REVIEW ARTICLE

Perception of HPV in Children

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ABSTRACT

Human papillomavirus (HPV), with its more than 100 genotypes, is a cause of different diseases, ranging from malignant epithelial tumors such as squamous cell carcinoma in cervix and mouth to benign skin warts. HPV transmission generally occurs through direct person to person contact and exposure to infected material. Since the involvement of HPV in oral carcinoma in adults has been established, high risk strains are being explored in oral cavity of children. The presence of HPV in children presents a serious problem especially when the modes of viral transmission in child always remain a controversial issue. In children presence of HPV shows a strong indication of sexual abuse, though infection from direct contact cannot be ruled out, since the virus has been proven to thrive successfully at a range of sites and infect healthy people. This review aims to discuss HPV mode of transmission in children and its associated epidemiology.

KEY WORDS: *Human Papilloma, Pediatrics, Vertical Infection Transmission.*

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INTRODUCTION

HPV not only involved in genesis of cervical cancer, but it is also involved in genesis of head and neck (oral cavity) cancers[1] and it is also a fact that all strains of HPV do not lead to oncogenecity but there are certain Strains of HPV which are High risk strains and they are classified according to their oncogenic potential [2]. and these HR Strains of (HPVs) are not only a risk factor of oral cancer in adults, but they also lead to oral infections in children like few studies showing that oral HPV infection may be increasing specifically among younger adults, teenagers, and children,[3]and the underlying cause of this increasing trend in children could not be established despite high suspicion for a sexual transmission. Other routes of transmission have been proposed[4], but these studies show a wide variation in their results. Thus, the mode of HPV transmission in children, including horizontal and vertical transmission, remains a controversial issue[5]. With the emerging era of HPV vaccines asymptomatic HPV infections in children, their modes of transmission become important in HPV research , and the critical question is how children are infected with HPV and how frequently high-risk HPVs can persist. This review examines HPV mode of transmission in children and its associated epidemiology.

DISCUSSION

The human papillomaviruses (HPV) consists of a closely related family of DNA viruses, which are capable of integrating into the human genome and leading to mutation of it and transformation of infected epithelia[6,7,8,9]. Most of the evidence for HPV-driven carcinogenesis, as well as the biological mechanisms, have been derived from studies of cervical cancer[10,11], but now new lines of evidence suggests HPV may also be an independent risk factor for oral cancer [12,13]. Although there are more than 100 strains of HPV but The latest classification published by the World Health Organization's International Agency for Research on Cancer (IARC) referred HPV-16, 18, 31,33, 35, 39, 45, 51, 52, 56, 58, 59 as High Risk HPVs [14].(Table 1) This classification included also many other genotypes as probably carcinogenic. There are 36 genotypes of HPV which are associated with benign lesions(24) and malignant lesions(12).[14]

Mode of HPV Transmission

The transmission of human papillomavirus (HPV) in children could be through three main routes; vertical transmission, non sexual transmission and sexual abuse(Figure 1). There are three main categories of vertical transmission of HPV; peri-conceptual transmission (time around fertilization), prenatal (during pregnancy) and perinatal (during birth and immediately thereafter.[15]

Peri-conceptual transmission can occur via the infected oocyte or spermatozoon, as HPV DNA has been detected in 8–64% of the semen samples from asymptomatic men.[16,17] While it was worrisome that HPV16 had been transcriptionally active in spermatozoa[18,19], along with this, HPV DNA has also been found in vas deferens biopsies[20]. There are few studies[21,22] which report prevalence of HPVDNA in amniotic fluid, placenta and cord blood samples. It is also a fact that Trophoblastic cells are found to be broadly permissive for HPV especially HPV11,16, 18 and 31 which complete their life cycle in cultured placental trophoblasts[23,24]. Because of this it is believed that vertical transmission is mainly during delivery when the fetus comes in contact with infected cervical and vaginal cells of the mother. HPV positivity of the newborn immediately after delivery indicates either an HPV infection acquired in utero or by contamination through infected maternal cells. The concordance of HPV infections in mother and the infant has been found to be 39%, ranging between 0.2% and 73%.[25] This supports the view that HPV can be transmitted from the mother to the child.

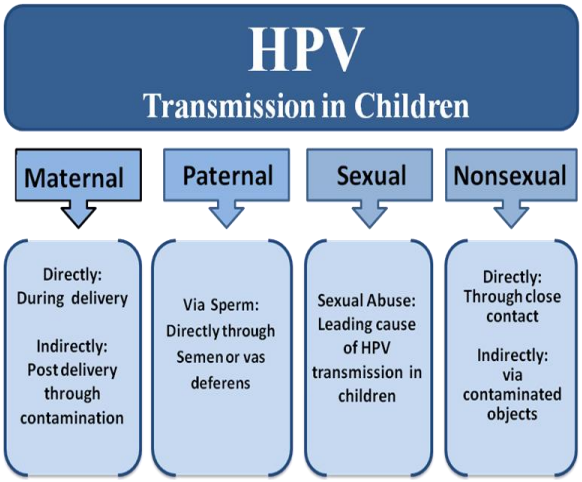
Another common route of HPV infection in newborns involves horizontal transmission from family, relatives and friends via digital contact.[26,27,28] Autoinoculation of HPV through scratching, from one site of the body to another, has also been observed by Sonnex et al. [29] They detected 27% of subjects had the same type of HPV in genitalia and fingers.[29] Presence of HPV infection in the anogenital tract of children usually raises the doubt of sexual abuse[30].

Hence, it is clear that infants and children might acquire oral and genital HPV infection at the postnatal stage from a variety of sources such as direct transmission (person-to-person or autoinoculation), and indirect transmission (via contaminated objects) and sexual abuse. [32]

Table 1: Classification of HPV genotypes and their predisposition to malignancy. Oral disease and associated Human Papilloma virus genotypes

Predisposition to Malignancy	HPV Genotypes	Lesions
High Risk	HPV-16, 18, 31,33, 35, 39, 45, 51, 52, 56, 58, 59	OSCC, Vernicous Carcinoma, Vegetative Lesions, Leukoplakia, Erythroplakia.
Benign lesions	HPV 1, 2, 3, 4, 6, 7, 10, 11, 13, 16, 18, 30, 31, 32, 33, 35, 45, 52, 55,57, 59, 69, 72 and 73	Vegetative Lesions, Warts, Keratotic Lichen, Oral Warts
Malignant lesions	2, 3, 6, 11, 13, 16,18, 31, 33, 35, 52 and 57	Leukoplakia, Erythroplakia, Maxillary Sinus Papilloma, Squamous Papilloma, Laryngeal Papilloma.
Probably carcinogenic	26, 30, 34, 53, 66, 67, 68, 69, 70, 73, 82, 85, 97	Laryngeal Papilloma, Oral Squamous Cell Carcinoma

Figure 1: Modes of HPV Transmission in Children[38]



Prevalence of HPV in children

The prevalence of HPV among children of aged 0-13 years is estimated to range from 32 to 52%.[34] While in infancy Cason et al. report prevalence of HR-HPV from 9 to 55%.[35]

Oral HPV infection is likely to decrease with age, as presented by Marais et al. who compared oral HPV prevalence between children, adolescent and adult. They found that oral HPV infection was highest in children (7.9%)[39], followed by adolescents (5.1%)[40], and lowest in normal adults (3.5%)[36].

Cancers associated with HPV in children are not very common. However, infections related to HPV are increasing in recent years in children. This incremental trend is directly associated with the increasing prevalence of HPV in the community[37]. As there are no longitudinal studies available to answer whether children exposed to HPV (oral) are at risk of developing carcinoma in adulthood, it prompts the need for similar research to comprehend the natural history of HPV infection in children. Further community based comprehensive epidemiological research is required which would provide baseline data of HPV prevalence that can be connected various means of transmissions amongst children discussed above.

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