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Hazardous Consequences of Polygamy,

Contraceptives and Number of Childs on cervical cancer in a low incoming country: Bangladesh

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Abstract. Background: Cervical cancer is the one of the most alarming disease among female in the low incoming country like Bangladesh. The societies of Bangladesh are conservative because of lacking education and consciousness. The information on Bangladeshi female's cervical cancer factors is not available. Purpose: To retrieve the associations among the factors with cervical cancer and to raise awareness among the women of society. Methods: A case-control study has been acquitted on 426 participants of both patients and non-patients from February 2014 till July 2014. Through a precise questionnaire based on former study the whole data collection process done. For analyzing of data some tasks like binary logistic regression, odds ratio, crosstabs and p-value tests have executed. Results: Factors like First sex at the age below 16, Lack of knowledge about cervical cancer, number of children above 3, STI (Sexually Transmitted Infection) affection, previous cervical cancer history are founded highly significant on the other hand oral contraception taken, contraception used and vaccine taken factors are significantly lower than the previous factors. Conclusions: The analysis would help to predict the risk factors of the cervical cancer and may help to diminish the cancer not only from Bangladesh but all over the world.

Keywords: Cervical cancer, Low incoming country, Risk Factors, Statistical Analysis, Socio Demographic Analysis

Az Gelişmiş Bir Ülkede Servik Kanserde Çocuk Sayısı, Gebelikten Korunma ve Çok Eşliliğin Tehlikeli Sonuçları: Bangladeş

Özet. Rahim ağzı kanseri Bangladeş gibi az gelişmiş bir ülkede kadınlar arasında en tehlikeli hastalıklardan biridir. Bangladeş toplumları eğitim ve bilinç eksikliği nedeniyle tutuculardır. Bangladeşli kadınların servikal kanser faktörleriyle ilgili bilgileri bulunmamaktadır. Amaç: Rahim ağzı kanseri ile ilgili dernek kurmak için ve toplumdaki kadınları bilinçlendirmek. Yöntem: Çalışma Şubat 2014-Temmuz 2014 tarihleri arasında ankete katılan hasta olan ve olmayan 426 kadın ile gerçekleştirilmiştir. Verilerin analizinde binary logistic regression, odds ratio, crosstabs ve p-value testleri kullanılmıştır. Bulgular: 16 yaş altında ilk cinsel ilişki, rahim ağzı kanseri hakkında bilgi eksikliği, 3 den fazla çocuk sayısı, STI (cinsel yolla bulaşan enfeksiyonlar) gibi faktörler yüksek oranda bulunurken, gebelikten korunma yöntemleri hakkındaki bilgiler az orandadır. Sonuç: Bu çalışma serviks kanseri risk faktörlerini tahmin etmeye yardımcı olarak yalnızca Bangladeş değil tüm dünyada kanseri azaltmada yardımcı olabilir.

Anahtar Kelimeler: Rahimağzı kanseri, az gelişmiş ülke, risk faktörleri, istatistiksel analiz, Sosyo Demografik Analiz

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1. INTRODUCTION

Billions of cells are the building block of the human body which grow, divide, and then die in a predictable manner. When something goes wrong with this system causes uncontrolled cell division and increases the possibility of cancer. According to National Cancer Institute, cancer that forms in tissues of the cervix (the organ connecting the uterus and vagina) is called cervical cancer. It is a slow-growing cancer exhibits no symptoms in the early stages but can be detected with regular Pap test [1]. During later stages of cancer, it shows symptoms like vaginal bleeding, pelvic pain and pain during sexual intercourse [2, 3]. Cervical cancer is usually caused by human papillomavirus (HPV) infection having ability to invade other parts of the body [4, 5].

Cervical cancer is the fourth most common cause of cancer in women. In 2012, it was estimated that there were 528,000 cases of cervical cancer, and 266,000 deaths in worldwide [6]. In Bangladesh, cervical cancer is a leading cause of cancerous death also. By the years of 2005, 2006 and 2007, it was estimated that 561, 583 and 574 women were affected by cervical cancer respectively which recorded as second common malignancies (21.5%) in Bangladeshi females [7].

Cervical cancer developed mostly in an intervening stage of cervix development called squamous metaplasia, which involves transformation of the columnar epithelium of the cervix into squamous epithelium during puberty, where transitional cells support HPV replication. HPV infection persistency in this period leads to cervical intra-epithelial neoplasia (CIN) 2 or CIN3 lesions and, eventually, development of invasive cervical cancer. Early sexual activity and multiple sexual partners in adolescents influence squamous metaplasia. Studies show that females having HPV carrier male partners are more prone to develop cervical cancer [8].

Some factors like long term use of oral contraceptives, smoking, multiple full term pregnancies, previous exposure to sexually transmitted infections (STIs) with chlamydia trachomatis, some herpes viruses and HIV increase the risk of cervical cancer among HPV-DNA positive women [8]. Estrogen and its receptors are strongly associated with human papillomavirus (HPV) infections and promote cervical cancer in combination with HPV oncogenes [9]. Cervical cancer is also influenced by lack of nutrition like vitamins [10] and by aging usually after post-menopausal period at 45 or above [11]. Sometimes cervical cancer is influenced by genetic factors, but this evidence is not clear [8].

Cervical cancer can be prevented by avoiding early and multiple marriages, multiple sexual partner, oral contraceptives, smoking, multiple pregnancies and increasing the use of a condom

during sexual intercourse. Cervical cancer can also be encountered by eating a lot of vitamin A, E, B12 rich nutritious foods and by vaccination [12]. Chemotherapy, surgery, hysterectomy, drugs targeting estrogen and its receptors may be effective in treating and/or preventing cervical cancer.

The actual reason and total curing procedure of cancer is not invented yet. Some general risk factors and symptoms of cervical cancer have discovered by many statistical analysis. Therefore, identification of genetic as well as environmental factors is very important in developing novel methods of cervical cancer prevention. There are lots of work to detect the risk factors of cervical cancer. Most of them are population based case control studies [5]. In some cases several databases, algorithms, induction techniques are used for the prediction of cervical cancer risk factors [13]. Some researchers used data mining to predict cancer risk [14-18]. Some used statistical approaches like correlation, chi-square test and regression analysis with confidence interval and P- value. A case-control study on the relationship between HIV and cervical cancer [5], Population based case-control study [4] and prevalence of precancerous cervical cancer leison among HIV infected women [19] took place in the previous analysis. A risk assesment of lung cancer evolution based on statistical analysis took place also [20]. But there was no work of cervical cancer risk prediction or risk factors using statistical approaches not only in Bangladesh but also all over the world.

In this paper, a statistical based data analysis has been performed where about 426 women's data of both patient and non-patients were used. The results are shown in the "Result and Analysis" section. The result shows the socio demographic analysis including frequency of the factors. The associations between the resultant factors are detected by odds ratio with confidence interval (C.I) and P-values and the significances of these factors are also demonstrated by the analysis.

2. METHODOLOGY

The detailed flow of methodology has been shown in this section. The whole methodology section has been split into three sub-sections to visualize the working procedure.

2.1 Data collection

Some persons' data are collected from the different diagnostic Centre and medical college hospital where female information of different age is present. Obtained data also contain both patient and non-patient data. 426 patients' data (199 cervical cancer patients and 227 non-cervical patients) is obtained from the different diagnostic center. There are 426 female patients whose

age between bellow 30 to above 60 years old. From the previous studies some risk factors were considered for cervical cancer assessment in Bangladeshi population, which includes- age, multiple sexual partner, lack of correct condom utilization, the age at first sexual intercourse of the woman, use of oral contraceptives for five or more years; high parity (five or more full term pregnancies); and previous exposure to other sexually transmitted infections (STIs), lack of proper nutrition, smoking, and sometimes it is genetic risk.

2.2. Data preprocessing

Incomplete, inconsistent and noisy data are present everywhere in the whole world. Data transformations, data cleaning, data reduction, data discretization, data integration are the five major tasks of the data pre-processing. Those processes convert the raw data to an analyzed result through some process. Analysis has taken place in the Statistical analysis of the pre-processed data and resets the associated and not associated data. After data collection, there were some missing values of the total data. In the meanwhile there were some values which may inconsistent and may occur confliction with the actual results. A little data were altered due to the actual result.

2.3. Statistical analysis

Detection of those factors which are statistically significant and finding the association among the factors with cervical cancer has been performed through some statistical approaches. In [16] the lung cancer risk facotrs were determined by P-value, odds-ratio, frequencies and sensitivity. Here in our analysis P-value and association among cervical cancer with various factors has been enumerated by $\chi 2$ – test after the pre-processing of the collected data. The odds ratio (OR), 95% confidence interval (C.I) has been observed by binary logistic regression which are statistically significant according to the crosstabs. Also here line plot and bar diagram have been used. The whole analysis has been executed by IBM Statistical Package for Social Sciences (SPSS version 20.0).

3. RESULTS AND STATISTICAL ANALYSIS

In this part at first the Table 1 shows the Cross tabulation and association among various factors with cervical cancer and Tables 2 shows Odds ratio and Confidence Interval of the associated Factors in Binary logistic regression analysis.

Table 1. Cross tabulation and association among various factors with cervical cancer.

Variable	Category	Patient		Association
		Affected N (%)	Unaffected N (%)	
Occupation	Business	8(4)	0(0.0)	NS
	Govt. service	9(4.5)	6(2.6)	
	Unemployed	15(7.5)	0(0.0)	
	Housewife	144(72.4)	209(92.1)	
	Private job	14(7)	12(5.3)	
	Shop keeper	9(4.5)	0(0.0)	
Knowledge about cancer	Yes	4(2)	68(30)	S
	No	195(98)	159(70)	
Cancer vaccine taken	Yes	2(1)	19(8.4)	S
	No	197(99)	208(91.6)	
Number of Sex partner	1-2	160(80.4)	217(95.6)	S
	3+	39(19.6)	10(4.4)	
Contraception used	Yes	7(3.5)	157(69.2)	S
	No	192(96.5)	70(30.8)	
Number of Childs	1-2	22(11.1)	179(78.9)	S
	3-5	122(61.3)	38(16.7)	
	5+	55(27.6)	10(4.4)	
Age	Below 30	0(0.0)	3(1.3)	NS
	31-45	3(1.5)	5(2.2)	
	46-60	133(66.8)	95(51.9)	
	Above 60	63(31.7)	95(41.9)	
Family cancer history	Yes	55(27.6)	12(5.3)	s
	No	144(72.4)	215(94.7)	
Affected by STI	Yes	79(39.7)	9(4)	S
	No	120(60.3)	218(96)	
Oral contraception taken	Yes	179(95)	69(30.4)	S
	No	10(5)	158(69.6)	
First sex age	Below 16	146(73.4)	21(9.3)	S
	Above 16	53(26.6)	206(90.7)	
Take Adequate Food	Yes	127(63.8)	205(90.3)	S
	No	72(36.2)	22(9.7)	
Cervical Cancer affected	Yes	44(22.1)	8(3.5)	S
	No	155(77.9)	219(96.5)	
Social status	Rich	14(7)	49(21.6)	NS
	Upper-middle	54(27.1)	40(17.6)	
	Lower-middle	99(49.7)	79(34.8)	
	Poor	32(16.1)	59(26)	
Education	Illiterate	110(55.10)	45(19.8)	NS
	Primary	54(27.1)	113(49.8)	
	secondary	22(11.1)	33(14.5)	
	Under graduate/ above	13(6.5)	36(15.9)	

3.1 Socio demographic descriptions of the correspondents

The analysis was performed on 426 Bangladeshi women whose age range is 27-80 and thimean age is 52.5. Here 60.3% age of the participant's lies between 46-60 and 37.1% of the participant's age lies between 60-80 years old which have been shown in Figure-1. Here 199 women are affected by cervical cancer (case group) and 227 women are not affected (control group). Education levels of the affected group, 55.10%, 27.1%, 11.1%, 6.5% participants are illiterate, primary, secondary and undergraduate/above respectively. On the other hand, in control group 19.8%, 49.8%, 14.5%, 15.9% participants are illiterate, primary, secondary and undergraduate/above respectively according to Table 1.

Table 2. Odds ratio and Confidence Interval of the associated Factors in Binary logistic regression analysis.

Factors	B	Sig. (p)	OR	95% C.I. for OR	
				Lower	Upper
Premature chronicle of cancer					
No(ref)	0.9	0.253	2.46	0.525	11.531
Yes					
Cancer vaccine taken					
No(ref)	-2.413	0.154	0.09	0.003	2.473
Yes					
Take Adequate Food					
No(ref)	-0.827	0.084	0.438	0.171	1.117
Yes					
How many Sex partner					
1-2(ref)	0.64	0.436	1.897	0.379	9.505
3+					
First sex (*)					
Below 16(ref)	-2.197	0.000	0.111	0.048	0.259
Above 16					
Oral contraception taken					
No(ref)	1.379	0.283	3.969	0.32	49.202
Yes					
Contraception used (*)					
No(ref)	-2.917	0.028	0.054	0.004	0.733
Yes					
Number of Childs (*)					
1-2(ref)		0.000			
3-5	2.238	0.000	9.378	3.727	23.599
Above 5	1.305	0.035	3.689	1.098	12.392
Previous Cancer history of cervical cancer (*)	2.009	0.006	7.459	1.762	31.572
No(ref)					
Yes					
Affected by STI (*)					
No(ref)	1.448	0.029	4.255	1.157	15.643
Yes					

*****Means Significant, OR = Odd Ratio

In case group 72.4% and in control group 92.1% women are housewife whereas a few numbers of women of the study participants are involving in business, government service, unemployed, private job and shop keeper. 49.7% and 27.1% correspondent's social statuses are lower middle and upper middle respectively and 23.1% are rich and poor. On the other hand, 21.6%, 17.6%, 34.8%, 26% women's social status is rich, upper middle, lower middle and poor respectively in unaffected group.127(63.8%) women of 199 affected women take adequate fruits and vegetables. But 205 (90.3%) of total 227 unaffected women take adequate fruits and vegetables has been shown in Table 1.

3.2. Clinical description of the correspondents

Table 1 depicts that 4 (2%) participants have knowledge about cancer among 199 affected correspondents whereas 68(30%) participants have knowledge about cancer among 227 unaffected correspondents. Only 1% women of affected group took cancer vaccine whereas 8.4% women of unaffected group took cancer vaccine. In case group 19.6% women who had more than 3 sexual partners on the contrary 4.4% women had more than 3 sexual Partners in control group. More than two third women of the affected group had their first sexual intercourse before the age reach of 16 years. In control group most of the correspondents (90.7%) had their first sexual intercourse after the age 16 years. 96.5% affected participants had not used condom during sex but 95% affected participants had taken oral contraception. In case group more than two third (61.3%) women have 3-5 and 27.6% women have more than 5 children. On the contrary in unaffected group more than two third (78.9) women have 1 or 2 children.

Table 2 represents the odds ratio and Confidence Intervals (C.I) of the associated factors. Here the significantly associated factors have been shown in the table using (*) sign. Whose first sex was at the age below 16 years has the possibility of cervical cancer is much more than the counterpart. The Table 2 clearly identifies that those takes oral contraceptives as well as also have a child between 3 to 5 bears the high risk of cervical cancer.

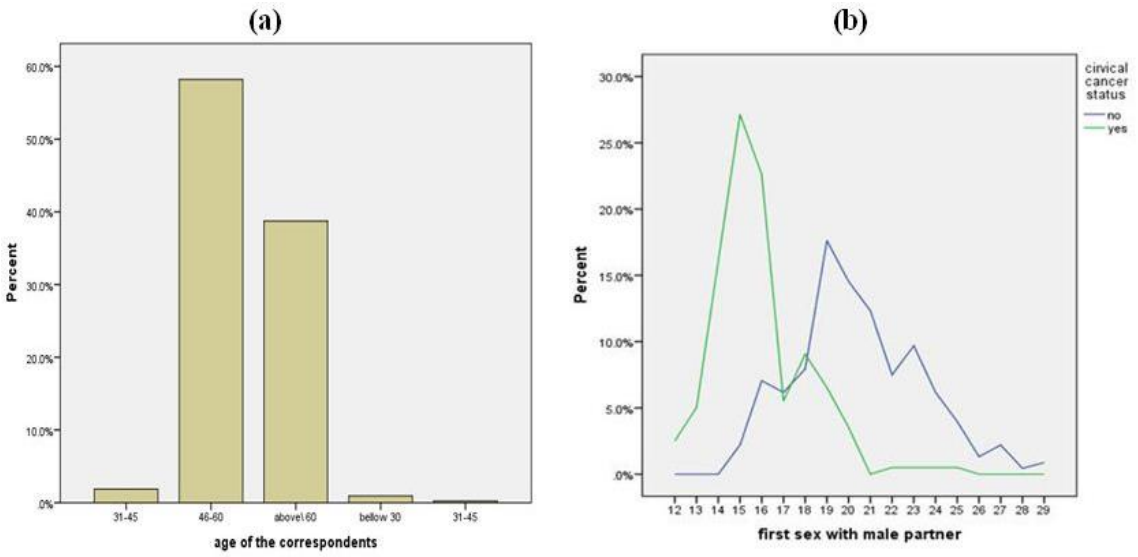


Figure 1. (a) Bar diagram of Age Distribution of the Cervical Cancer Patient. **(b)** Line plot between first sex with male partner and cervical cancer status.

Figure 1 represents the relation between cervical cancer and first sex with male partner. From the figure it is clear that those who have performed first sexual intercourse with a male partner at age 16 or less has more percentage of affecting cervical cancer.

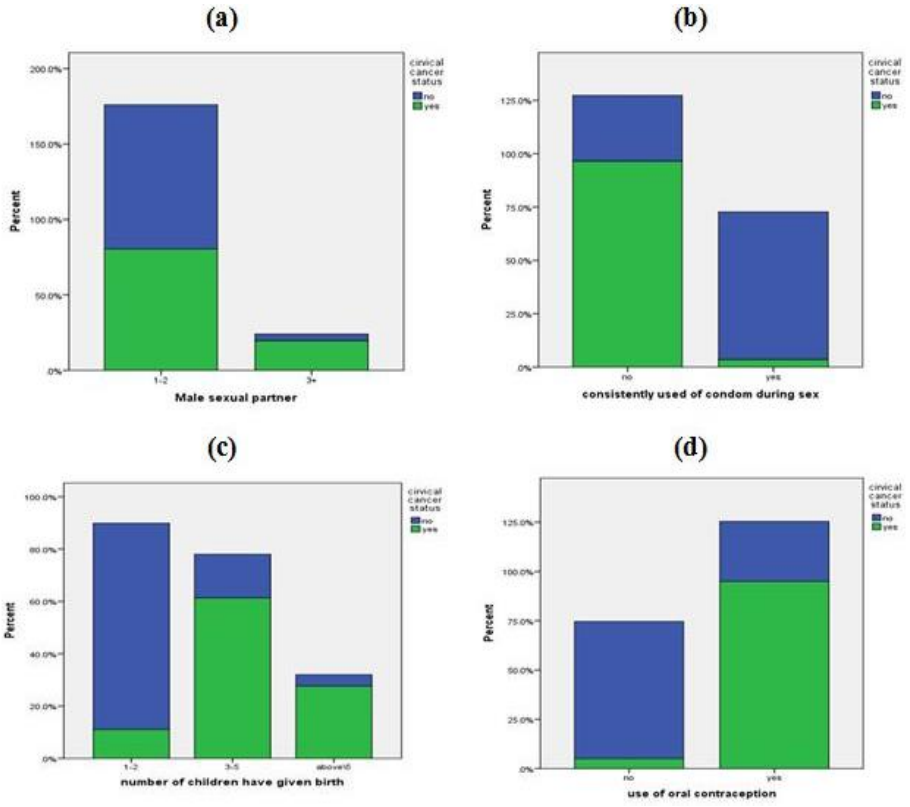


Figure 2. Bar Diagram of Cervical cancer status with four vital factors.

In Figure 2 illustrates that the women who have a male sex partner more than 3, who have not consistently used condom during sex, who have given birth more than 3 and who have used oral contraception are highly affected by cervical cancer. Contraception is one of the major issue for cervical cancer. Taking long term oral contraceptive and also who weas not using condom during sex increases the risk of cervical cancer which has a strong evidence [21]. Number of Childs above 3 increases the risk for cervical cancer. Those women who have above 3 children are situated in a risk zone for affecting cervical cancer [22]. First sex at a younger age below 16 is another crucial risk factor and playing an important role in developing cervical cancerNevertheless, we cannot deny the other risk factor which is the number of sex partners that is above 2 and it causes cervical cancer.

4. DISCUSSION

According to the written record, cervical cancer is that the second (21.5%) leading cancer when breast cancer (25.6%) in women. In Bangladesh, "The National Institute of Cancer analysis and Hospital" report shows that among the cervical cancer patients 91% were married 8%widow and 97% those all are married woman [7]. The analysis shows that among the 199 cancer patients about 87.4 % were married and 4.5% were widow. About 72.4% ladies were married woman among those cancer affected women. The analysis strongly depicts that the age of 60% participants were 46-60 and the rest 40% participant's age were above 60. From our study, it can be explored that there are four vital factors exist which are strongly responsible for cervical cancer. These factors are "whose first sex age was below or equal 16", "who have given birth higher than 3", "who have not consistently used condom during sex" and "who have more than 3 male sexual partner" are strongly related to with cervical cancer that were observed by the analysis. [cancer.org, other references]. In South Asian countries at Bangladesh most of the women are uneducated [7]. Regarding two third of the entire cancer affected patients were uneducated consistent with our analysis. About 70% of the total 227 unaffected women have no idea about cervical cancer because of their lack of knowledge on it. STI ($0.029<0.05$) was found as highly significant. "Oral contraception", "First sex" "Sex partner" and "Number of childeren" also are found important factors consistent with crosstabs. Those who took vaccine have the lower possibility of being affected by cervical cancer. From the former study STI [5], Adequete food[10], vaccin [12], number of sex partner, first sex age, oral contraception, family history [8] were found significant which are also detected from our analysis.

5. FUTURE WORK

Here we have used 426 women's data for the analysis but in future more data may use to get more better and efficient results. In the meanwhile other statistical techniques may use to determine the risk factors of cervical cancer.

6. CONCLUSION

Cervical cancer is one of the leading cancers in Bangladeshi women. Primary prevention of cervical cancer involves safer sexual practices, such as proper and consistent condom use to prevent HPV infection of the cervix. Death is inevitable due to cervical cancer. Most of the people are unaware of it. The diagnosis process of it is also difficult. In this article, the risk factors related to cervical cancer and the association has been analyzed. An efficient approach has been provided for the extraction of significant pattern from the data warehouse for efficient prediction of the

associated factors of cervical cancer. The remarkable factors associated with cervical cancer and therefore the association have been analyzed. A proficient approach has been provided for the extraction of great pattern for information.

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REFERENCES

[1] Defining Cancer, National Cancer Institute, (2014).

[2] Cervical Cancer Treatment (PDQ®), National Cancer Institute, (Retrieved 24 June, 2014).

[3] M. Shapley, J. Jordan, and P. R. Croft, A systematic review of postcoital bleeding and risk of cervical cancer, British journal of general practice, vol. 56, no. 527, pp. 453–460 (2006).

[4] M. Schiffman, N. Wentzensen, S. Wacholder, W. Kinney, J. C. Gage, and P. E. Castle, "Human papillomavirus testing in the prevention of cervical cancer," Journal of the National Cancer Institute, vol. 103, no. 5, pp. 368–383 (2011).

[5] G. Adjorlolo-Johnson, E. R. Unger, E. Boni-Ouattara, K. Touré-Coulibaly, C. Maurice, S. D. Vernon, M. Sissoko, A. E. Greenberg, S. Z. Wiktor, and T. L. Chorba, "Assessing the relationship between HIV infection and cervical cancer in Cote d'Ivoire: a case-control study," BMC infectious diseases, vol. 10, no. 1, p. 242 (2010).

[6] World Cancer Report, 2014; World Health Organization, 2014; pp. Chapter 5.12.

[7] Cancer Registry Report, 2005-2007; National Institute of Cancer Research and Hospital, Dhaka, Bangladesh; Published on December (2009).

[8] J. P. Shepherd, G. K. Frampton, and P. Harris, "Interventions for encouraging sexual behaviours intended to prevent cervical cancer," Cochrane Database Syst Rev, vol. 4 (2011).

[9] S.-H. Chung, S. Franceschi, and P. F. Lambert, "Estrogen and ERα: Culprits in cervical cancer?," Trends in Endocrinology & Metabolism, vol. 21, no. 8, pp. 504–511(2010).

[10] R. García-Closas, X. Castellsagué, X. Bosch, and C. A. González, "The role of diet and nutrition in cervical carcinogenesis: a review of recent evidence," International journal of cancer, vol. 117, no. 4, pp. 629–637 (2005).

[11] A. Castanon, R. Landy, J. Cuzick, and P. Sasieni, "Cervical screening at age 50–64 years and the risk of cervical cancer at age 65 years and older: population-based case control study," PLoS medicine, vol. 11, no. 1, p. e1001585 (2014).

[12] M. H. Einstein, M. Baron, M. J. Levin, A. Chatterjee, R. P. Edwards, F. Zepp, I. Carletti, F. J. Dessy, A. F. Trofa, A. Schuind, and others, "Comparison of the immunogenicity and safety

of CervarixTM and Gardasil® human papillomavirus (HPV) cervical cancer vaccines in healthy women aged 18–45 years," Human vaccines, vol. 5, no. 10, pp. 705–719 (2009).

[13] S. H. Ho, S. H. Jee, J. E. Lee, and J. S. Park, "Analysis on risk factors for cervical cancer using induction technique," Expert Systems with Applications, vol. 27, no. 1, pp. 97–105 (2004).

[14] L. Li, H. Tang, Z. Wu, J. Gong, M. Gruidl, J. Zou, M. Tockman, and R. A. Clark, "Data mining techniques for cancer detection using serum proteomic profiling," Artificial intelligence in medicine, vol. 32, no. 2, pp. 71–83 (2004).

[15] K. Ahmed, Abdullah-Al-Emran, T. Jesmin, R. F. Mukti, M. Rahman, F. Ahmed, "Early detection of lung cancer risk using data mining," Asian Pacific Journal of Cancer Prevention, vol. 14, no. 1, pp. 595–598 (2013).

[16] T. Jesmin, K. Ahmed, M. Z. Rahman, and M. B. A. Miah, "Brain Cancer Risk Prediction Tool Using Data Mining," International Journal of Computer Applications, vol. 61, no. 12, pp. 22-27 (2013).

[17] K. Ahmed, T. Jesmin, U. Fatima, M. Moniruzzaman , Abdullah-Al-Emran and M. Z. Rahman, "Intelligent and Effective Diabetes Risk Prediction System Using Data Mining ", ORIENTAL JOURNAL OF COMPUTER SCIENCE & TECHNOLOGY, vol. 5 No. 2, pp. 215-221 (2012).

[18] K. Ahmed, T. Jesmin, and M. Z. Rahman, "Early Prevention and Detection of Skin Cancer Risk using Data Mining," International Journal of Computer Applications (0975–8887), vol. 62, no.4, pp.1-6 (2013).

[19] Gedefaw, A. Astatkie, and G. A. Tessema, "The prevalence of precancerous cervical cancer lesion among HIV-infected women in Southern Ethiopia: a cross-sectional study," PLoS ONE, vol. 8, no. 12, pp. e84519 (1-8) (2013).

[20] R. F. Mukti, P. D. Samadder, A. A. Emran, F. Ahmed, I. B. Imran, A. Malaker, and S. Yeasmin, "Score Based Risk Assessment of Lung Cancer and its Evaluation for Bangladeshi People," Asian Pacific journal of cancer prevention: APJCP, vol. 15, no. 17, pp.7021-7027 (2014).

[21] J. Ferlay, I. A. for R. on Cancer, and others, GLOBOCAN 2000: cancer incidence, mortality and prevalence worldwide. IARC press, 2001.

[22] W. K. Huh, K. A. Ault, D. Chelmow, D. D. Davey, R. A. Goulart, F. A. Garcia, W. K. Kinney, L. S. Massad, E. J. Mayeaux, D. Saslow, and others, Use of primary high-risk human papillomavirus testing for cervical cancer screening: interim clinical guidance, Gynecologic oncology, vol. 136, no. 2, pp. 178–182, 2015.