ORIGINAL RESEARCH

Assessment of prevalence, characteristics, and potential implications of episomal papillomavirus infection in the human placenta

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ABSTRACT
Background: Papillomaviruses (PVs) are a diverse group of DNA viruses known to cause epithelial lesions and cancers. This study aims to investigate the prevalence, characteristics, and potential implications of episomal papillomavirus infection in the human placenta. **Materials & Methods:** 84 placentae of pregnant women were selected. Genomic DNA was extracted from placental tissue using standard protocols. Papillomavirus infection was detected using a combination of polymerase chain reaction (PCR) amplification targeting conserved regions of the L1 gene and subsequent DNA sequencing for viral typing. **Results:** Out of 84 placenatae, HPV was identified in 65 (77.3%). In HPV positive (65) and HPV negative (19), gestational age was 36.4 weeks and 38.2, maternal age was 31.2 and 30.5 years, maternal BMI was 26.2 and 25.8, Fetal PGC was 36.5 and 33.2, pre- term birth was seen in 12 and 2, intrauterine fetal death was seen in 5 and 1, acute chorioamnionitis was seen in 5 and 2, gestational/Diabetes mellitus was seen in 6 and 2 and pre-eclampsia was seen in 4 and 0. The difference was significant (P< 0.05). **Conclusion:** There was high prevalence of HPV in placentae. HPV positive cases had higher prevalence of intrauterine fetal death and acute chorioamnionitis.
Key words: episomal papillomavirus, human placenta, DNA

INTRODUCTION

Papillomaviruses (PVs) are a diverse group of DNA viruses known to cause epithelial lesions and cancers.[1] Although PV infections predominantly affect mucosal tissues, emerging evidence suggests the presence of PV DNA in various non-mucosal tissues, including the placenta.[2]

Episomal papillomavirus infection refers to the presence of the viral DNA in the host cell as an episome, which is a circular piece of DNA that can replicate independently of the host cell's genome.[3] Episomal replication allows the virus to persist in the infected cells without integrating into the host cell's DNA.[4] Regarding papillomavirus infection of the human placenta, it is important to note that HPV infection is primarily a mucosal infection affecting the genital tract.[5] While HPV can be present in various body fluids, including blood and amniotic fluid, the placenta typically acts as a barrier, protecting the fetus from direct exposure to HPV.[6] This study aims to investigate the prevalence, characteristics, and potential implications of episomal papillomavirus infection in the human placenta.

MATERIALS & METHODS

The present study consisted of 84 placentae of pregnant women. Placental tissue samples were obtained from consenting pregnant women during routine elective cesarean sections. Genomic DNA was extracted from placental tissue using standard protocols. Papillomavirus infection was detected using a combination of polymerase chain reaction (PCR) amplification targeting conserved regions of the L1 gene and subsequent DNA sequencing for viral typing.

Real-time PCR was performed to determine the viral load in placental samples. Episomal papillomavirus DNA was localized within placental tissue using in situ hybridization techniques. Expression of viral oncoproteins and host immune response markers was assessed using immunohistochemistry. Clinical information, including maternal and neonatal characteristics, was collected and correlated with viral infection data. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Presence of HPV

Total	Prevalence	Percentage
84	65	77.3%

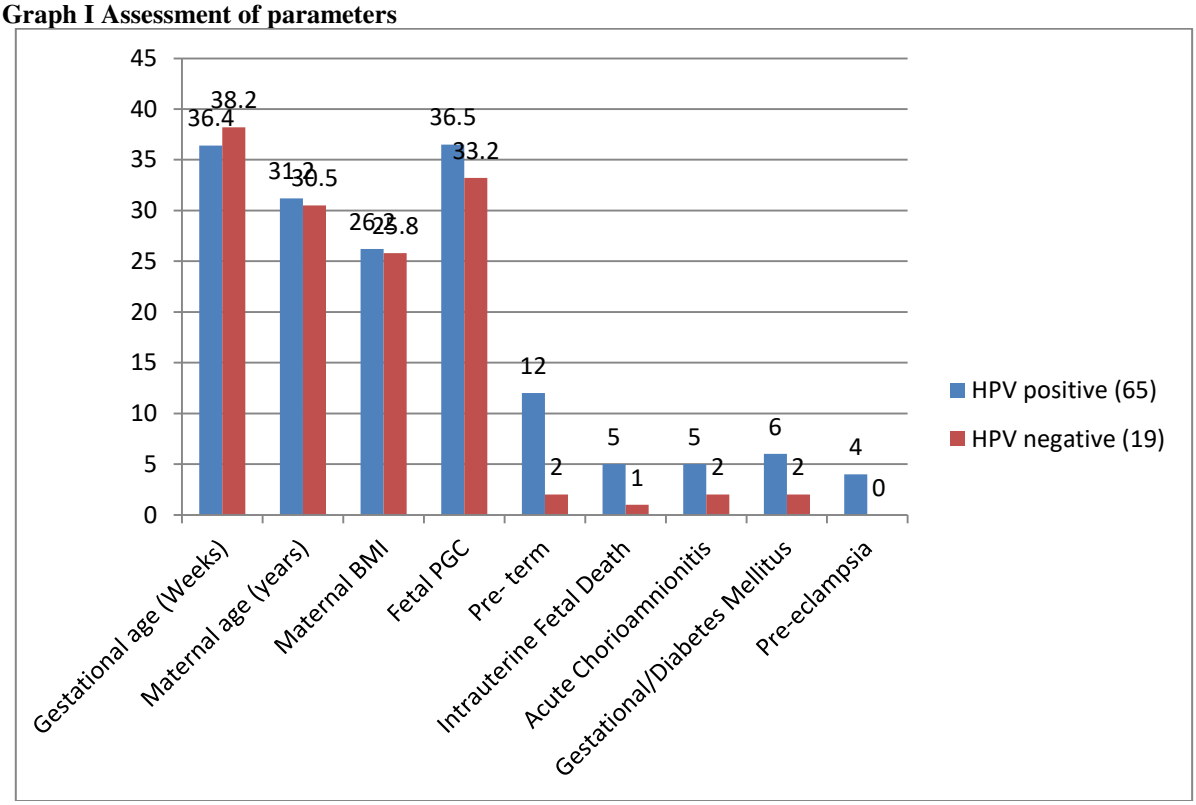
Table I shows that out of 84 placenatae, HPV was identified in 65 (77.3%).

Table II Assessment of parameters

Parameters	HPV positive (65)	HPV negative (19)	P value
Gestational age (Weeks)	36.4	38.2	0.92
Maternal age (years)	31.2	30.5	0.84
Maternal BMI	26.2	25.8	0.75
Fetal PGC	36.5	33.2	0.01
Pre- term	12	2	0.03
Intrauterine Fetal Death	5	1	0.05
Acute Chorioamnionitis	5	2	0.05
Gestational/Diabetes Mellitus	6	2	0.01
Pre-eclampsia	4	0	0.02

Table II, graph I shows that in HPV positive (65) and HPV negative (19), gestational age was 36.4 weeks and 38.2, maternal age was 31.2 and 30.5 years, maternal BMI was 26.2 and 25.8, Fetal PGC was 36.5 and 33.2, pre- term birth was seen in 12 and 2, intrauterine fetal death was seen in 5 and 1, acute chorioamnionitis was seen in 5 and 2, gestational/Diabetes mellitus was seen in 6 and 2 and pre-eclampsia was seen in 4 and 0. The difference was significant (P< 0.05).

Graph I Assessment of parameters



DISCUSSION

Human papillomavirus (HPV) infection primarily affects the skin and mucous membranes.[7] While HPV infections can cause various conditions like genital warts and certain types of cancers, it typically does not directly infect or affect the placenta during pregnancy.[8] During pregnancy, the placenta serves as a barrier between the mother and the developing fetus, providing nutrients and oxygen to support the baby's growth. The placenta also has its own immune system to protect against infections.[9] Generally, HPV does not cross the placental barrier to infect the fetus.[9] However, it's important to note that HPV can be transmitted to the baby during childbirth if the mother has active genital warts or other HPV-related lesions. In such cases, the baby may develop respiratory papillomatosis, a condition characterized by the growth of warts in the airway. This is a rare but serious complication.[10] This study aims to investigate the prevalence, characteristics, and potential implications of episomal papillomavirus infection in the human placenta.

We found that out of 84 placenatae, HPV was identified in 65 (77.3%). Slatter et al[11] selected three hundred and thirty-nine placentae based on the presence or absence of pregnancy complications. Five independent methods were used to identify HPV in the placenta, namely, immunohistochemistry for L1 viral capsid, in situ hybridization to high-risk HPV DNA, PCR, western blotting, and transmission electron microscopy. Pregnancy complications and uterine cervical smear screening results were correlated with placental HPV histopathology. In this study, which was deliberately biased towards complications, HPV was found in the decidua of 75% of placentae (253/339) and was statistically associated with histological acute chorioamnionitis. In 14% (35/253) of the HPV positive cases, HPV L1 immunoreactivity also occurred in the villous trophoblast where it was associated with a lymphohistiocytic villitis (HPV-LHV), and was exclusively of high-risk HPV type. HPV-LHV significantly associated with fetal growth restriction, preterm delivery, and pre-eclampsia. All cases of pre-eclampsia (20/20) in our cohort had high-risk placental HPV. A further 55 cases (22%, 55/253) of HPV positive placentae had minimal villous trophoblast HPV L1 immunoreactivity, but a sclerosing pauci-immune villitis, statistically associated with diabetes (49.1%, 27/55. For women with placental HPV, 33% (69/207) had an HPV-related positive smear result before pregnancy compared with (9.4% 8/85) of women with HPV-negative placentae.

We found that in HPV positive (65) and HPV negative (19), gestational age was 36.4 weeks and 38.2, maternal age was 31.2 and 30.5 years, maternal BMI was 26.2 and 25.8, Fetal PGC was 36.5 and 33.2, pre-term birth was seen in 12 and 2, intrauterine fetal death was seen in 5 and 1, acute chorioamnionitis was seen in 5 and 2, gestational/Diabetes mellitus was seen in 6 and 2 and pre-eclampsia was seen in 4 and 0. Zuo et al[12] determined the role of cervical cytologic screening during pregnancy in association with placental abnormalities and preterm birth. A review of 2,480 cases during 11 years revealed significant correlation of reactive, infectious, atypical, and dysplastic cytologic changes during pregnancy with abnormal placental findings. Also, all but dysplastic cytologic changes were significantly associated with preterm birth. Furthermore, we observed significant association of the presence of high-risk human papillomavirus (HPV) DNA with preterm birth and placental abnormalities. These findings indicate that cervical infection of HPV is a risk factor for preterm birth and that cervical cytology is an effective tool for screening women for infection and inflammation during pregnancy and predicting pregnancy outcome.

The limitation the study is small sample size.

CONCLUSION

Authors found that there was high prevalence of HPV in placentae. HPV positive cases had higher prevalence of intrauterine fetal death and acute chorioamnionitis.

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