibodies among subjects and we accept the alternative hypothesis, there is statistically significant difference where low incidence SARS-CoV-2 antibodies among subjects.

DISCUSSION

By considering important information in Table 1 researchers can better understand potential factors influencing prevalence of SARS-CoV-2 antigen among subjects regarding Figure 1 shows there is significant proportion of subjects and 79% have no hereditary history of disease. Therefore , the majority of participants didn't provide insights into potential risk factors or genetic predispositions that influence the prevalence of SARS-CoV-2 antigen; these results agree with Polechova et al., 2022 [15].

Figure 2; 91.1% not receiving any medication for a continuous period which can have implications for prevalence of SARS-CoV-2 antigen. Therefore we consider that certain medications can affect the immune system, either by suppressing or enhancing it resulting in a high proportion of subjects not receiving medication for a continuous period which indicates a relatively healthy population with fewer diagnosed health conditions requiring medication. The current results are supported by Tadese et al., 2021[3]. Table 3; most of subjects haven't previously infected with COVID-19 (60%) only 31.3% of them infected once, and 87.2% didn't not experience any complications during their previous infection. 93%, reported receiving the vaccine. This indicates a high vaccination rate among the participants. Among those who received the vaccine, 71.5% reported receiving three doses. This suggests that a significant portion of the vaccinated subjects received a booster dose that provides important insights into disease history and vaccination rate which provide protection against infection, Lower transmission potential and potential impact on the prevalence of SARS-CoV-2 antigen, which reflect individual and community health and Confidence in vaccine effectiveness as clarified by Hill et al., 2021[7] and Muangman et al., 2022 [14].

86.6% of subjects in Table 4, identified COVID-19 as a virus affectting respiratory system, this indicates a good understanding the virus nature also 50.3% of them recognized that contact with an infected person is method of transmission that indicate their awareness with primary mode of transmission. 52% correctly identified cough, fever, and shortness of breath as common symptoms that reflect a significant knowledge about disease typical signs. Moreover 55.9% of subjects had knowledge about potential health consequences of the disease. Approximately

50.3% of them recognized existence of more than one strain indicate a basic understanding of viral variants as reported by Gans et al., 2022 [17]. Additionally, 60.3% aware of World Health Organization's announcement of end of pandemic. These findings highlight the knowledge levels of various aspects of COVID-19 and global health announcements which are crucial for informed decision-making and adherence to preventive measures and the result supported by (Nickbakhsh et al., 2022) [4].

In Table 5; 50.8% of subjects were obligated to wear a mask; in college & 56.4% in public, this suggests that mask-wearing is practiced by a significant portion of participants. 90.5% regularly washed their hands reflecting high level of hand hygiene practices as important preventive measure to reduce virus transmission, 55.9% always adhering to social distancing. It is positive that a significant proportion practice social distancing to some extent as agreed with Hill et al., 2021[7].; who found 78.2%, reported drinking fluids to strengthen their immunity. High percentage of participants 92.2% adhering to preventive measures if they experienced symptoms of COVID-19 as clarified by (Abbasi-Oshaghi et al., 2020) [18] said subjects' seeking medical advice when experienced symptoms. 97.8% complied with preventive measures. This finding suggests a strong compliance with the recommended guidelines to prevent the spread of COVID-19. The current results are consistent with those of Ayouni et al., 2021& Bobrovitz et al., 2021 [19]. whom agree with the above mentioned results.

In table 6 the Mann-Whitney test indicate a statistically significant difference in all sections with a Mann-Whitney value of -4.945. The null hypothesis, which suggests no statistically significant difference in incidence of SARS-CoV-2 antibodies among students in contrast, the alternative hypothesis, which proposes a statistically significant difference in the incidence of SARS-CoV-2 antibodies, is accepted which supported by (Alharbi et al., 2021) [6] whom found general seroprevalence of COVID-19 in Saudi Arabia 11% in different regions. 96.6% of participants tested negative most subjects did not have detectable levels of the virus so the study hypothesis was accepted and there was low incidence SARS-CoV-2 Antibodies among students so study hypothesis was accepted; study results agree with (Wang et al., 2021) [24]. The characteristics of the participants were used to interpret and explain the high percentage of negative results. The study results agree with those (Gans et al., 2022) [17]. The percentage of negative results has implications for public health as (Turcato et al., 2022) stated that it can inform decisions about the disease surveillance, testing strategies, and containment measures in agreement with with (Ayouni et al., 2021) [19] who found a high proportion of negative results may suggest a relatively low prevalence.

CONCLUSION:

96.6% of participants were negative for virus antigen analysis so the study hypothesis was accepted and there was low incidence SARS-CoV-2 antibodies among subjects.

RECOMMONDATION

A well -prepared education intervention suited to subjects' needs should be conducted to raise their preventive practice when dealing with infectious diseases.

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AUTHOR CONTRIBUTION:

All authors participate in; formulate research design , writing research proposal, data analysis process , writing–original draft preparation, review and editing and they had read and agreed the published version of the manuscript.

Data collection was done by WA[1,2] and TE[3] also WA[1,2] was responsible about publishing process .

CONFILACT OF INTERET

The authors declare no conflicts of interest concerning the research, authorship, and publication of this article.

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