Review on Cervical Cancer: Effective Vaccination Project

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy (Hons.)

School of Pharmacy

BRAC University

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Declaration

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at BRAC University.

2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.

3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.

4. I have acknowledged all main sources of help.

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Approval

The thesis titled “Cervical Cancer: Effective Vaccination Project & Its Awareness” submitted by Ayonti Humayra ID-19146059 of Spring, 2019 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy.

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Ethics Statement

I, Ayonti Humayra, hereby certify that the following criteria are fulfilled for the manuscript " Cervical Cancer: Effective Vaccination Project":

1. This material is my own original material of review that has never been published beforehand.
2. The study does not include any animal.
3. All of the sources those are utilized are correctly credited (correct citation) along with a proper and justified reference.

Abstract

Cervical cancer, is ranked fourth globally and is one of the most prevalent types of cancer. The burden of this cancer is greatly underestimated in Bangladesh. This is highly associated with unprotective sexual intercourse with random partners. There is a vaccination program that is given throughout the early phases of adolescence to prevent the viral HPV proliferation. However, the vast majority of people in our country are utterly unaware of this one. As per WHO, that strongly recommends to get vaccinated between the age 9 to 13 to create a preventive shield against primary HV infection. The main goal is to evaluate how HPV vaccination programs have affected the incidence of cervical cancer cases and rates of associated morbidity and mortality. By doing this, we can greatly advance the fight against cervical cancer, improve public health outcomes, and guarantee that women all around the world will live longer, healthier lives.

Dedication

Dedicated to my beloved parents and respected supervisor

Acknowledgement

First and foremost, I would like to express my gratitude to the Almighty for his endless gifts, which have been given to me in an effort to provide me with the strength and determination to complete this project. It is my genuine pleasure to offer my heartfelt appreciation to my academic supervisor, Dr. Mohd. Raeed Jamiruddin (Associate Professor at BRAC University's School of Pharmacy), for his invaluable guidance and encouragement during this research. Through the course of my education and project writing, he was a true source of advice and support for me. I am quite grateful to Dr. Shahana Sharmin (Assistant Professor, BRAC University) for her valuable comments and ideas during my study, which helped me much in completing my project work in a timely manner.

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List of Acronyms

HPV	Human Papiloma Virus
FIGO	International Federation of Gynecology and Obstetrics
DNA	Deoxyribonucleic acid
PI/ECO	Participants, intervention/exposure, comparator, outcomes
CIN	Cervical intraepithelial neoplasia
STDs	Sexually transmitted diseases
WHO	World Health Organization
VCS	Vaccine Confidence Scale
qHPV	Quadrivalent Human Papilloma Virus
Ref	Reference
No	Number

Chapter 1

Introduction

1.1 What is cancer?

Uncontrolled and abnormally dividing bodily cells that are able to be divided into neighboring tissues are the hallmark of the group of diseases known as cancer (Hanahan, 2022). It is alarming how deep cancer is, getting into genetics, cell and tissue biology, pathology, and therapeutic response. Regarding the diverse types of disorders that cancer embraces are being developed by tools and techniques that are investigational and statistically more powerful than before. Cancer is a class of disorders characterized by uncontrolled and abnormally inappropriate. (Hanahan, 2022)

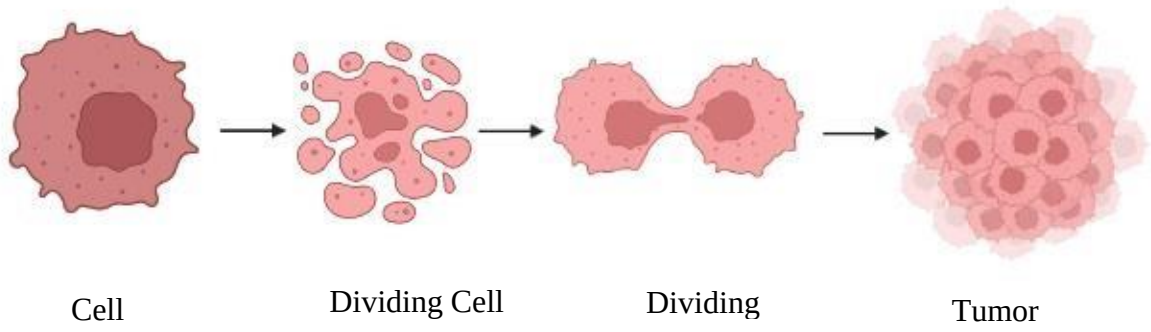


Figure 1: Normal cells dividing into cancer cells. A malignant growth will develop as the cancer cells multiply and proliferate, producing new cells. Several cancer cells may be identified in a tumor.

1.2 Current Scenario of Cancer in Bangladesh

In the continent of South East Asia, Bangladesh is a developing nation (Hussain, 2013). Despite being rare in composition, they are strong enough to withstand any life-threatening illnesses, including AIDS, cancer, hepatitis B-G, and others (Hussain, 2013). Currently, the main barrier is cancer, which has a wide range of manifestations and is shown as a conglomerate of over 100 different diseases accompanied by unchecked growth and multiplication of an abnormal/mutated cell, finally resulting in death (Hussain, 2013).

1.3 Challenges

Nowadays, the main obstacles preventing Bangladesh from providing sufficient cancer care are the high cost of treatment, inadequate radiation facilities, a lack of skilled personnel, and a lack of community awareness (Uddin et al., 2013). The lack of qualified medical physicists is a major obstacle to the growth of radiation treatment facilities in the nation (Uddin et al., 2013)

1.4 Cervical Cancer and its Overview

Cervical cancer is a form of cancer that causes in the cervix cell of women. It may develop slowly with time. It is one of the most common categories of cancer and ranked 4th around the whole world (WHO, 2022). Around 500,000 women are being identified with cervical cancer worldwide and among them about 270,00 results in deaths. The insufficient national cancer registries and the high prevalence of unidentified cases—both of which are known in Bangladesh—lead to a massive underestimation of the burden of this cancer there, as in other low-resource countries (WHO,

2022). Cervical cancer causes around 25% of cancer-related fatalities in women in Bangladesh, according to limited hospital data, this finding is not reflected in the national population (Bhuiyan, Sultana, et al., 2018).

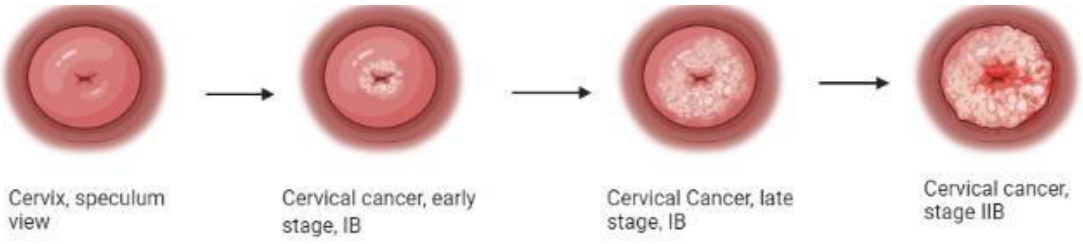


Figure 2: Developing cervical cancer. Cervical Cancer develops due to the presence of HPV, cancer cells multiply and proliferate, producing new cells. Several cancer cells may be identified in a tumor.

This cancer develops due to the presence of HPV (Human papillomavirus). HPV is a very reproductive stain and is spread through unprotective intercourse between two opposite gender. Uterine cervical cancer, the most common vaginal malignancy worldwide is one of the leading causes of cancer-related deaths in women, particularly in low-income nations (Haldorsen et al., 2019). The International Federation of Gynecology and Obstetrics (FIGO) system for classifying cervical cancers depended only on a gynecologic examination, with optional cystoscopy, proctoscopy, colposcopy, and biopsy. This system has recently changed. Since the 2018 FIGO staging update, the stage is now based on pathology assessments and easily available imaging data. The FIGO stage establishes the prognosis and categorizes patients according to a variety of treatment strategies, including primary (radical) surgical removal, ultimate chemoradiation, or preventative chemotherapy (Haldorsen et al., 2019).

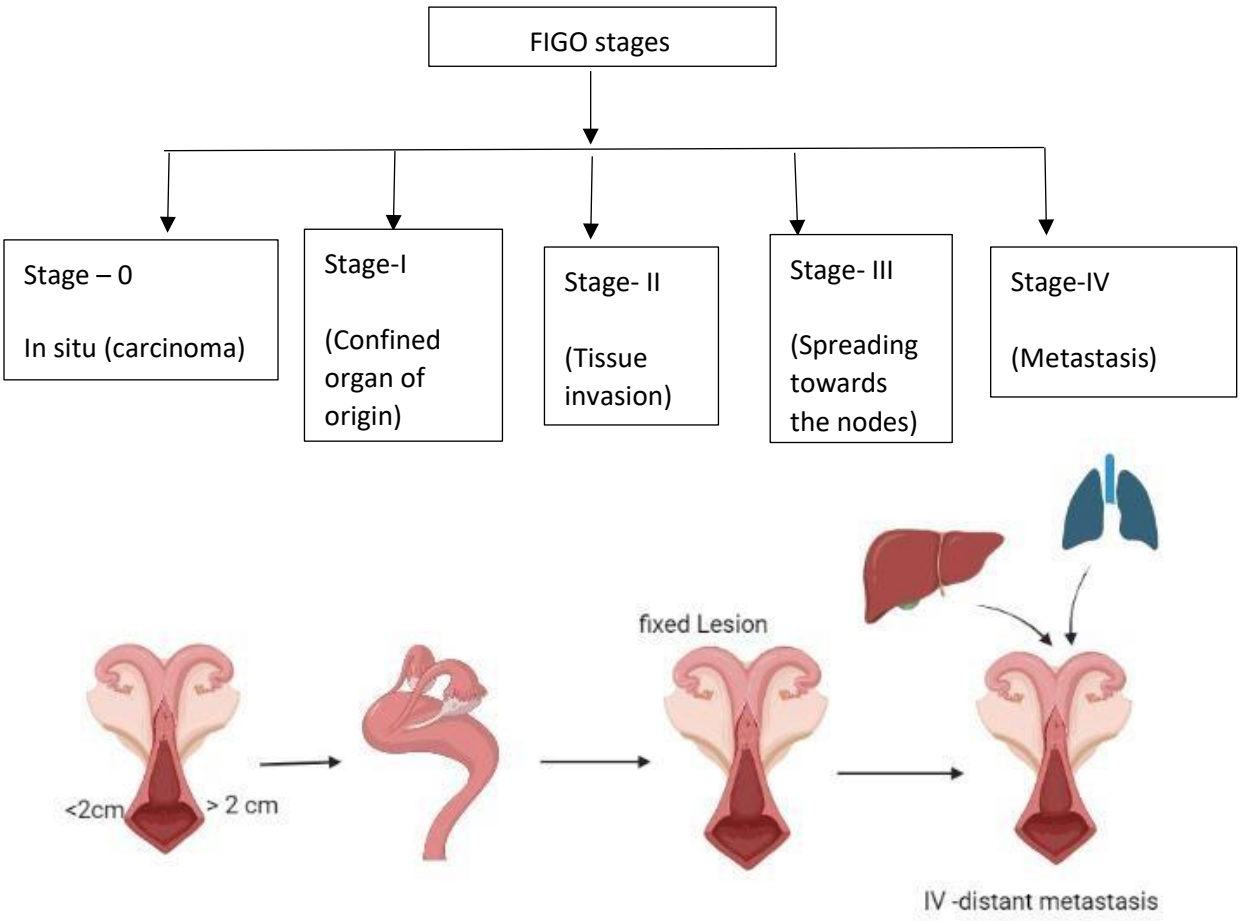


Figure 3: Stages of FIGO. A malignant tumor of vulva which 2 cm or less in size with a dept of invasion in one millimeter or less is considered as stage 1A. when the tumor size more than 1 cm or the dept of invasion more than 1 millimeter is considered as stage 1B. An extension to the lower third of the urethra, lower third of vagina it becomes stage 2. Another extension to the upper two thirds of the erythrom, bladder mucosa, upper to third of the vagina is known as stage 3. Lastly the lesion is fixed to pelvic bone distant metastasis involves metastases to distant organs. (Olawaiye et al., 2021)

A possible carrier of HPV DNA is a male candidate who has had several sexual partners or had contact with someone who was an initial HPV DNA carrier and who may later put their sexual partner at a high risk of developing cervical cancer. First Human Papillomavirus infections typically happen soon after the first sexual experience because the adolescent cervix is particularly susceptible to HPV infection. Therefore, early sexual contact age corresponds to early HPV exposure age. Early marriage also brings about repeated pregnancies, which harms cervical tissue and increases the risk of diseases (Chandana et al.,2020). Before the viral HPV growth, there is a vaccination program that is administered in the early stages of adolescence. The majority of people in our nation are, however, completely ignorant of this one. Most women in our nation are quite hesitant to discuss their difficulties with their husbands, relatives, or any doctor regarding this. This is how they misdiagnose their illness (WHO,2022).

Due to a lack of understanding about cervical cancer among the general population and medical experts, as well as limited access to healthcare facilities, early identification, and prompt testing are problematic in slum regions. Being aware is essential because it helps people learn more about the problem and, as a result, change their viewpoints. There is also a lack of awareness about female hygiene and there is nobody to talk about this or to share the knowledge about this. As the seniors of the family remain unconscious of this, their children also get little to no knowledge about this particular term, and this ignorance becomes life-threatening for the patient. As they grow up, the problem develops and after a certain period, the problem doesn't get rectified by any sort of vaccines. this will be very problematic and in the worst cases scenario, the patient might die (Arbyn et al., 2020). A country like Bangladesh doesn't possess the necessary screening process as well as any adequate treatment for this problem, so women who experience cervical cancer are most

likely to die in our country. Although currently, pharmaceutical companies are working on the vaccination project in our country, half of the total population is not aware of this. Females from remote areas are deprived of these sorts of knowledge and treatments as the distribution and availability of such treatments are not developed at all.

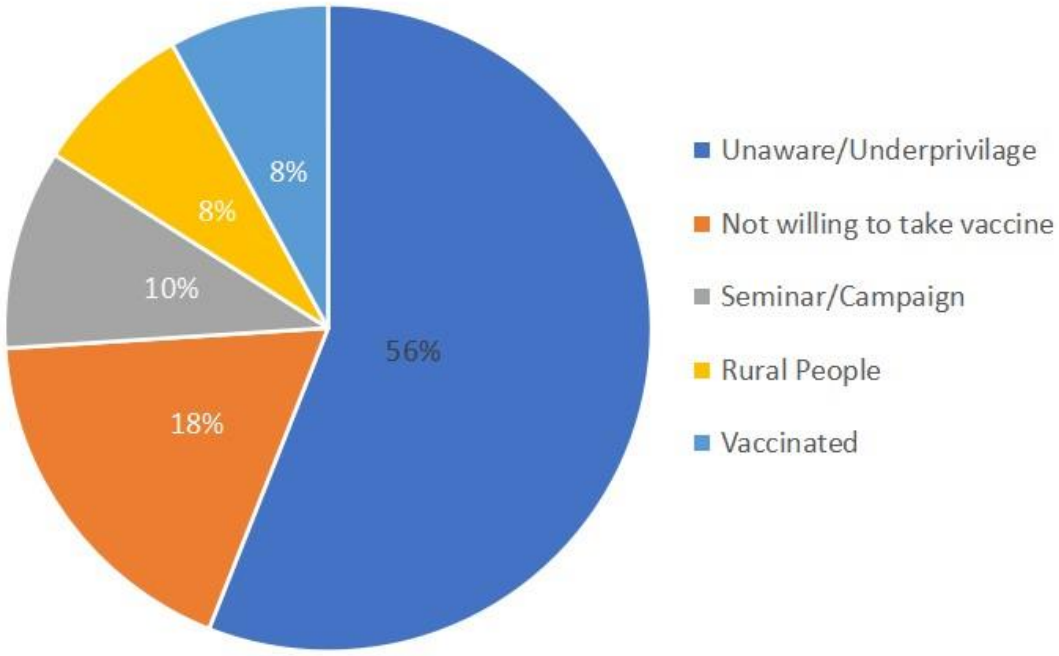


Figure: A pie chart showing the current data of people, According, to recent journals and reports from WHO, we get these sorts of data and we have tried to visualize the data through several graphs. The data specially indicates a rough idea about the people who are unaware about cervical cancer, mostly from the rural and remote location of our country.

1.5 Study objective-

This study's goal is to assess vaccines' capacity to prevent cervical cancer, with a particular emphasis on human papillomavirus (HPV) vaccines. The main goal is to evaluate how HPV vaccination programs have affected the incidence of cervical cancer cases and rates of associated morbidity and mortality. This investigation intends to evaluate cervical cancer vaccines' potential as a primary preventative tool, give evidence-based insights into their long-term efficacy, and pinpoint the major variables affecting vaccine effectiveness.

Chapter 2

2.1 Materials and Method

This report hasn’t been registered or published yet because this report is solely done for my undergraduate thesis paper and we don’t have permission to register it. In addition to the review being written in accordance with the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) standard.

2.2 Methodology:

This systematic review covered studies that addressed the research topic using the PI/ECO (participants, intervention/exposure, comparator, outcomes) structure.

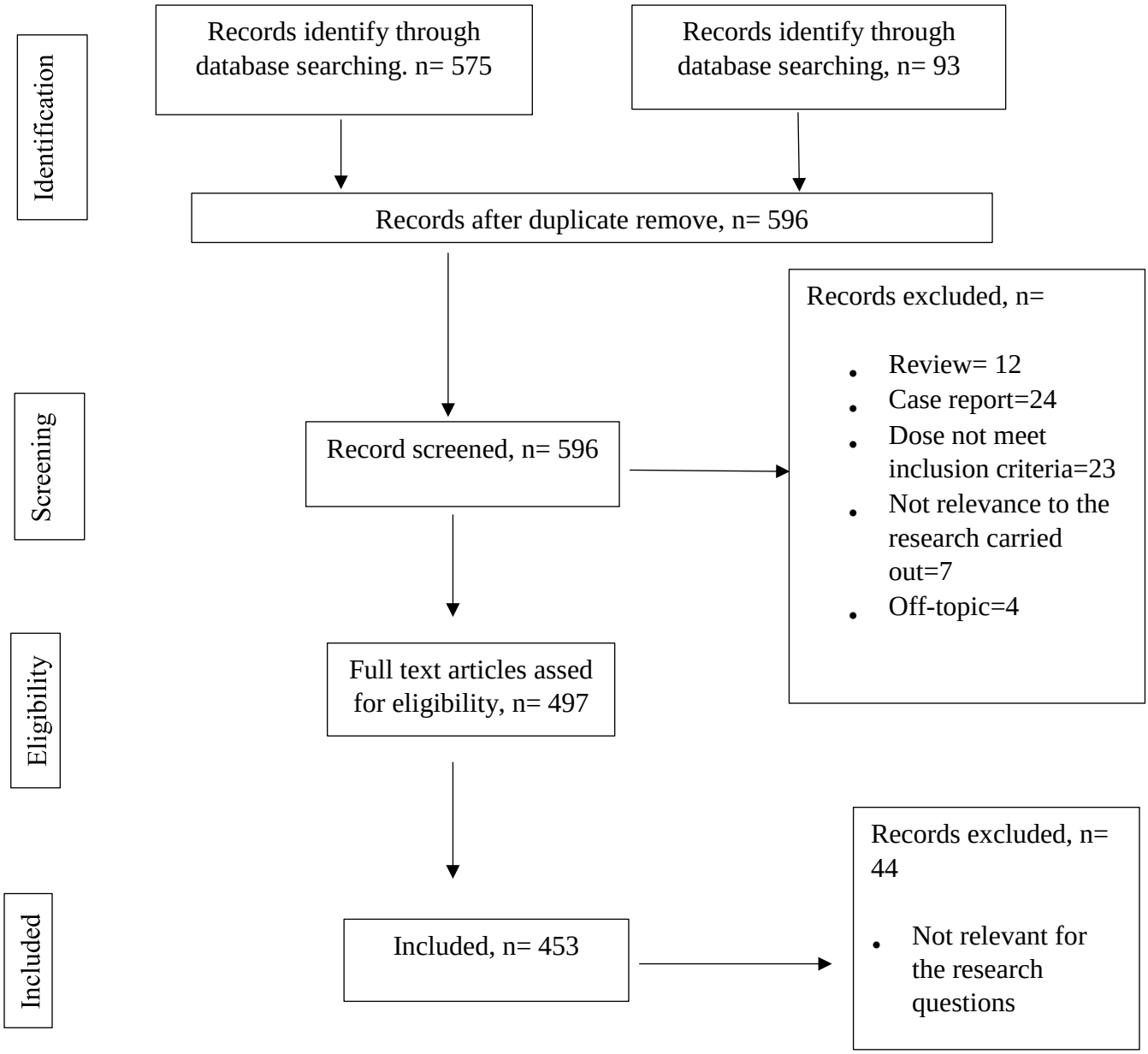
- **Participants:** Age 16-45
- **Interventions/exposure:** Cervical cancer
- **Outcomes:** To evaluate cervical cancer vaccines' potential as a primary preventative tool, give evidence-based insights into their long-term efficacy, and pinpoint the major variables affecting vaccine effectiveness.
- **Study design:** Randomized controlled trial, clinical trial,

PubMed

Firstly, the advanced PubMed site was visited and searched for some keywords to get the appropriate and targeted data results. Article types were randomized by several criteria such as controlled trials and clinical trials. The data ranges from the year 2013 to 2023 and we received many relevant results. Among them, exact relevant data was picked and verified. The extraction and verification methods were based on several determines such as age, drug name based on pvalue, any existing combination, cumulative data, and time. After that, several different therapeutic indications of cervical cancer, their objective, and their previous cases are also kept into consideration.

Keywords	Article type	Year	Results
(cervical cancer) AND (therapeutic effect)	Randomized controlled trial, clinical trial	2013-2023	229 results
((cervical cancer) AND (its aims)) AND (objective)	Randomized controlled trial, clinical trial	2013-2023	23 results
(current cases)) AND (of cervical cancer worldwide)	Randomized controlled trial, clinical trial	2013-2023	1 result
(cervical cancer) AND (vaccine efficacy)	Randomized controlled trial, clinical trial	2014-2023	68 results
((cervical cancer) AND (efficacy of vaccine)) AND (treatment)	Randomized controlled trial, clinical trial	2013-2023	74 results

(HPV vaccine) AND (types of vaccine)	Randomized controlled trial, clinical trial	2014-2023	144 results
(HPV vaccine) AND (its composition)	Randomized controlled trial, clinical trial	2014-2023	5 results
(cervical cancer) AND (effective dose of vaccine)	Randomized controlled trial, clinical trial	2013-2023	30 results
((cervical cancer) AND (effective dose of vaccine)) AND (new cases after vaccination program)	Randomized controlled trial, clinical trial	2013-2023	1 result


Identification
Records identify through database searching. n= 575
Records identify through database searching, n= 93
Records after duplicate remove, n= 596
Screening
Record screened, n= 596
Records excluded, n=
Review= 12
Case report=24
Dose not meet inclusion criteria=23
Not relevance to the research carried out=7
Off-topic=4
Eligibility
Full text articles assed for eligibility, n= 497
Included
Included, n= 453
Records excluded, n= 44
Not relevant for the research questions

Google Scholars

Firstly, the Google Scholars site was visited and searched for some keywords to get the appropriate and targeted data results. The data ranges from the year 2013 to 2023 and we received 74 raw results. Among them, exact relevant data was picked and verified. The extraction and verification methods were based on several determines such as age, drug name based on p-value, any existing combination, cumulative data, and time. After that, several different therapeutic indications of cervical cancer, their objective, and their previous cases are also kept into consideration.

Chapter 3

Treatments of Cervical Cancer

3.1 Primary treatment

Based on the attributes of different types of cancer, it has been determined that the majority of malignancies develop in advanced age. For several years, it has been observed that cancer incidence is higher in the elderly population compared to the younger population, indicating that cancer is predominantly an age-related disease. The majority of researchers who have investigated the correlation between age and cancer risk have primarily focused on the escalation of cancer risk with advancing age. Vaccination is widely recognized as a prominent public health intervention aimed at reducing the likelihood of infection and mitigating the prevalence of pathogenic agents such as HPV in the environment. It is widely acknowledged as the principal measure for averting the onset of cervical cancer.

3.2 Secondary treatment

Screening for early detection and treatment is the fundamental principle of secondary prevention. In countries with abundant resources, the implementation of regular cervical cancer screening has been shown to effectively prevent up to 80% of cervical tumors through early detection and treatment of pre-cancerous lesions. Cervical cytology, commonly known as Pap smear, emerged as a conventional medical procedure for diagnosing cervical intraepithelial neoplasia (CIN) in affluent countries during the 1940s. It is recommended that women who test positive for

premalignant cervical lesions, specifically CIN, undergo a confirmatory colposcopy. The implementation of cervical cytology as a screening method in numerous African countries is hindered by the need for advanced medical and laboratory equipment, trained personnel, insufficient patient monitoring procedures during follow-up visits, and limited availability of such services. (Finocchario-Kessler et al., 2016).

3.3 Vaccination

Human papillomavirus infection, which persists over time, is the leading cause of cervical cancer (HPV). There are more than 100 different forms of HPV, 13 of which are classified to be highrisk. They have the strongest correlation with the development of cervical cancer. (Ikeda et al., 2019)

However, two vaccines have been given the go-ahead. Both HPV types 16 and 18 are protected by the bifunctional vaccination. The quadrivalent vaccine offers defense against HPV types 6, 11, 16, and 18, which account for 90% of genital warts. Since HPV infection frequently develops soon after the start of sexual activity (more than 35% of women become infected within 2 years of beginning sexual activity), vaccination efforts should target 9–13-year-old children before their first sexual experience. In the UK, a broad initiative was started in 2008 to routinely vaccinate girls between the ages of 12 and 13 against HPV and to provide catch-up vaccination to girls up to the age of 18. The bifunctional HPV vaccination with strong efficacy against high-risk (HR) strains HPV16 and HPV18, which have been demonstrated to be responsible for over 70% of cervical cancers worldwide and roughly 80% of tumors in the UK, was initially used in the UK national program. The quadrivalent vaccine which also gives good efficacy against low-risk (LR) varieties HPV6 and HPV11, which are the main causes of STDs, was adopted by the UK program in 2012. (Mesher et al., 2018)

When the entire three-course regimen is administered, the vaccines are over 95% effective at preventing HPV infection brought on by vaccine-type HPV (Finocchario-Kessler et al., 2016). The WHO advises including HPV vaccination in national immunization programs if such action will advance public health goals and is both practical and affordable. However, vaccination uptake is

uneven worldwide as a result of barriers to vaccination, such as worries about the vaccine's safety, providers' reluctance to advise vaccination for younger girls, a lack of knowledge about the connection between HPV and cervical cancer, and varying parental acceptance of the HPV vaccine. Recent initiatives to immunize young males have gotten less attention, although they could indirectly protect girls by lowering the chance of HPV re-infection and by preventing additional HPV-related morbidities for men such as penile cancer, anal cancer, oropharyngeal cancer, and genital warts. (Finocchario-Kessler et al., 2016).

For the first time in **Bangladesh,** the cervical cancer vaccine named **Papilovax** has been introduced by **Incepta Vaccine Ltd**, the nation's first vaccine production company, where each dose of vaccine will cost 2500 taka.

3.4 Here showing some data of vaccine effectivity that were administered to the patient and been observed during a long period of time –

Table 2: Administration of 1st dose HPV vaccine

Median follow up time	Vaccine Efficacy	Total Population	Age	Drug Name	95% CL Upper Limit	95% CL Lower Limit	p-value	Reference Number
11.1/ every 2 years until year 11	1	7466	18-25	HPV-16/18	100	89.2		11
10.5	1	8872	18-45	E-coli produced HPV-16/1118	100	75.9	0.05	12
	0.974	14215	16-26	9vHPV	99.5	85	0.5	13
11.3	0.802	1539	18-25	bivalent	87	70.7	≥ .18	14
21.6	0.952	227	18-25	AS04-HPV16/18	97.6	91.6		15
11.5	0.864	7466	18-25	HPV-31C	65.1	97.1	0.02	16
11.5		1106	18-25	Ceravix	93.1	81.5	0.97	17
11.5		1106	18-25	Harvix	86	63.8	0.99	18
		4452	12 to above	ceravix	93.1	85.2		19
6 month and an annual follow up		4186	18-25	HPV-16/18	88.8	54.6	< .001	20
24 months	0.965	6051	15-24	HPV-16/18 AS04-adjuvanted vaccine	98.9	91.6	0.008	21
every six months through month 30	0.835	700	>30	HPV16	79	91	>0.05	22
16 weeks		19	20-50	HPV-16			>0.05	23
9 clinical visits		79877	45276	Gardasil	93.6	89.1	0.5	24
6 months	0.923	4755	16-25	9vHPV	99.6	54.4	0.02	25
6 months	0.923	2259	16-26	Gardasil	99.7	61.4		26
12.4 / follow up-4 years		913	16-17	HPV 16/18	73.2	89.9		27
		249	45277		76	83	< .05	28
		4404	>25	HPV 16/18 AS04adjuvanted	96.5	78.6		29
		278	45181		77	81	<0.001	30

Table 3: Administration of 2nd dose HPV vaccine

Median follow up time	Total population	Age	Drug Name	95% CL upper limit	95% CL lower limit	p-value	Reference Number
11.1/ every 2 years until year 11	7466	18-25	HPV-16/18	100	78		11
	8872	18-45	E-coli produced HPV16/1118	99.9	87.1		12
11.3		18-25	bivalent	99.2	19.5	≥ .24	13
1.2	227	18-25	AS04-HPV16/18	92.7	98.2	0.3	14
11.5	1106	18-25	Ceravix	99	74	0.99	15
11.5	1106	18-25	Harvix	92.5	29.9	0.93	16
	4452	12 to above	ceravix	96.7	83.3		17
	4186	18-25	HPV-16/18	77.7	62.8	< .001	18
11.5	7466	18-25	HPV-31-A/B	83.5	66.2	0.02	19
6 month and an annual follow up	6051	15-24	HPV-16/18 AS04adjuvanted vaccine	99.6	87.6	0.008	20
	700	>30	HPV16	81	70	<0.05	21
every six months through month 30	19	20-50	HPV-16	78.9	67.5	<0.05	22
	79877	45276	Gardasil	99.6	46.4		23
9 clinical visits at 6 months intervals	4755	16-25	9vHPV	98.4	92.9		24
	2259	16-26	Gardasil	90.2	83.7		25
every 6 months	913	16-17		73	084		26
12.4 / follow up-4 years	249	45277		77	66	<0.05	27
	4404	>25	HPV 16/18 AS04adjuvanted	88.4	74		28
	278	45181		79	64	<0.001	29
	72	20-39	DNA vaccine GX-188E	83	75	< 0.001	30
	14215	16-26	9-valent viruslike particle	100	70.4		31

3.5 In Comparison to Bangladesh

FDA has recently approved the administration of Gardasil for patients, aged between 27 to 45 which is proven to be highly effective against cervical cancer. It is applicable for both male and female. Canada, Australia, Portugal, Hong Kong, South Korea, United Kingdom and United States are well known for the efficient usage of this vaccine. It is also available in Bangladesh but unfortunately it is not within a reasonable price range, which might seem discouraging for a significant portion of the patients because a large population of Bangladesh falls under the range of Low to Middle class, who will not be motivated to use this vaccine because of the price and lack of awareness of it. Gardasil is the most widely used HPV vaccine. Then, we have Cervix. A lot of country approved this vaccine for mass usage as well. Cervix might cost a little bit less than Gardasil but it's still costly as per Bangladesh economy. For that, Incepta, a Bangladeshi pharmaceutical company developed their own vaccine for cervical cancer by keeping all the socioeconomic criteria in mind. It is Papilovax. They kept the pricing very minimal so that it can be widely accepted by the mass population. An experiment is run on a certain group of people to test the effectiveness of the vaccine and determine a standard significance. That's why, it is safe to use in terms of the people of Bangladesh and we strongly believe we should start.

Chapter 4

Data Analysis:

Table 4: Treatment efficacy of HPV vaccine.

Study Name	Total Population	Cumulative Efficacy	95% upper limit	95% lower limit	combination with / associated with	Against	Adverse Effect	Period of Time	Ref No.
Porras,2020	7466	0.974	99.6	88	CIN2+	HPV16/18	No serious adverse event.	11 years	11
Porras,2020	7466	94.90%	99.4	73.7	CIN3	HPV16/18	No serious adverse event.	at 11 years	12
Qiao,2019	3246	0.978	99.9	87.1	CIN2, CIN3	persistent infection		6 months	13
Hazari,2015	1106	0.864	97.1	65.1	CIN2	Persistent Infection		<2 years	14
Porras,2021	4452	0.917	97.6	71.3			No serious effect	6 or more	15
Zhu,2016	6051	0.873	99.7	53.2	CIN2+	HPV16/18		6 months	16
Joura,2015	14215	0.959	92.6	74				1 year	17
Sternberg,2018	2372	0.937	99.7	82.5	CIN2+	9vHPV	injectionsite related, mostly of mild to moderate intensity.	5 years	18
Beachler,2015	4186	0.914	96.6	81.4				4 years	19
Harper,2019	700	0.9401	97.2	88.1	CIN2+	Persistent Infection	No serious side effects	4 to 6 months	20

Study Name	Total Population	Cumulative Efficacy	95% upper limit	95% lower limit	combination with / associated with	Against	Adverse Effect	Period of Time	Ref No.
Hu,2020	227	0.8903	96.3	75.8			mild effect	2 years	21
Sampson,2019	79877	0.968	91.1	78	CIN2+		No serious side effects	9 clinical visits at 6 months intervals	22
Scarinci,2020	278	90.1	96.4	77.6	DNA vaccine GX-188E		No serious side effects		23
Choi,2020	72	87.3	93	74		9-valent viruslike particle	No serious adverse event	6 month and an annual follow up	24
Wheeler,2016	4404						No serious adverse event.		25
Adhikari,2019	913	86.9	96.3	69.7			low anxiety and depression in pregnant women	12.4 / follow up-4 years	26
Porter,2018	249	93.4	97	84.9			no serious side effect	1, Month 7, Month 12, and every 6 months	27
	479	0.9	93.2	86	CIN2+		low anxiety and depression	2 years	28
	479	0.87	91.9	79	CIN3+		low anxiety and depression	2 years	29
Kreimer,2020	7466	0.802	87	70.7		HPV16, HPV18		9 years	30

Chapter 5

Result

We garnered 575 results from the search bar and extra 93 results from additional sources. After that, we filtered out the duplicate results that gives us a whopping 596 results. After that, I ran a result screening and we have managed to narrow down by cutting the number of results based on several criteria such as, we filtered out 12 review articles, 24 case reports, 23 results that doesn't meet the inclusion criteria, 7 results for not being relevant to the carry out research and 4 results for falling under off topics. Based on the eligibility, there were 497 articles and from there 44 were excluded for not being relevant. Finally, we ended up with 453 results.

Chapter 6

Discussion

Generally, women from the age of 16 to 45 years are more susceptible to cervical cancers. So, as per the campaign initiative, we segment women based on this age range and monitor their progress after 1st, 2nd and 3rd dose. We determine the overall efficacy of the vaccine from the cumulative result from the 3rd dose and find out the universal or local significance standard. among these, a lot of them are conducted on various country and gathered data are from campaigns within 2013 to 2023.

After several research and study, we have determined the effectiveness by providing gaps of 2 years or 9 clinical visits within 6 months, where we had a 70% confidence rate of curing cervical cancer from a trial of 7466 patients and ended up boosting their overall immune system by a certain percentage. After the 1st dose, 2nd dose had also proven successful by generating positive results. In USA, UK, Australia, South Korea Gardasil vaccine is highly used because of its effectiveness in preventing the growth of cancer cell. From the above showing table, after administered the vaccine doses, a significant outcome was shown in the patients. In every study, the total population was targeted for getting the desired outcome and after the monitoring session, about 70-85% of population shows the positive result. It has significantly upheld the prevention process.

The HPV (human papillomavirus) vaccine's capacity to prevent cervical cancer has been studied in-depth and in clinical trials. This study's primary objective was to assess the effectiveness of the HPV vaccine by analyzing the reported P values from a number of studies. Notably, the determined

P value consistently stayed below 0.05 in every experiment, demonstrating a statistically significant association between the vaccine and the prevention of cervical cancer. This study provides strong support for the HPV vaccine's ability to prevent cervical cancer. The continuously low P values across several trials suggest that the HPV vaccine may have a significant impact on reducing cervical cancer incidence and prevalence. It seems unlikely that the observed effects of the vaccine could have been the result of pure random chance, according to the statistical significance of the results. The consistency of the findings enhances the validity and dependability of the evidence suggesting that the HPV vaccine is effective in preventing cervical cancer.

The results are in line with past studies and meta-analyses that have amply demonstrated the efficacy of HPV vaccines. These findings are consistent with the notion that HPV vaccination is crucial for reducing cervical cancer incidence. It is believed that the vaccine's ability to effectively prevent cervical cancer is due to its capacity to target the most prevalent oncogenic HPV subtypes associated with the disease's genesis.

After reading through a number of studies, we can see that the majority of the main results or the main goal was incidences of high-grade cervical cancer demonstrating non-inferiority of 1 - a dosage regimen from 2 - a dosing regimen. A combination vaccine that functions like a multisite of HPV 16/18 with or without this may reveal at the time of vaccination was to be offered in certain other circumstances. When compared to the qHPV vaccine, the 9vHPV vaccine would lower the cumulative incidence of a number of diseases, histological resolution six months after the initial injection in HPV16 mono-infected individuals with modified intent to cure, and vaccine confidence, as determined by the change in score on the Vaccine Confidence Scale (VCS), to

determine the histopathologic regression to CIN1 at V7 in the group of HPV type 16/18 (+) CIN3 patients.

We learned the effectiveness of several vaccines administered to women from the discussion above. Here, the most important factors to consider are their age, height, and physical make-up. Through geographical criteria, we may begin immunation program and limit vaccinations to women who meet strict requirements while also educating them about the fundamentals of medicine. Regardless of their level of education or socioeconomic standing, our basic policy will ensure the optimum health for every woman.

In case of Bangladesh, the first thing we need to focus is the environment, the area where the female and the girl child are living, their sorrundings, their livelihood, family literacy and awareness. It is always better to prevent cancer then to cure it. if we want to administer the vaccines here, we need to create that environment around them. Make them aware about their own health.

As a result, the consistent observation of P values below 0.05 in each trial analysed in this study provides strong evidence that the HPV vaccine is effective in preventing cervical cancer. These results, which are consistent with previous research, underscore the importance of HPV vaccination as a preventative measure against cervical cancer and other HPV-related illnesses.

It is essential to keep in mind that the HPV vaccine can also help prevent other cancers. This expanded range of defense highlights the significant contribution that HPV vaccination has made to overall public health. To implement this in Bangladesh, and for that local brands need to initiate their in-country production to ensure both availability and affordability. As the female demography

at more susceptible to this cancer, they will have a better understanding than anyone else. For that, we need to ensure as much women employability as possible so that they can reach the target consumers and encourage them towards the vaccines. Furthermore, the male population also need to have an in-depth idea about this cancer so that they can stay cautious about their friends and families. As we all know, prevention is better than cure, we need to encourage the women to be more aware of their health and hygiene. For example, during menstruation, women are compelled to use safe and clean pads as unhygienic condition is a strong exposure that eventually develops into cervical cancer. They need to be aware of the fact that females who are between 12 to 14 ages, they have the higher chance to prevent cervical cancer if they take the prescribed vaccine on a regular basis. We have to break the norms of shame for the discussion of body parts to ensure proper hygiene as well.

Chapter 7

Conclusions

Every trial looked at in the study on the HPV vaccine's capacity to prevent cervical cancer has time and time again shown statistically significant findings, proving the vaccine's effectiveness. These secondary-source results, which support earlier studies and show the value of HPV vaccination as a crucial cervical cancer prevention measure, are consistent with that research.

Future efforts must make use of the knowledge gained from this study to inform medical experts, policymakers, and the public about the significant role that the HPV vaccine has played in the drop in cervical cancer cases. This understanding ought should highlight the value of early immunization, emphasizing the effectiveness of the vaccine and its potential to prevent not only cervical cancer but also other HPV-related diseases.

Additionally, it's important to promote the development of good hygiene practices in women, including regular Pap testing and HPV screenings. These screenings, when coupled with HPV vaccination, are crucial for early detection, enabling quick intervention and greatly reducing the incidence of cervical cancer. The findings of this study highlight the importance of implementing comprehensive strategies like HPV vaccination, raising awareness, and developing good hygiene practices for women. By doing this, we can greatly advance the fight against cervical cancer, improve public health outcomes, and guarantee that women all around the world will live longer, healthier lives.

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