Prevalence of limitations and barriers of receiving herpes-zoster vaccine among patients attending PHC in Tabuk city, 2023, cross-sectional study

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Abstract

Background: Herpes Zoster (HZ), or shingles, is a vaccine-preventable condition that disproportionately affects older adults and immunocompromised individuals. Despite the availability of the HZ vaccine, uptake remains suboptimal in many settings, potentially due to poor awareness and misconceptions.

Aim: This study aimed to assess the awareness, knowledge, attitudes, and barriers to HZ and its vaccine among residents of Tabuk City, Saudi Arabia.

Methods: A cross-sectional, quantitative study was conducted among 500 patients aged 50 years and older attending primary healthcare centers (PHCs) in Tabuk City over a six-month period. Data were collected using a validated, structured questionnaire adapted from previous literature and translated into Arabic. The questionnaire covered demographics, knowledge of HZ and its vaccine, attitudes, and sources of information. Data were analyzed using SPSS version 28, with descriptive statistics and chi-square tests to examine associations between knowledge levels and participant characteristics.

Results: Among the participants, 56.0% demonstrated good knowledge of HZ, while 44.0% had poor knowledge. Awareness of HZ (76.8%) and its vaccine (68.4%) was generally high; however, gaps remained in the recognition of symptoms and understanding of disease impact. Factors significantly associated with better knowledge included female gender ($p = .012$), non-Saudi nationality ($p = .022$), higher education ($p = .001$), employment ($p = .001$), prior infection or vaccination history ($p = .001$), and using the internet or healthcare professionals as information sources ($p = .001$). While 62.0% expressed willingness to receive the vaccine, acceptance increased to 81.4% if recommended by a physician. Fear of side effects and perceived low risk were the main barriers to vaccination.

Conclusion: Although general awareness of HZ is high among the Tabuk population, significant knowledge gaps and misconceptions persist, especially regarding symptoms and vaccine safety.

Keywords: Herpes Zoster, shingles, vaccine awareness, knowledge, attitudes, Saudi Arabia, primary healthcare, Tabuk, vaccination barriers.

Introduction

Herpes zoster (HZ), commonly known as shingles, is a painful cutaneous eruption resulting from the reactivation of latent varicella-zoster virus (VZV) in sensory ganglia, often decades after initial varicella (chickenpox) infection. Its incidence and severity increase markedly with age, particularly among individuals aged 50 years and older, as cellular immunity to VZV wanes over time [1]. Globally, it is estimated that one in three individuals will develop HZ during their lifetime, with higher rates observed in elderly and immunocompromised populations [2]. Complications such as postherpetic neuralgia (PHN), which can persist for months or years, significantly impair quality of life and daily functioning [3].

Vaccination is currently the most effective preventive measure, with recombinant zoster vaccine (RZV) representing high efficacy in reducing both HZ and PHN incidence [4]. Despite the availability of effective vaccines, awareness, acceptance, and uptake remain suboptimal in many regions, including the Middle East, where vaccine hesitancy and limited knowledge may pose barriers to implementation [5, 6].

For herpes zoster, two vaccines are currently available: the varicella vaccine, administered to prevent primary VZV infection, and the zoster vaccine, which reduces the risk of reactivation in older adults [7, 8]. The herpes zoster vaccine is especially critical for individuals aged 60 years and above, who are at higher risk of developing severe complications [9]. Despite its proven efficacy, vaccine uptake remains suboptimal globally due to barriers such as limited awareness, vaccine hesitancy, and accessibility issues [10, 11].

In Saudi Arabia, where an aging population is increasingly at risk of herpes zoster, the need to address vaccination challenges is pressing. Understanding local barriers to herpes zoster vaccine (HZV) uptake, including knowledge gaps and misconceptions, is essential for improving public health outcomes. This study focuses on assessing awareness, obstacles, and vaccine hesitancy among the population in Tabuk city, offering insights into strategies for enhancing immunization coverage and reducing the burden of herpes zoster in Saudi Arabia.

Methodology

A quantitative, observational, cross-sectional design was applied to assess the study objectives. Tabuk City, located in the northern region of Saudi Arabia, has an estimated population of approximately 657,000 as of the 2020 census. Data collection was conducted in primary healthcare centers (PHCs) under the Ministry of Health, encompassing 35 centers distributed throughout the city. The target population included patients aged 50 years and above attending these PHCs, with an estimated population size of around 200,000 individuals within this age group. The study duration extended over six months. Sample size was calculated using an online calculator based on a 95% confidence interval and a 5% margin of error, resulting in a minimum required sample size of 139 patients from a total of 384 patients visiting PHCs. Inclusion criteria encompassed male and female individuals aged 50 years and above, as well as immunocompromised patients under 50 years. Exclusion criteria included patients who had received the shingles vaccine outside Tabuk City or in hospitals, children, and pregnant women.

Data were collected using a structured, close-ended questionnaire adapted from a similar study conducted in the United Arab Emirates. The questionnaire consisted of 27 questions divided into four sections: demographics (6 questions), knowledge about HZ and its vaccine (14 questions), attitudes toward HZ and vaccination (5 questions), and vaccination practices (2 questions). Question formats included yes/no responses, multiple-choice options, and Likert scale ratings. The original English questionnaire was translated into Arabic and reviewed by a language specialist to ensure grammatical accuracy and cultural appropriateness. The validated questionnaire was distributed online using an online link for the eligible patients till no more respondents were included/ participated.

A pilot study was conducted with 15 randomly selected eligible individuals to test clarity and reliability. Feedback from the pilot helped refine ambiguous questions and reduce medical jargon to ensure participant understanding. Data from the pilot were excluded from the final analysis. Additionally, a biostatistician reviewed the questionnaire to confirm its reliability and face validity. Researchers underwent standardization sessions to minimize interviewer bias and ensure uniformity in data collection procedures.

Data Analysis

Data analysis was performed using IBM SPSS Statistics for Windows, Version 28.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies and percentages, were used to summarize the socio-demographic characteristics, knowledge, attitudes, and perceptions of the participants. The overall knowledge score regarding Varicella (chickenpox), shingles (Herpes Zoster), and the associated symptoms and vaccine was calculated by assigning one point for each correct response. Participants with a total knowledge score below 60% were classified as having poor knowledge, while those with scores equal to or above 60% were considered to have good knowledge. Associations between participants' knowledge level and various independent factors such as age, gender, nationality, educational level, employment status, history of Varicella or shingles, vaccination status, and sources of information were examined using the Pearson Chi-square test. When expected cell counts were low, the Exact probability test was applied to ensure validity. Statistical significance was set at $p < 0.05$.

Results

Table 1 presents the bio-demographic characteristics of the 500 patients attending primary healthcare centers (PHC) in Tabuk City, Saudi Arabia. Regarding age, 44.4% (n=222) were younger than 50 years, 13.8% (n=69) were exactly 50 years old, and 41.8% (n=209) were older than 50 years. The majority were females (71.2%, n=356), while males constituted 28.8% (n=144). Most participants were Saudi nationals (92.4%, n=462). Regarding educational level, a large proportion were university graduates (72.6%, n=363), followed by those with secondary education (14.2%, n=71), below secondary (10.6%, n=53), and no formal education (2.6%, n=13). As for employment status, 50.2% (n=251) were employees or self-employed, 28.4% (n=142) were retired, and 21.4% (n=107) were not working, or were students.

When asked about prior Varicella (chickenpox) infection, 40.0% (n=200) reported having had the disease, whereas 60.0% (n=300) had not. Among those who had Varicella, 58.0% (n=116) contracted it in childhood, 22.0% (n=44) during adolescence, 13.0% (n=26) as adults, and 7.0% (n=14) did not recall the timing. Regarding Varicella vaccination, 38.4% (n=192) reported being vaccinated, 23.6% (n=118) were not, and 38.0% (n=190) did not remember. Among those vaccinated, 44.1% (n=156) received it in childhood, 4.0% (n=14) during adolescence, 3.1% (n=11) as adults, and 48.9% (n=173) could not recall when. Finally, only 5.8% (n=29) of the participants reported a previous episode of shingles (Herpes Zoster), while the vast majority (94.2%, n=471) had not experienced it.

Table 1. Bio-Demographic Characteristics of the Study patients attending PHC in Tabuk city, Saudi Arabia (N=500)

Items	No	%
Age in years		
< 50 years	222	44.4%
Exactly 50 years	69	13.8%
> 50 years	209	41.8%
Gender		
Male	144	28.8%
Female	356	71.2%
Nationality		
Saudi	462	92.4%
Non-Saudi	38	7.6%
Educational level		
No formal education	13	2.6%
Below secondary	53	10.6%
Secondary education	71	14.2%
University graduate	363	72.6%
Work		
Not working / student	107	21.4%
Employee / free work	251	50.2%
Retired	142	28.4%
Have you had Varicella in the past?		
Yes	200	40.0%
No	300	60.0%
If yes, how old were you?		
At childhood	116	58.0%
At adolescence	44	22.0%
At adult phase	26	13.0%
I do not remember	14	7.0%
Have you been vaccinated against Varicella?		
Yes	192	38.4%
No	118	23.6%
I do not remember	190	38.0%
If yes, how old were you?		
At childhood	156	44.1%
At adolescence	14	4.0%
At adult phase	11	3.1%
I do not remember	173	48.9%
Have you had shingles in the past (Herpes Zoster)?		
Yes	29	5.8%
No	471	94.2%

Table 2 illustrates the participants' knowledge and perceptions regarding Varicella (chickenpox), shingles (Herpes Zoster), and associated symptoms and vaccine awareness. A high proportion of respondents reported awareness of Varicella (79.8%, n=399) and shingles (76.8%, n=384). Furthermore, 59.6% (n=298) stated they personally knew someone who had experienced shingles. Considering symptoms, the most commonly identified were rash (67.6%, n=338) and pain (51.8%, n=259), followed by malaise (43.4%, n=217), itching (43.2%, n=216), and headache (19.4%, n=97), while 22.4% (n=112) were not familiar with any symptoms. Regarding the nature of shingles-related pain, 37.2% (n=186) reported it as severe and potentially lasting months or years, whereas 28.0% (n=140) considered it moderate, and only 3.2% (n=16) perceived it as mild. Regarding the impact of chronic shingles pain on daily activities, 45.4% (n=227) believed it to be very relevant, 19.8% (n=99) found it relevant, and 4.8% (n=24) considered it of little relevance, while 30.0% (n=150) were unsure. Awareness of the shingles vaccine was reported by 68.4% (n=342), whereas 31.6% (n=158) were not aware of it.

Table 2. Participants' Knowledge and Perceptions Regarding Varicella (Chickenpox), Shingles (Herpes Zoster), and Its Associated Symptoms and Vaccine (N=500)

Items	No	%
Do you know the disease called Varicella (chickenpox)?		
Yes	399	79.8%
No	101	20.2%
Do you know the disease called shingles (Herpes Zoster)?		
Yes	384	76.8%
No	116	23.2%
Do you know someone who had shingles (Herpes Zoster)?		
Yes	298	59.6%
No	202	40.4%
Symptoms of shingles (Herpes Zoster)		
Pain	259	51.8%
Rash	338	67.6%
Itching	216	43.2%
Malaise	217	43.4%
Headache	97	19.4%
I do not know	112	22.4%
The pain associated with shingles (Herpes Zoster) is:		
Severe, lasting months or years	186	37.2%
Moderate, lasting a few weeks	140	28.0%
Mild, lasting a few days	16	3.2%
I do not know	158	31.6%
Can the chronic pain associated with shingles impact normal daily activities?		
Little relevance	24	4.8%
Relevant	99	19.8%
Very relevant	227	45.4%
I do not know	150	30.0%
Are you aware of the vaccine against shingles?		
Yes	342	68.4%
No	158	31.6%

Figure 1 shows the overall participants' knowledge and perceptions regarding Varicella (chickenpox), shingles (Herpes Zoster), and related symptoms and vaccine awareness. More than half of the respondents (56.0%, n=280) had a good level of knowledge, while 44.0% (n=220) showed poor knowledge. Considering source of information (Figure 2), the most frequently reported source was the internet (38.3%, n=158), followed by other unspecified sources (24.5%, n=101) and general practitioners (23.7%, n=98). Social networks such as friends or contacts (20.6%, n=85) and family members (19.9%, n=82) were also commonly reported. Mass media accounted for a smaller portion (14.3%, n=59).

Figure 1. The Overall Participants' Knowledge and Perceptions Regarding Varicella (Chickenpox), Shingles (Herpes Zoster), and Its Associated Symptoms and Vaccine

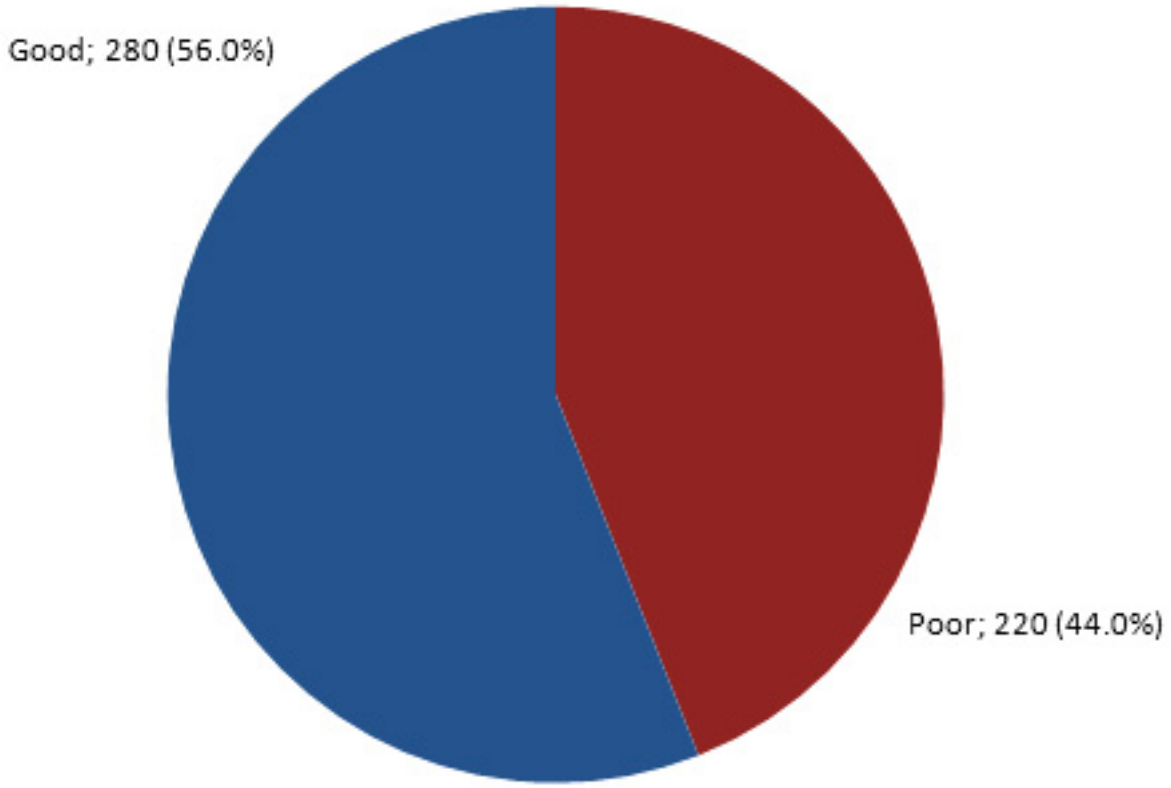

Figure 2. Source of Participants' Information about Varicella (Chickenpox), Shingles (Herpes Zoster), and Its Associated Symptoms and Vaccine

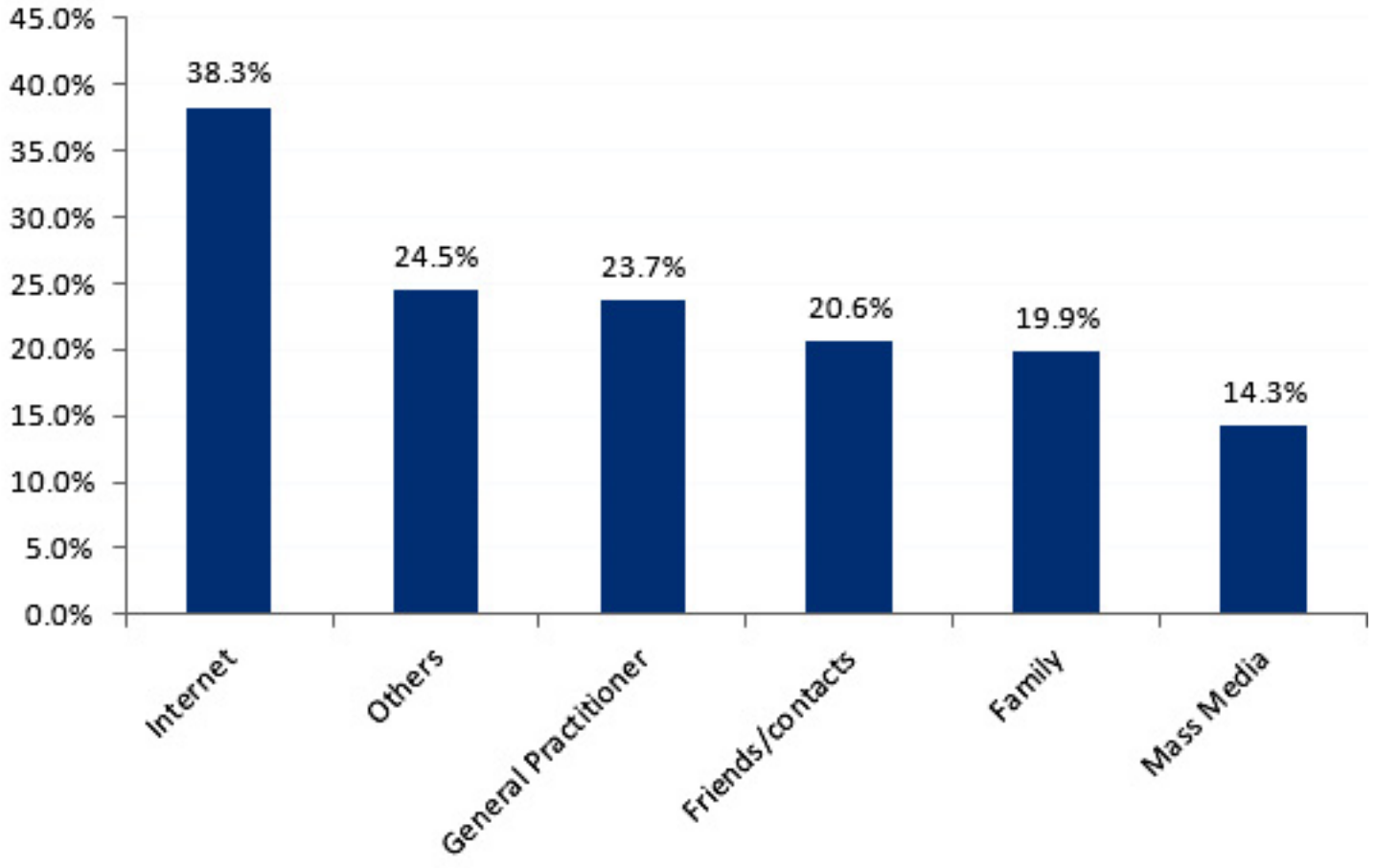

Table 3 presents the participants' attitudes and perceptions toward vaccination in general and the shingles vaccine in particular. A strong majority (88.0%, n=440) believed that vaccines are an effective tool for prevention. When asked about their willingness to receive the shingles vaccine, 62.0% (n=310) responded positively. This percentage increased to 81.4% (n=407) if the vaccine were recommended by their general practitioner. However, some concerns were evident among participants. About 41.8% (n=209) expressed worry that vaccines may interfere with other vaccines, and 47.2% (n=236) believed that vaccines could interact with other medications.

Table 3. Participants' Attitudes and Perceptions toward Vaccination and the Shingles Vaccine (N=500)

Attitude / perception	Yes		No	
	No	%	No	%
Do you think vaccines are an effective tool for prevention?	440	88.0%	60	12.0%
Would you vaccinate against shingles?	310	62.0%	190	38.0%
If your General Practitioner recommended the shingles vaccine, would you vaccinate?	407	81.4%	93	18.6%
Are you concerned that vaccines may interfere with other vaccines?	209	41.8%	291	58.2%
Do you believe that vaccines interact with other medications?	236	47.2%	264	52.8%

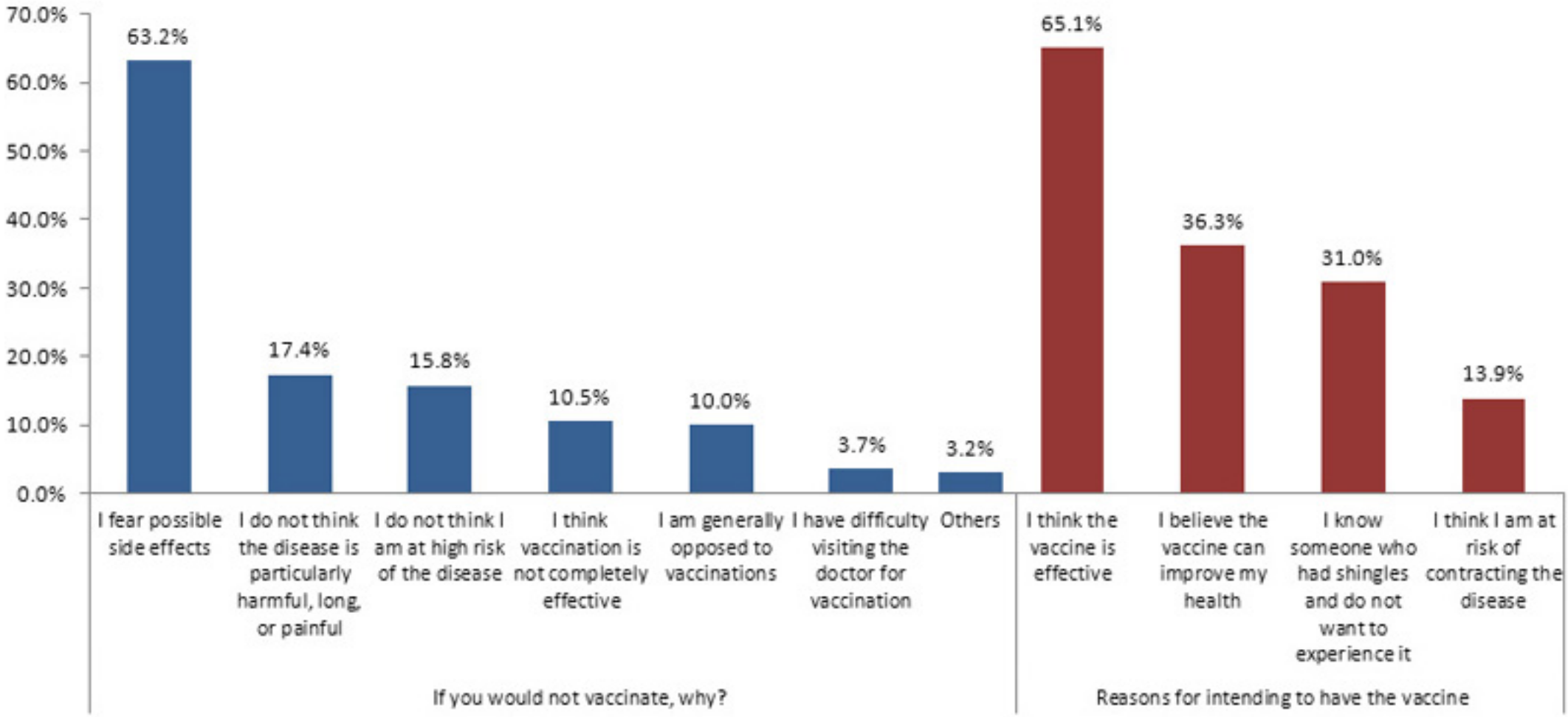

Figure 3. Reasons for Participants' Willingness or Unwillingness to Receive the Shingles Vaccine among Patients attending PHC in Tabuk city

Figure 3 presents the reasons reported by participants for either accepting or refusing the shingles vaccine. Among those unwilling to vaccinate, the most frequently reported reason was fear of possible side effects (63.2%, n=120), followed by the belief that the disease is not particularly harmful or severe (17.4%, n=33), and the perception of not being at high risk (15.8%, n=30). Other reasons included general opposition to vaccines (10.0%, n=19), doubts about vaccine effectiveness (10.5%, n=20), and difficulty accessing vaccination services (3.7%, n=7).

On the contrary, among those intending to receive the vaccine, the primary motivator was the belief in its effectiveness (65.1%, n=183). Additional reasons included the perception of being at risk for shingles (13.9%, n=39), knowing someone who had shingles (31.0%, n=87), and the belief that the vaccine would improve overall health (36.3%, n=102).

In Table 4, gender showed a significant difference, with females demonstrating higher knowledge levels than males (59.6% vs. 47.2%, p = .012). Nationality was also significant (p = .022), with non-Saudi participants showing better knowledge (73.7%) compared to Saudi participants (54.5%). Educational level was strongly associated with knowledge (p = .001), as participants with university education had higher knowledge (64.5%) than those with lower education levels, particularly those with no formal education (15.4%). Work status was another significant factor (p = .001), with employed participants having a better knowledge level (64.1%) compared to those not working or retired. Prior history of Varicella infection and vaccination were both significantly associated with higher knowledge levels (p = .001), as was a history of shingles infection, where nearly 90% (n=26) of those with past infection demonstrated good knowledge (p = .001). Regarding sources of information, those who received information from internet sources (76.6%), general practitioners (71.4%), or family and friends (over 67%) had significantly higher knowledge levels (p = .001), compared to those relying on “other” sources (46.5%). On the other hand, age did not show a statistically significant association with knowledge level (p = .546).

Table 4. Factors Associated with Participants' Knowledge and Perceptions Regarding Varicella (Chickenpox), Shingles (Herpes Zoster), and It's Associated Symptoms and Vaccine

Factors	Overall knowledge level				p-value
	Poor		Good		
	No	%	No	%	
Age in years					
< 50 years	96	43.2%	126	56.8%	.546
Exactly 50 years	27	39.1%	42	60.9%	
> 50 years	97	46.4%	112	53.6%	
Gender					
Male	76	52.8%	68	47.2%	.012*
Female	144	40.4%	212	59.6%	
Nationality					
Saudi	210	45.5%	252	54.5%	.022*
Non-Saudi	10	26.3%	28	73.7%	
Educational level					
No formal education	11	84.6%	2	15.4%	
Below secondary	37	69.8%	16	30.2%	.001*
Secondary education	43	60.6%	28	39.4%	
University graduate	129	35.5%	234	64.5%	
Work					
Not working / student	61	57.0%	46	43.0%	.001*
Employee / free work	90	35.9%	161	64.1%	
Retired	69	48.6%	73	51.4%	
Have you had Varicella in the past?					
Yes	70	35.0%	130	65.0%	.001*
No	150	50.0%	150	50.0%	
Have you been vaccinated against Varicella?					
Yes	64	33.3%	128	66.7%	.001*
No	57	48.3%	61	51.7%	
I do not remember	99	52.1%	91	47.9%	
Have you had shingles in the past (Herpes Zoster)?					.001*^
Yes	3	10.3%	26	89.7%	
No	217	46.1%	254	53.9%	
Source of information about the vaccine					
General Practitioner	28	28.6%	70	71.4%	
Family	20	24.4%	62	75.6%	
Friends/contacts	28	32.9%	57	67.1%	.001*
Mass Media	21	35.6%	38	64.4%	
Internet	37	23.4%	121	76.6%	
Others	54	53.5%	47	46.5%	

In Table 4, gender showed a significant difference, with females demonstrating higher knowledge levels than males (59.6% vs. 47.2%, p = .012). Nationality was also significant (p = .022), with non-Saudi participants showing better knowledge (73.7%) compared to Saudi participants (54.5%). Educational level was strongly associated with knowledge (p = .001), as participants with university education had higher knowledge (64.5%) than those with lower education levels, particularly those with no formal education (15.4%). Work status was another significant factor (p = .001), with employed participants having a better knowledge level (64.1%) compared to those not working or retired. Prior history of Varicella infection and vaccination were both significantly associated with higher knowledge levels (p = .001), as was a history of shingles infection, where nearly 90% (n=26) of those with past infection demonstrated good knowledge (p = .001). Regarding sources of information, those who received information from internet sources (76.6%), general practitioners (71.4%), or family and friends (over 67%) had significantly higher knowledge levels (p = .001), compared to those relying on "other" sources (46.5%). On the other hand, age did not show a statistically significant association with knowledge level (p = .546).

Discussion

In this study, the bio-demographic profile of participants attending primary healthcare centers in Tabuk City revealed a dissimilar representation across age groups, with a substantial portion aged 50 years and above. Females constituted the majority of the sample, and most participants were Saudi nationals. A notably high level of education was observed among respondents, with the majority having university degrees. Employment status varied, with many participants actively employed or self-employed, while others were retired or not working, including students.

Our study showed a significant defect in vaccination history, and disease perception related to Varicella and Herpes Zoster (HZ) among patients attending primary healthcare centers in Tabuk City. A considerable proportion of participants reported a history of Varicella infection, which matches with global patterns where Varicella remains a prevalent childhood illness, especially in regions without universal vaccination programs [12]. However, a prominent number of participants were uncertain about their history of Varicella infection or vaccination, reflecting deficiencies in personal health records and limited recall. This is consistent with findings from other populations, where poor documentation and low awareness of Varicella immunization history have been recognized as obstacles to HZ vaccine uptake [13].

Although some participants reported receiving the Varicella vaccine, nearly half were unable to recall the timing of vaccination. This observation is consistent with previous studies in Saudi Arabia and neighboring countries, which have identified challenges in vaccine documentation and public understanding of immunization schedules [14]. Furthermore, the low self-reported prevalence of HZ in this sample contrasts with international data showing increased incidence among older adults due to age-related decline in cell-mediated immunity [15]. This discrepancy may reflect underdiagnosis, misreporting, or a lack of awareness among patients' patterns observed in comparable settings where HZ is often overlooked unless severe complications occur [16].

The Varicella and Herpes Zoster (HZ) vaccination coverage observed in this study appears relatively low compared to other regions in Saudi Arabia and globally. Studies from major Saudi cities such as Riyadh and Jeddah have reported slightly higher Varicella vaccination rates, likely due to better healthcare infrastructure and awareness campaigns in urban centers [17, 18]. Globally, countries with established universal Varicella vaccination programs, such as the U.S. and parts of Europe, report significantly higher immunization rates [19]. The low HZ vaccine uptake in our study matches with trends in many middle-income nations, where barriers such as cost, lack of recommendations from physicians, and insufficient public health prioritization persist [20]. In contrast, countries like the U.S., where the HZ vaccine is routinely recommended for older adults, have achieved much higher coverage [21].

A relatively high level of awareness about Varicella (chickenpox) and Herpes Zoster (HZ) among participants was assessed with most respondents recognizing the names of both diseases. However, significant defects continue in the recognition of symptoms and the understanding of disease severity, which may affect timely healthcare-seeking behavior and vaccination decisions. While most participants reported awareness of shingles and over half knew someone who had been affected, only one-fifth could not identify any symptoms. Rash and pain were the most frequently recognized features, consistent with previous studies showing that visible symptoms are more readily recalled than systemic ones [22, 23]. Fewer participants associated HZ with malaise, itching, or headache, indicating a limited understanding of its broader clinical presentation, which has similarly been reported in other populations [15]. Remarkably, more than one-third of participants understood that shingles-related pain could be severe and long-lasting, yet fewer were uncertain about its potential to disrupt daily life, indicating a partial awareness of the debilitating nature of postherpetic neuralgia. Such misconceptions are known to contribute to delayed diagnosis and underutilization of preventive measures like vaccination [24]. Although two-thirds of participants were aware of the shingles vaccine, this awareness did not necessarily correspond to high vaccination rates, a pattern consistent with other research showing that awareness alone does not lead to action, particularly when issues of trust, access, or perceived need exist [25]. Alarmingly, the internet was cited more often than healthcare professionals as a source of information, raising concerns about misinformation,

especially in regions where online content is not always reliable. Previous studies in Saudi Arabia have highlighted the growing role of social media and informal sources in shaping public health perceptions, often at the expense of accurate knowledge [26-28]. Generally, the distribution of knowledge scores revealed that more than half of respondents had good knowledge.

Our study also showed that fear of side effects is the dominant barrier to shingles vaccine uptake, consistent with global trends where vaccine hesitancy is often driven by safety concerns [29]. A notable proportion also underestimated shingles severity or perceived them as low-risk, reflecting gaps in public awareness of the disease's potential complications. Similar reasons have been reported in Saudi and international studies, where misconceptions about susceptibility and harm contribute to low vaccination rates [30-32].

On the other hand, belief in vaccine effectiveness was the strongest motivator for acceptance, aligning with findings that confidence in vaccines drives uptake [33]. Personal exposure to shingles and perceived health benefits also played key roles, suggesting that direct experience with the disease may enhance vaccine willingness. However, the low influence of healthcare provider recommendations (not a top-cited factor) indicates missed opportunities for physician-driven advocacy, a known facilitator in high-coverage regions like the U.S. and Europe.

Conclusion and Recommendations

This study highlights both encouraging trends and significant gaps in the awareness and understanding of Varicella and Herpes Zoster (HZ) among patients attending primary healthcare centers in Tabuk City. While general awareness of these conditions and their vaccines was relatively high, substantial proportions of participants particularly those with lower education levels, limited prior infection history, or inadequate access to accurate information had poor knowledge. Only slightly more than half of respondents showed a good knowledge score, and misconceptions about disease severity, symptoms, and vaccine interactions were common. Internet sources were the most relied-upon channel for health information, more than general practitioners, which raises concerns about the quality and accuracy of public knowledge. Socio-demographic factors such as gender, nationality, education, and employment status were significantly associated with knowledge levels. Targeted educational interventions should be implemented, especially for older adults and those with lower education or no history of infection, to address knowledge gaps about HZ and its prevention. Also, primary healthcare providers must be empowered and encouraged to play a more prominent role in patient education, as their recommendations were shown to greatly influence vaccine acceptance. Public health campaigns to deliver accurate, culturally tailored messages, countering misinformation were commonly found online.

References

1. Schmader K. Herpes zoster in older adults. Clinical infectious diseases. 2001 May 15:1481-6.
2. Johnson RW, Alvarez-Pasquin MJ, Bijl M, Franco E, Gaillat J, Clara JG, Labetoulle M, Michel JP, Naldi L, Sanmarti LS, Weinke T. Herpes zoster epidemiology, management, and disease and economic burden in Europe: a multidisciplinary perspective. Therapeutic advances in vaccines. 2015 Jul;3(4):109-20.
3. Kawai K, Gebremeskel BG, Acosta CJ. Systematic review of incidence and complications of herpes zoster: towards a global perspective. BMJ open. 2014 Jun 1;4(6): e004833.
4. Lal H, Cunningham AL, Godeaux O, Chlibek R, Diez-Domingo J, Hwang SJ, Levin MJ, McElhaney JE, Poder A, Puig-Barberà J, Vesikari T. Efficacy of an adjuvanted herpes zoster subunit vaccine in older adults. New England Journal of Medicine. 2015 May 28;372(22):2087-96.
5. Moustafa NM, Alsaif N, Alsaeed E, Alanezi A, Algarni A, Alkathery L, Mohamed R, Alsaif NF, Alkathery LS. Assessing the Knowledge, Attitude, and Practice of Healthcare Workers on the Herpes Zoster Vaccine in Saudi Arabia: A Cross-Sectional Study. Cureus. 2025 Jan 11;17(1).
6. Duque S, Marinho A, Almeida P, Marques Pereira R, Buzaco R. Expanding the coverage of herpes zoster vaccination recommendations in European countries: the example of Portugal. Drugs & Therapy Perspectives. 2025 Jan 15:1-0.
7. Gagliardi AM, Andriolo BN, Torloni MR, Soares BG. Vaccines for preventing herpes zoster in older adults. Cochrane Database of Systematic Reviews. 2016(3).
8. Gabutti G, Bolognesi N, Sandri F, Florescu C, Stefanati A. Varicella zoster virus vaccines: an update. ImmunoTargets and therapy. 2019 Aug 6:15-28.
9. Tseng HF, Smith N, Harpaz R, Bialek SR, Sy LS, Jacobsen SJ. Herpes zoster vaccine in older adults and the risk of subsequent herpes zoster disease. Jama. 2011 Jan 12; 305(2):160-6.
10. Galagali PM, Kinikar AA, Kumar VS. Vaccine hesitancy: obstacles and challenges. Current pediatrics reports. 2022 Dec; 10(4):241-8.
11. Singh P, Dhalaria P, Kashyap S, Soni GK, Nandi P, Ghosh S, Mohapatra MK, Rastogi A, Prakash D. Strategies to overcome vaccine hesitancy: a systematic review. Systematic reviews. 2022 Apr 26; 11(1):78.
12. World Health Organization (WHO). Varicella and herpes zoster vaccines: WHO position paper. Wkly Epidemiol Rec. 2014;89(25):265-88.
13. Harpaz R, Ortega-Sanchez IR, Seward JF. Prevention of herpes zoster: recommendations of the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report: Recommendations and Reports. 2008 Jun 6; 57(5):1-30.
14. Alsubaie SS, Gosadi IM, Alsaadi BM, Albacker NB, Bawazir MA, Bin-Daud N, Almanie WB, Alsaadi MM, Alzamil FA. Vaccine hesitancy among Saudi parents and its determinants: Result from the WHO SAGE working group on vaccine hesitancy survey tool. Saudi medical journal. 2019 Dec;40(12):1242.

15. Yawn BP, Gilden D. The global epidemiology of herpes zoster. Neurology. 2013 Sep 3; 81(10):928-30.
16. Albrecht MA, Levin MJ, Hirsch M, Mitty J. Epidemiology, clinical manifestations, and diagnosis of herpes zoster. UptoDate. 2022 [Internet]. 2023.
17. Al-Orini D, Alshoshan AA, Almutiri AO, Almreef AA, Alrashidi ES, Almutiq AM, Noman R, Al-Wutayd O. Acceptability of herpes zoster vaccination among patients with diabetes: a cross-sectional study in Saudi Arabia. Vaccines. 2023 Mar 14;11(3):651.
18. Alleft LA, Alhosaini LS, Almutlaq HM, Alshayea YM, Alshammari SH, Aldosari MA, Alateeq FA, Alhosaini L, Alshammari S, Aldosari M. Public knowledge, attitude, and practice toward herpes zoster vaccination in Saudi Arabia. Cureus. 2023 Nov 25;15(11).
19. Marin M, Marti M, Kambhampati A, Jeram SM, Seward JF. Global varicella vaccine effectiveness: a meta-analysis. Pediatrics. 2016 Mar 1; 137(3).
20. World Health Organization (WHO). Herpes zoster vaccine position paper. Wkly Epidemiol Rec. 2014; 89(25):265-88.
21. Lu PJ. Surveillance of vaccination coverage among adult populations—United States, 2018. MMWR. Surveillance Summaries. 2021; 70.
22. Johnson RW, Alvarez-Pasquin MJ, Bijl M, Franco E, Gaillat J, Clara JG, Labetoulle M, Michel JP, Naldi L, Sanmarti LS, Weinke T. Herpes zoster epidemiology, management, and disease and economic burden in Europe: a multidisciplinary perspective. Therapeutic advances in vaccines. 2015 Jul; 3(4):109-20.
23. Patil A, Goldust M, Wollina U. Herpes zoster: a review of clinical manifestations and management. Viruses. 2022 Jan 19; 14(2):192.
24. Patel NJ, Chauhan D, Patel MR. Vaccination Hesitancy among Caregivers of Children under Five: A Mixed-Methods Study in Semi-Urban Areas. European Journal of Cardiovascular Medicine. 2025 Apr 9; 15:243-5.
25. Bunker D. Who do you trust? The digital destruction of shared situational awareness and the COVID-19 infodemic. International Journal of Information Management. 2020 Dec 1; 55:102201.
26. Marar SD, Al-Madaney MM, Almousawi FH. Health information on social media. Perceptions, attitudes, and practices of patients and their companions. Saudi medical journal. 2019 Dec;40(12):1294.
27. Alduraywish SA, Altamimi LA, Aldhuwayhi RA, AlZamil LR, Alzeghayer LY, Alsaleh FS, Aldakheel FM, Tharkar S. Sources of health information and their impacts on medical knowledge perception among the Saudi Arabian population: cross-sectional study. Journal of Medical Internet Research. 2020 Mar 19;22(3):e14414.
28. Alshakhs F, Alanzi T. The evolving role of social media in health-care delivery: measuring the perception of health-care professionals in Eastern Saudi Arabia. Journal of multidisciplinary healthcare. 2018 Sep 21:473-9.
29. MacDonald NE. Vaccine hesitancy: Definition, scope and determinants. Vaccine. 2015 Aug 14; 33(34):4161-4.
30. Newman AM, Jhaveri R. Myths and misconceptions: varicella-zoster virus exposure, infection risks, complications, and treatments. Clinical therapeutics. 2019 Sep 1; 41(9):1816-22.
31. Wang Q, Yang L, Li L, Liu C, Jin H, Lin L. Willingness to vaccinate against herpes zoster and its associated factors across WHO regions: global systematic review and meta-analysis. JMIR public health and surveillance. 2023 Mar 9; 9:e43893.
32. AlMuammar S, Albogmi A, Alzahrani M, Alsharef F, Aljohani R, Aljilani T. Herpes zoster vaccine awareness and acceptance among adults in Saudi Arabia: a survey-based cross-sectional study. Tropical Diseases, Travel Medicine and Vaccines. 2023 Oct 21; 9(1):17.
33. Hoffmann M, Baggio M, Krawczyk M. Vaccination demand and acceptance.