Original Article

Knowledge about human papillomavirus (HPV) related oral cancers among oral health professionals in university setting–A cross sectional study

Shelly Arora^{a,*}, Srinivas Sulugodu Ramachandra^a, Christopher Squier^b^a Faculty of Dentistry, SEGi University, Malaysia^b Department of Oral Pathology, Radiology & Medicine, College of Dentistry & Dental Clinics, University of Iowa, USA

ARTICLE INFO

Article history:

Received 8 June 2017

Accepted 3 December 2017

Available online 5 December 2017

Keywords:

HPV associated OSCC
knowledge
Malaysia
Vaccine

ABSTRACT

Introduction: Scientific literature suggests that human papillomavirus (HPV) infection may be associated with oral squamous cell carcinoma (OSCC). However, knowledge regarding HPV-OSCC link among oral health professionals (OHP) has been insufficient. So, the aim of this study was to assess the knowledge about HPV associated OSCC among OHP working in dental faculties in Malaysia.

Methodology: Ethical committee of the University approved this study. A validated, pre-tested questionnaire was sent electronically to 224 OHP. Questionnaire collected information regarding demography, knowledge about HPV-OSCC link, HPV vaccine, and willingness to educate patients about HPV OSCC link among the participants of this cross-sectional study. Data collected was analysed using "Stata/IC-13" and was summarised using descriptive statistics like frequency, percentage, mean and standard deviation.

Results: Out of 179 participants, around 39% of the participant's opined virus was not a causative factor for OSCC. Around, 44% replied posterior portion of the tongue/oro-pharynx was the commonest site for HPV related OSCC, whereas 29% replied that lateral border of the tongue was the common site for HPV related OSCC. Forty one percent educated patients regarding HPV infection being a causative factor for OSCC. HPV vaccine can prevent OSCC was stated by 70% OHP. Only 12% were aware of the availability of HPV vaccine in Malaysia. Majority (99%), agreed that there is a need to offer continuing education programmes to dentists highlighting advances and preventive strategies in the fight against OSCC.

Conclusion: Substantial increase in awareness is required among OHP regarding HPV-OSCC link.

© 2018 Published by Elsevier B.V. on behalf of Craniofacial Research Foundation.

1. Introduction

Oral squamous cell carcinoma (OSCC) is prevalent across the world and is one of the commonest cancers in South Asia and Malaysia.^{1,2} The most well recognized etiologic factor for OSCC is the use of tobacco.^{1,2} Recent research suggests that human papillomavirus (HPV) infection is also an important risk factor for OSCC. Infection by HPV is through sexual contact.³ There are nearly 200 different strains of HPV, out of these 9 are known to cause cancers, and another 6 are suspected of causing cancers. Among the various strains, HPV-16 is of the primary concern due to its association with OSCC. HPV-16 is also associated with cervical, anal, and penile cancers.⁴

The current literature shows 25.6% of all oropharyngeal cancers are associated with HPV infection especially HPV – 16.⁵ Lim *et al.*, reported prevalence of OSCC associated HPV-18 as 85% and OSCC associated HPV-16 as 75% among Malaysians.⁶ Saini *et al.*, found a strong association of HPV with OSCC, and also suggested that HPV-16 was the predominant type found in Malaysian patients with OSCC.⁷ OSCC associated with HPV has better prognosis and improved response to chemo-radiation therapy compared to tobacco related OSCC.⁴ So, early detection and increased awareness of this entity can result in reduction in mortality and morbidity of these patients.

Oral health professionals (OHP) can play an important role in the prevention of HPV-associated OSCC by educating patients about the etiology of HPV infection. Vaccines are available, which can protect individuals from HPV infection. OHP interact with patients on a regular basis and are concerned with overall health of the individual and not just the dental health of their patients. OHP

* Correspondence address at: Faculty of Dentistry, SEGi University, No.9 Jalan Teknologi, Taman Sains, Selangor, Kota Damansara, Pin-47810 Malaysia.

E-mail address: arorashells76@yahoo.co.in (S. Arora).

can offer the option of vaccination for prevention of HPV associated OSCC.^{8,9}

Government and non-governmental organizations are working towards increasing the awareness of this HPV-OSCC link.¹⁰ Educational programmes including 'mouth cancer awareness'

week have been conducted since 2006 in Malaysia to encourage dentists to carry out early detection of OSCC.¹¹ Despite these efforts, many OHPs are uninformed about the HPV-OSCC link and the option of HPV vaccines for its prevention across the globe.¹⁰ However, such a study has not been carried out among OHPs in

AWARENESS ABOUT HUMAN PAPILLOMAVIRUS (HPV) RELATED ORAL CANCERS AMONG ORAL HEALTH PROFESSIONALS IN A UNIVERSITY SETTING.

Information for the participant:

This questionnaire is intended to assess the awareness of oral health professional regarding Human Papillomavirus (HPV) related oral cancers. All information contained in this questionnaire is strictly confidential and will be used only for the purpose of research. There are 16 questions to be answered and the entire exercise should not take more than 10 minutes. Please answer the questions below; put (✓) against the most appropriate choice.

Thank you very much for your support.

Consent Form *

I understand the purpose of the study and acknowledge that I am participating in the study voluntarily and that the information below was provided with my complete knowledge and consent.

- ☐ I agree
☐ I disagree

1. Age

Less than 20 years

☐

20-30 years

☐

30-40 years

☐

40-50 years

☐

50-60 years

☐

> 60 years

☐

2. Gender:

Male

☐

Female:

☐

3. How do you identify yourself?

General dentist

☐

Oral medicine/pathology specialist

☐

Specialist in other oral fields

☐

4. Your education level is

Bachelor's

☐

Master's

☐

PhD

☐

5. Your teaching/clinical experience

1-5 years

☐

5-10 years

☐

>10 years

☐

> 20 years

☐

6. Which of the following do you believe to be possible causes of oral cancer? (Tick as many as necessary)

Smoking

☐

Chewing powdered tobacco products like gutkha

☐

Viruses

☐

Chronic mechanical irritation

☐

7. Which of the following viruses can cause OSCC?

Human papillomavirus

☐

Human herpes virus

☐

Epstein Barr virus

☐

8. Do you know that the most common oral/ clinical manifestations caused by HPV are warts?

Yes

☐

No

☐

9. Do you know that HPV infection is a sexually transmitted infection?

Yes

☐

No

☐

10. According to you, which is the most common transmission route for HPV?

Air

☐

Saliva

☐

Blood

☐

Sexual

☐

Fig. 1. a) Picture of the validated questionnaire page 1. b) Picture of the validated questionnaire page 2.

11. The oral cancers caused by HPV associated infections are commonly seen in which parts of the mouth?

Lateral border of the tongue ☐ Labial mucosa ☐
Posterior portion of the tongue/oro-pharynx ☐ Palatal area ☐

12. According to you, why it's important to differentiate between oral squamous cell carcinoma and HPV associated oral squamous cell carcinoma

✓ HPV associated OSCC can be treated easily ☐
✓ Prognosis of HPV associated OSCC is better than OSCC ☐
✓ Treatment strategies for HPV associated OSCC is different ☐

13. Do you educate your patients about oral HPV infections and the possible risk of oral cancer due to such infections?

Yes ☐ No ☐

14. Are you aware that cancers caused due to HPV infection can be prevented by HPV vaccination?

Yes ☐ No ☐

15. Is HPV vaccination available in Malaysia?

Yes ☐ No ☐ Don't know ☐

16. Do you think there is need to offer continuing education programmes to dentists highlighting advances and preventive strategies in the fight against oral cancer?

Yes ☐ No ☐

THANK YOU FOR YOUR TIME AND RESPONSE.

Fig. 1. (Continued)

Malaysia. So, the aim of this study was to determine the awareness among OHPs regarding the HPV associated OSCC and to assess their current knowledge of preventive strategies. The study will help in identifying the knowledge gaps among OHPs and inform us as to measures that might be undertaken to resolve this.

2. Methodology

The sample size for the study was calculated, which showed minimum of 150 OHPs were required to achieve around 80% professionals with knowledge on HPV associated OSCC with 20% relative precision at 1% risk based on previous studies. The SEGi University Ethics Committee approved the study and informed consent was obtained from all the participants. Participants

included general dental practitioners (GP), specialists in Oral Medicine(OM)/Oral Pathology(OP) and specialists in other dental fields in academic settings.

2.1. Research instrument

The questionnaire in total had 16 questions. The initial five questions were related to age, gender, level of education, academic/clinical experience and specialty. The next questions related to the etiology of OSCC, knowledge regarding HPV associated OSCC and site of occurrence. Further questions were related to transmission routes of HPV infection, importance of distinguishing HPV associated OSCC from other OSCC. The final section of the questionnaire assessed knowledge regarding HPV

vaccination, its availability in Malaysia and willingness to educate patients regarding the HPV-OSCC link. The demand for continuing education programmes regarding OSCC was also evaluated.

The questionnaire was reviewed for content validation by a subject expert (CS) in context to HPV-OSCC link, diagnostic, prognostic and therapeutic measures for HPV associated OSCC and continuing professional development related to HPV-OSCC. In addition, the questionnaire was also pilot tested among 15 OHP to evaluate clarity, wording of questions, time considerations, and minor changes were made accordingly.

Fig. 1a and b show the detailed questionnaire consisting of 16 questions. The validated, pre-tested questionnaire was sent electronically to 224 OHP at six dental faculties in Malaysia. The questionnaire was sent between 15th Dec 2016 and 14th January 2017 and 179 responses were received.

2.2. Statistical methods

Data was entered in an excel spread-sheet and analysed using statistical software “Stata/IC-13”. Data was summarised using descriptive statistics including frequency, percentage, mean and standard deviation. Univariate tables (frequency distribution) were constructed to show distribution of selected respondents according to various parameters and variables in the study. Bi-variate tables (cross tables) were constructed to show the relationship between two variables using Pearson’s Chi-square test and Fisher’s Exact test.

3. Results

Responses were received from 179 respondents out of 224, giving a response rate of 79.5%. Table 1 summarizes the demographic characteristics of the participants.

63% of the participants believed that smoking was one of the causes for OSCC. Almost 92% stated that chewing tobacco was a causative factor for OSCC. Viruses and chronic mechanical irritation were considered not to be a causative factor for OSCC by 39% and 46% of the respondents respectively. However, out of 179 participants, 165 believed that oral cancer can be caused by HPV infection. Among these, a majority were specialists in OM/OP (96%), followed by other dental specialists (95%) and GP’s (84%). This difference in knowledge between specialists and GPs was

found to be statistically significant (p value 0.02). Out of 179 respondents, 72%(n = 129) had master’s, whereas 28% (n = 50) had bachelor’s level of education. About teaching/clinical experience, 59%(n = 105) had less than 5 years of teaching experience, 27% (n = 48) had teaching experience between 5–10 years and 14.5% (n = 26) had more than 10 years of teaching experience. Among these, respondents with master’s level of education had more knowledge compared to those with bachelor’s degree. Similarly, participants with more number of teaching experience responded more appropriately.

Among 179 participants, 158(88%) opined that HPV infection most commonly presented as warts. Among the 165 respondents, who believed that HPV was associated with OSCC, 44%(n = 72) replied that posterior portion of the tongue/oro-pharynx was the commonest site for HPV related OSCC, whereas 29% replied that lateral border of the tongue was the most common site. The posterior portion of the tongue was stated to be the most common site for HPV associated OSCC by specialists in OM/OP (55.6%), specialists in other dental fields (40%), and GP (43%). However these differences were not statistically significant (p value 0.34).

Sexual contact was the route for HPV transmission according to 49% (n = 81) of the respondents, whereas 35% (n = 57) suggested saliva to be the route for HPV transmission. Approximately 43% (n = 71) suggested that treatment strategies for HPV associated OSCC were different from other OSCC and that this was the main reason to differentiate between HPV associated OSCC and other OSCC. About 39% (n = 64) of respondents were unaware of the importance of differentiating HPV associated OSCC from other OSCC.

Out of 165 respondents, 41% (n = 67) stated that they educate patients regarding HPV infection being a causative factor for OSCC. More specialists in OM/OP (67%) did this than other specialists (33%) and GP’s (42%) and these differences were statistically significant (p value 0.00)

About 70% (n = 116) of respondents believed that HPV vaccine can prevent OSCC. Only 12% (n = 22) were aware of the availability of HPV vaccine in Malaysia. A clear majority (99%, n = 177) agreed that there is a need to offer continuing education programmes for dentists to highlight advances and preventive strategies in combatting OSCC.

4. Discussion

Increased awareness of the HPV-OSCC link among OHPs can improve early identification of the disease, which can result in a reduction in mortality and morbidity of these patients.^{12,13} Knowledge of the HPV-OSCC link among OHPs has been studied before. Daley *et al.*, examined the awareness, attitudes, and perceived role of 38 OHPs ((17 dentists and 21 hygienists) concerning HPV-related OSCC and the HPV vaccine and reported a lack of knowledge regarding these issues. They suggested that these domains should be discussed with OHPs so that they can make their patients aware of the HPV-OSCC link and option of HPV vaccination.⁸ Daley *et al.*, conducted a web-based survey among 210 Florida dentists to assess dentist’s readiness to discuss the HPV vaccine with female patients. They concluded that it is necessary to further inform dentists about primary prevention of HPV-related OSCC despite high levels of knowledge.⁹ In our study, 67 out of 179 (40%) educated their patients about HPV as the possible causative factor of OSCC.

HPV related OSCC has been frequently diagnosed in the oropharynx.¹⁴ In our study, 44% responded correctly regarding the most frequent site of HPV associated OSCC, whereas 29% believed that lateral border of the tongue is the most frequent site. Specialists in OM/OP (56%) were more aware of the most vulnerable site compared to specialists in other fields and GP’s.

Table 1
showing the demographic characteristics of the participants.

Age group	Frequency (Percent)
<30	82 (45.8%)
30–40	87 (48.6%)
>40	10 (5.6%)
Gender	
Female	94 (52.5%)
Male	85(47.5%)
Speciality	
Specialist in Oral Medicine/Oral Pathology	28 (15.6%)
Other Speciality	102(57%)
General Dental Practitioners	49 (27.4%)
Qualification	
Bachelor’s	50 (27.9%)
Master’s	129(72.1%)
Teaching/Clinical Experience (years)	
0–5	105(58.7%)
5–10	48(26.8%)
>10	26 (14.5%)
Total number of participants	179(100%)

This indicates that a significant proportion of the OHPs were confused with regard to the most common site of occurrence of HPV associated OSCC.

Mallen-St Clair et al., stated that HPV associated OSCC is different from other OSCC in regard to prognosis, and response to chemoradiation therapy.¹⁵ In our study, around 39% of participants were unaware of the importance of distinguishing between HPV associated OSCC and other OSCC. OHP's who are aware of this distinction can better present preventive strategies to their patients.

About 70% of the OHP were aware of HPV related OSCC being prevented by HPV vaccines but only 40% educated their patients of HPV being a causative factor for OSCC. This is consistent with findings by Chattopadhyay et al., who reported that dentists were not prepared to discuss the benefits of HPV vaccine in prevention of OSCC.¹⁶

In any health care system, GP's are usually the initial point of contact for patients. In our study, we have found that GP's have significantly less knowledge about HPV-OSCC link and also are less likely to educate their patients about the HPV-OSCC link. This could be because specialists have greater access and incentive to updating themselves about scientific advances. Accordingly, efforts should be made to update GP's which will contribute to an earlier identification of the disease.

The Malaysian government approved the use of HPV vaccination in 2006.¹⁷ The present study showed that only 12% of the OHP were aware of the availability of HPV vaccine in Malaysia. Al- Dubai et al., studied the level of knowledge regarding HPV infections, HPV vaccines, attitudes toward HPV vaccination and barriers to being vaccinated among 300 Malaysian women.¹⁸ They found a low level of knowledge about HPV and HPV vaccination and suggested that the public should be educated regarding the HPV-OSCC link and options of HPV vaccination.¹⁸

In our study, 99% of the participants (who were dentists and dental specialists) felt the need for continuing education programmes to increase awareness among OHP. Daley et al., has similarly reported knowledge deficits among dentists and dental hygienists regarding HPV-OSCC link and suggested offering additional education and training courses.¹⁹ Saleh et al., reported only 26% of the OHPs have participated in exclusive oral cancer education programmes.¹¹

National HPV immunisation programme supplying HPV vaccine free to targeted 13 year olds by the Malaysia government has been implemented since 2010.¹² Awareness programmes have been conducted regularly through mass and print media about the availability of free vaccines. According to Annual Report of Malaysia Ministry of Health (2012), the immunisation coverage for complete 3 dosage of HPV vaccine was achieved 87.12% in year 2011 among girls aged 13 years old.¹²

Conclusion: The present study highlighted lack of awareness with regard to details about HPV associated OSCC, including commonest site of occurrence, importance of differentiating from other OSCC and availability of vaccination in Malaysia. This study shows the necessity of offering continuing education programs to increase the awareness among the OHPs.

Source of funding

Nil

Conflict of interest

None.

Acknowledgements

Nil

References

1. Cancer Incidence in Peninsular Malaysia (2003–2005). In: Lim GCC, Rampai S, Yahaya H, eds. *The Third Report of the National Cancer Registry of Malaysia*. National Cancer Registry, Ministry of Health Malaysia; 2008:1–179.
2. Azizah Ab M, Nor Saleha IT, Noor Hashimah A, Asmah ZA, Mastulu W. *Malaysian National Cancer Registry 2007- Malaysian Cancer statistics, data and figure*. <http://nci.moh.gov.my/index.php/en/announcement/340-malaysian-national-cancer-registry-report-2007-2011>. Accessed 28.01.17.
3. Walvik L, Svensson AB, Friborg J, Lajer CB. The association between human papillomavirus and oropharyngeal squamous cell Carcinoma: Reviewed according to the Bradford Hill criteria for causality. *Oral Oncol*. 2016;63:61–65.
4. H.P.V. oral cancer foundation <http://oralcancerfoundation.org/understanding/hpv/hpv-oral-cancer-facts/>. Accessed 16th 2017.
5. de Martel C, Ferlay J, Franceschi S, et al. Global burden of cancers attributable to infections in 2008: a review and synthetic analysis. *Lancet Oncol*. 2012;13(6):607–615.
6. Lim KP, Hamid S, Lau SH, Teo SH, Cheong SC. HPV infection and the alterations of the pRB pathway in oral carcinogenesis. *Oncol Rep*. 2007;17(6):1321–1326.
7. Saini R, Tang TH, Zain RB, et al. Significant association of high-risk human papillomavirus (HPV) but not of p53 polymorphisms with oral squamous cell carcinomas in Malaysia. *J Cancer Res Clin Oncol*. 2011;137(2):311–320.
8. Daley E, DeBate R, Dodd V, Dyer K, Fuhrmann H, Helmy H, Smith SA. Exploring awareness, attitudes, and perceived role among oral health providers regarding HPV-related oral cancers. *J Public Health Dent*. 2011;71(2):136–142.
9. Daley E, Dodd V, DeBate R, et al. Prevention of HPV-related oral cancer: assessing dentists' readiness. *Public Health*. 2014;128(3):231–238.
10. Dodd VJ, Daley EM, Logan HL. Discussing the link between HPV and oral cancer: where do we begin? *Today's FDA*. 2011;23(1):58–61.
11. Saleh A, Kong YH, Vengu N, Badrudeen H, Zain RB, Cheong SC. Dentists' perception of the role they play in early detection of oral cancer. *Asian Pac J Cancer Prev*. 2014;15(1):229–237.
12. Bruni L, Barrionuevo-Rosas L, Albero G, et al. *ICO Information Centre on HPV and Cancer (HPV Information Centre)*. Human Papillomavirus and Related Diseases in Malaysia. Summary Report 27 July 2017. Accessed on 16th September 2017.
13. Khode SR, Dwivedi RC, Rhys-Evans P, Kazi R. Exploring the link between human papilloma virus and oral and oropharyngeal cancers. *J Cancer Res Ther*. 2014;10(3):492–498.
14. Wang MB, Liu IY, Gornbein JA, Nguyen CT. HPV-positive oropharyngeal carcinoma: a systematic review of treatment and prognosis. *Otolaryngol Head Neck Surg*. 2015;153(5):758–769.
15. Mallen-St Clair J, Alani M, Wang MB, Srivatsan ES. Human papillomavirus in oropharyngeal cancer: The changing face of a disease. *Biochim Biophys Acta*. 2016;1866(2):141–150.
16. Chattopadhyay A, Weatherspoon D, Pinto A. Human papillomavirus and oral cancer: a primer for dental public health professionals. *Community Dent Health*. 2015;32(2):117–128.
17. Wong LP. Young multiethnic women's attitudes toward the HPV vaccine and HPV vaccination. *Int J Gynaecol Obstet*. 2008;103(2):131–135.
18. Al-Dubai SA, Alshagga MA, Al-Naggar RA, et al. Knowledge, attitudes and barriers for human papilloma virus (HPV) vaccines among Malaysian women. *Asian Pac J Cancer Prev*. 2010;11(4):887–892.
19. Daley EM, Thompson EL, Vamos CA, et al. HPV-related knowledge among dentists and dental hygienists. *J Cancer Educ*. 2016;10.1007/s13187-016-1156-5.