Introduction

Among all cancers prevalent in India, oral cancer ranks fifth in overall mortality.\(^1\) The commonest of all, the squamous cell cancer accounts for 90–95% of oral cancer cases reported,\(^2\) therefore needs to be taken care for early detection and prevention to reduce the disease burden. High risk HPV type 16 and 18 has been linked to the causation of 25% of oral cancers.\(^3\)

A published data from ongoing National Health and Nutrition Examination Survey study states that about 26 million Americans on any given day and seven in every 100 in United Kingdom have an oral HPV infection/cancer.\(^4,5\)

Further, the same virus sub-types have also been reported to be responsible for 70% cervical cancer cases,\(^6\) which may be attributed to the resemblance between cervical and oropharyngeal...
epithelium,[3] which is squamous cell type. Prevalence of oral HPV is on rise because of high-risk sexual behavior like oro-genital sex leading to sharing of viruses between oral and genital sites.[7] A study conducted in Brazil has reported HPV infections among sexually active adolescents and young adults.[8] Another study conducted on patients with oropharyngeal cancer from Middle East found a very high prevalence (85.3%) of HPV-related oropharyngeal cancer among them.[9] Increasing prevalence among young adults and teenagers besides adults suggests other modes of transmission as well. It may be like near personal contacts with family members and through fomites at school and other educational settings.[10]

This study included medical undergraduate and the nursing students, who need to be aware of the possible modes of infection in the hospital settings. Diseases like recurrent respiratory papillomatosis, oral and anogenital warts, anogenital intraepithelial neoplasia are associated with HPV. Infective airborne particles are produced when these are treated by laser or electrosurgical procedures and therefore needs care.[11] Further, HPV 16 are resistant to glutaraldehyde and ortho-phthalaldehyde, the two disinfectants used in hospitals, and can even survive for months at low temperature without a host. Also the patients with planter warts harboring HPV can spread virus by walking barefoot.[12,13] Current evidence supports their transmission from mother to fetus during intrauterine period at the time of delivery and later through saliva.[14] These facts are important for medical and nursing graduates to be aware of.

With all epidemiological estimates, it is predicted that HPV positive oropharyngeal cancer cases will exceed the cervical cancers cases by the year 2020.[15] Therefore, vaccination against HPV 16 and 18 needs to be made mandatory, which may offer protection to both types of cancers, the cervical and oral. The HPV vaccination has also been recommended by CDC (Centers for Disease Control and Prevention) to get protection from both types of cancers, the cervical and oral. The HPV infection is most prevalent in late teens and early 20s.[16] CDC suggests vaccination for everyone till the age 26 years if not vaccinated earlier.[17]

A study evaluating awareness and acceptability regarding HPV vaccine has shown that even among medical graduates, the desired knowledge lacks.[18] When incidence of oral cancer is increasing worldwide,[1,4] with high incidence rate among 15–24 years age group,[16] this study becomes highly relevant, keeping the awareness about HPV as priority among medical/nursing students who were young adults in their ideal age for vaccination, fulfilling our efforts to motivate them for the same.

**Subjects and Method**

This cross-sectional study included 100 consented healthy undergraduate medical and nursing students and was approved by Institutional Ethical committee of AIIMS, Patna.
Table 1: Oligonucleotide Primer Sequences of HPV16, HPV18 and β-actin used for PCR

| Gene   | Forward                     | Reverse                  | Product size (bp) |
|--------|-----------------------------|--------------------------|-------------------|
| HPV 16 | TGCTAGTGCTTATGCAGCAA        | ATTACTGCAACATTGGTAC      | 152               |
| HPV 18 | AAGGATGCTGACCCGGGCTGA      | CAGGCCAGGTTGGCAGGT        | 216               |
| β-actin| CCAACGGGCTGACCGGATGA        |                          | 97                |

Figure 1: Gel electrophoresis of PCR products. Lane 1: Student sample; Lane 2: Negative control; Lane 3: Positive control of HPV16; Lane 4: Molecular weight marker (50 bp); Lane 5: Positive control of HPV18; Lane 6: Negative control; and Lane 7: Student sample. Lower Panel: β-actin as an internal control.

The mean age of the participants was 21.5 years (18–25 years). Almost all the participants were from good socioeconomic background having good oral hygiene and none were addicted to tobacco or alcohol.

Qualitative analysis of the Feedback

Feedback about the study in creating awareness regarding HPV and its vaccine was conducted using three-point Likert scale.

Responses of the participants regarding their level of knowledge and awareness regarding HPV have been summarized in Figure 2.

About 60–70% of the students agreed that participation in this study has improved their knowledge about HPV, along with the awareness about the vaccine; its acceptance and recommendation [Figure 2]. However, 10–20% responses showed disagreement about the same whereas, 20–25% had a neutral response [Figure 2].

Discussion

It is now evident that the HPV not only causes cervical cancer but is also a player in oral cancers, especially squamous cell carcinoma.[24] HPV positive OSCC (oral squamous cell carcinoma) have a better prognosis and menace to death is 60% of that of HPV negative OSCC, cause being strong loco regional control by HPV positive OSCC.[21]

There has been a lack of knowledge among the young generation regarding HPV and its disease-causing potential. Poor socioeconomic status, a critical factor in maintaining body hygiene and oral health, increases the chance of HPV infection.[22]

Limiting tobacco/alcohol and maintaining a healthy diet may reduce the chances of HPV oral infections.[22] The development of vaccines against HPV has also raised hopes for prevention of cancers caused by it. However, poor awareness about the same, even among the medical students has been observed.[18]

Our study has focused on screening of saliva of healthy young adults of age group 18–25 years, for HPV presence and creates awareness among these participants regarding HPV 16 and 18 sub-types in oral cancers including the benefits of vaccination which is recommended in this age group.

In our study, none of the saliva samples was found positive for HPV 16 or 18, which may be because of the fact that the study population belonged to an educated society with better socioeconomic status that had good oral hygiene and were not addicted to tobacco or alcohol. Also, the young population had an efficient immune system working for the protection from various infections. Similar results were found in previous study with 100 healthy subjects aged 20–31 years screened for HPV presence in saliva.[23] However, in other study, 6% HPV infected cases were detected in a mixed population of 268, which included subjects of less than 20 years of age.[24] This study showed that HPV was present primarily in the oral cavity of children of younger than 2 years of age and in adolescents of more than 13 years of age. This finding needs further explanation and suggests screening of saliva of the family members of the positive cases in the similar way.

Since our study had a small sample size (100 subjects) of participants of distinct group, reflecting sampling bias also, the results may not give the real picture about the HPV infection among the target population. However, this study definitely generated awareness among the participants as depicted in our results. The knowledge about the HPV and the outcome of infections associated with it have created the awareness among the study population of young adults, the need and the acceptance of vaccines to be taken at the right age. This may be one step in the right direction and also the need of the hour as one questionnaire based descriptive study has shown a very low acceptance rate (23%) of HPV vaccine in India.[25]

HPV vaccination has been implemented in the National immunization programs (NIPs) by more than 60 countries worldwide.[26] Those countries that have executed routine HPV vaccination in the recommended age group before 2010 have experienced a decrease in prevalence of high risk HPV type and diseases caused by them.[27] Safety of HPV vaccines has also been authenticated as no side effect has been reported even...
Small sample size is the limitation of the study and needs to be conducted on a much larger population. Further, study with large and different population groups will provide more awareness and firmer decision regarding inclusion and acceptance of HPV vaccination in the National Immunization Schedule for both boys and girls for prevention of oral carcinoma.

The highlight of this study is the approach with which the awareness about HPV16 and 18 and their role in causing oral and cervical cancer was created among young adults through a non-invasive screening with saliva.

The key points of this study are a) the non-invasive method of screening for the presence of HPV 16 and 18 b) the selected group of subjects in the study, the young adults who need to get aware for timely protection from the disease caused by the virus; and last but not the least c) the study may help to incorporate immunization against high risk HPVs in health care decision-making to reduce the disease burden in the future. A novel message conveyed through this study is that there is a breach in the knowledge regarding HPV related oral cancer in India and also for its vaccine which necessitate this study to be conducted.

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Conflicts of interest
There are no conflicts of interest.

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