Indian Journal of Surgical Oncology (June 2023) 14(2):504–509
https://doi.org/10.1007/s13193-022-01657-w

ORIGINAL ARTICLE

Evaluation of the Therapeutic Effect of Quadrivalent Human Papillomavirus (HPV) Vaccination on Cervical Intraepithelial Neoplasia Lesions

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Received: 18 February 2022 / Accepted: 19 September 2022 / Published online: 1 October 2022

Abstract

Cervical cancer is the most common health problem among global young women. Cervical intraepithelial neoplasia (CIN) is a pre-invasive stage of cervical cancer, the major cause of which is human papillomavirus (HPV), and vaccination has a promising effect on reducing the progression of CIN lesions. The current study was a retrospective case control investigation in two centers, Shiraz and Sari Universities of Medical Sciences from 2018 to 2020 to evaluate the effect of quadrivalent HPV vaccination on CIN lesions (I, II, and III). Eligible patients diagnosed with CIN were selected and divided into two groups: one group received HPV vaccine and the control group did not. The patients were followed up after 12 and 24 months. The information about tests (e.g., Pap smear, colposcopy, and pathology biopsy) and history of vaccination was recorded and statistically analyzed. 150 patients were classified into the control group (without HPV vaccination) and the other 150 patients were in the Gardasil group (with HPV vaccination). The patients' mean age was 32 years old. Two groups were not significantly different according to age and CIN grades. Between two groups in 1 and 2 years' follow-up examinations, the high-grade lesions in both Pap smear and pathology were significantly diminished in patients in the HPV vaccinated group in comparison with the control group with *p*-values 0.001 and 0.004 in 1 year follow-up respectively and 0.00 after 2 years follow-up. HPV vaccination can prevent the progression of CIN lesions in 2-year follow-up examination.

Keywords Human papillomavirus (HPV) · Cervical intraepithelial neoplasia (CIN) · HPV vaccination · Cervical cancer · Pap smear

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Background

Cervical cancer is a serious public health problem among young women worldwide. It is the fourth and second common cancer in global and developing countries, respectively [1]. Likewise, in Iran, cervical cancer is the second most common malignancy among women. In contrast, in high-income countries, screening and vaccination have been routinely done from the year 2006, to take a step to promote community health and HPV vaccination before infection [3].

The prevalence of high risk human papillomavirus (HPV) infection in cervical cancer patients is more than healthy Iranian women (76% vs. 7%). It is important that it is the main risk factor (80%) of cervical intraepithelial neoplasia (CIN) lesions which are the first stage of the HPV infection and its associated inflammation [2]. CIN is classified as CIN I (mild dysplasia), CIN II (moderate dysplasia), and CIN III (severe dysplasia), according to the damaged

can prevent the transformation of these lesions to invasive cervical cancer, but it needs much more period of follow-up [12]. Although we reached valuable data in this study, it is important to mention some limitations; first as HPV vaccination is infrequent and also costly in Iran, our study was conducted on a small number of patients. The other issue is the short term of follow-up in our study. We recommend that further studies should be conducted with longer period of follow-up in the future.

Conclusion

The patients with CIN have no obvious clinical symptoms, and this causes the majority of patients to refuse medical advice. Therefore, the training for both patients and care providers is required to emphasize the annual performance of screening tests. Screening programs are the fundamental strategies to early detection of cervical cancer and many precancerous lesions and it could be prevented by HPV vaccination, among young women. The results of the current investigation demonstrated that HPV vaccination could prevent the progression of CIN up to 2-year follow-up examination. Finally, community education plays an important role in the collective screening and timely vaccination coverage.

Acknowledgements The authors would like to thank Dr. Seyed Jaber Mousavi for his statistical analysis support. The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran, and also Center for Development of Clinical Research of Nemazee Hospital and Dr. Nasrin Shokrpour for editorial assistance.

Author Contribution Study concept and design was performed by Z.Sh, Z.N., and F.Y. M.H. and Z.Sh wrote the main manuscript text and analyzed data. F.Y., S.P., and Z.N. prepared the data. F.N., M.M., and M.A. did critical revision of the manuscript for intellectual contents. M.H. and Z.Sh did study supervision. All authors reviewed and approved the final version of the manuscript.

Declarations

Ethics Approval and Consent to Participate This study was conducted according to the Declaration of Helsinki. Study protocol and participation information were explained to all patients, and written informed consent was obtained from them. All patients were free to decline or withdraw at any stage of the study. The study protocol was approved by the Ethics Committee of Shiraz University of Medical Sciences (code: IR.SUMS.REC.1399.1307). Patient's information was extracted from their files with authorization from Shiraz University of Medical Sciences' Ethics Committee and Security Office, which maintains the confidentiality of patient identity.

Consent for Publication Not applicable.

Competing Interests The authors declare no competing interests.

References

1. Burkman RT (2012) Berek & Novak's gynecology. JAMA 308(5):516–517
2. Chan CK, Aimagambetova G, Ukybassova T, Kongrtay K, Azizan A (2019) Human papillomavirus infection and cervical cancer: epidemiology, screening, and vaccination—review of current perspectives. J oncol 2019:3257939. https://doi.org/10.1155/2019/3257939
3. van de Laar R, van Beekhuizen H, Hofhuis W (2020) HPV vaccination after LEEP. A systematic review and meta-analysis. Authorea. https://doi.org/10.22541/au.158273459.94601143
4. Brotherton JM, Bloem PJ (2015) HPV vaccination: current global status. Curr Obstet Gynecol Rep 4(4):220–233
5. Drolet M, Bénard É, Pérez N, Brisson M, Ali H, Boily M-C et al (2019) Population-level impact and herd effects following the introduction of human papillomavirus vaccination programmes: updated systematic review and meta-analysis. The Lancet 394(10197):497–509
6. Karimi-Zarchi M, Allahqoli L, Nehmati A, Kashi AM, Taghipour-Zahir S, Alkatout I (2020) Can the prophylactic quadrivalent HPV vaccine be used as a therapeutic agent in women with CIN? Randomized Trial BMC Public Health 20(1):1–7
7. Pollock KG, Kavanagh K, Potts A, Love J, Cuschieri K, Cubie H et al (2014) Reduction of low-and high-grade cervical abnormalities associated with high uptake of the HPV bivalent vaccine in Scotland. Br J Cancer 111(9):1824–1830
8. Ikeda S, Ueda Y, Hara M, Yagi A, Kitamura T, Kitamura Y et al (2021) Human papillomavirus vaccine to prevent cervical intraepithelial neoplasia in Japan: a nationwide case-control study. Cancer Sci 112(2):839
9. Villa LL, Costa RL, Petta CA, Andrade RP, Ault KA, Giuliano AR et al (2005) Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: a randomised double-blind placebo-controlled multicentre phase II efficacy trial. Lancet Oncol 6(5):271–278
10. Mao C, Koutsky LA, Ault KA, Wheeler CM, Brown DR, Wiley DJ et al (2006) Efficacy of human papillomavirus-16 vaccine to prevent cervical intraepithelial neoplasia: a randomized controlled trial. Obstet Gynecol 107(1):18–27
11. Sherman ME, Lorincz AT, Scott DR, Wacholder S, Castle PE, Glass AG et al (2003) Baseline cytology, human papillomavirus testing, and risk for cervical neoplasia: a 10-year cohort analysis. J Natl Cancer Inst 95(1):46–52
12. Elias A, Linthorst G, Bekker B, Vooijs P (1983) The significance of endocervical cells in the diagnosis of cervical epithelial changes. Acta Cytol 27(3):225–229
13. Skinner EN, Gehrig PA, Van Le L (2004) High-grade squamous intraepithelial lesions: abbreviating posttreatment surveillance. Obstet Gynecol 103(3):488–492
14. McCredie MR, Sharples KJ, Paul C, Baranyai J, Medley G, Jones RW et al (2008) Natural history of cervical neoplasia and risk of invasive cancer in women with cervical intraepithelial neoplasia 3: a retrospective cohort study. Lancet Oncol 9(5):425–434