Original Article :

Knowledge, Attitude, and Practice of Varicella-Zoster Virus and Its Vaccination among Al-Qunfudah General Population in Saudi Arabia

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Abstract

Background and Aims:
Understanding public knowledge, attitudes, and practices regarding Varicella-Zoster Virus (VZV) and its vaccination is crucial to mitigate the risk for this infection. This study aims to assess the knowledge, attitudes, and practices regarding VZV and its vaccination at Al-Qunfudah governorate.

Methods:
A descriptive cross-sectional study was conducted on a convenience sample of 473 participants from Al-Qunfudah governorate residents. Data was collected by an online questionnaire that was distributed via electronic platforms. The data was analyzed using SPSS software.

Results:
Among 473 participants, only 24 (5.1%) received the VZ vaccine. Knowledge of the VZV was significantly higher among young and employed ones (p = 0.010 and 0.027, respectively). While knowledge about the VZ vaccine was significantly higher among elderly, female, Saudi, and retired participants as well as those who received the three Covid-19 vaccine doses (p = 0.025, 0.029, 0.033, 0.041, and 0.027), respectively. VZ Vaccine willingness was higher among females and those without chronic conditions (p = 0.012, 0.007), respectively. The most common barriers to the VZ vaccine were being healthy (186, 39.3%), ignorance (172, 36.4%), and concerns about the vaccine side effects (162, 34.2%).

Conclusion:
This study uncovers a significant gap in awareness about VZ vaccination following the COVID-19 pandemic, and vaccination rates are very low. Despite this, there is a strong willingness among the population to receive the vaccine when recommended by a healthcare provider. By integrating VZ vaccine information into broader public health campaigns, there is great potential to improve vaccination rates.

Keywords:
Attitude, Varicella-Zoster Virus, knowledge, vaccination

Introduction:

Varicella Zoster Virus (VZV) is a neurotropic human herpesvirus from the alpha herpesviridiae genus. The virus causes primary infection, which results in varicella, and HZ represents the reactivation of latent infection.[1] The VZV genome has approximately 125,000 base pairs of straight double-stranded DNA, and the nucleocapsid contains 162 capsomers. The virus infects exclusively human cells, including epithelial cells, T lymphocytes, and ganglionic neurons.[2] Older age, immunosuppression, and mechanical stress may cause dormant VZV infection to reactivate.[3]

The SARS-CoV-2 virus, which caused the coronavirus outbreak in 2019, is associated with the new development of several cutaneous lesions. The most common presentations are maculopapular rash, urticarial pattern, chilblain-like acral pattern, vesicular lesions, and purpuric "vasculitis" pattern.[4-6] Additionally, this pandemic negatively affected the human immune system and lymphopenia, which increases HZ cases.[5]

The onset of HZ rash related to COVID-19-associated typical symptoms was variable. A systematic review reported that 29 patients with COVID-19 developed HZ. In another study done on 501 persons, 68.8% had herpes zoster (HZ) and chronic illness (diabetes, hypertension).[7]

In 75% of patients with cutaneous manifestations, skin lesions appeared before the other typical clinical manifestations of COVID-19. This infection has been shown to be able to reactivate numerous viruses, including human herpesvirus and Epstein–Barr virus, as revealed in a recent case of pityriasis rosea during COVID-19.[8,9]

Public knowledge about viral infections and their preventive measures is vital to limit their spread and complications. In a previous study, over 80% of Saudi people were aware of HZ, while only about 50% knew about the HZ vaccine.[10] To our knowledge, no study has assessed public awareness of VZV and its vaccine in the Al-Qunfudah governorate, Makkah Region, Saudi Arabia. Thus, this study aimed to assess knowledge, attitude, and practice of varicella-zoster virus and its vaccination in the Al-Qunfudah governorate.

Methods:

Study design and population:

This descriptive cross-sectional study was done at Al-Qunfudah governorate, and data were collected in the period from March to April 2024.

The inclusion criteria were all populations

of Al-Qunfudah governorate, Makkah Region, Saudi Arabia, of both genders and all age groups.

Sample size:

Using a 95% confidence interval and 5% marginal error, the Raosoft online calculator was used to determine the minimum sample size, which was 384 participants. It's based on the total number of adults in Al-Qunfudah governorate (300,516) and the frequency of adequate knowledge about VZV (50%).

Data collection:

A validated self-administered questionnaire was used to collect data about sociodemographic characteristics and history of COVID19 infection and its vaccination, knowledge of VZV and its vaccination, attitudes, and practices regarding the VZ vaccine. The questionnaire included seven questions about VZV, six questions about the VZ vaccine, two practice questions, six attitude questions, a question that assessed barriers to the VZ vaccine, and two questions that addressed sources of information.

To facilitate data collection, the study instrument was constructed using the Google Forms program. Following its creation, the survey was reviewed by a panel of family medicine and microbiological experts, who approved its validity. Then pilot research was carried out, and the survey link was sent on various electronic platforms such as Telegram and WhatsApp. When 31 responses were received, the link was closed, and the data was pretested. The pilot data was evaluated to determine its reliability using Cronbach's alpha, which was 0.85, suggesting reliability. The pilot data was not used in the main analysis. Finally, the main study data was obtained via disseminating the study tool in its digitalized version via various electronic channels.

For every right answer, a score of "1" was given, and for every wrong or "don't know answer, a score of "0" was given. A knowledge score was also computed, awarding a point when a participant affirmed a true statement or disagreed with a false one. As such, scoring ≥80% was considered as "high," 60-79% as "intermediate," 40-59% as "fair," 20-39% as "low," and <20% as "unsatisfactory."[10]

Data analysis:

Data was statistically analyzed using the SPSS application version 26. To investigate the association between the variables, the chi-squared test (χ^2) was applied to qualitative data that was expressed as numbers and percentages. Quantitative

data was expressed as mean and standard deviation (mean ± SD), where Mann-Whitney and Kruskal-Wallis tests were used for parametric variables. Correlation analysis using Spearman's test was done, and a p-value of <0.05 was considered statistically significant.

An ethical approval for the study was obtained from the research ethics committee of Umm Al-Qura University, Saudi Arabia, with approval number HAPO-02-K-012-2024-02-2007. The study's nature and goal were described in the questionnaire that was used. Every participant was requested to freely take part in the study, and since the tool contained no personal information, confidentiality was maintained.

Results:

Of the 473 respondents, 230 (48.6%) were between the ages of 31 and 50, 392 (82.9%) were women, 451 (95.3%) were Saudi nationals, and 307 (64.9%) were married. Of them, 73.4% had a university or higher education level, 223 (47.1%) were employed, and 226 (47.8%) earned more than 10,000 SR each month. Nearly one-quarter of the individuals (126, 26.6%) had chronic illnesses. 247 people (52.2%) had a history of Covid-19 infection. Only 7 (2.8%) of them had shingles following Covid-19 infection, while 117 (24.7%) had a history of chickenpox.

A total of 378 (79.9%) of individuals heard about VZV, but only roughly 239 (50.5%) were aware of the VZ vaccine. The mean total knowledge score was 7.24 ± 3.98, with 4.92 ± 2.99 for shingles and 2.32 ± 1.96 for the VZ vaccination. According to the knowledge score classification, just 2.7% of participants had a high knowledge level, 42.9% had an intermediate knowledge level, and 30.4% had a moderate knowledge level. The mean knowledge score about VZV was substantially higher among participants aged 19 to 30 years and employed individuals (p = 0.010 and 0.027, respectively). While the score about its vaccine was substantially higher among individuals aged 51 years or older, females, Saudi nationals, and retired participants (p = 0.025, 0.029, 0.033, and 0.041, respectively). Participants who believed there was a link between Covid-19 and shingles (p < 0.001), those who received all three Covid-19 vaccine doses (p = 0.027), and those with a history of chickenpox infection (p = 0.005) had significantly higher mean knowledge scores for the VZ vaccine (Table 1).

Table 1. Statistical relationship between knowledge regarding VZV and its vaccine and participants' demographic variables (n= 473)

Variable	Knowledge score of VZV		Knowledge score of VZ vaccine	
	Mean ± SD	p-value	Mean ± SD	p-value
Age (years)				
≤18	4.77 ± 3.43	**0.010**	2.33 ± 1.81	**0.025**
19-30	5.13 ± 3.01		2.16 ± 2.14	
31-50	4.5 ± 2.91		2.2 ± 1.89	
≥51	5.63 ± 2.97		2.79 ± 1.87	
Gender				
Female	4.98 ± 2.97	0.340	2.41 ± 1.96	**0.029**
Male	4.62 ± 3.11		1.91 ± 1.92	
Nationality				
Saudi	4.97 ± 3	0.117	2.36 ± 1.95	**0.033**
Non-Saudi	3.86 ± 2.83		1.54 ± 2.01	
Marital status				
Single	5.12 ± 3.09	0.275	2.34 ± 2.17	0.244
Married	4.76 ± 2.89		2.26 ± 1.88	
Divorced /widow	5.55 ± 3.45		2.79 ± 1.83	
Educational level				
Can read and write	5.7 ± 3.3	0.299	2.4 ± 2.11	0.517
Secondary school or less	4.62 ± 2.96		2.12 ± 1.86	
University or higher	5 ± 3		2.39 ± 1.99	
Occupation				
Student	4.78± 2.64	**0.027**	2.16± 2.14	**0.041**
Unemployed	4.15 ± 2.71		2.18 ± 1.93	
Retired	5.2 ± 3.07		2.84 ± 1.76	
Employed	5.26 ± 3.14		2.26 ± 1.97	
Family income				
Less than 5000	4.47 ± 2.8	0.287	2.23 ± 1.84	0.294
5000-10000	4.85 ± 3.07		2.15 ± 1.89	
More than 10000	5.11 ± 2.99		2.49 ± 2.05	
Having a chronic condition				
No	4.94 ± 2.99	0.715	2.24 ± 1.97	0.095
Yes	4.87 ± 3.02		2.54 ± 1.92	
Do you think there's a relationship between Covid-19 and shingles?				
No	5.07 ± 2.72	0.161	2.66 ± 2.1	**<0.001**
Yes	5.5 ± 3.34		3.13 ± 2.12	
I don't know	4.73 ± 3.03		2 ± 1.79	

Have you had Covid-19?				
No	5.03 ± 3.01	0.406	2.28 ± 2.01	0.565
Yes	4.81 ± 2.98		2.36 ± 1.92	
If yes, did you have vaccination? (n= 247)				
No	4 ± 5.41	0.264	3.25 ± 2.62	0.485
Yes	4.83 ± 2.94		2.34 ± 1.91	
How many doses of the vaccine (n= 247)				
One	3.66 ± 1.96	0.342	2 ± 1.26	**0.027**
Two	4.45 ± 2.75		1.92 ± 1.87	
Three	5.03 ± 3.1		2.59 ± 1.94	
Have you ever had shingles after Covid-19 infection? (n= 247)				
No	4.84 ± 3.01	0.616	2.35 ± 1.92	0.813
Yes	4 ± 1.82		2.57 ± 2.07	
Have you had chicken pox?				
No	4.98 ± 3.04	0.388	2.17 ± 1.9	**0.005**
Yes	4.72 ± 2.85		2.79 ± 2.09	

Taking the "agree" and "strongly agree" responses into account, 179 participants (37.8%) were concerned about contracting shingles, 302 (63.8%) believed that shingles had a substantial impact on health, and 142 (30.1%) were concerned about the vaccine's cost. Participants had a positive attitude based on the following: 353 (74.6%) wanted to learn more about the disease, while 398 (84.1%) wanted to know how to prevent it. In addition, 346 (73.2%) were eager to acquire the shingles vaccine when their healthcare professional advised it (Table 2).

Table 2: Participants attitudes towards VZV and its vaccine (n=473) .

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	n (%)	n (%)	n (%)	n (%)	n (%)
I am worried about getting shingles.	49 (10.4)	70 (14.8)	175 (37)	105 (22.2)	74 (15.6)
Shingles have a significant effect on health	15 (3.2)	19 (4)	137 (29)	186 (39.3)	116 (24.5)
I am interested in knowing more about this disease	11 (2.3)	21 (4.4)	88 (18.6)	174 (36.8)	179 (37.8)
I am interested in knowing about how to prevent it	10 (2.1)	10 (2.1)	55 (11.6)	170 (35.9)	228 (48.2)
I worry about the cost of the vaccine	71 (15)	104 (22)	156 (33)	84 (17.8)	58 (12.3)
I would get the shingles vaccine if the doctor recommended it	16 (3.4)	25 (5.3)	86 (18.2)	163 (34.5)	183 (38.7)

Regarding the participants' practices, only 24 (5.1%) of them were vaccinated against shingles. 217 (45.9%) respondents said they avoid using the same utensils when they encounter someone who has shingles, 187 (39.5%) claimed they avoid shaking hands or hugging, and 160 (33.8%) stated they avoid sharing food (Table 3).

Table 3: Participants practice towards VZV and its vaccine ((n= 247).

Have you ever had the shingles vaccine?	**n (%)**
No	449 (94.9)
Yes	24 (5.1)
Protective measures against shingles	
Do not use the same utensils	217 (45.9)
Get vaccinated	164 (34.7)
Do not share food	160 (33.8)
Wear a mask	172 (36.4)
Do not hug or shake hands	187 (39.5)
Take medications	56 (11.8)
Do nothing	146 (30.9)

The mean attitude score was 22.34 ± 3.55 (6-30). Saudi participants and those with moderate family monthly income (5000-10000 SR) had substantially higher scores (p values 0.014 and 0.038, respectively). The mean practice score was 1.24 ± 1.26 (0-4) and female participants were considerably more inclined to receive the VZ vaccine (p = 0.012), those without chronic diseases (p = 0.007), and those who received the complete COVID-19 vaccination doses (three doses) (p = 0.039) (Table 4).

Table 4: Relationship between mean attitude and practice score and participants' willingness to have VZ vaccine and their demographics (n= 473).

Variable	**Attitude score towards VZ vaccine**		**Practice score to VZ vaccine**		**Intention to be Vaccinated**	
	Mean SD	p-value	Mean SD	p-value	n (%)	p-value
Age (years)						
≤18	21.5 ± 3.36	0.312	1.16 ± 1.24	0.777	7 (4)	0.530
19-30	22 ± 3.96		1.17 ± 1.26		47 (26.9)	
31-50	22.39 ± 3.33		1.24 ± 1.29		78 (44.6)	
≥51	22.81 ± 3.53		1.33 ± 1.22		43 (24.6)	
Gender						
Female	22.32 ± 3.54	0.936	1.26 ± 1.16	0.335	155 (88.6)	**0.012**
Male	22.44 ± 3.61		1.13 ± 1.28		20 (11.4)	

Nationality						
Saudi	22.44 ± 3.53	**0.014**	1.24 ± 1.27	0.972	170 (97.1)	0.156
Non-Saudi	20.45 ± 3.55		1.27 ± 1.15		5 (2.9)	
Marital status						
Single	22.15 ± 3.84	0.345	1.26 ± 1.27	0.959	51 (29.1)	0.553
Married	22.37 ± 3.48		1.23 ± 1.26		109 (62.3)	
Divorced /widow	22.85 ± 3.05		1.2 ± 1.32		15 (8.6)	
Educational level						
Can read and write	20.2 ± 4.84	0.436	2 ± 0.94	0.086	5 (2.9)	0.319
Secondary school or less	22.34 ± 3.7		1.11 ± 1.21		37 (21.1)	
University or higher	22.41 ± 3.45		1.26 ± 1.28		133 (76)	
Occupation						
Student	22.09 ± 3.63	0.278	1.06 ± 1.21	0.52	24 (13.7)	0.601
Unemployed	21.74 ± 3.88		1.35 ± 1.25		41 (23.4)	
Retired	22.91 ± 3.61		1.2 ± 1		32 (18.3)	
Employed	22.54 ± 3.31		1.25 ± 1.31		78 44.6)	
Family income						
Less than 5000	21.62 ± 4.41	**0.038**	1.3 ± 1.11	0.573	25 (14.3)	0.335
5000-10000	21.98 ± 3.25		1.29 ± 1.2		59 (33.7)	
More than 10000	22.85 ± 3.43		1.18 ± 1.29		91 (52)	
Having a chronic condition						
No	22.2 ± 3.55	0.271	1.27 ± 1.2	0.423	128 (73.1)	**0.007**
Yes	22.73 ± 3.53		1.16 ± 1.25		47 (26.9)	
Do you think there's a relationship between Covid-19 and shingles?						
No	22 ± 3.5	0.141	1.19 ± 1.26	0.889	55 (31.4)	0.79
Yes	23.03 ± 3.4		1.28 ± 1.3		21 (12)	
I don't know	22.36 ± 3.6		1.25 ± 1.26		99 (56.6)	
Have you had Covid-19?						
No	22.54 ± 3.69	0.266	1.2 ± 1.25	0.525	89 (50.9)	0.305
Yes	22.16 ± 3.42		1.27 ± 1.28		86 (49.1)	
If yes, did you have vaccination? (n= 247)						
No	23.25 ± 6.07	0.658	1.75 ± 1.5	0.383	1 (1.2)	0.678
Yes	22.14 ± 3.38		1.27 ± 1.28		85 (98.8)	
How many doses of the vaccine (n= 247)						
One	21.33 ± 2.33	0.636	0.83 ± 0.98	0.676	0 (0.0)	**0.039**
Two	22.15 ± 2.96		1.32± 1.3		22 (25.6)	
Three	22.2 ± 3.76		1.27± 1.12		64 (74.4)	

Have you ever had shingles after Covid-19 infection? (n= 247)						
No	22.14 ± 3.44	0.639	1.25 ± 1.27	0.182	85 (98.8)	0.247
Yes	22.85 ± 2.85		2 ± 1.52		1 (1.2)	
Have you had chicken pox?						
No	22.15 ± 3.63	0.061	1.23 ± 1.26	0.821	132 (75.4)	0.949
Yes	22.93 ± 3.25		1.27 ± 1.29		43 (24.6)	

The most prevalent barriers to the VZ vaccine indicated by participants were being healthy and not at risk (186, 39.3%), ignorance (172, 36.4%), and concerns about the vaccine's negative effects (162, 34.2%) (Figure1).

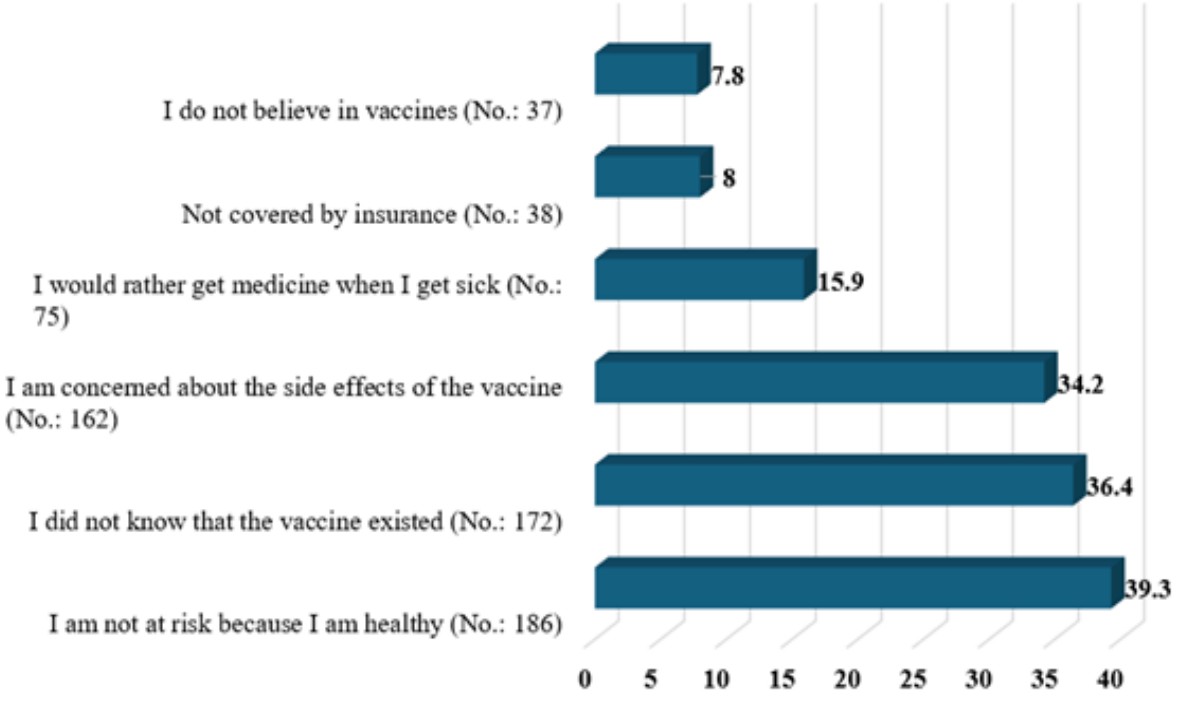


Figure 1. Barriers to varicella zoster vaccine (N. 473)

Figure1: Barriers to varicella zoster vaccine (N.473)

There was no significant difference in response to the barrier questions among both genders on the VZ vaccine ($p > 0.05$) (Figures 2).

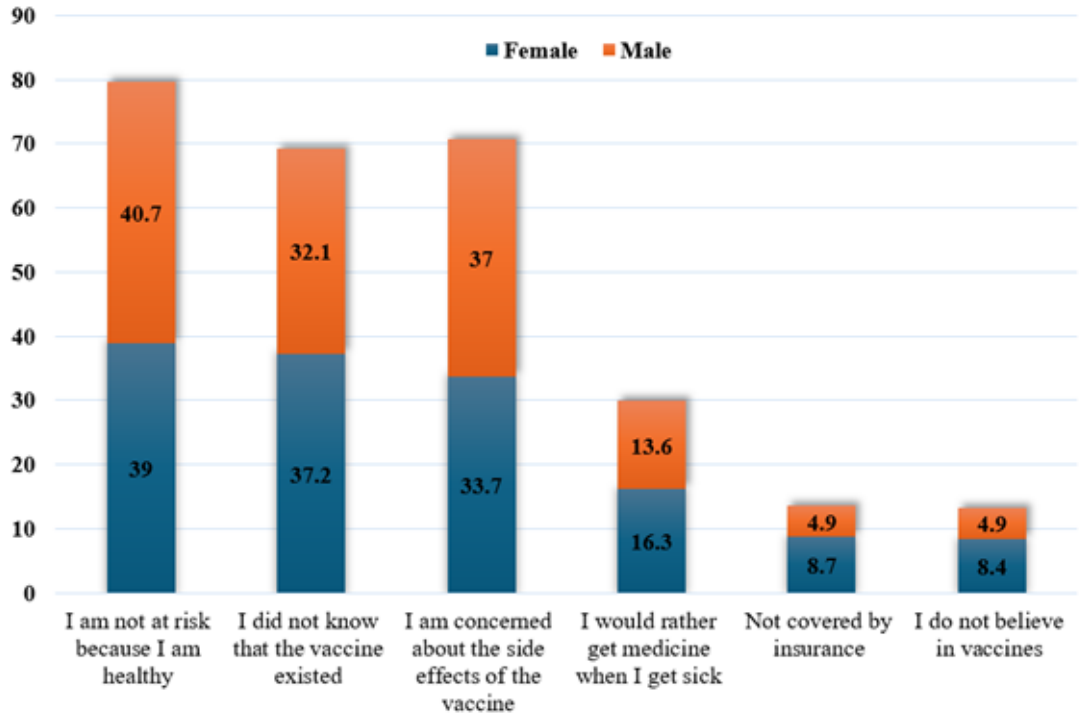


Figure 2. Gender difference according to barriers to the VZ vaccine

Figure2: Gender difference according to barriers to the VZ vaccine.

Discussion:

Herpes zoster infections are reactivations of the varicella-zoster virus, and since COVID-19, there has been a significant increase in HZ, especially in people older than 50. [7,11,12]. This study aimed to measure the knowledge, attitude, and practice of VZV and its vaccine after COVID-19 in the population in Al Qunfudah governorate.

Comparison with other studies

The current study reveals significant gaps in knowledge about VZV and its vaccine. A total of 378 (79.9%) of individuals heard about VZV, but only 239 (50.5%) were aware of its vaccine. This result is consistent with a study conducted in South Korea reported that over 80% of participants were aware of VZV and over half were aware of the VZ vaccine. [13]

On the contrary, with research conducted in the UAE community, which found that just 15% of respondents were aware of the VZ vaccine and just over 60% were aware of VZV. [10] Furthermore, the results of an American study indicate that participants' greater knowledge about VZ and its vaccine had a substantial impact on their motivation to obtain the vaccine.[14]

Women knew more about the disease and its preventative vaccine. This result contradicts another study conducted in Saudi Arabia, which found that men were more aware of the VZ vaccine than women. However, the same study confirms the current result that adults with higher education levels have more understanding about the VZ vaccine.[15]

In this study, the VZ immunization rate was extremely low, with only 7 (5.1%) receiving the vaccine. Numerous studies have found that VZ immunization rates are extremely low across a wide range of geographic areas. In the UAE and Hong Kong [10,16] approximately 3% of people have received the VZ vaccine compared to the United States 8% [11]. This underscores the critical need to increase public awareness of the disease's morbidity and the importance of obtaining the available vaccine, not only in Saudi Arabia but also in other countries throughout the world.

Most participants in this study were aware that persons over 50 should acquire the vaccine. This provides a potential strategy for persuading people who are most in need of the immunization to get it, given that more than 73.2% of participants expressed positive sentiments and were willing to receive the vaccine if a healthcare practitioner (HCP) recommended it. This outcome is consistent with another study.[17] In Saudi Arabia, the cost of the vaccine is not a disincentive, contrary to a South Korean study that found the price of the VZ vaccine was a substantial barrier to immunization.[13]

This study discovered that around half of the subjects were unaware that the HZ vaccine even existed. Even though there were high COVID-19 vaccination rates, only 12.5% believed there was a connection between COVID-19 and shingles (VZV). Knowledge about shingles and its vaccine was limited; only 2.7% had a high level of knowledge, while attitudes towards the shingles vaccine were positive. These findings highlight a significant need for targeted educational efforts to improve understanding and increase vaccine uptake in the population.

The existing study reported that 175 (37%) of the respondents intended to take the VZV, and this is supported by a previous systematic review in the US, where the authors found the VZ vaccine acceptance rate around the world is between (2.8%-89.02%).[18] The willingness to receive the shingles vaccine was significantly higher among females, those without chronic conditions, and those who had received the full COVID-19 vaccination. Against this finding, a previously done Saudi study found that men were 1.9 times more likely to accept the vaccine than women.[19]

Participants who had three doses of the COVID-19 vaccine or a history of chickenpox had higher knowledge scores about shingles and its vaccine. However, barriers such as a lack of perceived risk and limited knowledge about the vaccine's existence were prevalent, leading to low vaccination rates. This finding agrees with that of a previous Saudi study in Al-Ahsa.[20]

Limitations:

Despite the optimistic results, it is necessary to highlight some of the study's limitations. First, the study was conducted on the entire population, rather than just the vulnerable population. Second, participants may have another disease that reduces immunity (such as diabetes or the use of immunosuppressive medicines), which could be the source of herpes zoster infection; therefore, Covid-19 is not the major reason. Third, the study sample is unequally distributed as a result of the employment of a convenient sampling strategy. Finally, the sample was gathered online, which raises the likelihood of recall bias in the results.

Conclusions:

The study found that, despite positive sentiments toward the VZ vaccine, there is still a lack of awareness and suboptimal behaviors among the Al-Qunfudah population. Positive attitudes toward the VZV vaccine were higher among females with no history of chronic illness or who received the COVID-19 vaccine. The most frequently cited barriers to VZV use are a lack of information about it and the public's misunderstanding that being healthy means not needing to get vaccinated. Further research, particularly qualitative research, is regarded as necessary for a thorough understanding of this subject. Family physicians and other primary health care teams are advised to take the effort to educate individuals about VZV and its vaccine. The COVID-19 vaccination can protect people from illness and the detrimental effects on their immune systems, as well as indirectly against VZV infection.

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