

Awareness and Perceptions of the HPV Vaccine in Oral Cancer Prevention Among Dental Students in Pakistan: A Cross-Sectional Study

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Abstract

Introduction: This study was aimed to evaluate the awareness, knowledge, attitudes, and practices of dental students in Pakistan regarding Human Papillomavirus (HPV) and its vaccine. **Materials and Methods:** A descriptive cross-sectional survey was done using a structured questionnaire. The study population included dental students across Pakistan. Data were collected online, and 202 valid responses were analyzed using SPSS. **Results:** Among 202 participants, 92.6% (n=187) had heard of HPV. Transmission through oral intimate contact was recognized by 89.0% (n=180), while 86.1% (n=174) acknowledged HPV as a risk factor for oral/oropharyngeal cancers. Awareness of the HPV vaccine was reported by 119 (58.9%), and only 43.6% (n=88) were aware of its availability in Pakistan. Knowledge of the ideal vaccination age was low, with 102 (50.5%) responding “don’t know.”. 89.6% (n=181) believed the vaccine reduces oral cancer risk. Most participants 94.0% (n=190) supported inclusion of HPV education in curriculum, 97.0% (n=196) expressed willingness to recommend vaccination in practice. **Conclusion:** This study is one of the first multi-institutional baseline evidence from Pakistan on dental students’ awareness and perceptions regarding HPV and its vaccine in oral cancer prevention. While general awareness of HPV was high, critical gaps in vaccine-related knowledge, availability, and practices were identified. Strengthening vaccine literacy among future oral health professionals may play a pivotal role in advancing oral cancer prevention and informing national immunization and public health strategies in Pakistan.

Keywords: Papillomavirus Infections- Papillomavirus Vaccines- Oral Cancer- Awareness; Dental Students

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Introduction

Cancer is a debilitating condition and a major global health challenge, with human papillomavirus (HPV) emerging as an important etiological factor in a subset of head and neck cancers. Human papillomavirus (HPV) is a double-stranded DNA virus of the Papillomaviridae family, with over 200 genotypes identified; high-risk types (HPV-16, HPV-18) are strongly oncogenic through E6/E7-mediated inactivation of p53 and Rb.

Globally, HPV is implicated in ~10% of oral cavity squamous cell carcinoma (OSCC) and ~42% of oropharyngeal squamous cell carcinoma (OPSCC), with HPV-16 as the dominant subtype [1]. Among 140 OSCC patients, 67.9% were HPV positive (mostly HPV-16).

That’s a high prevalence in this cohort [2]. According to the Global Burden of Disease 2019 estimated an incidence of 12.76 per 100,000 for lip and oral cavity cancers in Pakistan. In contrast, HPV-positive OPSCC incidence in the U.S. increased from 0.8 per 100,000 in 1988 to 2.6 per 100,000 in 2004 [3, 4].

Males are more affected than females, with a global male: female ratio of 2:1 to 4:1 for HPV-positive OPSCC. In Pakistan, oral cavity cancers (lip, buccal mucosa, tongue) are among the most common cancers in both genders; in the Karachi Cancer Registry (1995–2002), head and neck cancers ranked 2nd in men and 3rd in women [5].

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Meta-analyses of Head and Neck Squamous Cell Carcinoma (HNSCC) confirm the highest HPV positivity in oropharyngeal cancers (tonsil, base of tongue). In contrast, non-oropharyngeal sites (oral cavity proper, larynx, hypopharynx) show much lower HPV attribution, as little as ~1% in some multinational studies [6]. A recent study of 186 OSCC cases reported high-risk HPV in only ~3.8%, underscoring the limited role of HPV in oral cavity cancers compared to tobacco-related risks [7, 8].

HPV prevalence in Pakistan shows wide variability. A Karachi cohort reported 67.9% HPV positivity in OSCC cases, while another study detected only 3.8% [9]. Local etiologies such as smokeless tobacco, betel quid, and areca nut are major contributors, whereas alcohol use is less common compared to Western countries. Limited HPV vaccination coverage and low awareness further increase the burden [8, 10].

Given these epidemiological patterns, assessing awareness and perceptions of the HPV vaccine among dental students is vital for strengthening oral cancer prevention strategies in Pakistan.

This study aims to assess the awareness, knowledge, and perceptions of dental students in Pakistan regarding the HPV vaccine, as HPV is an emerging risk factor for oral cancers and preventive vaccination remains underutilized due to low awareness. By addressing this gap, the study seeks to generate evidence that can guide educational and preventive strategies in the dental curriculum.

Materials and Methods

This investigation was designed as a cross-sectional observational study with the primary aim of evaluating the awareness, knowledge, and perceptions of dental students regarding the human papillomavirus (HPV) vaccine and its association with oral cancers. The design was chosen because it enabled the assessment of knowledge levels, attitudes, and self-reported willingness to recommend vaccination at a single point in time, which is particularly suitable for identifying educational gaps and barriers among student cohorts. The study was conducted across multiple dental institutions in Pakistan, encompassing both public and private sector colleges, in order to ensure diversity and representativeness of responses. Data collection was carried out over a period of 1–2 months.

Participants included undergraduate dental students

enrolled in Bachelor of Dental Surgery (BDS) programs, as well as postgraduate trainees actively engaged in clinical training. Only students aged 18 years or above who provided informed consent were eligible for participation. Students from non-dental disciplines, those with medical conditions preventing participation, and individuals unwilling to provide consent were excluded. A total of 202 participants were included in the study. Prior to enrollment, all participants were informed of the study objectives, assured of the voluntary nature of their involvement, confidentiality of responses, and their right to withdraw at any stage without penalty. Informed consent was obtained electronically before access to the questionnaire was granted.

Data were collected using a structured, pre-validated questionnaire developed on Google Forms. The instrument consisted of both closed-ended and multiple-choice questions designed to evaluate students' knowledge, awareness, and perceptions regarding HPV infection and the role of HPV vaccination in oral cancer prevention. Participants were approached during scheduled class hours as well as through online academic platforms. Participation was entirely voluntary, and responses were recorded anonymously to ensure confidentiality and encourage honest reporting.

Responses were compiled in Microsoft Excel and subsequently analyzed using SPSS software version 22. Descriptive statistics, including frequencies and percentages, were applied to summarize demographic data and response distributions. Inferential statistics, specifically the Chi-square test, were employed to assess associations between demographic variables and awareness levels. A p-value of <0.05 was considered statistically significant.

Ethical approval was obtained from the Research Ethics Committee of Liaquat University of Medical and Health Sciences under reference number LUMHS/REC/1071. All procedures were conducted in accordance with institutional and national ethical standards, and strict data protection protocols were observed to maintain participant confidentiality.

Table 1. Knowledge of HPV

Variable	N	Percentage (%)
Heard of HPV (Yes)	187	92.6
Heard of HPV (No)	15	7.4
HPV-related condition: Oral cancer	127	62.9
HPV-related condition: Oropharyngeal cancer	103	51
HPV-related condition: Genital warts	90	44.6
HPV-related condition: Cervical cancer	65	32.2
HPV-related condition: Don't know	26	12.9
Transmission via oral intimate contact (Yes)	180	89
HPV risk factor for oral/oropharyngeal cancers (Yes)	174	86.1

Table 2. Knowledge of HPV Vaccine

Variable	N	Percentage (%)
Heard of HPV vaccine (Yes)	119	58.9
Heard of HPV vaccine (No)	83	41.1
Vaccine available in Pakistan (Yes)	88	43.6
Vaccine available in Pakistan (No/Not sure)	114	56.4
Ideal age: Don't know	102	50.5
Ideal age: 15–26 years	48	23.8
Ideal age: Before 15 years	45	22.3
Ideal age: Above 26 years	7	3.5
Vaccine reduces oral cancer risk (Yes)	181	89.6

Table 3. Practices

Variable	N	Percentage (%)
Personally received HPV vaccine (No)	174	86.1
Educated peer/patient about HPV (No)	149	73.8

Results

A total of 202 students enrolled in various dental colleges and universities of Pakistan participated in this study. Knowledge of dental students regarding Human Papilloma Virus is summarized in Table 1 and related to its vaccine is summarized in Table 2.

With respect to attitudes, 67.3% (n=136) strongly agreed and 26.7% (n=54) agreed that dental students should be educated about HPV and its vaccine, while 6.4% (n=13) remained neutral. Nearly all participants 97.0% (n=196) expressed willingness to recommend HPV vaccination to their patients in future practice, and 95.0% (n=192) supported its inclusion in Pakistan's national immunization program.

Regarding practices, the response of dental students is summarized in Table 3.

Discussion

When compare globally our findings show awareness level of HPV vaccine 58.9% which is higher than those in China (40.27%) [11], Turkey (26.6%) [12] and Saudi Arab (49.9%) [13] but lower than those in Italy (69.9%) [14]. A meta-analysis study suggest that single dose of HPV vaccine may be sufficient to provide immunogenic protection for at least 8 years [15], while our findings indicate that dental students in Pakistan still lacks awareness about vaccine benefits and recommendations. In our research, about 86.1% of participants aware that HPV is risk factor for oropharyngeal cancer, where as another study found that around 12-39% of participants had aware about that [16].

Findings of this study reveals that despite having high HPV awareness (92.6%), dental students in Pakistan have significant knowledge gaps and misconceptions about HPV vaccine and its prevention. Alarming lack of awareness about HPV vaccine and its availability shows that there is an urgent need for targeted educational interventions.

However, there are certain limitations of this study. The study was conducted using online questionnaire using convenience sampling method, which restricts the probability of all the students from all the colleges and universities to participate in this study.

There are few possibilities of how these findings can be applied in educational settings for dental students in Pakistan. The key is that educators must plan to emphasize the role of HPV in oropharyngeal cancers within their curriculum because a significant proportion (86.1%) of dental students were aware of HPV as risk factor, leveraging this awareness to enhance education on prevention and vaccine strategies is crucial. Overall, this approach has potential to make HPV prevention a core component of dental practice in Pakistan.

In conclusion, the majority of dental students in Pakistan who participated in this study had awareness of HPV in oropharyngeal cancers, but most of them lack awareness regarding its vaccine, which provides a solid foundation for further educational interventions. There is a clear need to enhance knowledge and awareness regarding HPV prevention and vaccination strategies among dental students.

Declarations

Conflict of interest

The authors declare no conflict of interest.

Disclosure

This manuscript is derived from an independent academic research project and has not been submitted as part of any thesis, dissertation, or ongoing study.

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Consent

Informed consent was obtained from all participants prior to the inclusion of their data in this study.

Authors' Contributions

MB (Muhammad Bilal): conceptualization of the study and drafted the manuscript. RP (Ram Pershad): questionnaire adaptation, data acquisition, and data management. S (Sadaf): data collection, literature review, and preliminary drafting. SL (Sejal Lohana): data validation, and results interpretation. MM (Maryam Mahmood): data collection and critical revision of the manuscript. MA (Mahnoor Anwar): drafted methodology and assisted in data interpretation.

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