

Article

Importance of Conventional Pap Smear Application for Iraqi women health: scientific review

Huda Hameed Kadhim Alabbody ¹

Citation: Alabbody, H. H. K. (2025). Importance of conventional Pap smear application for Iraqi women health: Scientific review. American Journal of Biodiversity, 2(1), 26–34.

Received: 5th Jan 2025

Revised: 10th Jan 2025

Accepted: 13th Jan 2025

Published: 17th Jan 2025



Copyright: © 2024 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)

Center for Market Research and Consumer Protection, University of Baghdad, Iraq

*Correspondence: huda@bccru.uobaghdad.edu.iq

Abstract: A Pap test can identify the pre-cancerous and cancerous problem in the vagina and uterine cervix. Cervical tumour is the easiest gynecologic disease to be diagnosed, treated and prevented using regular screening tests and follow-up. This review aimed to explore the opinion of specialists about cytological changes and the precancerous lesions with Pap smear test and visual inspection of the cervix, also to determine the relationship of this malignancy with demographic characteristics of patients. Results showed that few cervical cancer and pre-cancer were with women in postmenopausal period, but more were with women in the premenopausal period. Visual inspection of the cervix can show erosion lesions by gross inspection. Upon cytology examination, women can showed non-specific inflammation, or exposed to reactive squamous metaplasia, sometimes may be had Koilocytotic atypia, cervical intraepithelial neoplasia (CIN1) or low grade squamous intraepithelial lesion (LGSIL). Also the studies showed oral contraception methods may be risk factors to cervical precancerous cases. In the Middle East unless the abnormal vaginal discharge can lead the women to attend the clinic but rare women come for routine checking or Pap test. Conclusion: We conclude routine screening and Pap smear testing for uterine cervix and vagina might be useful especially for sexually active women for preventing the occurrence of precancerous and later cancerous lesions in these organs.

Keywords: Pap test, Precancerous lesion, cervical cancer, Iraqi women health

Introduction

Cervical cancer is the third most commonly diagnosed cancer and the fourth leading cause of cancer death among women worldwide. Cervical cancer incidence and mortality rates have declined in developed countries due to the use of cytology screening programs [1]. However, the vast majority of deaths occur among women living in low- and middle-income countries due to poor access to screening and treatment facilities [2]. In addition, this cancer is often not recognized until symptoms appear, which include vaginal bleeding, foul-smelling discharge, pelvic or leg pain, or even kidney failure. The cure rate for cervical cancer once symptoms appear is much lower than when the disease is detected early [3]. Common women who acquire cervical cancer incline to have one or more risk factors that influence the disease. The risk factors involve ethnic factors, younger age at first sexual intercourse, earlier age at first birth, multiple sexual partners, steroid contraception, and infection with, e.g. human papillomavirus (HPV), herpes simplex virus type 2, Neisseria gonorrhoeae and Chlamydia

trachomatis, immunosuppression, changing sexual behavior, cigarette smoking and human immunodeficiency virus (HIV)-infected women [4-8].

It has been observed that 99.7% of precancerous changes of the cervix are caused by infection with human papillomavirus (HPV), which has several carcinogenic subtypes, including: 16, 18, 31, 33, 35, 39, 45, 51, 52, 56 and 58 [6, 7]. Although the majority of HPV infections are curable spontaneously and do not lead to precancerous cellular changes, chronic infection with certain types of HPV (especially types 16 and 18) can cause abnormalities in cervical cells [9]. Up to one-third of these lesions can develop into cervical cancer if left untreated [10, 11].

The high mortality rate from cervical cancer in developing countries is mainly due to unsuccessful screening programmes, limited access to cervical cancer screening, and low levels of treatment and follow-up after abnormal test results [12,13].

Currently, two types of diagnostic tests are used for cervical cancer screening including the Pap test (also known as the Pap smear) and the human papillomavirus (HPV) test [9]. The latter test, the HPV test, detects infections caused by potentially cancer-causing viruses as well as providing a reproducible profile for women at high risk of developing precancerous or cancerous lesions [9]. However, HPV testing is currently of limited use in low-income countries due to trained technicians, laboratory infrastructure, and storage facility requirements [14,15]. With regard to the Pap smear test, it allows for the detection and treatment of precancerous cervical lesions [16,17]. However, gross cervical lesions are not always seen in patients with an abnormal Pap smear. Therefore, this test is followed by colposcopy as well as the treatment reaction in the common cytology-based screening. Unfortunately, these tests are not always feasible in most low- and middle-income countries due to their high cost and less healthcare services [18].

Prevention, early detection, treatment and control of cervical lesions before surgical intervention are essential methods for reducing cervical cancer and are essential methods for reducing premature mortality throughout the productive period of a woman's life [1]. Effective training and screening techniques have been developed, including visual inspection application (VIA) of 3–5% acetic acid solution to the cervix, which does not require any laboratory equipment [19, 21]. VIA is easy to learn, with health care workers being taught within 5–10 days [22]. This test has similar or even better sensitivity when compared with conventional cytology, and in low-resource countries, VIA is the preferred choice for cervical cancer screening. However, its specificity is lower, increasing the risk of overtreatment [23, 24]. Vaccinating young females against HPV 16 and HPV 18 infection has been shown to be an effective new method for reducing cervical cancer, although this vaccine is expensive and not feasible in poor countries [25].

Though cervical cancer incidence rates have declined in the Middle East and other parts of developing countries, which may be due to low incidence of HPV or may be due to societal disapproval of extramarital sexual activity [26]. However, cervical cancer mortality remains a major health problem in developing countries [1].

In Iraq, several studies have been conducted on the Pap test, mainly to detect reproductive system problems including specific or non-specific infections, in addition to specific cytological changes as precancerous lesions [27-29]. Reports from Iraqi health institutions indicate that more than 300 women are diagnosed with cervical cancer every year, and more than 200 of them die from the disease [30]. Also, 197 cases of cervical cancer were recorded among Iraqi female patients (25-70 years old) living in different governorates during 2013. In Iraq, cervical cancer ranks twelfth among women, and tenth among those aged 15-44 years [31]. In general, there are no data yet on the Iraqi population infected with HPV, but in Asia, the continent to which Iraq belongs, about 2.5% of females are exposed to cervical infection with HPV 16/18 [7,30].

Although the incidence rates of cervical cancer in Iraqi hospitals are very low, if this cancer occurs, it will develop to an advanced stage, which predicts a very poor survival [32]. Because there are many studies that link the demographic and clinical characteristics of patients with the incidence of cervical cancer. Therefore, and because of the importance of this disease in Iraqi women, this study aimed to extract the findings of previous studies in Iraq in particular and the Middle East in general about the association of cervical cancer with the demographic characteristics of patients and the

estimation of visual examination of the cervix along with the study of the cellular changes of precancerous lesions using the Pap test.

Materials and Methods

The methodology for the article focuses on how to Structure and conduct a comprehensive investigation of cervical cancer screening through the Pap smear test. Quantitative as well as qualitative data drawn from multiple sources, such as previous research and health reports along with clinical studies, are used in the study. Demographic and clinical histories of patients are meticulously recorded in order to assess for potential risk factors that include age, sexual activity, contraceptive use, and HPV infection. Detailed procedures of the Pap smear procedure are provided in this chapter, from the purity and number of sampling with the Ayers spatula, to the cytological examination following the Bethesda classification system.

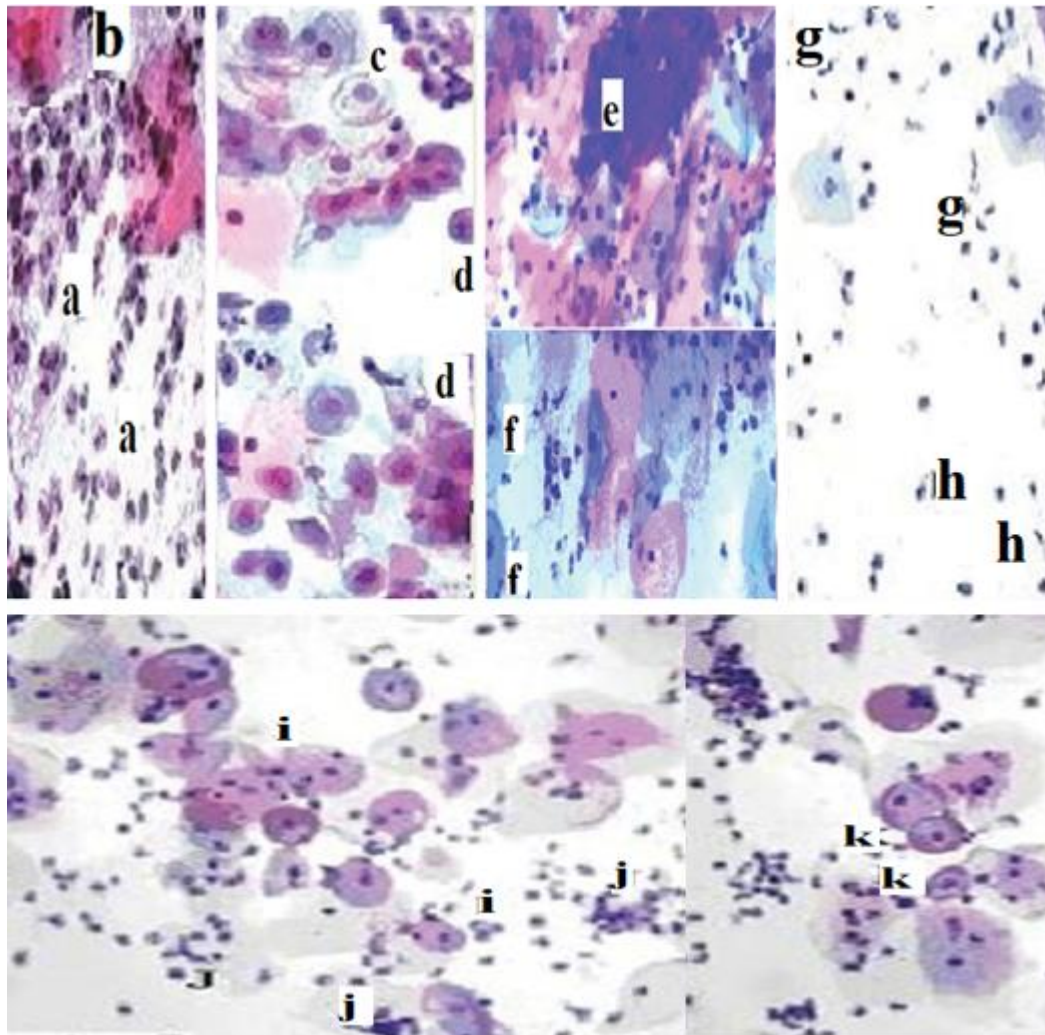
Visual inspection methods such as VIA supplement Pap smear results, and are low resource costs alternative screening methods. Descriptive and inferential statistics are used in data analysis to correlate patient characteristics with precancerous lesions in an attempt to build a robust understanding of the epidemiology of the disease. The quality control of this methodology is rigorous and focused toward making the study accessible for women living in underserved countries serving as a mark of the study's commitment to practical and sustainable health interventions. Throughout the research process ethical considerations, including informed consent and patient confidentiality are rigorously up held. The findings are aimed to help indicate what could be tweaked in cervical cancer prevention strategies.

Results and Discussion

Pap Smear Test Technique

A Pap smear test is a microscopic examination of cells taken from the cervix and is used to detect precancerous or cancerous conditions of the cervix as well as other medical conditions. Patients first undergo visual examination of the cervix and vagina at a designated center. Samples are then collected from the participants using an Ayers spatula or brush [18]. The smaller end of the Ayers spatula is inserted through the external orifice and the columnar squamous junction is scraped by rotating the spatula 360 degrees. The scraping is then spread evenly on a glass slide to be stained for cytological diagnosis according to the Papanicolaou staining method. Pap staining is performed according to the procedure described by Manal, et al., which involved fixing all slides in 95% ethanol before staining for 20–30 minutes, then immersing the slides in descending concentrations of ethanol, each for 10 dips, including 95%, 80%, 70% and 50% ethanol. The slides are then dipped 10 times in distilled water, followed by 1-2 min of hematoxylin staining. Excess stain is removed by briefly exposing the slides to running tap water. Ascending concentrations of ethanol (50%, 70%, 80% and 95%) are then applied, immersing the slides 10 times in each concentration. The slides are then placed in Orange-G stain for 2 min, followed by 10 dips in 95% ethanol. Eosin stain is also used to stain the specimens for 2 min, after which the slides are dipped in 95% ethanol for 10 dips, and this is repeated for another 10 dips in 95% ethanol. Absolute ethanol is then used for 10 dips. The slides are then placed in a 50:50 mixture of absolute ethanol: xylene for 5 min. Finally, the slides remain in xylene for 20 minutes to be fixed with DPX (a mixture of dysterin, a softening agent, dissolved in xylene) [33].

Slides are examined under a light microscope at 40x% magnification, and cervical smears are examined by a pathologist. According to the 2001 Bethesda classification, smears are described as negative for atypical squamous cells (ASC), atypical glandular cells (AGC), low-grade intraepithelial lesion, high-grade intraepithelial lesion, and carcinoma [34].



Multiple fields of Pap smear of women with conventional Pap smear from archived cases of the author's work and research

According to Bethesda Terminology (9) the main cytological changes that can be diagnosed in the cervix by Pap smears:

- 1- Non-specific cervicitis with benign squamous metaplasia exhibiting inflammatory-associated cellular changes (a),
- 2- Reactive squamous metaplasia (b),
- 3- Endocervical glandular dysplasia (i.e., CIN1 or LGIL), (c)
- 4- Non-specific cervicitis, sheets of benign abnormally exfoliated endocervical or endocervical polyp (d),
- 5- Atypia of squamous and endocervical cells (e),
- 6- *Candida albicans* (f)
- 7- *Trichomonas vaginalis* (g)
- 8- Infections with dysplastic cells (h)
- 9- Non - specific cervicitis extending to the endocervix (i),
- 10- Aplastic endocervical cells (j)
- 11- Koilocytotic atypia possibility due to Human Papillomavirus infection (k)

Pap Smear for prevention of cancer and other problems

The cause of most cervical cancer is thought to be human papillomavirus (HPV) infection [6,7]. This infection resolves without any therapeutic intervention in most women, however, those with persistent

HPV infection are at risk of developing type II and III cervical cancer [29,35]. In developing countries, there is a tendency to increase the incidence of the disease attributed to early onset of sexual activity, certain sexual behaviors such as high number of multiple partners, infrequent use of condoms, multiple pregnancies, immunosuppression and infectious agents mainly HPV [36]. In addition to oral contraceptives, and dietary habits [11, 30, 37].

This review was conducted in order to determine the potential impact of risk factors on cervical health in Iraqi women. Studies show that most infected women are married, which means that sexual activity plays a major role in the vulnerability of the female reproductive system to many health problems [38]. It has been reported that almost all sexually active women will be infected with HPV at some point in their lives, while some may be infected repeatedly. The peak time of infection is shortly after sexual activity [2].

Previous studies suggest that young women have large areas of immature cervical epithelium, which appears to be more susceptible to HPV infection than other squamous epithelium. If sexual activity begins at an early age, especially with multiple partners carrying HPV infection, women are at increased risk of cervical cancer [39–41]. HPV-induced cervical cancer can develop within 2 years of infection of the unstable squamous epithelium of the cervix. However, most cancers arise from or adjacent to pre-existing lesions that progress from one stage to another over a period of 10–30 years. Over time, uninfected squamous epithelium matures and appears to be more susceptible to infection with risk-free or low-risk viruses, such as HPV 6 [42]. On the other hand, it has been shown that postmenopausal women without previous cervical diseases are less likely to develop cervical cancer [43]. Furthermore, in previous studies, residence, occupation, or menstrual cycle regularity had no significant effect on the incidence of cervical cancer. While taking oral contraceptives for more than 5 years doubles the risk, taking them for more than 10 years quadruples the risk [45].

The Papanicolaou cytology test. Named after Dr. George N. Papanicolaou who first described it in 1928, this test has dramatically reduced cervical cancer incidence and mortality by 75%. It is a screening tool that looks for changes in the transformation zone of the cervix, which are often caused by human papillomavirus (HPV). Previous studies have found that there may be a significant association between abnormal Pap smears and hormonal contraceptives, bleeding after intercourse, vaginal discharge, abdominal pain, and itching, which are the most important signs of cervicitis that prompt women to seek a cervical screening clinic. [21, 47].

Mild and moderate cervical problems, such as erosions and warts, were shown by microscopic examination to be nonspecific vaginitis and cervicitis in women, and extended to the cervix with reactive squamous hyperplasia and cervical intraepithelial neoplasia (CIN1) or low-grade squamous intraepithelial lesion (LGSIL), which can be called precancerous lesions. These conditions can be treated at low cost and in a short time to avoid progression to cervical cancer [18]. Cervical cancer is known to be preceded by a long stage of pre-invasive disease called cervical intraepithelial neoplasia (CIN), which is classified into grades I, II, and III. If left untreated, these lesions, especially high-grade CIN II and III lesions, can progress to cancer to a large extent. Using the Papanicolaou technique for Pap and vaginal smears, these changes can be detected [48]. Furthermore, mild dysplasia of the squamous cells of the cervix has been demonstrated with mild dysplasia and therefore the possibility of HPV infection cannot be excluded [48].

Previous studies have demonstrated the ability of Pap smear testing of the cervix to diagnose some microbiological agents such as actinomycetes, herpes simplex virus, or human papillomavirus, in addition to *Candida albicans* and *Trichomonas vaginalis* [49].

Another advantage of applying Pap tests is to prevent unnecessary treatment that may have negative effects on the patient's health. The treatment program for cervical cancer is radical hysterectomy with pelvic lymph node dissection for early-stage disease along with radiation or chemotherapy or both for advanced stages [50-52]. However, some doctors do not give chemotherapy unless it is necessary to avoid suppressing the patient's immune system [53].

Molecular detection of HPV DNA or RNA is currently the standard screening test [54], however, these tests are relatively cost-effective in developing countries. In addition, HPV vaccination, whether available or not, cannot replace cervical cancer screening [2]. Thus, in the absence of a well-organized

screening program, a reliable and inexpensive approach such as the Pap test is needed for the initial diagnosis of cervical problems. This should be combined with increased awareness of women to attend clinics and hospitals for routine screening against gynecological diseases including cervical cancer [37, 55–57].

Cytology-based screening programs have faced many logistical challenges in different countries. Among these challenges is the registration of qualified screeners who are able to establish appropriate laboratories and provide quality assurance programs, which may represent one of the biggest struggles [42]. Furthermore, it is necessary to develop a cancer control strategy that integrates cancer screening and diagnosis with the treatment of pre-invasive and invasive cancers [3].

According to the most recent guidelines from the American Cancer Society, screening should begin at age 21 [58], and younger women should not be screened with either the Pap test or the HPV test. However, women aged 21–29 should be screened every 3 years, while the HPV test should be used only if the Pap test reveals abnormal results. Women aged 30–65 should be screened every 5 years with the Pap test and HPV test combined. This type of screening is desirable, but continuing with Pap testing every 3 years is more appropriate [59, 60].

Conclusion

Pap smear is a very important method for early detection of cervical cancer, which needs follow-up to identify reproductive complications, especially cancerous and precancerous lesions. If lesions and infections are identified and treated later, the development of a serious disease problem may be stopped and controlled. We strongly recommend that sexually active women undergo routine Pap smear screening because they are more susceptible to infection or precancerous or cancerous cellular changes than others.

Acknowledgment

This work has been funded by University of Baghdad, Baghdad, Iraq.

Conflict of interest

The authors declare that they have no conflict of interest.

REFERENCES

- [1] Guida F, Kidman R, Ferlay J, et al. Global and regional estimates of orphans attributed to maternal cancer mortality in 2020. *Nat Med*. 2022;28(12):2563-2572. doi:10.1038/s41591-022-02109-2.
- [2] Singh D, Vignat J, Lorenzoni V, et al. Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. *Lancet Glob Health*. 2023;11(2):e197-e206. doi:10.1016/s2214-109x(22) 00501-0
- [3] Maranga IO, Hampson L, Oliver AW, et al. Analysis of factors contributing to the low survival of cervical cancer patients undergoing radiotherapy in Kenya. *PLOS ONE*. 2013;8: e78411. doi:10.1371/journal.pone.0078411.
- [4] Frida KM, Atieno WMC, Habtu M. Socio-demographic factors associated with advanced stage of cervical cancer at diagnosis in Kenyatta National Hospital, Kenya: a cross sectional study. *J Cancer Sci Ther*. 2017;9:554-561. doi:10.4172/1948-5956. 1000473..
- [5] Ba-Alawi E, Azzani M, Alsaïdi N, Wahib A, Anaam B, Mtroosh W, Anaam B et al. *BMC Cancer* (2025) 25:4, <https://doi.org/10.1186/s12885-024-13310-6>
- [6] Osman MT, Al-Naggar RA, Taha BI. Knowledge and awareness of cervical cancer screening among Iraqi immigrant women living in Malaysia. *World J Med Sci*. 2013;8(2):123–9.
- [7] Darj E, Chalise P, Shakya S. Barriers and facilitators to cervical cancer screening in Nepal: a qualitative study. *Sex Reproductive Healthc*. 2019;20:20–6
- [8] Hamid GA, Hadi AS, Al-Ahdal F, Yassin S. Gynecological Malignancies in Aden, Yemen: An Overview of 4 Years. *European Journal Of Pharmaceutical And Medical Research*. 2018;5(10):117–20
- [9] Tsikouras, Panagiotis, et al. “Cervical cancer: screening, diagnosis and staging.” *Journal of BUON*, Vol. 21, No. 2, 2016, pp. 320-25.

- [10]WHO. Self-care interventions: human papillomavirus (HPV) self-sampling as part of cervical cancer screening and treatment, 2022 update. 2022.
- [11]Lefevre C, Pivert A, Le Guillou-Guillemette H, Lunel-Fabiani F, Veillon P, Le Duc-Banaszuk A-S, et al. Urinary HPV DNA testing as a tool for cervical cancer screening in women who are reluctant to have a Pap smear in France. *Journal of Infection*. 2020;81 (2):248 – 54..
- [12]Singh D, Vignat J, Lorenzoni V, et al. Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. *Lancet Glob Health* 2023;11(2):e197-e206.
- [13]AlHilfi,T.K.,Lafta,R.,&Burnham,G.(2013).Healthservices inIraq.The *Lancet*, 381, 939–948. [https://doi.org/10.1016/S0140-6736\(13\)60320-7](https://doi.org/10.1016/S0140-6736(13)60320-7). Ali, S., Skirton, H., Clark, M. T., & Donaldson, C. (2017). Integrative review of cervical cancer screening in Western Asian and Middle Eastern Arab countries. *Nursing & Health Sciences*, 19(4), 414–426. <https://doi.org/10.1111/nhs.12374>
- [14]Alwan, N. A., Al-Attar, W. M., Al Mallah, N., & Abdulla, K. N. (2017). Assessing the Knowledge, Attitude and Practices Towards Cervical Cancer Screening Among a Sample of Iraqi Female Population. *Iraqi Journal of Biotechnology*, 16(2), 38–47. 17Mathew, Aleyamma, and Preethi Sara George. "Trends in incidence and mortality rates of squamous cell carcinoma and adenocarcinoma of cervix-worldwide." *Asian Pacific Journal of Cancer Prevention*, Vol.10, No.4, 2009, pp. 645-50.
- [15]Hwaid AH: Knowledge and awareness of papillomavirus and cervical cancer among college students and health care workers women in Diyala, Iraq. *American Journal of Public Health Research* 2013, 1(8):221–225.
- [16]Republic of Iraq Ministry of Health and Environment Iraqi Cancer Board. Iraqi Cancer Registry, 2012. [Online] 2015 [Cited 2021 June 16]. Available from URL: https://bccru.uobaghdad.edu.iq/wpcontent/uploads/sites/41/uploads/My%20Files/PDF/2012Iraqi%20cancer_Arabic.pdf
- [17]Said SAH, Fazari AB, Osman MAMA, Khan F, Yahiya K, Ahmed S, et al. Perceived Barriers to Cervical Cancer Screening Using Pap Smear Test among Women Attending Saad Abu Al Ella Hospital in Khartoum State, 2022. *Journal of Cancer Therapy*. 2023;14(2):73 – 9
- [18]Yousif NG, Sadiq AM, Yousif MG, Al-Baghdadi JJ, Hadi N. Notch1 ligand signaling pathway activated in cervical cancer: poor prognosis with high-level JAG1/Notch1. *Arch Gynecol obstet*. 2015;292(4):899–904..
- [19]Abdulraheem AF, Khudhairi JM. Papanicolaou Smear Outcome of Referred Women to Health Facilities in Baghdad. *Mustansiriya Med J* 2014;13:33-7.
- [20]Barzanjy BK, Talat LA, Ismail SA. Cervical dysplasia: assessment and risk factors among women attending the Maternity Teaching Hospital in Erbil, Kurdistan-Iraq. *Zanco J Med Sci* 2013;17:286-93. doi: 10.15218/zjms.2013.0004.
- [21]Brisson M, Kim JJ, Canfell K, Drolet M, Gingras G, Burger EA, et al. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 lowincome and lower-middle-income countries. *Lancet* 2020;395:575-90. doi: 10.1016/S0140-6736(20)30068-4.
- [22]Safaeian M, Solomon D, Castle PE. Cervical cancer prevention-- cervical screening: science in evolution. *Obstet Gynecol Clin North Am* 2007;34:739-60, ix. doi: 10.1016/j.ogc.2007.09.004. 6. The World Bank. World Bank Country and Lending Groups. [Online] [Cited 2021 June 20] Available from URL: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>
- [23]Nayar R, Wilbur DC. The Pap test and Bethesda 2014. *Cancer Cytopathol* 2015;123:271-81. doi: 10.1002/cncy.21521.
- [24]Maraqa B, Lataifeh I, Otay L, Badran O, Qutaiba Nouri Y, Issam I, et al. Prevalence of Abnormal Pap Smears: A Descriptive Study from a Cancer Center in a Low-Prevalence Community. *Asian Pac J Cancer Prev* 2017;18:3117-21. doi: 10.22034/APJCP.2017.18.11.3117.
- [25]HayumbuY, Valerie et al. Cervical cancer and precancerous cervical lesions detected using visual inspection with acetic acid at Livingstone Teaching Hospital. *Pan African Medical Journal*, v. 40, n. 235, 2021.

- [26] Meites E, Szilagyi PG, Chesson HW, Unger ER, Romero JR, Markowitz LE. Human papillomavirus vaccination for adults: updated recommendations of the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep* 2019; 68: 698-702.
- [27] Ali, Manal Abd, and Aseel Al Qzweni. "Cervical Pap smear is gold diagnostic tool for cervical cancer." *Kufa Medical Journal*, Vol. 16, No. 2, 2015.
- [28] AL-Rubaiee, NS and Al-Alwan, NAS. "Application of the Bethesda system for cervical cytological reporting." *Journal of the Faculty of Medicine, Baghdad*, Vol. 48, No. 1, 2006, pp. 41-47
- [29] Alabbody H Lafta J, Yaseen Al-Ghuraibawi Z, Assessment of the Healthy Women by Detection and Determination of Cells in Conventional Pap Stained Cervical Smear Images. *International Journal of Medical Research & Health Sciences*, 2018, 7(6): 150-160
- [30] Alabbody, H.H.K. Al-Ghuraibawi, Z.A.G A comparative study between conventional pap smear and liquid-based cytology: A clinco-cytological study of Iraqi women with some health problems of cervix. *Iraqi Journal of Science*, 2019, 60(11), pp. 2362–2370
- [31] Alabbody, H.H.K. Demographic and clinical study on patients referred to the national cancer research center for pap smears, *Iraqi Journal of Science*, 2018, 59(4C), pp. 2159–2167
- [32] USAID. "Primary healthcare project: Guidelines for Early Detection and Periodic Screening of Breast and Cervical Cancers in Primary Health Care Settings in Iraq." 2013. Iraqi Cancer Board. Annual report of cancer disease in Iraq 2013. Ministry of Health, Cancer Board. 2017
- [33] Mohammed, Mahmoud, and Khalida Mohammed. "Prevalence of abnormal cervical smears among females in Kirkuk governorate." *Journal of Kirkuk University-Scientific Studies*, Vol. 7, No. 2, 2012.
- [34] Suresh, B. "Cervical smear collection procedures." *Gynaecological cytology cervix*, Vol. 1, 1996, pp. 141-52.
- [35] Al-Alwan NA, Al-Kurri LE, Al-Rawi K. Cytology-histopathology correlation as quality control procedure in gynecologic cytodiagnosis. *Journal of the Faculty of Medicine, Baghdad*, Vol. 30, No. 2, 1994, pp. 95-99.
- [36] Abbas ZH,; Al-Sabbagh, WRM; Taher, Jwad TM , OZ, Evaluation of cervical cytological abnormalities in correlation with clinical findings in Iraqi patients, *Medical Journal of Babylon* 21(1):p 144-148
- [37] Muhammad OZ. "The Cervical screening in Erbil does not target every woman." *Polytechnic*, Vol. 6, No. 3, 2016, pp. 474-90.
- [38] Wright TC, Stoler MH, Behrens CM, Sharma A, Zhang G, Wright TL. Primary cervical cancer screening with human papillomavirus: end of study results from the ATHENA study using HPV as the firstline screening test. *Gynecol Oncol* 2015; 136: 189-97.
- [39] Finocchiaro-Kessler S, Wexler C, Maloba M, Mabachi N, Ndikum-Moffor F, Bukusi E. Cervical cancer prevention and treatment research in Africa: a systematic review from a public health perspective. *BMC Women's Health*. 2016;16:1.
- [40] Donatus L, Nina FK, Sama DJ, Nkfusai CN, Bede F, Shirinde J, et al. Assessing the uptake of cervical cancer screening among women aged 25–65 years in Kumbo West Health District, Cameroon. *Pan Afr Med J*. 2019;33:106.
- [41] Manga S, Kiyang E, DeMarco RF. Barriers and facilitators of follow-up among women with precancerous lesions of the cervix in Cameroon: a qualitative pilot study. *Int J Womens Health*. 2019;2019:11.
- [42] Hallidu M, Odonkor ST, Sumaila I. Cervical cancer knowledge and screening among young female adults in the Kintampo municipal hospital, Bono East Ghana. *Eutr J Health Sci*. 2021;6(4):64–81.
- [43] Andersen B, Christensen BS, Christensen J, et al. HPV-prevalence in elderly women in Denmark. *Gynecol Oncol*. 2019;154:118–23. <https://doi.org/10.1016/j.ygyno.2019.04.680>
- [44] Osingada CP, Ninsiima G, Chalo RN, Muliira JK, Ngabirano T. Determinants of uptake of cervical cancer screening services at a no-cost reproductive health clinic managed by nurse-midwives. *Cancer Nursing*. 2015;38(3):177–84.

- [45] Chidyaonga-Maseko F, Chirwa ML, Muula AS. Underutilization of cervical cancer prevention services in low and middle income countries: a review of contributing factors. *Pan Afr Med J*. 2015;21:231. <https://doi.org/10.11604/pamj.2015.21.231.6350>.
- [46] Pity, Intisar S., Maida Y. Shamdeen, and Shawnim A. Wais. "Follow up of atypical squamous cell Pap smears in Iraqi women." *Asian Pacific Journal of Cancer Prevention*, Vol. 13, No. 7, 2012, pp.3455-60.
- [47] Abdulla, Kawakeb N., et al. "Evaluation of Pap smear data in Baghdad province." *International Journal of Scientific and Research Publications*, Vol. 6, No. 5, 2016, pp. 634-39.
- [48] J. Low. *Genit. Tract Dis*, The natural history of cervical intraepithelial neoplasia Grades 1, 2, and 3: a systematic review and meta-analysis., 25 (2021), pp. 221-231, 10.1097/LGT.0000000000000604
- [49] Cobbinah P a Zheng, Si Z a, Oklah F b, Yuyang Z, Comparative analysis of Paiteling a traditional Chinese medicine (TCM) and CO2 laser therapy for high-risk HPV-associated with LSIL (CIN1) lesions, 302(11) 2024, 81-86
- [50] Qin F, Pang H, Yu T, Luo Y, Dong Y. Treatment strategies and prognostic factors of 2018 FIGO stage III C cervical cancer: A review. *Technol Cancer Res Treat*. Jan-Dec 2022;21:15330338221086403. doi:10.1177/15330338221086403
- [51] Schaafsma M, Plante M, Mom CH, van Trommel NE. Is less more in the surgical treatment of early-stage cervical cancer? *Curr Opin Oncol* 2022;34:473-89.
- [52] Schmeler KM, Pareja R, Lopez Blanco A, et al. ConCerv: a prospective trial of conservative surgery for low-risk earlystage cervical cancer. *Int J Gynecol Cancer* 2021;31:1317-25.
- [53] Miriyala R, Mahantshetty U, Maheshwari A, et al. Neoadjuvant chemo- therapy in cervical cancer: past, present and future. *Int J Gynecol Cancer*. 2022;32:260–5. <https://doi.org/10.1136/ijgc-2021-002531>.
- [54] Arbyn M, Simon M, de Sanjosé S, Clarke MA, Poljak M, Rezhake R, et al. Accuracy and effectiveness of HPV mRNA testing in cervical cancer screening: a systematic review and meta-analysis. *Lancet Oncol*. 2022 Jul;23(7):950–60.
- [55] Alwan NAS, Alabbody HH, Yaseen SAS, Demographic and Clinical Study on Patients Referred to the National Cancer Research Center for Pap Smears, *Journal of the Faculty of Medicine Baghdad* 60 (4), 208-214
- [56] Atoof, Wafaa M., Nuha Alwandawi, and Hana Algomele. "Knowledge, attitude and practice of workers about the cervical cancer and pap smear in the college of nursing." *Kufa Journal for Nursing Sciences*, Vol. 4, No. 3, 2015
- [57] Saslow, Debbie, et al. "American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer." *CA: A Cancer Journal for Clinicians*, Vol. 62, No. 3, 2012, pp.147-72.
- [58] Castanon A, Sasieni P. Is the recent increase in cervical cancer in women aged 20-24 years in England a cause for concern? *Prev Med*. 2018;107:21-28.
- [59] Tabatabaei FS, Saeedian A, Azimi A, Kolahdouzan K, Esmati E, Maddah Safaei A. Evaluation of survival rate and associated factors in patients with cervical cancer: a retrospective cohort study. *J Res Health Sci*. 2022;22(2):e00552
- [60] Zhang XX, Zeng QL, Cai WW, Ruan WQ. Trends of cervical cancer at global, regional, and national level: data from the global burden of disease study 2019. *BMC Public Health*. 2021;21(1):894