Journal of Obstetrics, Gynecology and Cancer Research | ISSN: 2476-5848

The Trend of Abnormal Cervical Cytology Among Iranian Women During Recent Years from 2013 to 2016

Farah Farzaneh[1*], Farzaneh Jamdar[2], Sarang Younesi[3], Mehdi Taheri Amin[4], Pourandokht Saadati[5], Fariba Navidpour[6], Payam Balvayeh[7], Robabeh Ghodssi-Ghasemabadi[8], Maryam Sadat Hosseini[9]

1. *Professor of Gynecology Oncology, Preventative Gynecology Research Center (PGRC) Shahid Beheshti University of Medical Sciences, Tehran, Iran*
2. *Gynecology-oncology Fellowship, Preventative Gynecology Research Center (PGRC), Shahid Beheshti University of Medical Sciences, Imam Hossein Hospital, Tehran, Iran*
3. *Doctor of Clinical Laboratory Sciences, Technical Manager at Nilou Medical Laboratory, Tehran, Iran*
4. *Doctor of Clinical Laboratory Sciences, CEO at Nilou Medical Laboratory, Tehran, Iran*
5. *Anatomical and Clinical Pathologist, Founder of Nilou Medical Laboratory, Tehran, Iran*
6. *MSc in Midwifery, Manager of Post Analytical-Quality Control Department, Nilou Medical Laboratory, Tehran, Iran*
7. *Anatomical and Clinical Pathologist, Manager of Pathology Department in Nilou Medical Laboratory, Tehran, Iran*
8. *PhD Student, Department of Biostatistics, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran*
9. *Professor of Gynecologic-oncology, Preventative Gynaecology Research Center (PGRC) Shahid Beheshti University of Medical Sciences, Imam Hossein Hospital, Tehran, Iran*

Article Info

Received: 2018/09/16;
Accepted: 2019/01/25;
Published Online: 16 Oct 2019;

Use your device to scan and read the article online

Corresponding Information:
Farah Farzaneh
Professor of Gynecology Oncology, Head of the Preventative Gynecology Research Center (PGRC) Shahid Beheshti University of Medical Sciences, Tehran, Iran
Tel: *09124768922*
Email: *farahzaneh@yahoo.com*

ABSTRACT

Background & Objective: Cervical cancer is one of the common cancers in developing countries, which has a high rate of mortality. This study aimed to evaluate the prevalence of abnormal cervical cytology among Iranian women.

Materials & Methods: In this cross-sectional study, cervical cytological results of 137,484 Iranian women, who were screened for cervical cancer in Tehran and 12 other provinces of Iran from 2013 to 2016, were investigated. The Pap smear was prepared by a liquid-based method and evaluated by a pathologist.

Results: The overall prevalence of abnormal cervical cytology in the studied population was 3%. The mean age of the population was 35.77±9.6. In this study, the prevalence of abnormal cytology in 2013, 2014, 2015, and 2016 was 2.10%, 2.68%, 3.47%, and 3.60%, respectively. The rate of the abnormal Pap smear has increased over the years, and this trend has been statistically significant (P<0.001). In this population, atypical squamous cells of undetermined significance (ASCUS) cytology was the most common abnormal Pap smear (1.96%).

Conclusion: In this study, the prevalence of abnormal cervical cytology has been significantly increased in Iran in recent years. This increase requires careful monitoring of general education programs, strict cervical cancer screening, and routine vaccination against HPV infection.

Keywords: Pap smear, HPV vaccination, Cervical cancer screening

Introduction

As a gynaecologic cancer, cervical cancer is the third common cancer and also the cause of cancer-related death in the United States **(1)**. The prevalence and mortality rate due to the cervical cancer, depends on the availability of screening programs for detection precancerous lesions and vaccination against human papillomavirus (HPV), which are more accessible in developed countries comparing to developing countries. These interventions have led to a reduction of 75% in the prevalence and severity of this cancer in developed countries over the last 50 years **(2,3)**. Unfortunately, in developing countries, cervical cancer, with over 85% of new cases, is one of the leading causes of cancer death, where the access for cervical cancer screening programs and HPV vaccination is limited **(4-6)**. Evaluation of cervical cytology, with the introduction of Papanicolaou smear in 1941, is a standard method for screening cervical cancer and identifying premalignant lesions **(7)**. According to Chaichian *et al.* study, the incidence of cervical cancer has been increasing in Iran during recent years. By some data (from the

National Cancer Registry and Center for Disease Control of the Ministry of Health, as well as Treatment and Medical Education), they showed that registered cancer cases increased approximately three-fold from 394 cases in 2003 to 907 in 2009. Their research indicated that the incidence rate of cervical cancer increased from 1.64 per 100,000 women in 2003 to 2.61 per 100,000 women in 2009 **(8)**.

HPV plays a major role in developing cervical cancer and precancerous lesions **(9-11)** and can be detected in 99.7% of cervical cancers **(9)**. Among all behavioral, sexual, and socioeconomic risk factors, the effect of HPV infection, in cervical neoplasia, is more critical than other ones, which are also dependent upon HPV infection **(12)**. Recent studies have shown that the prevalence of HPV infection has increased in Iran in recent years **(13)**. This suggests the possibility of an increase in abnormal cervical cytology and risk of cervical cancer in the coming years. The prevalence of abnormal cytology and premalignant lesions varies in different regions and changes over time. In the study by Afrakhteh, the prevalence of the abnormal Pap smear was 1.18% in Tehran in 2007 **(14)**.

This study aimed to evaluate the prevalence of abnormal cervical cytology based on the 2001 Bethesda System and its changing trends in Iran in recent years.

Materials and Methods

Study Population

In this cross-sectional study, the results of Pap smears, from all subjects of NILOU Medical Laboratory, were reviewed from 2013 to 2016. Pap smear samples were taken by gynaecologists in public and private clinics in Tehran and 12 other cities (provinces) and then sent to the NILOU Laboratory (i.e., one of the most accredited laboratories in Iran). The information of the subjects was recorded by trained laboratory personnel.

Cytology Analysis

Slurries were stained based on liquid-based (using E-Prep, South Korea) and Thin Prep (using the Hologic system, USA) methods via Papanicolaou staining, and checked out by verified cytoscreeners. It should be noted that 10% of normal slides (randomly) and all abnormal slides were reviewed by two pathologists and then the final results were reported. The results are classified according to the 2001 Bethesda System, which included negative for intraepithelial lesion or malignancy (NILM), atypical squamous cells of undetermined significance (ASCUS), atypical squamous cells-cannot exclude HSIL (ASC-H), low-grade squamous intraepithelial lesion (LSIL), high-grade squamous intraepithelial lesion (HSIL), atypical glandular cells (AGC), and squamous cell carcinoma (SCC).

Statistical Analysis

The quantitative data were reported by using mean and standard deviation, and the qualitative data were reported by using frequency and percentage. The estimated prevalence was reported by using a 95% confidence interval. Chi-square tests of trend were used for the data analysis. Statistical analyses were performed in R statistical software (version 3.1), and P-value<0.05 was considered statistically significant.

Results

In this study, the results of the Pap smears of 137,484 Iranian women aged between 17 and 82 years were studied. According to the Bethesda System, 99.6% of Pap smears were satisfactory for evaluation in the studied population. The mean age of the screened women was 35.77±9.6 years. The prevalence of abnormal cervical cytology in this study population was 3% (4,115 out of 137,025) according to the Bethesda System classification. The abnormal cytology of ASCUS is the most common type (64.8%) of the abnormal Pap smear. The prevalence of abnormal cytology is presented in Table 1.

In this study, the largest screened age group was 30-39 years. The highest prevalence of abnormal cytology (4.12%) was significantly related to the age group of less than 25 years (*P*<0.001). The mean age of women with HSIL is 32.78±8.03 years. The prevalence of abnormal cytology, in relation to age, is presented in Table 2.

Table 1. Prevalence of abnormalities

Abnormal Pap smear	Number (Percent of Total)	Prevalence (95%CI)
ASC-US	2667 (64.80%)	1.95% (1.87% - 2.02%)
ASC-H	637 (15.50%)	0.46% (0.43% - 0.50%)
LSIL	739 (18.00%)	0.54% (0.50% - 0.58%)
HSIL	60 (1.46%)	0.04% (0.03% - 0.06%)
AGC	12 (0.24%)	0.01% (0.01% - 0.04%)
TOTAL	4115	3% (2.91% - 3.10%)

ASCUS: atypical squamous cells of undetermined significance; ASC-H: atypical squamous cells-cannot exclude HSIL; LSIL: low-grade squamous intraepithelial lesion; HSIL: high-grade squamous intraepithelial lesion; AGC: atypical glandular cells.

Table 2. The rate of abnormal Pap smear according to the age of the individual

Age category	Total number of participants	Number of abnormal Pap smear	Prevalence of abnormal Pap smear (95%CI)	P-value
<25 y	13,215	544	4.12% (3.79%-4.47%)	< 0.001
25-29 y	26,081	973	3.73% (3.51%-3.97%)	
>30 y	97,729	2598	2.66% (2.56%-2.76%)	
TOTAL	137,025	4115		

In this study, the prevalence of abnormal Pap smears increased from 2.10% (95% CI 1.94%-2.27%) in 2013 to 3.6% (95%CI 3.41%-3.79%) in 2016, and this difference is statistically significant (*P*=0.001). The prevalence of low-risk abnormal cytology increased from 1.76% in 2013 to 2.95% in 2016 with a statistically significant increasing trend during this period (*P*<0.001). Also, the prevalence of high-risk abnormal cytology increased from 0.34% in 2013 to 0.65% in 2016 (*P*<0.001 for trend). The trend of the prevalence of abnormal cytology is presented in Table 3.

The incremental trend was observed from 2013 to 2016 in all kinds of abnormal cytology, except AGC. Data are represented in Figure 1.

Table 3. Assessment of the prevalence of abnormal cytology during 2013-2016

Abnormality \ Year	2013	2014	2015	2016	P-value*
Abnormal cytology	2.10% (1.94%-2.27%)	2.68% (2.51%-2.86%)	3.47% (3.28%-3.67%)	3.60% (3.41-3.79)	0.001
Low-risk Abnormal cytology	1.76% (1.61%-1.91%)	2.24% (2.09%-2.41%)	2.86% (2.69%-3.04%)	2.95% (2.78%-3.13%)	<0.001
High-risk Abnormal cytology	0.34% (0.28%-0.42%)	0.43% (0.37%-0.51%)	0.61% (0.53%-0.70%)	0.65% (0.57%-0.73%	<0.001

Data are represented as a prevalence (95%CI). **P*-value for trend. Low-risk Abnormal cytology: ASCUS and LSIL; High-risk Abnormal cytology: HSIL, ASC-H, and AGC.

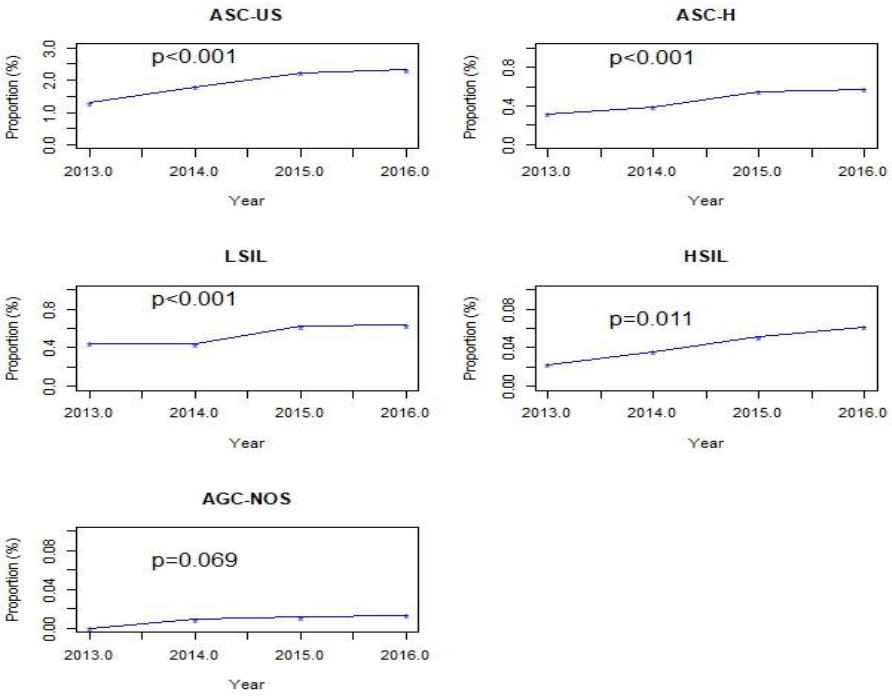

Figure 1. The trend of a different kind of abnormal cytology during 2013-2016 (p-value in each box is related to the trend test). ASCUS: atypical squamous cells of undetermined significance; ASC-H: atypical squamous cells-cannot exclude HSIL; LSIL: low-grade squamous intraepithelial lesion; HSIL: high-grade squamous intraepithelial lesion; AGC: atypical glandular cells.

Discussion

Cervical cancer is considered as a preventable malignancy due to appropriate screening programs, HPV vaccination, its lengthy pervasive conditions, and effective treatments for a precancerous disease **(15-17)**. The common types of cervical cancer start with precancerous changes, which can be detected in screening cervical cytology and led to early treatment **(15)**.

Surprisingly, the prevalence of abnormal cervical cytology is different in other countries at different times. Based on the published studies, the rate of abnormal Pap smear showed a wide range of percentages from as low as 0.98% in Israeli Jewish women **(18)** to as high as 15.5% in a rural population of Zimbabwe **(19)**.

In this study, the overall prevalence of abnormal Pap smears in the study population was 3% from 2012 to 2016, which was higher than previous studies in Iran **(14,20-21)**. ASCUS was the most common type (1.95%) of abnormal cytology in the study population. In a similar study by Afrakhteh *et al.* (2007), the prevalence of the abnormal Pap smear was 1.18% in Tehran **(14)**. ASCUS was the most common abnormal cervical pathology in their study too, and the prevalence of cervical cancer was 0.2% **(14)**. In another study by Almassi Nokiani (2008), the prevalence of the abnormal Pap smear was only 0.3%. In their study, no cases of HSIL and cervical cancer were reported under the age of 35 years **(20)**. Masoumi *et al.* (2016) reported that the prevalence of the abnormal Pap smear was 1.67% in Hamadan, Iran. The most-reported abnormal cytology was ASCUS, and the lowest was LSIL. **(21)**. The percentage of the abnormal Pap smear in Iran is comparable to other countries in the middle-east region. The rate of abnormal cytology is reported to be 3.8% in Jordan **(22)**, 4.3% in Kuwait **(23)**, 4.89% in UAE (24), and 4.7% to 7.9% in different regions of Saudi Arabia **(24,25)**. It is also comparable to some European countries, such as Turkey (2.8%) **(26)**, Italy (2.4%) **(27)**, and Belgium (3.7%) **(28)**. However, the rate of cervical cytology abnormalities in Iran is lower than many countries around the world, such as Russia (9.8%) **(29)**, Egypt (7.8%) **(30)**, Romania (5.9%) **(31)** and India (6.3%) **(32)**.

Although the total prevalence of the abnormal Pap smear is still low in Iran, in this study, we encountered a significant increase in both low-grade and high-grade cytological abnormalities from 2013 to 2016. The prevalence of cytological abnormalities in 2013, 2014, 2015, and 2016 was 2.10%, 2.68%, 3.47%, and 3.60%, respectively (P<0.001), which is alarming. No consistent pattern emerges in other countries. For example, in UAE, 60% increase of cervical cytological abnormalities was reported by Muna Al Zaabi *et al.* over the last 10 years **(33)**. On the other hand, Shelly Gupta (2017) investigated the cytological outbreak from 2013 to 2016 in India. Their study indicated the decreasing trend of cervical dysplasia and cervical cancer in cervical smears over the four consecutive years **(34)**. Meanwhile, due to several reasons, our findings were opposite during the period of 2013-2016.

Over the past years, the prevalence of high-risk HPV infection has been increasing in Iran, which rose from 5% in 2012 to 10.3% in 2018 **(13,35)**. This increase in the prevalence of high-risk HPV infection could lead to an increase of abnormal cervical cytology in future. Momenimovahed (2018) stated that despite the low incidence of cervical cancer in Iran, the risk factors associated with this cancer are not few, which may result in a higher incidence of cervical cancer in the future. Their findings demonstrated that some factors, such as marital status, marriage age and age of first pregnancy, smoking, consumption of oral contraceptive pills, multiple sexual partners, family history, and multiparty are associated with cervical cancer **(36)**.

It was noticed that in the majority of studies, including ours, ASCUS had the highest prevalence among all cytological abnormalities **(14,21,23,25-29,31, 33)**. In the present study, the mean age of the screened women was 35.77±9.6 years, and the largest screened age group was 30-39 years.

In this study, the prevalence of cervical cytological abnormalities in women, younger than 25 years old, was significantly higher than those of older ages (P<0.001). However, major lesions were low-grade lesions, such as ASCUS and LSIL in this age group, and the mean age of severe dysplasia and HSIL was 32.78 years. The higher rate of the low-grade lesion, among young women in this research, is comparable to the other studies and is due to the higher prevalence of HPV infection in this age group. However, it is not worrisome. Based on several researches, many of the cytological abnormalities, even high-grade lesions, regress spontaneously in this age group after disappearing HPV infection **(37-39)**. These findings emphasize that there is a strong need for vaccination and regular screening of young women.

As mentioned earlier, the increase in the prevalence of high-risk HPV infection had many causes, which consequently has led to an increase of cervical cytological abnormalities and cervical cancer in Iran in recent years. Most of the Iranian population is young, and we have observed a change in the sexual behavior of adolescents in recent years, which emphasizes a need for training for this age group. Hookah smoking is a traditional type of

smoking in Iran, which has become popular among teenagers in recent years. Meanwhile, most people are unaware of the disadvantages of using this type of tobacco. According to the researches, Tobacco smoking is considered a potential risk factor for cervical cancer and also is associated with an increased risk of HPV infection and genital wart **(40-41).** Water pipe use is associated with higher CO_2, equal amount of nicotine and dramatically, more smoke exposure compared to cigarette smoking. Water pipe tobacco smoking exposes the people to some serious toxicants as cigarette smoking and associated with similar health risks **(42)**.

On the other hand, vaccination against HPV virus in Iran is not routine, and insurance companies do not cover vaccination costs and especially HPV testing costs during cervical cancer screening programs. As it was found in the study of Staples *et al.*, educational interventions, focusing on the importance of HPV vaccination for parents with young children, have a positive effect on public health. This study also emphasizes that early prevention and diagnosis have a vital role in the reduction of inequalities in cervix cancer **(43)**.

Limitation: Given the retrospective nature of the study, demographic data of patients were not complete, and studying the risk factors of abnormal cytology was not possible.

Conclusion

This study shows that in recent years the prevalence of the abnormal Pap smear has had an increasing trend in Iran, which may be alarming and need to assess the etiology. These findings emphasize that there is a strong need to routinize vaccination against HPV infection, cover HPV testing cost, properly implement the cervical cancer screening, and increase training in the society.

Acknowledgements

The authors would like to thank Dr. Taheri M, the NILOU medical laboratory manager and their personnel for their contribution to this study.

Conflict of Interest

Authors declared no conflict of interests.

References

1. Siegel R, Ward E, Brawley O, Jemal A. The impact of eliminating socioeconomic and racial disparities on premature cancer deaths. Ca-a Cancer Journal for Clinicians. 2011;61(4):212-36. [DOI:10.3322/caac.20121] [PMID]
2. Quinn M, Babb P, Jones J, Allen E. Papers. Bmj. 1999;318(7188):904. [DOI:10.1136/bmj.318.7188.904] [PMID] [PMCID]
3. Willoughby BJ, Faulkner K, Stamp E, Whitaker C. A descriptive study of the decline in cervical screening coverage rates in the North East and Yorkshire and the Humber regions of the UK from 1995 to 2005. Journal of Public Health. 2006;28(4):355-60. [DOI:10.1093/pubmed/fdl062] [PMID]
4. Ferlay J. GLOBOCAN 2000. Cancer incidence, mortality and prevalence worldwide, version 1.0. IARC cancerbase. 2001.
5. Jemal A, Center MM, DeSantis C, Ward EM. Global patterns of cancer incidence and mortality rates and trends. Cancer Epidemiology and Prevention Biomarkers. 2010;19(8):1893-907. [DOI:10.1158/1055-9965.EPI-10-0437] [PMID]
6. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. CA: a cancer journal for clinicians. 2015;65(2):87-108. [DOI:10.3322/caac.21262] [PMID]
7. Papanicolaou GN, Traut HF. The diagnostic value of vaginal smears in carcinoma of the uterus. American Journal of Obstetrics & Gynecology. 1941;42(2):193-206. [DOI:10.1016/S0002-9378(16)40621-6]
8. Chaichian S, Khateri S, Moradi Y, Khosravi Shadmani F, Mansori K, Khazaei Z, et al. Trends in cervical cancer incidence in Iran from 2003 to 2009. Middle East Journal of Cancer. 2018;9(1):57-63.
9. Walboomers JM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. The Journal of pathology. 1999;189(1):12-9. https://doi.org/10.1002/(SICI)1096-9896(199909)189:1<12::AID-PATH431>3.0.CO;2-F [DOI:10.1002/(SICI)1096-9896(199909)189:13.0.CO;2-F]
10. Kaufman RH, Adam E, Icenogle J, Lawson H, Lee N, Reeves KO, et al. Relevance of human papillomavirus screening in management of cervical intraepithelial neoplasia. American journal of obstetrics and gynecology. 1997;176(1):87-92. [DOI:10.1016/S0002-9378(97)80017-8]
11. Schiffman MH, Bauer HM, Hoover RN, Glass AG, Cadell DM, Rush BB, et al. Epidemiologic evidence showing that human papillomavirus infection causes most cervical intraepithelial neoplasia. JNCI: Journal of the National Cancer Institute. 1993;85(12):958-64. [DOI:10.1093/jnci/85.12.958] [PMID]
12. Khan MJ, Partridge EE, Wang SS, Schiffman M, Group ASCoUSLGSILTS. Socioeconomic status and the risk of cervical intraepithelial neoplasia grade 3 among oncogenic human papillomavirus DNA-positive women with equivocal or mildly abnormal cytology. Cancer. 2005;104(1):61-70. [DOI:10.1002/cncr.21129] [PMID]
13. Jamdar F, Farzaneh F, Navidpour F, Younesi S, Balvayeh P, Hosseini M, et al. Prevalence of human papillomavirus infection among Iranian women using COBAS HPV DNA testing. Infectious agents and cancer. 2018;13(1):6. [DOI:10.1186/s13027-018-0178-5] [PMID] [PMCID]
14. Afrakhteh M, Khodakarami N, Moradi A, Alavi E, Shirazi FH. A study of 13315 papanicolau smear diagnoses in Shohada Hospital. Journal of family and reproductive health. 2007;1(2):74-8.

15. American cancer society , www.cancer.org Last Revised: January 23, 2019
16. Nour NM. Cervical cancer: a preventable death. Reviews in Obstetrics and Gynecology. 2009;2(4):240.
17. Bal MS, Goyal R, Suri AK, Mohi MK. Detection of abnormal cervical cytology in Papanicolaou smears. Journal of Cytology/Indian Academy of Cytologists. 2012;29(1):45. [DOI:10.4103/0970-9371.93222] [PMID] [PMCID]
18. Sadan O, Schejter E, Ginath S, Bachar R, Boaz M, Menczer J, et al. Premalignant lesions of the uterine cervix in a large cohort of Israeli Jewish women. Archives of gynecology and obstetrics. 2004;269(3):188-91. [DOI:10.1007/s00404-002-0371-y] [PMID]
19. Thistle P, Chirenje Z. Cervical cancer screening in a rural population of Zimbabwe. The Central African journal of medicine. 1997;43(9):246-51.
20. Nokiani FA, Akbari H, Rezaei M, Madani H, Ale Agha M. Cost--effectiveness of pap smear in Kermanshah, Iran. Asian Pac J Cancer Prev. 2008;9(1):107-10.
21. Massomi Z, Khani S, Gharosian M, Farhadian M, Shayan A. The Prevalence of Abnormal Pap Smears in females Referred to Health Centers Affiliated to Medical Sciences During the Years 2012 to 2016. J Educ Community Health. 2016;3(2):16-22. [DOI:10.21859/jech-03023]
22. Maraqa B, Lataifeh I, Otay L, Badran O, Nouri YQ, Issam I, et al. Prevalence of Abnormal Pap Smears: A Descriptive Study from a Cancer Center in a Low-Prevalence Community. Asian Pacific journal of cancer prevention: APJCP. 2017;18(11):3117.
23. Kapila K, George SS, Al-Shaheen A, Al-Ottibi M, Pathan SK, Sheikh ZA, et al. Changing spectrum of squamous cell abnormalities observed on Papanicolaou smears in Mubarak Al-Kabeer Hospital, Kuwait, over a 13-year period. Medical Principles and Practice. 2006;15(4):253-9. [DOI:10.1159/000092986] [PMID]
24. Altaf FJ. Cervical cancer screening with pattern of pap smear. Saudi Med J. 2006;27(10):1498-502.
25. Elhakeem HA, Al-Ghamdi AS, Al-Maghrabi JA. Cytopathological pattern of cervical Pap smear according to the Bethesda system in Southwestern Saudi Arabia. Saudi medical journal. 2005;26(4):58892.
26. Atilgan R, Celik A, Boztosun A, Ilter E, Yalta T, Ozercan R. Evaluation of cervical cytological abnormalities in Turkish population. Indian Journal of Pathology and Microbiology. 2012;55(1):52. [DOI:10.4103/0377-4929.94856] [PMID]
27. Rossi PG, Ricciardi A, Cohet C, Palazzo F, Furnari G, Valle S, et al. Epidemiology and costs of cervical cancer screening and cervical dysplasia in Italy. BMC Public Health. 2009;9(1):71. [DOI:10.1186/1471-2458-9-71] [PMID] [PMCID]
28. Arbyn M, Van Nieuwenhuyse A, Bogers J, De Jonge E, De Beeck LO, Matheï C, et al. Cytological screening for cervical cancer in the province of Limburg, Belgium. European Journal of Cancer Prevention. 2011;20(1):18-24. [DOI:10.1097/CEJ.0b013e32833ecbc6] [PMID]
29. Shipitsyna E, Zolotoverkhaya E, Kuevda D, Nasonova V, Romanyuk T, Khachaturyan A, et al. Prevalence of high-risk human papillomavirus types and cervical squamous intraepithelial lesions in women over 30 years of age in St. Petersburg, Russia. Cancer epidemiology. 2011;35(2):160-4. [DOI:10.1016/j.canep.2010.08.010] [PMID]
30. El All HSA, Refaat A, Dandash K. Prevalence of cervical neoplastic lesions and human papilloma virus infection in Egypt: national cervical cancer screening project. Infectious agents and cancer. 2007;2(1):12. [DOI:10.1186/1750-9378-2-12] [PMID] [PMCID]
31. Stolnicu S, Musca S, Micu D, Micu L, Moldovan C, Puscasiu L. Prevalence of abnormal Pap smears in a consecutive and previously unscreened population in Romania. International Journal of Gynecology & Obstetrics. 2014;124(2):156-9. [DOI:10.1016/j.ijgo.2013.07.030] [PMID]
32. Jena A, Bharathi T, Reddy S, Manilal B, Patnayak R, Phaneendra B. Papanicolaou (Pap) test screening of staff members of a tertiary care teaching hospital in South India. J Clin Sci Res. 2012;1:174-7.
33. Al MZ, Al SM, Al TS, Al SA, Coetsee K, Balayah Z, et al. Age Specific Cytological Abnormalities in Women Screened for Cervical Cancer in the Emirate of Abu Dhabi. Asian Pacific journal of cancer prevention: APJCP. 2015;16(15):6375-9. [DOI:10.7314/APJCP.2015.16.15.6375] [PMID]
34. Gupta S, Iyengar S, Jain B. Trend of Cervical Dysplasia And Cervical Cancer -in Papanicolaou Smears in Perimenopausal Females In Tertiary Care Centre, Gwalior Madhya Pradesh. Journal of Dental and Medical Sciences 2017;16(12):10-3.
35. Khodakarami N, Clifford GM, Yavari P, Farzaneh F, Salehpour S, Broutet N, et al. Human papillomavirus infection in women with and without cervical cancer in Tehran, Iran. International journal of cancer. 2012;131(2):E156-E61. [DOI:10.1002/ijc.26488] [PMID]
36. Momenimovahed Z, Salehiniya H. Cervical cancer in Iran: integrative insights of epidemiological analysis. BioMedicine. 2018;8(3). [DOI:10.1051/bmdcn/2018080318] [PMID] [PMCID]
37. Moscicki A-B, Shiboski S, Hills NK, Powell KJ, Jay N, Hanson EN, et al. Regression of low-grade squamous intra-epithelial lesions in young women. The Lancet. 2004;364(9446):1678-83. [DOI:10.1016/S0140-6736(04)17354-6]
38. Edelman M, Fox AS, Alderman EM, Neal W, Shapiro A, Silver EJ, et al. Cervical Papanicolaou smear abnormalities in inner city Bronx adolescents: prevalence, progression, and immune modifiers. Cancer Cytopathology: Interdisciplinary International Journal of the American Cancer Society. 1999;87(4):184-9. [DOI:10.1002/(SICI)1097-0142(19990825)87:43.0.CO;2-#]
39. Mount SL, Papillo JL. A study of 10 296 pediatric and adolescent Papanicolaou smear diagnoses in Northern New England. Pediatrics. 1999;103(3):539-45. [DOI:10.1542/peds.103.3.539] [PMID]
40. Schabath MB, Villa LL, Lazcano-Ponce E. Smoking and human papillomavirus (HPV) infection in the HPV in Men (HIM) study. Cancer Epidemiol Biomarkers Prev. 2012;21(1):102-10 [DOI:10.1158/1055-9965.EPI-11-0591] [PMID] [PMCID]
41. Ghaemdoust, F., Nahvijou, A., Zendehdel, K. and Farzaneh, F. 2019. Waterpipe as a Risk Factor for Genital Warts? A Case Report. Basic & Clinical Cancer Research. 2019;11(3)
42. Eissenberg T, Shihadeh A. Waterpipe tobacco and cigarette smoking: direct comparison of toxicant exposure. American

journal of preventive medicine. 2009 D;37(6):518-23 [DOI:10.1016/j.amepre.2009.07.014] [PMID] [PMCID]

43. Staples JN, Wong MS, Rimel B. An educational intervention to improve human papilloma virus (HPV) and cervical cancer knowledge among African American college students. Gynecologic oncology. 2018;149(1):101-5. [DOI:10.1016/j.ygyno.2017.10.015] [PMID]

How to Cite This Article:

Farzaneh F, Jamdar F, Younesi S, Mehdi Taheri Amin M, Saadati P, Navidpour F, et al . The Trend of Abnormal Cervical Cytology Among Iranian Women During Recent Years from 2013 to 2016. jogcr. 2019; 4(1): 29-35