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OF SCIENCE AND TECHNOLOGY

Investigating the effects of visual inspection with acetic acid and cryotherapy methods on human papillomavirus infected patients at Katutura and central hospitals, Namibia

By

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Thesis submitted in partial fulfilment of the requirements for the degree of master health sciences in the faculty of health and applied sciences.

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DEDICATION

This thesis is dedicated to Hilma Nakale for always being on my side and for giving me hope in this study, not to fear anything and always think for a good future.

I further dedicate this to myself for always telling myself not to give up and to think positive always.

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ABBREVIATIONS

ACOG	American College of Obstetricians and Gynaecologists
ART	Antiretroviral therapy
CC	Cervical Cancer
FDA	Food and Drug Administration
HPV	Human Papilloma Virus
LBC	Liquid based cytology
LR-HPVs	Low-Risk Human Papilloma Virus
WHO	World Health Organization
MoHSS	Ministry of Health and Social Services
CIN	Cervical Intraepithelial Neoplasia
HIV	Human Immunodeficiency Virus
HR-HPVs	High-Risk Human Papilloma Virus
LR-HPVs	Low-Risk Human Papilloma Virus
VIA	Visual Inspection with acetic Acid
NUST	Namibia University of Science and Technology
ICC	Invasive Cervical Cancer
SPSS	Statistical software Package for the Social Sciences
DNA	Deoxyribo Nucleic Acid
SSA	Sub-Sahara Africa
SADC	Southern African Development Community
US	United States

ABSTRACT

The human papillomavirus (HPV) infests the cells of the cervix and causes cervical cancer. With an estimated 530 000 new cases per year, it is the third most frequent malignancy among women globally. In Namibia, 135 people died because of the disease in 2018. Cervical cancer is a public health issue in developing nations with significant social and economic consequences. In Human Papilloma Virus (HIV) positive women, HPV infection and persistence, as well as cervical precancerous lesions and malignancy, are more common. The Papanicolaou (Pap) smear is a cervical cancer-screening test that looks for both precancerous and cancerous cells in the cervix. Visual examination with acetic acid (VIA) and cryotherapy are becoming the favoured techniques for early identification of cervical cancer in developing nations. The Pap smear is a cervical cancer-screening test that examines the cervix and colon for precancerous and cancerous abnormalities. In Namibia, VIA and cryotherapy are rapidly replacing Pap smears. To date, however, the scale and impact of the use of these methods have not yet been investigated in Namibia. The aim of the study was to investigate how the use of VIA and Cryotherapy has impacted HPV-infected patients.

Women in reproductive age group (20-49 years) visiting two Namibian hospitals (Katutura and Central Hospital) were investigated using a cross-sectional study design. The study was conducted using a mixed methodological approach.

The Statistical Software Package for the Social Sciences (SPSS) was used to analyse information gathered through questionnaires; while data received through interviews was analysed by coding and creating themes.

The study highlighted the experiences of women who underwent VIA and Cryotherapy methods.

The 250 women that participated in the study ranged from 25-50 years of age. One hundred and seventy-eight patients (71.2%) were in the 40-49-year-old age group.

Most of the participants were from the Havana area. The great majority 188 (75.2%) were Oshiwambo speaking and 155 (62%) were single. In the study, 139 (55.6%) women were HIV positive and the remaining 111 (44.4 %) were HIV negative. Fifty-six (22.4%) patients were using family planning by injection. In this study 53, 46, 204, 135, & 158 children were respectively given birth by women of 25 to 30, 31 to 35, 36 to 40, 41 to 45, 46 to 50 aged groups. The 36-50 age

groups have more kids. The majority of women 151 (60.4%) with HPV infection who participated in the study have more than 3 children.

Interestingly, there was an association between para gravida and HPV infection among the women who took part in the study.

A family history of cancer was mentioned by up to 27.6% of the individuals. Ninety-nine (39.6%) received a Pap smear procedure with negative result in the past. Out of the 250 women, 132 (52.8%) received cryotherapy while 19 (7.6%) women had colposcopy treatments respectively.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

1.2 Background

The human papillomavirus (HPV) infests, multiplies in the cells of the cervix (the lower part of the uterus), causes cervical cancer. With an estimated 530 000 new cases per year, it is the third most frequent malignancy among women globally. The human papillomavirus is responsible for nearly all occurrences of cervical cancer. Early identification and immunization can help prevent cervical cancer. Surgery or a concurrent chemo radiation regimen that includes cisplatin-based chemotherapy, external beam radiation, and brachytherapy may be beneficial to patients with cervical cancer. Cervical cancer was discovered at an average age of 53 years over the world, with ages ranging from 44 in Vanuatu (Singapore) to 68 in the United States. In the United States in 2016, an estimated 12,990 instances of cervical cancer were diagnosed, with 4120 deaths, with a median age of 47 years at the time of diagnosis. Furthermore, Zambia's annual cervical cancer incidence rate is 58.4/100,000 with fatality rates of 36.2/100,000 per year (WHO, 2019).

The disease (cervical cancer) claimed 135 lives of Namibians in 2018 (Iita, Dyk, Wilkison&Tuhadeleni, 2018).

Cervical cancer affects around, 80000 women in underdeveloped countries with limited screening and immunization programmes, and more than 60 000 women die from the illness (MoHSS, 2018). In Eastern, Western, Central, and Southern Africa, cervical cancer was the main cause of cancer, related death in women. Inadequate cervical cancer therapy kills more than a quarter of a million people each year in many developing nations. The highest rate was discovered in Eswatini. Before the age of 75, around 6.5 % of women will have cervical cancer (Arbyn,Weiderpass, Bruni, De sanjoe, Saraiya, Ferlay & Bray, 2020).

Cervical cancer is a concern in developing nations such as India. According to World Cancer Statistics, over 80% of all cervical cancer cases were diagnosed in developing and low-resource

countries due to a lack of knowledge and the difficulty in implementing cytology-based screening programs (Sachan, Singh, Patel & Sachan,2018).

Even though the global rate has dropped in recent decades, it remains the third most prevalent cancer in women, with many instances occurring in developing countries. Cervical cancer remains the most frequent malignancy among women in Eastern and Central Africa.

Cervical cancer screening coverage in the Southern African Development Community (SADC) ranges from 2% to 20% in urban areas and 0.4 to 14% in rural regions (Batema, Blakemore, Koneru, Mtesigwa, Mccree, Lisovicz, Aris, Yuma, Mwaiselage & Jolly, 2019).

The most common sexually transmitted Infection (STI) virus that causes cervical cancer is HPV, which accounts for 99.7% of all invasive cervical cancer cases globally (WHO, 2019). When HPV infection persists in the cervix, it can cause dysplasia or cervical intraepithelial neoplasia, which are both precancerous lesions of the cervix. The *Papillomaviridae* family is divided into genus, species, and types based on genomic similarity. HPV is a member of the *Papillomaviridae* family. HPV infection is a danger for all sexually active women. There is a well-established association between HPV infection and cervical cancer (Olusola, Banerjee, Philley & Dasgupta, 2019).

The World Health Organization (WHO) has launched a Global Initiative to scale up prevention, screening, and treatment operations in order to eliminate cervical cancer as a public health problem in the twenty-first century. The cervix, on the other hand, has become the gold standard in secondary cervical cancer prevention for precancerous lesions discovered by microscopic analysis of cells scraped from the skin (Arbyn, Weiderpass, Bruni, De sanjoe, Saraiya, Ferlay & Bray, 2018).

The most prevalent method for diagnosing cervical dysplasia, is a Pap smear (Cooper & McCathrain 2021). The majority of Pap smears currently use liquid based cytology to distinguish between normal and pathological cellularity. The Pap smear is a cervical cancer test that is based on identification of precancerous and cancerous cells of the cervix (Vahedoor, Behrashi, Khamehchian, Abedzadeh-Kalahroudi, Moravveji & Mohmadi-Kartalayi, 2019). Cervical cancer has a long incubation time that is preventable disease. If rigorous screening is implemented, early detection and adequate treatment can be achieved. The Papanicolaou, (Pap) smear is a collection of cells from the squamocolumnar junction of the cervix, where squamous metaplasia causes the smooth columnar epithelium to meet the columnar cells (Cooper & McCathran 2021).

The Human Papillomavirus (HPV) is responsible for more than 90% of cervical cancer cases, which can infiltrate the columnar epithelium and the smooth squamous epithelium through cell proliferation and modification. If abnormal cells are found during Pap smear screening, colposcopy may be employed. The cervix is examined under a microscope and 5 % acetic acid is applied to the cervix to detect suspicious areas during this treatment. Women with non-conclusive Pap test results should have a colposcopy, screening, and biopsy.
A Pap smear is a painless, non-invasive, and inexpensive test for detecting precancerous lesions in the cervix of women (Sachan, Sigh, Patel & Sachan, 2018).

In poorer countries, visual inspection with acetic acid (VIA) and cryotherapy are becoming the favoured treatments for cervical cancer early detection. In low- and middle-income nations' "see and treat" programs, cryotherapy, which uses liquid nitrogen to kill precancerous cells on the cervix, is a frequent treatment for cervical cancer. VIA is a simple and cost effective procedure that is acceptable to both women and service providers, it is a preferred alternative to cytology based screening. When techniques that are more accurate are not available, the World Health Organization (WHO) currently advocates VIA screening followed by treatment ("see and treat") as a cervical cancer screening strategy.
The advantages of VIA and cryotherapy procedures do not require electricity, are simple to use, and are effective.

When compared to the usual Pap smear, these techniques have a sensitivity of 77 % in detecting Cervical Intraepithelial Neoplasia 2 and 3 (CIN) and 67 % -79 % in detecting pre-cancers. VIA is currently used to screen women ranging between 20 to 49 years in clinics/hospitals in Namibia. CIN (cervical intraepithelial neoplasia) is a premalignant lesion of the cervical epithelium that can be proven histologically from a biopsy sample and is classified into three stages (1, 2, and 3). CIN2-3 is thought to persist or progress to cervical cancer in 70 % of affected women after 0-20 years (MoHSS, 2018).

According to Silkensen Schiffman Sahasrabuddhe &Flanigan (2018), VIA has the advantage of being low-cost, with a low supply chain load and results that are immediately visible. When it

comes to diagnosing precancerous lesions. However, VIA has low accuracy and is not regularly reproducible. The positive predictive value of VIA is influenced by other factors in screened populations such as age, parity, and the severity of underlying cervical illness. It is also heavily reliant on the observer's competence and judgment.

1.3 Statement of the problem

Cervical cancer has been a public health concern in developing nations because it mostly affects women of reproductive age, with significant social and economic consequences. Cervical cancer is the third most prevalent disease in women infected with the Human Immunodeficiency Virus (HIV). In these women, it is also the primary cause of mortality (HIV). In HIV-positive women, HPV infection can lead to infection, persistence, and an increased risk of cervical precancerous lesions and malignancy. Despite the use of pap smear for screening for years, cervical cancer is nevertheless on the rise, especially among young women (Vahedoor, Behrashi, Khamehchian, Abedzadeh-Kalahroudi, Moravveji & Mohmadi-Kartalayi, 2019).

Although the screening (Pap smear) is painless, the results take four (4) weeks to be communicated to patients. False-positive pap smears have been documented in roughly 30% of cases in recent investigations. Furthermore, Pap smear necessitates the use of laboratories, well-trained and experienced staff as well as high costs. Due to the disadvantages of the Pap smear screening procedure, VIA and Cryotherapy were proposed as screening and treating methods for cervical precancer. The procedures are less costly, do not need laboratory services, can be done by a single person, and results are available in one to two minutes. Pap smear is gradually being replaced by VIA and Cryotherapy for detecting cervical cancer and is progressively introduced in Namibia. To our knowledge, the two treatment procedures have been introduced to Katutura and Central Hospitals where one thousand one hundred and thirty-nine (1139) women aged 20-49 were screened in the year 2019. However, studies investigating the effectiveness of both VIA and Cryotherapy have not been done in Namibia yet. Besides the cost of setting the different procedures or operations, what are the psychological, emotional, and Histopathology influences of Pap smear and the VIA and Cryotherapy on women who went through these processes.

1.4 Aim and objectives of the study

The purpose of the study was to investigate the effects of VIA and Cryotherapy in HPV infected patients.

The objectives of the study were:

1. To assess the socio-demographic reparations and possible risk factors of HPV infected patients who undertook the VIA and Cryotherapy procedures.
2. To analyse the diagnostic and pathophysiology outcomes of HPV infected patients who undertook the VIA and Cryotherapy procedures.
3. To analyse the psychological and emotional experiences of HPV infected women who received VIA and Cryotherapy treatment procedures.

1.5 Research questions

1. What are the demographic repartitions and possible risk factors of the participants who undertook the VIA and Cryotherapy procedures?
2. What are the diagnostic and pathophysiology outcomes of HPV infected patients who undertook the VIA and Cryotherapy procedures?
3. How do VIA and Cryotherapy affect the patients psychologically and emotionally after receiving treatment?

1.6 Significance/Contribution

The findings from the study highlighted the experiences of women who underwent VIA and Cryotherapy and compare the finding in the two facilities. The identified problem will help the MoHSS to re-evaluate the existing policies to improve VIA and Cryotherapy management currently in place. Results can be utilized in curricula for training relevant health practitioners to improve the quality of services offered to women who come for these procedures. This study will also be useful for other researchers to gain valuable information about the two treatments/procedures.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter examines a variety of studies on the effects of VIA and Cryotherapy techniques. This chapter is organized into sections with relevant headings that provide a thorough description of the study topic's theoretical understanding.

2.2 Cervical cancer

Cervical cancer, particularly invasive cervical cancer, is the main cause of cancer-related morbidity and mortality among women in developing nations (ICC). ICC kills a large number of reproductive-age women every year. Cervical cancer is a disease of the female reproductive system that can be avoided (2018, Arbyn, Weiderpass, Bruni, De sanjoe, Saraiya, Ferlay, and Bray). It is the world's second most frequent cancer among women. Sub-Saharan Africa, Melanesia, Latin America and the Caribbean, South Central Asia, and Southeast Asia have the highest estimated rates. Cervical cancer is a leading cause of death among women worldwide, and it is caused by a chronic infection with a high risk Human Papillomavirus in the United States of America (USA)(Olusola, Banerjee, Philley, and Dasgupta) (2019).

Each year, more than 12 000 cervical malignancies are discovered in the United States, resulting in around 4000 deaths, with an average age of diagnosis of 49 years. In addition, a lack of proper health insurance appears to be a substantial socioeconomic obstacle to timely cervical cancer prevention screening, resulting in cervical cancer incidence inequalities.

Cervical cancer in African American and Hispanic/Latina women, on the other hand, is commonly detected at an advanced stage. Human papillomavirus (HPV) infection, a large number of sexual partners, high parity, smoking cigarettes, long-term use of oral contraceptives, and first sexual behaviour at a young age are all risk factors for cervical cancer.

Cervical cancer is one of the most preventable and treatable cancers when detected early due to the slow progression of pre-cancer lesions to invasive cancer stage (Inayat, Hanif,Afsar & Ullah, 2019). Radical hysterectomy, lymph node dissection, and/or radiation with or without chemotherapy are suggested therapies for people with early stage cervical cancer, according to Cytology. Cervical cancer does not show any symptoms in its early stages. Abnormal soreness,

vaginal bleeding between menstrual periods, after sexual intercourse, and douching are the most common complaints. Foul-smelling discharges, bloody thinners discharge, and discomfort are among the other symptoms.

Cervical cancer is a fatal gynecologic tumor that kills about 266,000 women each year throughout the world (Wang, Zhang, Li, Hao, Zhao & Liang, 2018).

In China, around 61,700 new cases of cervical cancer are diagnosed each year, with approximately 29,600 deaths. Cervical cancer has surpassed breast cancer as the third highest cause of cancer death in Chinese women aged 15 to 44. Cervical intraepithelial neoplasia is known to be caused by infection with the carcinogenic Human Papillomavirus (HPV) (CIN) (Wang, Zhang, Li, Hao, Zhao & Liang, 2018).

According to a European survey, around 33000 cases of cervical cancer were diagnosed in 2018, with 15000 people death.

The World Health Organization (WHO) has called for the eradication of cervical cancer through immunizing at least 90% of girls before the age of 15. Screening at least twice in a lifetime for 70% or more of the target age group, and treating more than 90% of women with lesions identified by screening (Abryn, Bruni, Kelly, Basu, Poljak, Gultekin & Weiderpass, 2020).

In developing countries, the most common cancers in women are cervical, breast, and stomach cancer. Many underdeveloped countries are unable to implement cancer-screening programs due the significant financial, technical, and human resources required (Ara, Inayat, Hanif, Afsar & Ullah, 2019).

According to Chigbu, Onyebudhi, Nakenyi & Egbuji (2017), cervical cancer screening programs in high-income nations are well developed and well implemented. In Sub-Saharan Africa, an estimated 70,000 new cases of cervical cancer are diagnosed each year; the majority of these African countries are members of the Southern African Development Community (SADC).

Only HPV types 16 and 18 are responsible for 70% of all cervical cancer incidences world - wide.

Zambia was ranked sixth in the world in terms of cervical cancer in 2002, but by 2014, it has moved to fourth in the world and third in Africa. Cervical cancer is the most frequent malignancy among Zambian women between the ages of 15 and 44. Every year, 2330 Zambian women are

expected to be diagnosed with cervical cancer, with 1380 dying because of the disease (Kabelenga, Mwanakasale & Siziya, 2018).

According to Amukugo, Rungayi, and Karera (2018), Namibia is a Sub-Saharan African country with a population of 2.4 million people. 813 157 women between the ages of 15 and 44 are at risk of cervical cancer among the 2.4 million-people. Every year, about 132 new cases of cervical cancer are discovered, with 59 women death as a result. Cervical cancer is caused by a number of factors in Namibia including, female smoking (11.7 %). Overall fertility (3.6 %), hormonal contraception (34 %), and a high HIV prevalence (13.3 %).

Namibia has one of the highest rates of cervical intraepithelial neoplasia (CIN) and human papillomavirus infection in the world, according to a 1988 study (Amukugo, Rungayi & Karera, 2018).

Rungayi & Karera (2018) further reported between 1995 and 2000, 607 cases of cervical cancer were detected. However, in 2011 and 2012, there were 234 and 266 new cases, respectively. The vast majority of these individuals were referred to Health Centres around the country for treatment. In Namibia, the warning symptoms and causes of cervical cancer is poorly understood. As a result, women should exchange knowledge with one another (Iita, Van Dyk, Wilkinson & Tuhadeleni, 2018).

2.3 Biology of Cervix and the development of Cervix cancer

The cervix, which is located at the bottom of the uterus, is a cylindrical-shaped structure made up of stroma and epithelium. The ectocervix, which projects into the vagina and is bordered by squamous epithelium, is the intravaginal portion. The columnar epithelium lines the endocervical canal, which runs from the internal os as the uterus's connection to the external os, which opens into the vagina.

Almost all cases of cervical cancer arise from the ecto- or endocervical mucosa in the transition zone. The transformation zone is the area of the cervix between the old and new squamocolumnar junction. The end cervical canal is lined with mucus secreting columnar epithelium, while the exocervix is lined by stratified squamous epithelium (Small jr, Bacon, Bajaj, Chuang, Fisher, Harkenrider, Jhingran, Kitchener, Mileshkin, Vigwanathan & Gaffney 2017). The

transition between these two populations of cells is known as the squamocolumnar junction, and it is thought to be the most sensitive to viral neoplastic change that leads to cervical cancer from HPV infection. Most of HPV infections are transient and will go away on their own. On the other hand, persistent infection can lead to premalignant disorders such cervical intraepithelial neoplasia or adenocarcinoma in situ. In most women, the change from dysplasia to aggressive cancer might take years or decades if they do not receive therapy.

Cervical cancer develops as a sequence of low-grade and high-grade cervical intraepithelial lesions (CINs) from normal cervical epithelium, with HPV infection playing a key role in CIN development. HPV infection of the cervical epithelium causes changes in the host genome, resulting in the silencing of numerous tumour suppressor factors on the one hand, and the induction of abnormal tumor-promoting factors on the other (Olusola, Banerjee, Philley & Dasgupta, 2019).

Invasion is the process of cervical precancer cells spreading beneath the epithelial layer and into the stroma (deeper tissues) of the cervix. Cervical cancer is caused by cervical intraepithelial neoplasia (CIN), which is a series of epithelial changes (Rajkumar, 2018).

Cancer in situ affects the biological and genetic characteristics of cells in an irreversible way, and aberrant cells have the ability to spread to other parts of the body (Rajkumar, 2018).

Cervical cancer is divided into two types.The most common type is squamous cell carcinoma, which develops in the exocervix and accounts for 80% of cases. Squamous cells have a scale-like, flat appearance and their width is more than their height (Ngoma & Autier, 2019).

Adenocarcinomas are the second most common and formed in the glandular cells, which are found in the upper region of the cervix and account for 20% of cases. The cervical cells do not change into cancer suddenly but instead develop to pre-cancerous changes. These changes gradually turn into cancer (Marilin, 2011).

CIN are abnormal cells that appear on the cervix's surface. CIN shows abnormal changes in squamous cells that line the cervix but is not cancer (Rajkumar, 2018). It takes a long time for these alterations to manifest as cancer and in a number of women, the abnormality resolves on its own. CIN is classified into three grades that are based on how deeply these abnormal cells have penetrated the cervix lining (World Health Organization, 2014). CIN2 is also called low-grade

squamous intraepithelial lesion where abnormal cells have entered one-third of the lining of the cervix (World Health Organization, 2014). When abnormal cells are seen in up to two-thirds of the cervix's lining, the condition CIN2 (high-grade squamous intraepithelial lesions) develops. (World Health Organization, 2014).

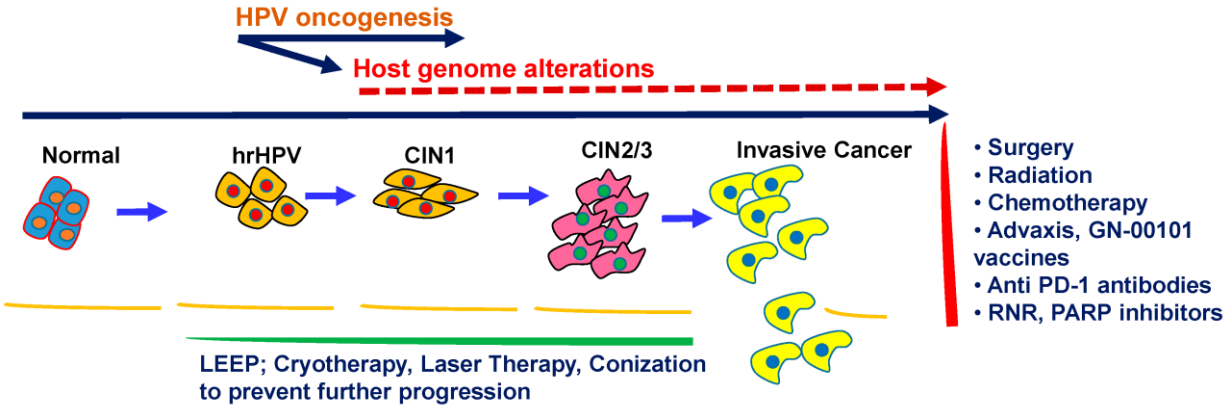

Figure 1 : development of cervical cancer (Olusola et al., 2019)

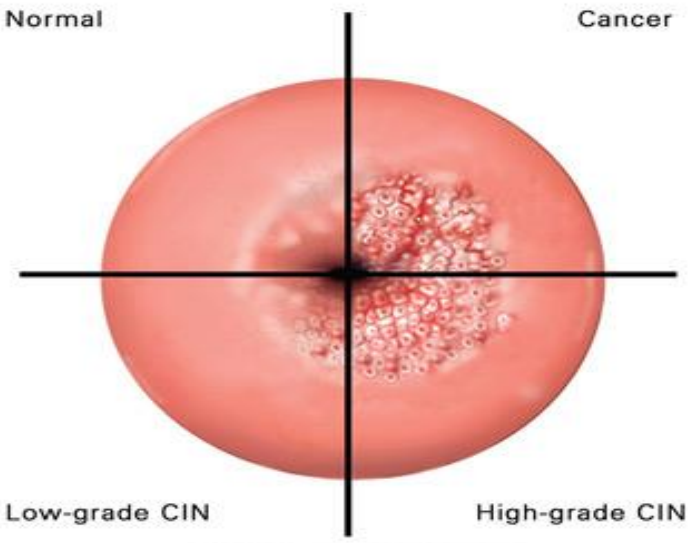

Figure 2: classified grades of CIN (: pre-cancerous cells)

(Prat, 2012)

CIN is link to the various phases of cervical cancer development, with four stages being the most widely utilized to determine the differences in the cells lining the cervix (Prat, 2012). The goal of staging is to figure out how far the cancer has gone and whether it has affected local structures

or further away organs. Staging aids in determining the most effective treatment option (Mello & Sundstrom, 2019). Precancerous cells are found at stage 0 of the process. In stage 1, cancer cells have moved from the cervix's surface into deeper tissues, most likely into the uterus, and to nearby lymph nodes (arenac & Mikov, 2019). In stage 2, the cancer has gone beyond the cervix and uterus, but not to the pelvic walls or the lower region of the vaginal canal (arenac & Mikov, 2019). The lymph nodes in the area may or may not be affected. In stage 3, cancer cells can also be identified in the lower part of the vagina or the pelvic walls, and they can block the ureters, which carry urine from the bladder (arenac & Mikov, 2019). The lymph nodes in the area may or may not be affected. In stage 4, cancer has gone to the bladder or rectum and is protruding from the pelvis. It is possible that the lymph nodes will be harmed or not.

The cancer has spread throughout the body. (Šarenac & Mikov, 2019).

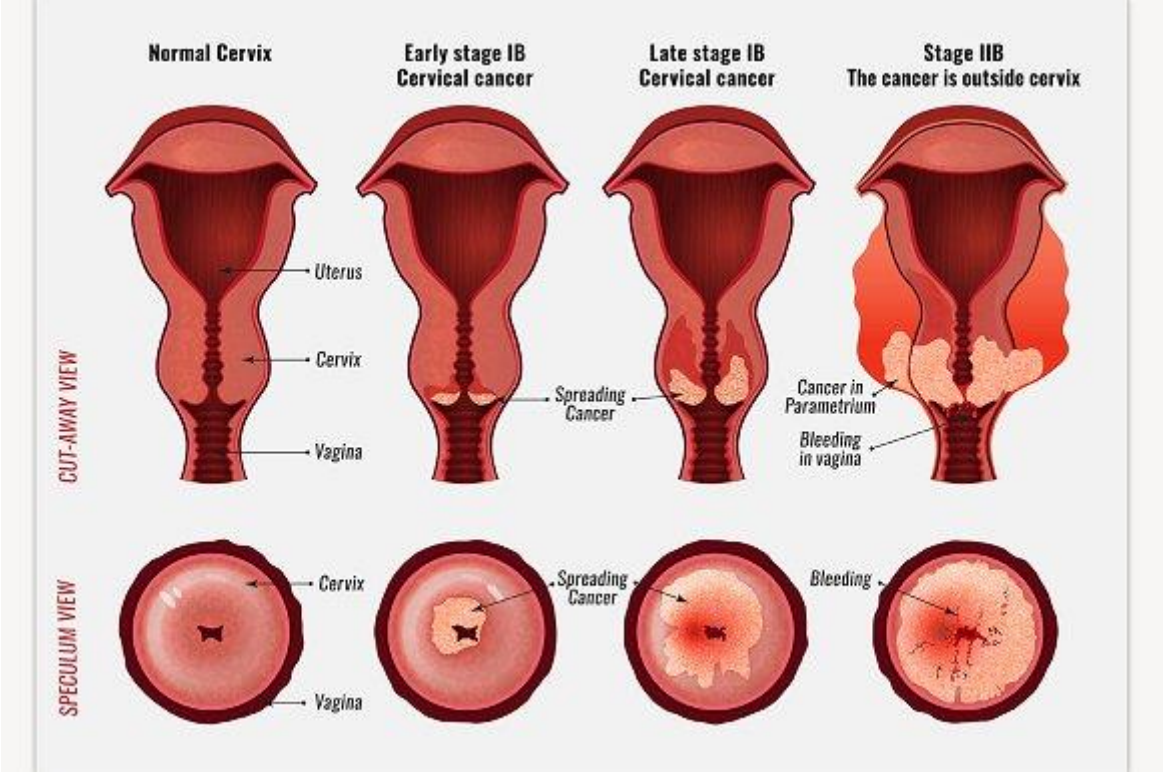

Figure 3: the 4 stages of cervical cancer progression

(Herzliya Medical Center, 2019)

Causes, Symptoms, and manifestation of cervical cancer

- **Causes**:

Atypical changes in the cervical tissue constitute the start of cervical cancer.

Cervical cancer is linked to a number of factors, including:

• **Human papillomavirus (HPV):** Sexual intercourse is the only way for this virus to spread. There are over a hundred different types of HPV, with at least 13 of them having the ability to cause cervical cancer. HPV 16 and 18 carcinogenic strains cause 70% of cervical cancer, and roughly, HPV 16 and 18 cause half of CIN 3 (Mwaka, Orach, Were, Lyratzopoulos, Wabinga & Roland 2016).

• **Having a large number of sexual partners or starting sexual activity at a young age**: sexual contact with someone who has HPV almost always leads to the transmission of cancer-causing HPV strains. HPV is more likely to infect women who have had many sexual partners. This raises their chances of getting cervical cancer (Felman, 2019).

Smoking: Local immune suppression and mutagenic activity of cigarette components have been established in cervical cells, and may play a role in HPV persistence or malignant transformation similar to that seen in the lungs. The major risk factor for higher grades of cervical illness appears to be smoking. In the early stages of cervical disease, smoking appears to have little or no influence (Felman, 2019).

• **A compromised immune system**: HIV/AIDS patients and transplant recipients are more likely to develop cervical cancer, necessitating the administration of immunosuppressive medicines (Felman, 2019).

• **Contraceptive pills**: Long-term use of a variety of conventional contraceptive tablets increases a woman's risk of breast cancer (Mwaka, Orach, Were, Lyratzopoulos, Wabinga & Roland, 2016).

• **Other STDs**: Chlamydia, gonorrhea, and syphilis have all been related to a higher risk of cervical cancer (Felman, 2019).

- **Socio-economic status:** In places with low earnings, HPV infection rates appear to be greater (Felman, 2019).
    - **Symptoms:**

Precancerous cervix changes do not usually produce discomfort or other symptoms in the early stages, and they are not detected until a woman undergoes screening. Symptoms normally don not appear until aberrant cervical cells are cancerous and infect nearby tissue. A lot of foul-smelling vaginal discharge, unusual bleeding, or intermenstrual bleeding, postcoital bleeding, postmenopausal hemorrhage, or backache are the most common symptoms (Mishra, Shastri, & Pimple, 2011).

• Difficulty peeing, pain when urinating or blood in the urine are other symptoms. • Dull backache or swelling in the legs are further symptoms.

• Diarrhea, rectum pain, or bleeding when urinating.

- Fatigue, loss of weight and appetite, and an overall sense of unwell.
- Nausea, vomiting, and constipation, as well as a bloated abdomen (Mwaka et al., 2016).

In its early stages, cervical cancer can be asymptomatic (Riaz, Manazir, Jawed, Ali & Riaz (2020). Patients may still experience foulsmelling vaginal discharge and atypical bleeding, including intermenstrual hemorrhage, post-coital bleeding, and postmenopausal bleeding. HPV infection has been linked to practically every instance of cervical carcinoma around the world, with HPV oncogenic subtypes 16 and 18 accounting for 70% of cases. Furthermore, about a third of all women diagnosed with cervical cancer die while the disease is still treatable and preventable if detected early. Up to 50-90 % of women who develop cervical cancer or die from it have never had their cervical cancer screened.

According to Riaz, Manazir, Jawed, and Riaz (2020), cervical cancer can be effectively controlled through primary, secondary, and tertiary preventive strategies, such as prophylactic HPV vaccination, screening, diagnosis, and treatment of pre-cancerous and invasive cervical cancer.

2.4 Prevention of cervical cancer

Cervical cancer prevention and early detection education is an important aspect of primary care. Women are urged to attend screening sessions and receive information from health experts on how to recognize early warning signs and symptoms of cervical cancer. Surgery, radiation, and chemotherapy are commonly utilized to increase overall survival, disease-free survival, progression-free survival, and a lower recurrence rate in cervical cancer patients.

However, HPV infects the human genitalia in over 40 different serotypes, 15 of which are known to cause cancer. Serotypes 16 and 18 are responsible for 70% of all cervical malignancies. prophylactic vaccination was created in the 1990s after it was discovered that high-risk HPV infection causes cervical cancer. Vaccination is considered primary prevention (since it targets carcinogenic serotypes) and screening is considered secondary prevention. There are now three vaccines in use to prevent cancer.1. Bivalent (cervarix) 2. A Quadrivalent (Gardasil) and 3. 9-valent

formulation (gardasila). HPV serotypes 16 and 18 are protected by all three vaccines (Small Jr, Bacon, Bajaj, Chuang, Fisher, Harkenrider & Gaffney 2017).

Kabelenga, Mwanakasale &Siziya (2018), Cervical cancer is linked to cigarette smoking, the number of sexual partners, parity, the use of oral hormonal contraception, fertility rate, HIV infections, genetic predisposition and early sexual activity, early marriage, and low socioeconomic status.

2.5 Procedures applied for HPV detection

2.5.1 Pap smear and Visual Inspection with acetic Acid (VIA)

Papanicolaou cytological testing (also known as Pap smear test) is a cervix precancerous lesions screening method that reduces the risk of cancer by 75-90 %. In the industrialized world, routine Pap smear testing has reduced the occurrence of cervical cancer however, the picture in low- and middle-income countries is considerably different.

Furthermore, a fundamental lack of information and attitude among the population regarding early detection of cancer and its high mortality rates can be attributed in part to a lack of resources. But primarily to a fundamental lack of information and attitude regarding early detection of cancer and its high mortality rates. However, the HPV vaccine's effectiveness to prevent cancer is limited by various variables, including its expensive cost (Chigbu, Onyebudhi, Nakenyi & Egbuji 2017).

Cervical cancer screening is a procedure that detects precancerous cervix tumours before they progress to malignancy. If these precancerous lesions are treated and eliminated, cervical cancer can be avoided. Because precancerous lesions take years to turn into cervical cancer, regular screening can detect almost all precancerous lesions before they turn cancerous. The majority of cervical malignancies are prevented when all girls in the target age group are screened and any precancerous lesions found are treated (Kabelenga, Mwanakasale & Siziya, 2018).

The Pap smear (cytology) test has been found to minimize cervical cancer incidence and mortality in large populations (Vahedoor, Behrashi, Khamehchian, Abedzadeh-Kalahroudi, Moravveji & Mohmadi-Kartalayi, 2019).

Exfoliated cells from the cervix are collected on glass slides during the Pap smear process. In the laboratory, the cells are processed and evaluated for the existence of cervical premalignant cells. Cervical cancer can be detected early and treated effectively if comprehensive screening is done (Sachan, Singh, Patel & Sachan, 2018).

A Pap smear test for the presence of precancerous cervical intraepithelial neoplasia and the early stage of invasive cervical cancer can detect early cervical epithelial alterations. Cervical cancer mortality has fallen considerably in developed countries because of extensive screening systems. For detecting a high-grade squamous intraepithelial cancer, the Pap test has a sensitivity of 70.80%. (HSIL). The sensitivity of a Pap test paired with an HPV DNA test for detecting precancerous lesions is increased. In many industrialized nations, Pap smear screening has had a significant impact on cervical cancer incidence and mortality.

Cervical cancer incidence can be reduced by up to 90% when screening quality and coverage are high. Many women in developing nations, where 80% of new cases originate, have never undergone Pap smear procedure. George Papanicolaou's development of cytological screening in the late 1940s was a huge public health success story in cervical cancer prevention (Akinfolarin, Olusegu, Omoladun, Esan, & Onwundiegu) (2017).

Cervical cancer incidence and mortality rate have fallen considerably in many developed nations since the advent of conventional cytology or Pap smear. The highest cervical cancer's mortality rate is 10 to 35 deaths per 1000,000 people in developing countries, compared to 2 to 4 deaths per 1000,000 people in developed countries due to the frequency with which the Pap smear test is performed in developed countries (Parsa, Sharifia, Shobeiri & Karami, 2017).

Underdeveloped countries lack access to effective screening programs and a low rate of Pap smear or pelvic examination adoption, the condition is frequently not diagnosed until it has progressed to a more advanced stage and symptoms manifest, resulting in a higher rate of cervical cancer death. Cervical cancer screening tests are accessible all throughout the world and vary depending on resources and government guidelines. The WHO devised and approved the screen and treat campaign as simpler strategy,because of the availability of high-quality cervical cancer screening services (Miri, Moodi, Sharif-zadeh, Moghadam, Miri & Norozi (2017).

Current screening method such as Pap smear, are generally costly and difficult to scale up. As a result, low-cost, long-lasting and user-friendly screening alternatives like VIA in low settings are required (Maza, Schocken, Bergman, Randall & Cremer, 2017).

In low-resource countries, however, maintaining high-quality cytology-based programs is problematic.As a result, in low resource settings, screening with VIA or HPV DNA testing, followed by Cryotherapy treatment, is the most efficient and effective strategy for detecting and treating cervical cancer precursors (freezing) (Sherris, Wittet, Kleine, Sellors, Luciani,Sankaranarayanan & Barone , 2009).

In low resource nations, visual inspection with acetic acid (VIA) and rapid cryotherapy for secondary prevention of cervical cancer have been adopted and are being used. The VIA treatment involves saturating the cervix with 5% acetic acid (table vinegar), which causes precancerous cells to turn white after 30-60 seconds due to intracellular proteins, whereas normal cells do not. Despite the fact that VIA has a higher sensitivity (96.7%) than the Pap smear (53%), its specificity is poor, leading in overtreatment (Griffin, Mudhar, Rundle, Shiraz, Mahmood, Egawa & Doorbar, 2020).

An acetic acid ocular inspection, which can be done in the doctor's office, allows for direct observation of cervical cells without the need of microscope. Early detection of cervical cancer followed by appropriate therapy could make a very large difference to survival rates (Griffin, Mudhar, Rundle, Shiraz, Mahmood, Egawa & Doorbar, 2020).

Maree et al. (2009) described VIA as a low-cost procedure that may be carried out using simple equipment and by experienced doctors, nurses, and midwives without the use of laboratory facilities. One minute after administering freshly produced acetic acid to the cervix at a concentration of 3-5%, VIA detects acetone white lesions on the cervix.

VIA screening has been widely applied in numerous low-income nations in sub-Saharan Africa due to its feasibility. VIA screening is especially appropriate for everyone, and the world Health Organization has established guidelines for adopting VIA in public health settings (Bhatla, Aoki,Sharma & Sankaranarayanan,2018).

The presence of acetowhite or mustard yellow (VILI) lesions on the cervix, that suggest malignant or precancerous tissue, can be detected by trained physicians or even untrained healthcare workers.

VIA and VILI offer the same sensitivity and specificity in cytology, as well as the advantages of being easy to use and cost-effective for large-scale applications (Adsul, Manjunath, Srinivas, Arun, & Madhivanan, 2017).

VIA is a low-cost process that produces fast results and requires no special equipment other than a decent light source, a speculum, and 5% acetic acid. VIA has grown in popularity and can be used as a preliminary test for mass screening in low-resource settings, with women who test positive being subjected to further testing (Saleh, 2017).

Cryotherapy can be used to treat women who test positive for VIA at the same clinic visit (Chigbu, Onyebuchi, Nnakenyi & Egbuji, 2017).

2.5.2 Cryotherapy

Cryotherapy is used to freeze lesions in women who have VIA positive screening results. Cryotherapy is a non-invasive procedure that can be performed in outpatient or community clinics settings (Mutumbo, Tozin, Simoens, Lisbeth, Bogers, Van Geertruyde & Jacquemyn, 2017).

According to Olusola, Banerjee, Philley & Dasgupta (2019), Cryotherapy procedure has little complications such as vaginal discharge or spot bleeding as well as substantial issues such as pelvic inflammatory or severe haemorrhage. Cryotherapy should be avoided if lesions covers more than 75% of the cervix, spreads more than 5mm beyond the tip of the Cryotherapy probe, or if cancer is suspected or diagnosed.

Olusola, Banerjee, Philley, and Dasgupta (2019) conducted a study in which Cryotherapy was used to treat 28, 827 patients with CIN, with cure rates of 94.0 % for CIN2 and 85.0 % for CIN 3. Cervical intraepithelial neoplasia, a slow-progressing phase of the disease that can be recognized and treated, is the precursor of invasive cervical cancer (CIN).

To confirm CIN, which is divided into three stages, a biopsy sample can be used (CIN1, 2, and 3) After 10–20 years, CIN2-3 is expected to remain or progress to cervical cancer in 70% of afflicted

women. The precancerous stage might last anywhere from 7 to 20 years, allowing for early detection and treatment (Kasem, Razzaque, Adiba, Anika & Banika, 2019).

2.5.3 Colposcopy

The colposcopy surgery is a crucial component of cervical cancer prevention (Wentzensen, Massad, Mayeaux, Khan, Waxman, Einstein & Huh 2017). Colposcopy and biopsy, which were created to identify invasive malignancies, have evolved into diagnostic techniques for women with abnormal cervical screening findings. Colposcopy employs a magnified cervix to guide biopsy sampling for histologic diagnosis, separating high-risk women who require treatment from lower-risk women who are monitored according to management guidelines.

The incidence of cervical cancer in the United States of America (USA) has fallen considerably with the advent of cytology screening followed by colposcopy (Mutumbo, Tozin, Simoens, Lisbeth, Bogers, Van Geertruyde & Jacquemyn2017).

Furthermore, women who are referred to colposcopy because their cervical cancer screening results are abnormal and are at risk of a variety of underlying cervical precancer risks; however, there are currently no recommendations on how colposcopy should be performed in routine practice and modified based on an individual's risk profile (Riaz, Manazir, Jawed, Ali & Riaz, 2020).

Colposcopy training and practice in affluent nations varies greatly. Despite the absence of data, hundreds of thousands of colposcopies are likely performed each year in the United States by a range of doctors in disciplines such as gynaecologic oncology, gynaecology, family medicine, and internal medicine. (Olusola, Banerjee, Philley & Dasgupta, 2019).

2.6 Human Papillomavirus (HPV) and Human Immunodeficiency Virus (HIV)

According to Wang et al. (2018), HPV is a member of the *papillomaviridae* family, a non-enveloped DNA viral taxonomy family split into genus, species, and types based on nucleotide sequence comparison. More than 200 HPV genotypes have been identified so far, and they have been divided into five taxa (Alpha, Beta- and Gamma papillomaviruses represent the largest groups). Based on their carcinogenicity, HPV genotypes from the Alpha papillomavirus are classed as low-risk human papillomavirus (LR-HPVs) or high-risk human papillomavirus (HR-HPVs). Based on

epidemiological evidence, the HR-HPVs HPV51 (species 5), HPV56 (species 6), HPV18, 39, 45, and 59 (species 7) and HPV 16, 31, 33, 35, 52, and 58 (species 9) have all been confirmed as carcinogenic types (species 9). The remaining HR-HPVs are classified as "maybe" or "likely" carcinogenic.

The HPV virus is spread from person to person, most commonly through sexual contact. Although nonsexual transmission is possible with fomites, the most common means of transmission are genital touch and sexual activity. When you have several sexual partners or a partner who has multiple sexual relationships, your chances of being exposed increase dramatically. HPV infection at an early age raises the chance of long-term infection. During puberty and the first pregnancy, the cervix has the most metaplastic activity. HPV-related cervical cancer is diagnosed at an average age of 49 years. Because it has a slow-growing dysplastic mechanism that leads to cancer in 10-30 years, this implies an earlier age of exposure (Cooper & McCathran, 2021).

The basal cells of the cervix's squamous epithelium are affected by HPV. When basal cells form and progress to the epithelium's surface, HPV DNA replicates once within the host cell. As the early part of the viral genome is deregulated, HPV gene expression becomes unlinked to the state of cellular differentiation of infected epithelial cells, leading in a significant rise in the synthesis of two HPV oncoproteins (E6 and E7). Immature "basaloid-type" squamous cells and mitotic figures can be seen in the upper half of the cervical epithelium, indicating that the epithelium's regular cell cycle regulation has been interrupted. After applying acetic acid to the cervix, these characteristics can be seen during colposcopy. A sample of this area is taken and sent to a pathologist to determine the severity of dysplasia (Cooper &McCathran, 2021).

Cervical neoplasia is caused by a persistent infection with one or more high-risk (HR) types of the human papillomavirus (HPV) (HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68). HPV infections are usually transitory in most women and go away on their own. The infection can persist in a small number of women, leading to high-grade cervical intraepithelial neoplasia (CIN) or cancer later in life. The majority of CIN1 lesions are caused by HPV infections that are short-lived and go away on their own.

Between the context of HPV-based screening and the natural history of the disease in HRHPV-positive women with histopathology demonstrating normal cervix or CIN1 and in whom colposcopy has reasonably excluded high-grade disease. The natural history of the disease in HRHPV-positive women with histopathology demonstrating normal cervix or CIN1 and in whom colposcopy has reasonably excluded high-grade disease is little known and of immense practical significance. Doctors will be able to choose the appropriate course of action for these HPV-positive women with a normal cervix or low-grade lesions by understanding their natural history (Mittal, Basu, Muwonge, Banerjee, Ghosh, Sengupta, Das, Day,Mandal, Panda ,Biswas & Sankaranarayanan, 2017).

2.7 HPV infection management and treatment

2.7.1 HPV vaccinations

One of the most important therapy options for cervical cancer is effective HPV vaccinations.
Early diagnosis of precancerous lesions by screening is critical for cervical cancer prevention, which is especially crucial in low-resource countries where HPV vaccination uptake is low. Developed countries with well-structured cervical cancer screening programs have shown considerable decreases in cervical cancer incidence and mortality when compared to emerging countries with low vaccination coverage and no established cervical cancer screening programs. Cervical cancer incidence and mortality have decreased in the United States since the advent of the Papanicolaou smear cytology test, with organized cervical cancer screening programs and screening rates of 83 %.
Cervical cancer, on the other hand, remains a major issue in underdeveloped nations, with cervical cancer screening rates ranging from 6–8% (Musa, Achenbach, O'Dwyer, Evans, Mchugh, Hou, Simon, Murphy & Jordan, 2017).
Since the first HPV vaccine was registered for use by the US Food and Drug Administration (FDA).

According to Xie, Tan, Shao, Liu, Tou, Zhang, Luo, and Xiang (2017), in 2006, vaccination has quickly become one of the most important strategies for cervical cancer prevention; On the other hand, HPV vaccines are not frequently used. Only three HPV vaccines are now available, and they

are for subtypes 6/11/16/18/31/33/45/52/58 of the virus, which has 148 subtypes. For girls aged 13–26 who have not been vaccinated, the HPV vaccine is advised. However, the World Health Organization (WHO) advises against using the HPV vaccine in place of cervical cancer screening, particularly in those over the age of 26. As a result, screening for cervical cancer prevention is still essential over the world, particularly in underdeveloped nations.

HPV testing in invasive cervical cancer has recently indicated a significant frequency of HPV 16 and 18 in Sub-Saharan Africa.

Furthermore, when compared to those without CIN2/3 diagnosis, the HPV18 deoxyribonucler acid (DNA) load appears to be less significant or perhaps lower among women (Doorbar & Griffin, 2019).

HPV vaccines have been developed and are projected to prevent 70% to 90% of invasive cancer incidences in women who have never been exposed to the virus. Despite the fact that cytology programs have been introduced in various countries, their effectiveness is limited due to a lack of affordable treatment choices. Up to 80% of women diagnosed with cervical precancer do not receive the treatment they require (Maza, Schocken, Bergman, Randall & Cremer, 2017).

HIV positive women had a seven-fold higher risk of cervical cancer than HIV-negative women, according to Stuart, Yeboah, Sarkodie, Benjamin, Akorsu, and Mayaud (2019).

In high-income countries, non-attendance during cervical screenings is still a major issue. High-income women with HIV who are infected with HPV are at a higher risk of HPV persistence and precancerous lesions, which can proceed to severe cervical cancer if not discovered and treated early. Cervical cancer incidence among HIV-positive women in South Africa is projected to be 396 per 100,000 person-yearly, which is more than ten times higher than the general population rate (Campos, Lince-Deroche, Chibwesha, Firnhaber, Smith, Michelow, Meyer-Rath, Jamieson, Jordaan, Sharma, Regan, Sy, Liu, Tsu, Jeronimo & Kim, 2018).

Women's life expectancy has increased dramatically as antiretroviral treatment (ART) has been more widely available, with more than 60% of HIV-positive people projected to receive ART. To ensure that the expected life expectancy increases from ART are fully realized among HIV-positive women, cervical cancer screening programs must be implemented. In addition, the World Health Organization (WHO) recommends that women with HIV get cervical cancer screening with HPV

testing at least every three years if resources are available. For countries with fewer resources, visual inspection with acetic acid (VIA) is a viable screening option. Cervical cytology (Pap tests) screening is only recommended in countries where cytology coverage and quality indices are high (Campos, Lince-Deroche, Chibwesha, Firnhaber, Smith, Michelow, Meyer-Rath, Jamieson, Jordaan, Sharma, Regan, Sy, Liu, Tsu, Jeronimo & Kim,2018).

2.8 Shortcomings of HPV infection management and treatment

Non-attendance is linked to a lack of understanding (Stuart, Obiri-Yeboah, Adu-Sarkodie, Hayfron-Benjamin, Akorsu & Mayaud, 2019).

Women are deterred from screening due to embarrassment involved with sample collection, fear of pain, and fear of cancer diagnosis. The majority of women have never had their cervical cancer tested and have sought treatment only after experiencing symptoms. Cervical cancer is likely to progress faster at the time of presentation if treatment is delayed. In addition, many women feared being shunned if they sought screening advice from family members. Some of the challenges that prevent women from having cervical cancer screening are listed below:

- **Anxiety over death**

When a woman is diagnosed with cervical cancer, the first thought that comes to mind is the fear of death and leaving her children without a mother.

- **Knowledge**

There is a lack of knowledge regarding cervical cancer, it causes, and how to prevent it.

In Africa, cervical cancer was thought to be caused by specific meals or birth control.

- **Finance**

Some women are willing to go to health facilities for cervical screening, but they do not have enough transport money.

- **Fear of being stigmatized**

Women suffering from cervical cancer are regarded as low- value women by spouses and community members. They are stigmatized and isolated.

Cervical cancer education and awareness among women varies greatly across Sub-Saharan Africa (SSA) according to surveys.

Although the cost of setting the different procedures or operations and the time to obtain results have been used to motivate the choice of preferable procedure, this study has explored and assessed the psychological and emotional influences of VIA and Cryotherapy on women who went through these processes. In low-resources, countries around the world, particularly in Sub-Saharan Africa, major challenges include low socioeconomic position, lack of awareness. Inadequate finance and a scarcity of providers. Patient navigation is being used in a number of initiatives to help overcome some of these limitations.

Patient navigators were utilized as part of a multidimensional initiative in Zambia to improve cervical cancer screening for HIV-positive women, who face similar screening and treatment challenges as those in Tanzania. In the United States, Muslim women face significant language and healthcare access barriers, notably in New York City, and cultural and religious beliefs influence health attitudes and behavior (Bateman, Blakemore, Koneru, Mtsesigwa, Mc Cree, Lisovicz, Aris, Yuma, Mwaiselage & Jolly 2018).

The major barriers to preventing testing for rural women, according to a study conducted in India by Parsa, Sharifia, Shobeiri, and Karami (2017), are a lack of awareness of cervical cancer symptoms, as well as a dearth of knowledge about screening procedures and cancer risk factors. Furthermore, the rural population requires greater training for cervical cancer screening due to traditional norms such as frequent early marriage, a lack of education, and a lack of health awareness.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This study's research methodology, which includes the research design, study population, sampling method, sample size, study environment, research instrument, data collecting, data analysis, and ethical considerations.

3.2 Study design

According to Majid (2018), the use of evidence based methodologies, protocols, and guidelines as tools and framework for conducting a research study is known as study design. This was a mixed methodology research project that used qualitative and quantitative research methods. According to Boeren (2017), the quantitative research approach, refers to data obtained using "predetermined" techniques such as questionnaires. Open-ended questions were utilized to get qualitative data from clients. The study used a cross-sectional methodology to look at the effects of VIA and cryotherapy on women in their reproductive years (20-49 years).

3.3 The population of the study

The term "population" refers to a collection of individuals as a whole or items who have certain common features or meet criteria that the researcher is interested in, and to whom the researcher's results are applied (Majid, 2018).

The age of women who undertook the VIA and Cryotherapy procedures at the Katutura and Central Hospitals were between 20-49 years old because they are prone to HPV infection according to the guideline (MoHSS, 2018).

3.4 Sampling method

The study participants were chosen through purposive sampling. According to Etikan, Musa & Alkassin (2017), purposive sampling is a non-random technique that does not require a specific number of participants. This study used patients who went through the VIA and Cryotherapy

procedures. Some patients have conditions like diabetes mellitus, hypertension, HIV- positive status, and other conditions for as long as they went through the procedures and willingly give their consent to partake in the study.

3.4.1 Inclusion criteria

- Female patients between the ages of 20 and 49 who had undergone VIA and Cryotherapy were included in the study.
- Both HIV negative and positive.

3.4.2 Exclusion criteria

Female patients under the age of 20 and those over the age of 49, according to the guidelines.

3.5 Sample size

According to Etikan, Musa & Alkassin (2016) a sample size is a portion of a larger group of people chosen by the researcher to take part in research projects. With careful consideration of these recent statistics, the likely prevalence is calculated using the ratio percent of HPV infection, precancerous lesions, and cervical cases specific for Namibia (to date), the estimated population at risk, and the current population. HPV infection and precancerous lesions: Cervical cases
(3.2+21.1+33.7): 62.5
Ratio percent -> Population of interest (3.2+21.1+33.7)
Total population burden x 100% (3.2+21.1+33.7+62.5) x 100 = 48.13 %

Prevalence population base on ratio percent = 851 340 x (48.13/100) = 409 749.94

Population proportion % (p) = Prevalence population 407 749.94
Whole population x 100% 2 448 000 x 100 = 16.65%

For quantitative the sample size for the study was 214 subjects, with consideration of the level of confidence of 95%, based on the formula: n = z2*p *(1−p)/d2

Where: z = 1.96 for a confidence level (α) of 95%, p = proportion (expressed as a decimal), d = margin of error.

z = 1.96, p = 0.16649999999999998, d = 0.05

n = 1.962 * 0.16649999999999998 * (1 - 0.16649999999999998) / 0.052

n = 0.5331 / 0.0025 = 213.251

n ≈ 214 (Sinha, Singh, Mishra, et al. 2018)

The sample size was above 214, to accommodate for cases with unforeseen data challenges or gaps, to remove bias, and increase the significance probability of research data and findings.

Patients from both hospitals (Windhoek Central hospital= 125 and Katutura state hospital=125) were selected randomly when they came for VIA and Colposcopy procedures.

For qualitative the sample size was 10 to 15 or until data saturation is reached.

A total of 10 women were involved in the study.

3.6 Study setting

The research was carried out in the Katutura and Central Hospitals in Namibia's capital, Windhoek. Katutura Hospital is in the Katutura neighbourhood while Central Hospital (a referral hospital for all the regions) is located in Windhoek west. Both hospitals provide medical services to people.

3.7 Research instrument

A research instrument is a gadget collection of information (Boeren, 2017). A written consent form was required of all study participants. For individuals who could not read or write in English, a local language translator was provided. The researcher collected data via face-face interviews and recorded responses to questions in the interview guide using mobile phone audio recording. The interview, as well as questionnaire, was conducted in English as the medium of communication. Participants who did not understand English were asked to find a trusted translator. The questionnaires contained closed -ended questions.

3.8 Data collection

The process of selecting individuals and getting data from them is referred as data collection (Boeren, 2017). The participants granted permission. All participants were informed about the research topic and its implications. Data was collected through questionnaires that consisted of demographic questions on cervical screening in the past and data was collected through interviews, whereby information from the patients was recorded.

3.9 Data analysis

According to Boeren (2017), Data analysis is the process of giving order, structure, and meaning to massive amounts of data. In quantitative analysis, the patient data was analysed and presented in tables and figures using the Statistical Software Package for the Social Sciences (SPSS). Thematic analysis was used to explore qualitative data.

3.10 Ethical consideration

Namibia University of Science and Technology (NUST) higher degree committee, as well as from the MoHSS (Ref: ANM 2020), and Katutura and Windhoek Central Hospitals, provided ethical approval. Participants were provided thorough information about the study and given their personal consent before data collection began. The study only included voluntary participants who can withdraw at any time when they so feel. Participants were not subjected to harm in anyways, no offensive, discriminatory, or other unacceptable language was used during the interview. Furthermore, participants were granted the right to not give information or respond to questions asked if they opt not to do so.

Every aspect of the research was communicated with honesty and transparency. A high level of confidentiality of the research data was ensured, no names were used and no unauthorized disclosure of participants' information.

3.11 Conclusion

The study design, the study's population, the sampling process, the inclusion and exclusion criteria, and the sample size were all discussed in this section. The research design, research tools, data collecting, data analysis, ethical considerations, and work plan were all finished on time.

CHAPTER FOUR

RESULTS

4.1 Introduction

The aim of chapter four (4) was to analyse the information gathered. In a quantitative study, results were presented in Figures and tables, and a qualitative study, results were discussed in themes and sub-themes.

4.2 The socio-demographic reparations and possible risk factors for HPV infected patients

The sociodemographic data includes the ages of participants from both Hospitals, locations, ethnicity, occupation, and marital status.

4.2.1 Number of HPV patients per age group

Figure 4.1 shows the age of patients that participated in the study. Among the 250 participants, 51 (20%), 21 (8.4%), 61 (24.4%), 69 (27.6%) and 48 (19.2%) were respectively of 25 to 30, 31 to 35, 36 to 40, 41 to 45, 46 to 50 age groups. The majority (71.2%) of the patients who undertook the VIA and Cryotherapy procedures were in their forties.

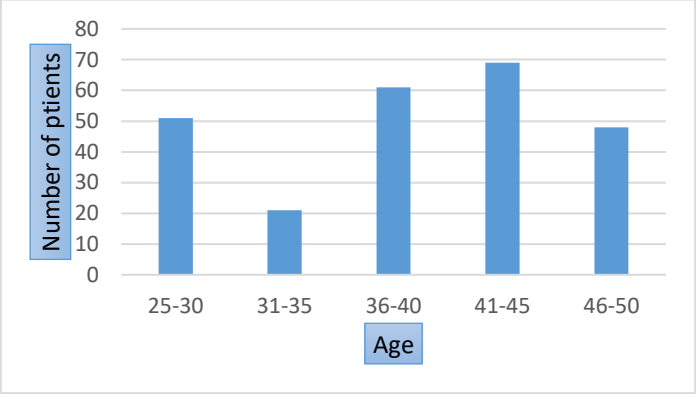

Figure 4.1: Number of HPV patients per age groups

4.2.2 Number of HPV patients per location

The Figure 4.2 shows that the number of participants per location were 43 (17.2%) Havana, 36 (14.4%) Hakahana, 28 (11.2%) Khomasdal, 15(6%) Greenwell, 34 (13.6%) Ombili, 15 (6%) Okahandja park, 23 (9.2%) Okuryangava, 4 (1.6%) Rocky crest, 16 (6.4%) Windhoek west and 36

(14.4%) Otjomuise respectively. Majority of the patients who went for the procedure were from Havana, an informal settlement situated in Katutura, Windhoek.

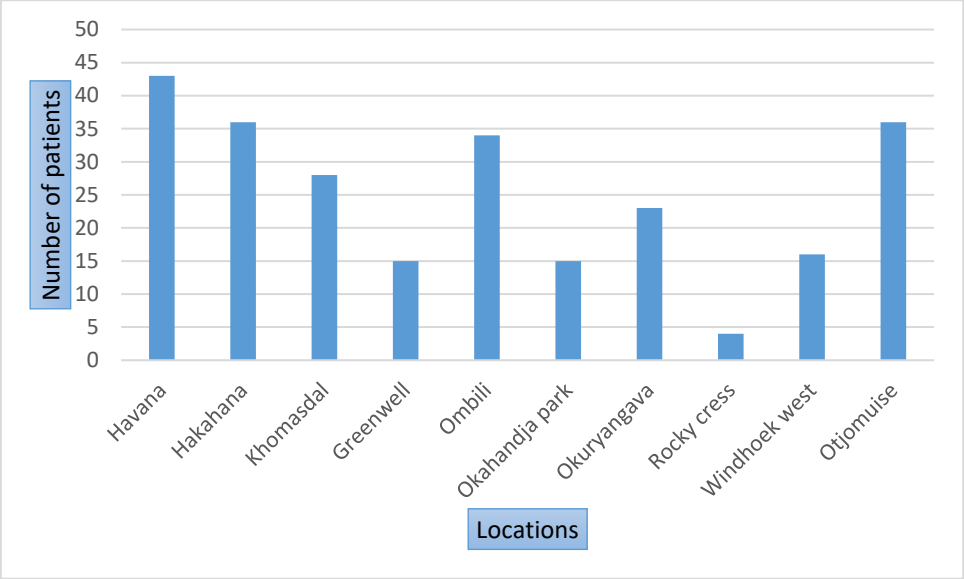

Figure 4.2: Number of HPV patients per location

4.2.3 Number of HPV patients per ethnicity

Among the 250 participants, 20 (8%) Kavango, 36 (14.4%) Herero, 188 (75.2%) Oshiwambo, and 6 (2.4%) mixed ancestry undertook part of the study (Figure 4.3).

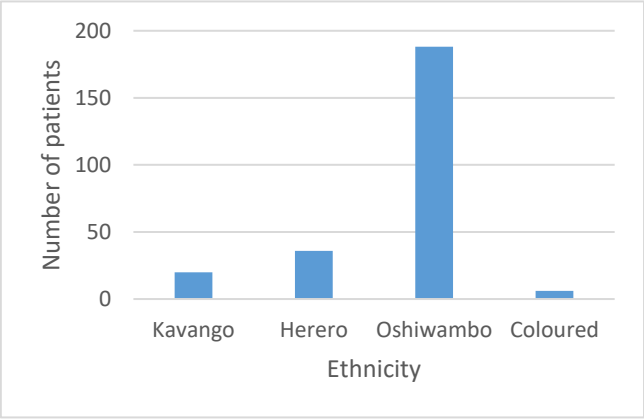

Figure 4.3: Number of HPV patients per ethnicity

4.2.4 Number of HPV patients per occupation

Figure 4.4 shows the occupations of the patients. It can be observed that 92 (36.8%) Self-employed, 15 (6%) cleaners, 14(5.6%) nurses, 112 (44.8%) unemployed, 10 (4%) housekeeper, 5 (2%) secretary and 2 (0.8%) doctors were among the patients.

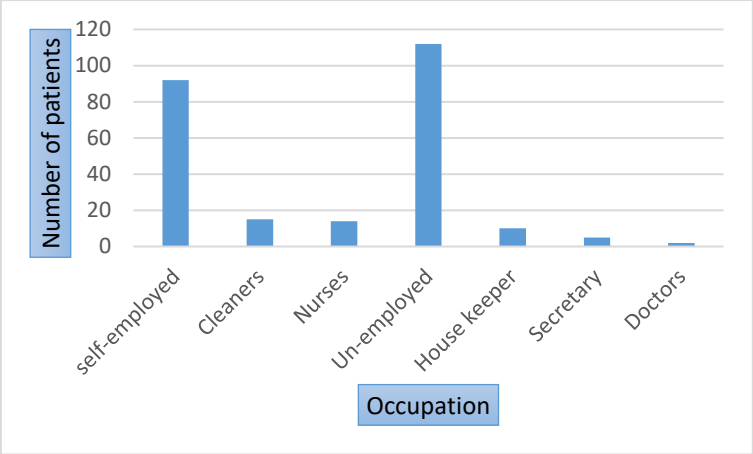

Figure 4.4: Number of HPV patients per occupation

4.2.5 Marital status of the participants and HPV infection

Out of the 250 participants, 155 (62%) were single with 100 HPV positive and 55 HPV negative while 95 (38%) were married with 51 HPV positive and 44 HPV negative (Figure 4.5).

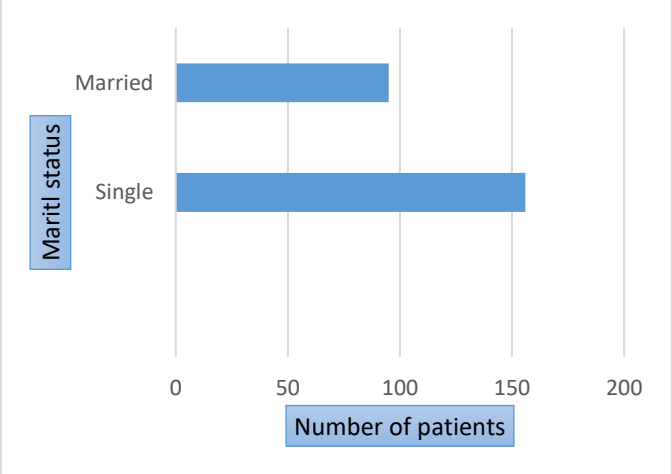

Figure 4.5: Marital status of the participants

4.3 Possible risk factors for HPV infection among patients who undertook the VIA and Cryotherapy procedures

4.3.1 HIV status per age groups

Figure 4.6 showed that out of the 250 participants, 111 (44.4%) were HIV negative and 139 (55.4%) HIV positive. According to HIV status per age groups, 36 (14.4%) HIV negative versus 15 (6%) HIV positive participants were of the 25 to 30 age group, all 21 (8.4%) participants of 31 to 35 age group was HIV negative, 31 HIV negative versus 30 (12%) HIV positive participants of the 36 to 40 age group, 4 (1.6%) HIV negative versus 65 (26%) HIV positive participant of the 41 to 46 age group, 19 (7.6%) HIV negative versus 29 (11.6%) HIV positive participant of the 46 to 50 age group.

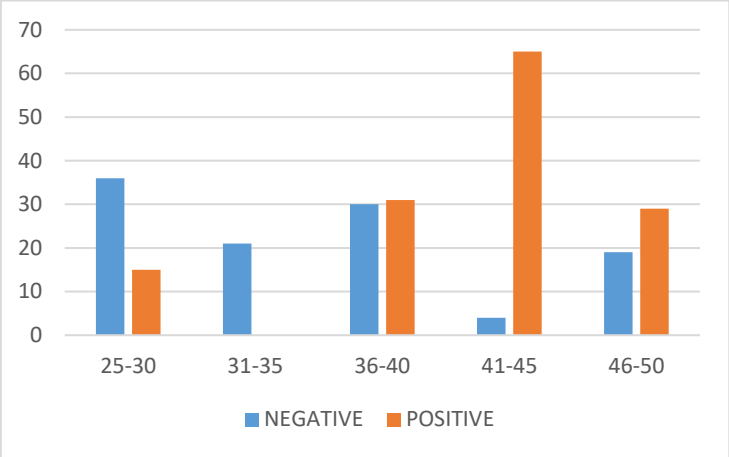

Figure 4.6: HIV status per age groups

4.3.2 Family planning using contraceptives

Figure 4.7 shows the types of family planning the patients are using. One can note that 56 (22.4%) patients were using injection for family planning, 29 (11.6%) patients were using implantation and the rest 165 (66%) patients were not using any family planning.

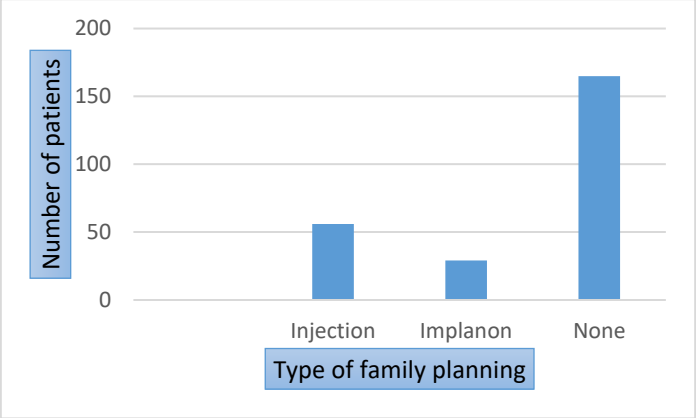

Figure 4.7: Family planning procedures

4.3.3 Sexual activity, sexual partners and pregnancy

All the 250 patients were sexually active, and each affirmed to have only one sexual partner. All 250 patients were tested negative for pregnancy before the procedures.

4.3.4 Para gravida

Figure 4.8 indicates the total number of kids per participants and per age groups.

Among the participants of the 25 to 30 age group, 2 women had 3 children each, 17 women had 2 children each, 13 women had 1 child each and the rest 19 is yet to have children.

The participants of 31 to 35 age group, twelve 12 women had 3 children each, 4 women had 2 children each, 2 women had 1 child each and the rest 7 is yet to have children.

The participants of 36 to 40 age group, 14 women had 5 children each, 22 had 3 children each, 11 had 4 children each, 4 had 6 children each, and 9 had 2 children each.

Among Participants of the 41 to 45 age group, 11 women had 4 children each, 2 had 1 child each, 13 had 3 children each, 25 had 2 children each, and 12 is yet to have children.

In the group of participants aged 46 to 50, 14 women had 2 children each, 14 had 3 children each, 7 had 4 children each, 10 had 6 children each, and 3 is yet to have children. From the 250 participants, 617 children were born.

Regardless of the age groups, 44 women (composed of 15 HPV positive and 29 HPV negative), 17 women (composed of 9 HPV positive and 8 HPV negative),

69 women (composed of 50 HPV positive and 19 HPV negative), 63 women (composed of 36 HPV positive and 27 HPV negative), 29 women (composed of 18 HPV positive and 11 HPV negative), 14 women (of 10 HPV positive and 4 HPV negative) and 14 women (of 13 HPV positive and 1 HPV

negative) gave birth respectively to 0, 1, 2, 3, 4, 5 and 6 children. An association analysis was conducted between para gravida and HPV infection. A Pearson's Chi-Squared test was carried out to assess whether para gravida and HPV infection status were related. There was significant evidence of an association, ($\chi^2(6) = 24.518$; $p < 0.001$) for para gravida and HPV positive and ($\chi^2(18) = 137.098$; $p < 0.001$) for para gravida and HPV negative (Table4.1).

Table 4.1 Chi-Square Tests:

	Para gravida and HPV negative			**Para gravida and HPV positive**		
	Value	df	Asymptotic Significance (2-sided)	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	137.098[a]	18	.000	24.518[a]	6	.000
Likelihood Ratio	144.107	18	.000	25.991	6	.000
Linear-by-Linear Association	67.220	1	.000	13.233	1	.000
N of Valid Cases	99			151		

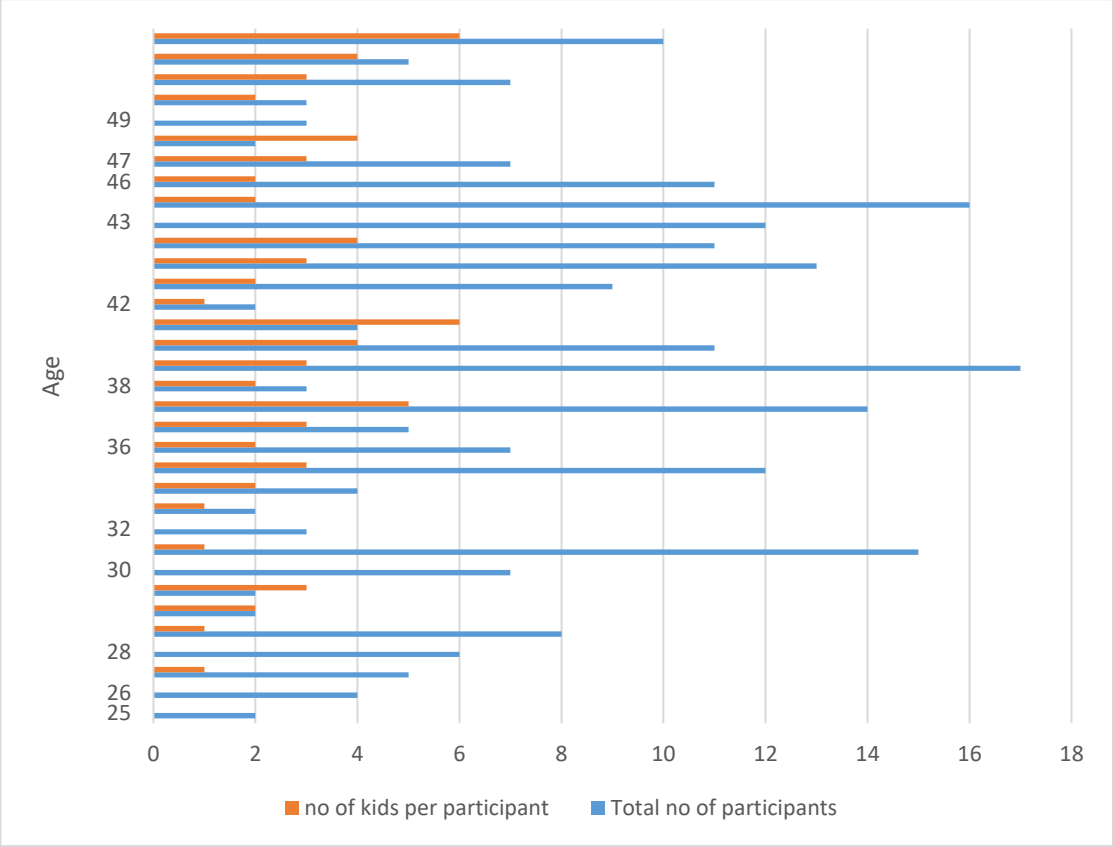

Figure 4.8: Para gravida

4.3.5 Family history with cancer

Figure 4.9 shows the Family history with cancer. Forty-three (17.2%) participants acknowledged the presence of Cervical cancer, 26 (10.4%) prostate cancer while 63 (25.2%) are not sure and 135 (54%) recognized that there was no cancer history in their families. However, one or combination of more than one of skin blood bone, and throat cancer(s) was or were found among participant families.

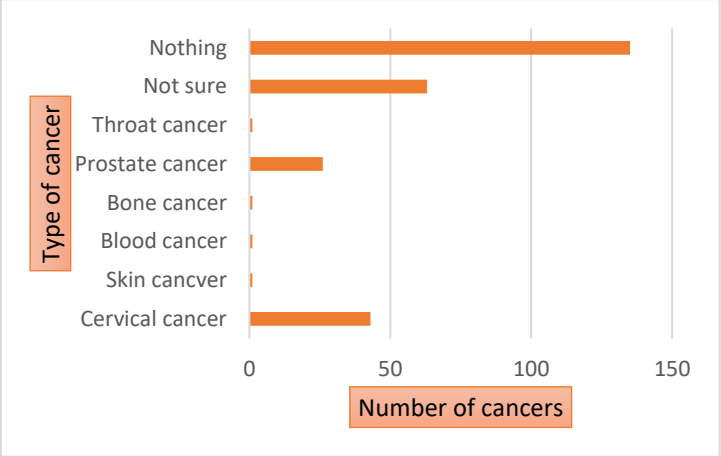

Figure 4.9: Family history on cancer

4.4 Diagnostic and pathophysiology outcomes of HPV infected patients

Among the 250 patients assessed, 151 were tested HPV positive and 99 HPV negative Out of the 151 tested HPV positive patients 132 were referred for cryotherapy and 19 for colposcopy treatments. Table 4.2 and Figures 13 & 14 show the results of 19 patients (from both Hospitals) who went through colposcopy treatment.

Cervical Intraepithelial Neoplasia was diagnosed based on the biopsy results (CNI). When dysplasia affects one-third of the epithelium, CIN I develops. Abnormal alterations in around a third to two-thirds of the epithelial layer are referred to as CIN II. The most severe kind of CIN is CIN III, which affects more than two-thirds of the epithelium.

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Table4. 2: Colposcopy results

DIAGNOSIS (CERVICAL BIOPSY)	MACROSCOPY	MICROSCOPY
1. CHRONIC CERVICITIS	Cervical biopsy in 2 pieces, 15x6x5mm and 8mm across.	Sections show the cervical tissue with benign ectocervical and endocervical mucosa. There is stromal chronic inflammation and nabothian cyst. No neoplastic process.
2. CHRONC CERVICITIS	LLETZ biopsies 20x10mm	Sections show cervix exhibiting moderate chronic inflammatory infiltrates in the stroma and squamous metaplasia. No dysplasia, no malignancy.

3. CHRONIC CERVICITIS	Cervical tissue in two pieces-largest 25x15x8mm and smallest 15x15x5mm	Sections show cervix with ectocervical and endocervical mucosa. There is stromal chronic inflammation with mucosa laceration and nabothian cyst. No dysplasia
4. CHRONIC CERVICITIS	LLETZ biopsy in two pieces 18x10x7mm and 12x8x5mm	Sections show cervix with benign ectocervical and endocervical mucosa. No dysplasia noted.
5. CHRONIC CERVICITIS	Cervical tissue 15x10x10mm	Sections show both endocervix tissue fragments. There is dense lymphohistiocytic infiltrates in the stroma. There is no atypia, no dysplasia, no malignancy.
6. CHRONIC CERVICITIS	Two pieces of cervical tissue largest 20x15x5mm and smallest 15x7x5mm	Sections show cervix exhibiting squamous metaplasia and moderate lymphoplasmacystic infiltrates in the stoma. No malignancy
7. CHRONIC CERVICITIS	Cervical biopsy in 2 pieces, 15x6x5mm and 8mm across	Sections show the cervical tissue with benign ectocervical and endocervical mucosa. There is stomal chronic inflammation and nabothian cyst. No neoplastic process
8. CHRONIC CERVICITIS	Two biopsies, 20mm across	Sections show cervix exhibiting squamous metaplasia, kilocytosis and dense lympoplasmacytic infiltrates in the stroma. No evidence of high grade dysplasia.
9. CHRONIC CERVICITIS	Cervical tissue in two pieces combined 22x18x5mm	Sections show cervix exhibiting squamous metaplasia and moderate lymphoplasmacystic infiltrates in the stoma. No malignancy
10. CHRONC CERVICITIS	LLETZ biopsies 20x10mm	Sections show cervix exhibiting moderate chronic inflammatory infiltrates in the stroma and squamous metaplasia. No dysplasia, no malignancy.
11. CIN I-III	LLETZ biopsy 20x15x5mm	Section show cervix exhibiting squamous metaplasia and kilocytosis
12. CIN I-III	4 pieces of LLETZ biopsies, the largest is 20x10x6mm	Section show the cervix with ectocervical and endocervical mucosa. There is mild squamous dysplasia with koilocytosis and basaloid cells within the lower 1/3 of the epithelium. Stromal chronic

		inflammation is associated. Section margins are negative for dysplasia.
13. CIN I-III	LLETZ biopsy 30x20x10mm	Sections show cervix exhibiting squamous and kilocytosis. No high grade dysplasia, no malignancy.
14. CIN I-III	Multiple biopsies,35mm across together	Sections show cervix exhibiting squamous metaplasia, kilocytosis and mild to moderate chronic inflammatory infiltrates in the stroma. No high grade dysplasia, no malignancy.
15. CIN I-III	Two cervical tissues-the biggest is 15x5mm	Sections show cervical tissue with both ecto and endocervical components. There is atypia affecting 1/3rd of the thickness of the ectocervix and superficial crypts of the endocervix.
16. CIN I-III	Three cervical tissues-the biggest 30x10mm	Sections show cervical tissue at the transformation zone with atypia affecting 1/3 of the thickness of the ectocervix and superficial crypts of the endocervix. The lesion is 3mm away from the endocervical margin. The ectocrvical margins are negative.
17. CIN I-III	Two cervical tissues ,15x10mm and 10x10mm	Sections show cervical tissue at the transformation zone with atypia affecting only 1/3 of the thickness of the ectocervix and superficial crypts of the endocervix. Both the peripheral ectocervical margins and deep endocervical margins are negative.
18. CIN I-III	Three cervical tissues- the biggest 30x10	Sections show cervical tissue at the transformation zone with atypia affecting 1/3 of the thickness of the ectocervix and superficial crypts of the endocervix. The lesion is 3mm away from the endocervical margin. The ectocervical margins are negative
19. CIN I-III	Three pieces of LLETZ biopsy, the largest measuring 15x12x8mm	Sections show the cervix with ectocervical and endocervical mucosa. Mild squamous dysplasia is noted at the squamocolumnar junction with koilocytosis and baseloid cells within lower 1/3 of epithelium. Stromal chronic

		inflammation is associated. Resection margins are negative for dysplasia.

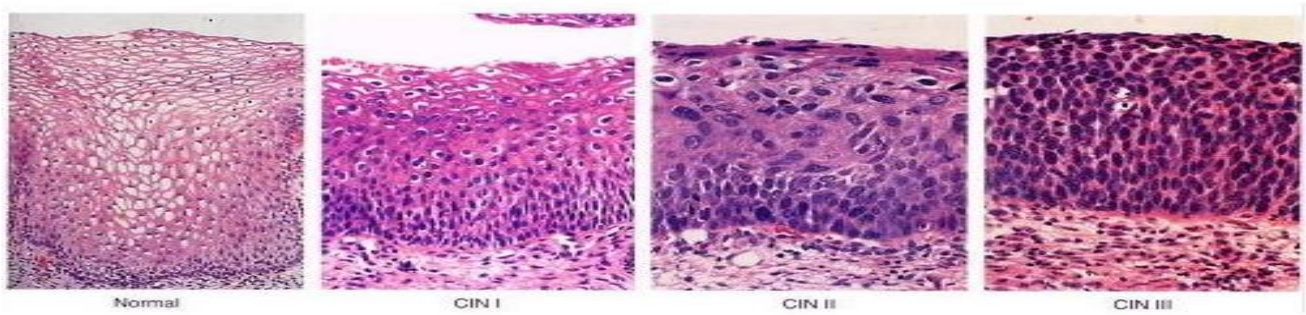

Figure 4.10: the CIN I-III histology results

The image above shows the CIN I-III histology results.

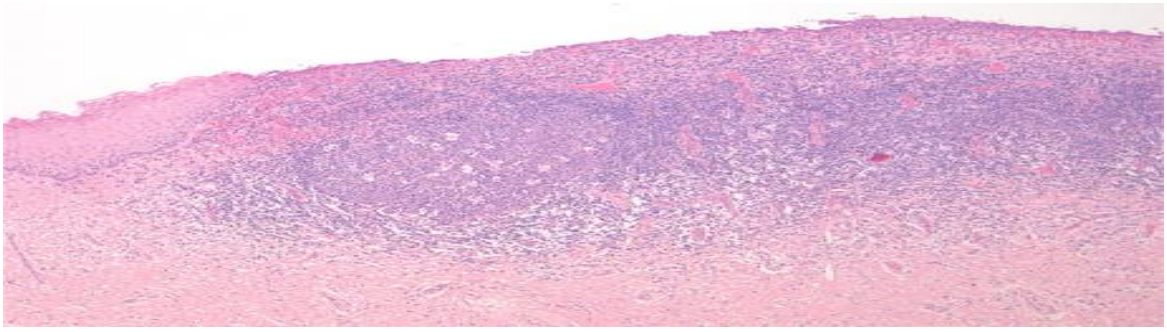

Figure 4.11: Chronic cervicitis
The image above (Figure 4.11) shows the chronic cervicitis inflammation of the cervix.

4.5 Psychological and emotional experiences of HPV infected women

4.5.1 Cervical cancer screening

Among the 250 participants, 151 were never screened for cervical cancer in the past while 99 patients were screened for Pap smear with negative results.

4.5.2 Source of information on the VIA procedure

When patients were asked how they have been informed about the VIA procedure, 103 (41.2%) responded that they were referred by medical doctors, 92 (36.8%) were informed by people in the community about the VIA procedure and 55 (22%) find it out through their routine Pap smear follow up.

4.6 Experiences during and after the VIA procedure

To perform the qualitative methodology of the study, ten participants of which two HPV -positive patients per age group were randomly selected.

4.6.1 Pain of the procedure

When participants were asked to give their impression of the pain during and after the procedure, their answers reveal that most of the patients did not experience pain. The following were few comments recorded:

Seven (7) patients were satisfied that they did not experience any pain even though they were scared before the procedure. The remaining 3 patients were feeling happy after the procedure and believe they will heal. However, they experienced slightly abdominal pain.

4.6.2 Side effects experienced

When participants were asked to give their impression on the VIA procedure side effects they experienced, 3 patients observed brownish discharge, 4 patients observed some pain in the abdomen while the rest 3 did not observe any side effect.

CHAPTER FIVE

DISCUSSION

This is the first study in Namibia to examine at the effects of Visual Inspection with Acetic Acid and Cryotherapy. A mixed methodology with both qualitative and quantitative research methods was used. 2 women were 25 years old, 9 women of 26 years, 18 of 28 years, 22 of 30 years, 21 of 32 years, 26 of 36 years, 35 of 38 years, 35 of 42 years, 28 of 43 years, 6 of 45 years, 11 of 46 years, 9 of 47 years and 28 of 49 years old respectively.

5.1 The socio-demographic reparations and possible risk factors of HPV infected patients

5.1.1 Age & location

Patients that participated in the study were 51, 21, 61, 69, and 48 respectively of 25 to 30, 31 to 35, 36 to 40, 41 to 45, 46 to 50 age groups. In this study, the majority (178 of 250) of the patients who sought the VIA and Cryotherapy treatments, were in their forties. These findings are consistent with findings of other researchers. Malagon, Kulasingam, Mayrand, Ogilvie, Smith, Bouchard & Franco, (2018). Cervical cancer is more common among older women, based on research. They also discovered that screening using cytology could reduce risk up to the age of 75.

Furthermore, Amukugo, Rungayi & Karera (2018), stated that women in the age group of 40 carry the highest risk for developing invasive cervical carcinoma. This was further confirmed by Mello & Sundstrom (2020), who concluded that HPV tends to persist in women of that age group. However, HPV can proliferate at any age group that is sexually active (Fentie, Tadesse & Gebretekle, 2020).

Among the 250 participants, 43 (17.2%) were from Havana, 36 (14.4%) Otjomuise, 16 (6.4%) from Windhoek west, 36 (14.4%) from Hakahana, 15 (6%) from Okahandja park, 34 (13.6%) from Ombili, 4 (1.6%) from Rocky crest, 23 (9.2%) from Okuryangava, 28 (11.2%) from Khomasdal and 15 (6%) from Greenwell.

Cervical cancer was detected in 80 % of all cases in emerging and low-resource nations, according to studies comparing the frequency of the disease in developed and developing countries. (Sachan, Singh, Patel & Sachan, 2018). Women from developing and low-resource countries cannot afford regular screening for HPV infection. Some of them may lack awareness of these

health services, others may be ignorant of the symptoms, thus missing opportunities for screening for HPV infection and be adequately treated for cervical cancer (Nakash, Al-assadi, Al-safi & Al-diab, 2017). In South Africa, residents of informal settlements were less likely to have access to cancer screening than those living in metropolitan regions (Peltzer & Phaswana-Mafuya, 2014).

In a study conducted in Nigeria, women living in rural communities in West Africa had very low awareness, knowledge, and screening uptake of cervical cancer.

Due to lack of awareness about the disease, preventative practice was equally low (Oluwole, Mohammed, Akinyinka & Salako, 2017).A similar study done by Muasa & Nzioka (2017), women living in informal settlements in Kenya lack awareness about many aspects of cervical cancer, particularly indicators, symptoms, and causes.

5.1.2 Ethnicity and occupation

Most of the patients who had the procedure done were Oshiwambo 188 (75.2%) and 36 (14.4%) Herero speaking. Women from these tribes seem to be well informed as compared to the other tribes investigated in this study. There are other health care providers (government and private) that are offering cervical cancer screening apart from Katutura State Hospital and Windhoek Central Hospital, which may explain the few numbers of mix ancestral and other tribes visiting the centres where this study took place. Factors such as lack of awareness, fear, and resource to excess health facilities could also be reasons for a low number of participants from other tribes.

The majority of participant patients who had the procedure done were either 112 (44.8%) unemployed or 92 (36.8%) self-employed. These groups of participants might not afford private health care facilities. Social settlement and occupational status can favour cervical cancer screening. In South Africa, a higher socioeconomic position with access to medical aid was associated with cancer screening (Theme et al., 2016; Narayan et al., 2017). In Zimbabwe, financial independence was linked to cervical cancer screening in private healthcare settings among women living in mining and resettlement areas, leading to a drop in HPV infection and cervical cancer development in these areas. (Tapaera, Kadzatsa, Nyakabau, Mavhu, Dreyer, Stray-Pedersen & Hendricks, 2019). Lack of resources has been associated with an increase in cervical cancer (Olusola, Banerjee, Philley & Dasgupta, 2019).

In 2018, 311 000 cervical cancer fatalities were reported, with more than 85 % of them occurring in developing nations with insufficient screening and vaccination programs (Ferlay, 2018).

5.1.3 Marital status & Sexual partners

HPV is the most common sexually transmitted infection that causes cervical cancer, accounting for more than 99.7% of invasive cervical cancer cases globally. (WHO, 2019).

Among the 250 patients, 155 (62%) were single with 100 HPV positive and 55 HPV negative while 95 (38%) were married with 55 HPV positive and 44 HPV negative. Thus, 64.51% and 57.89% of the single and married participants were respectively HPV infected. This could be attributed to other risk factors to HPV infection although each participant from the study has acknowledged having only one sexual partner. For the above situations to occur, three possibilities can be underlined. Firstly, the sole sexual partner may be questionable. Secondly, the sexual partner might have other sexual partners. Lastly, the participants in this study or their sexual partners might be infected through the use of HPV contaminated public facilities, exchange of sex toils, or intimate clothes. A study done by Fentie, Tadesse & Gebretekle (2020), stated that single women are more likely to have multiple sexual partners. In the Namibian socio-cultural settings, generally, single women do not live with their sexual partners. Thus, favouring situations where some sexual partners are likely to have many sexual partners increasing the likelihood of contracting HPV infection. A study done in Turkey by Sidabutar, Martini & Wahyuni (2017), indicated that 68% of the women population who went for cervical cancer screening were married compared to 38% observed in this study. The socio- religious and educational settings can play an important awareness role to motivate married women to undertake HPV infection screening.

Mothers in Thailand are the major decision-makers for their daughters when it comes to the link between HPV, oral and anal cancers, as well as the link between HPV and cervical cancer (Grandahl et al., 2018).

Because the cervix still has an immature membrane, it is very sensitive to pathogenic agents, particularly high-risk type HPV, early age at first sexual intercourse (AFSI) has been linked to high-risk HPV infection (Sidabutar, Martini & Wahyuni, 2017).

It has also been shown that the increased HPV risk was linked to a biological predisposition of the immature cervix throughout adolescence, which may be more vulnerable to persistent HPV infections and so have a higher chance of cancer development (Schiffman et al. 2007). Two proposed explanations for the link between early sexual experience and a higher risk of cervical

cancer are biological immaturity and hormone influence. (Ribeiro et al., 2015). Almost everyone who engages in sexual activity will be infected with HPV at some point in their lives, and some will be infected multiple times. (Aweke, Ayanto & Ersado, 2017).

5.1.4 HIV

According to the MoHSS guideline (2018), VIA and Cryotherapy procedures are put in place to cater for women aged 20-49 and they should have valid three months HIV test results or status prior to their visit to health care facilities for the VIA and Cryotherapy procedures. Follow -ups are given to patients according to their HIV status. The follow-up for VIA negative test for a patient with HIV positive is after 3 years while VIA negative test for a patient with HIV negative follows up is after 5 years.

Cervical cancer is the most common cancer and a leading cause of death in women infected with the Human Immunodeficiency Virus (HIV). In the current study 139 (55.6%) women were HIV positive while 111 (44.4%) were HIV negative. Women infected with HIV are at risk of HPV infection and are the target of persistent and increased risk of cervical precancerous lesions and cancer (Vahedpoor, Behrashi, Khamehchian, Abedzadeh-Kalahroudi, Moravveji & Mohmadi-Kartalayi, 2019). This is because HIV-positive status favours changes occurring during the natural development and progression of HPV infection and speeds up the progression of invasive carcinoma (Vahedpoor et al, 2019). Therefore, HIV-positive women are prone and more vulnerable to the onset of HPV-induced invasive cervical carcinoma (Denny, 2016). A study done by Amukugo, Rungavi & Karera (2018), indicates that HIV-positive infection contributed up to 13.3 % to cervical cancer in Namibia.

5.1.5 Family planning using contraceptives

Family planning is the use of preventative methods to interfere with the process of pregnancy to take place (Amukugo, Rungavi & Karera 2018). The study findings showed that 56 (22.4%) patients were using family planning by injection while 29 (11.6%) patients had Implanon contraceptives inserted on their arms. The rest of the patients 165 (66%) are not on family planning due to misinformation about health impact as they claim it can cause infertility and nonstop bleeding. Hormonal contraceptives are the most contributing factor with a 34% rate of HPV infections in Namibia (Amukugo, Rungavi & Karera 2018).

Hormonal contraceptives use might be associated with a higher aggregate temporal exposure of the cervix to HPV (Dalby & Law, 2020). Prolonged use of contraceptives increased the risk of cervical cancer up to four-fold on HPV-infected women (WHO, 2019). This finding is similar to the study done by Mwaka et al. (2016) which concluded that long-term use of contraceptives raises a woman's risk of HPV and that oestrogen and progesterone stimulate the development and growth of some cancers (Mwaka et al., 2016). Furthermore, hormonal contraceptives were found to potentially promote DNA integration of HPV into the genome of the host, possibly binding distinct HPV-DNA sequences embedded in transcriptional regulatory regions, and as well as regulate cell apoptosis (Gadducci, Cosio & Fruzzetti, 2020). In this study, the duration of contraceptive usage was not recorded. However, the use span of over 5 years increases the likelihood of formation of precancerous lesions (Vegunta, Files & Wasson, 2017).

5.1.6 Sexual activity, pregnancy, and number of children

The MoHSS guideline (2018), stated that pregnant women are not eligible for VIA and Cryotherapy. For this reason, before the procedure pregnancy test result or status is normally required. Patients were selected randomly in terms of their age and number of children. In this study 53, 46, 204, 135, & 158 children were respectively given birth by women of 25 to 30, 31 to 35, 36 to 40, 41 to 45, 46 to 50 aged groups. The 36-50 age groups have more kids. The majority of women 151 (60.4%) with HPV infection who participated in the study have more than 3 children. There was relationship between para gravida and HPV infection among women who participated in the study. Theoretically speaking, the more pregnancy and/or childbirths a woman is exposed to the higher the risk of being infected with the HPV virus and the greater the chance to develop cervical cancer (Zheng, Wang, Song, Wang & Meng, 2019). A similar study done by Imelda, Tarigan & Eryunika (2021), concluded that if a woman gives three times vaginal birth, she might have a loose birth canal and tore cervical lining, causing open tissue. Thus, the HPV virus might have a higher possibility to contaminate the opening tissue and cause infection.

Women who had 3 or more full-term pregnancies have an increased risk of developing cervical cancer (WHO, 2019) due to the increased exposure to HPV infection with sexual activity (Kashyap, Krishman, Kaurand & Ghai, 2019). A study conducted by Dunyo, Effah & Udofia (2018), stated that hormonal changes and weaker immunity during pregnancy are possibly the causes of women being more susceptible to HPV infection or cancer growth.

Several women die each year from cervical cancer caused by HPV infection among women of reproductive age group (Arbyn, Weiderpass, Bruni, De sanjoe, Saraiya, Ferlay & Bray, 2018). Furthermore, it has been proven that women who commenced sexual intercourse at an early age are likely to present cervical lesions than women who started at latter age (yitagesu, Samuel & Tariku, 2018).

5.1.7 Family history of cancers

Genetically cervical cancer can be passed on from a mother or a sister carrier of cervical cancer gene, at a probability of 2-3 times higher compared to family where no member had the malignancy (Kakehongo, 2018). In this study 43 (17.2%) participants acknowledged the presence of cervical cancer and 26 (10.4%) prostate cancer in their families. Thus 27, (6%) of the participants acknowledged a form of family history of cancer. This finding is similar to the findings of a study done by (Felman, 2019) arguing that cervical cancer may run in some families. If a mother or a sister had cervical cancer, the chances of a next of kin developing the disease are higher than a woman whose family history did not show any form of malignancy. Furthermore, in some rare instances inherited conditions make some women less able to fight off HPV infection than others. In other instances, women from the same family of a patient that has cancer could be more likely to have one or more forms of cancer compared to non-genetic cancer risk factors families (Olusola, Banerjee, Philley & Dasgupta, 2019).

5.1.8 Screened for cervical cancer in the past

Out of 250 patients, 99 (39.6%) received Pap smear procedures with negative results in the past. Women who received cervical cancer screening once or twice in past will reduce their lifetime risk of cervical cancer (Sondang, Santi, and Chatarina 2017). Among the 250 participants, 151 (60.4%) were never screened for cervical cancer. The predominant reasons for women that did not go for screening in past were the fact that:

- They were afraid to go to the hospital and being diagnosed with cervical cancer.
- They were not ready for the screening.
- They did not know about cervical cancer screening and its importance.

Similarly, in Ethiopia, the reasons for not screening were lack of information, no signs, and symptoms (Shine, Tadesse, Shiferaw, Mideksa & Seifu, 2017). Attendance for cervical cancer screening is associated with the socio-economic status of women (Petkeviciene, Ivanaus & Klumbiene, 2018).

5.2 Diagnostic and pathophysiology outcomes of HPV infected patients

The VIA method is intended to detect precancerous cervical lesions in women before they become cancerous.

Cervical cancer can be prevented by treating or removing these precancerous tumours (Kabelenga, 2018). The VIA procedure consisted of the application of 5%, acetic acid (table vinegar) to the cervix, and after 30-60 seconds, precancerous cells turned white due to the presence of more intracellular proteins while normal cells did not change colour (Bhatla, Aoki, Sharma & Sankaranarayanan,2018).

Women with VIA positive screen results are normally referred for cryotherapy to freeze the lesions. However, if abnormal cervical lesions are observed they go for a colposcopy procedure. Colposcopy and biopsy are methods used to detect cervical cancer and treat precancerous lesions. (Riaz, Manazir, Jawed, Ali & Riaz, 2020). In this study, 132 (52.8%) women had cryotherapy while 19 Colposcopy uses visual characterisation of the magnified cervix to guide biopsy sampling for histologic diagnosis, allowing high-risk women who require treatment to be distinguished from lower-risk women who do not. (7.6%) had colposcopy which showed results of CIN I, where the dysplasia is present up to CIN II aberrant alterations in around one-third of the epithelium, and in about one-third to two-thirds of the epithelial layer.

The most severe form of CIN III affecting over two-thirds of the epithelium cervicitis is the inflammation of the cervix (Rajkumar, 2018).

5.3 Psychological and emotional experiences of HPV infected women

Ten patients participated in the study and shared their thoughts on their experiences before and after the operation. Patients were nervous before the surgery and relieved afterward, believing that being screened would prevent them from acquiring cervical cancer.

Evidence suggests that women who are having a pelvic examination may feel anxious. This unpleasant sensation might occur prior to the examination, throughout the examination, and for

several weeks afterward. Furthermore, patients' negative emotional reactions stem mostly from lack of understanding of anatomy and awareness of cervical cancer prevention measures, leading them to believe that the objective of screening is to discover cancer rather than prevent cancer (Postolica, Lorga, Petrariu & Azoicai, 2017).

Another study found that HPV infection was linked to serious mental and psychological issues, including stigma associated with the disease. (Sanders, Miller, Hernandez & McEvoy, 2020). When compared to the impacts of abnormal Pap smear test findings, HPV testing is more likely to cause mental worry.

5.4 Side effects and recommendations by patients

After the procedures, patients had brownish discharges and abdominal pain. The same side effects were reported by participants in the study done by Mishra, Shastri, & Pimple, (2016). Other side effects includes spotting bleeding and pelvic inflammatory were also noted (Mutumbo, Tozin, Simoens, Lisbeth, Bogers, Van Geertruyde & Jacquemyn, 2017). Most of the patients recommended the VIA procedure than Pap smear as a suitable cervical cancer screening in Namibia; because it is affordable, the procedure is not painful, it is quick, and results are immediately available after the screening. This is also confirmed in literature where several authors compared the VIA procedure and Pap smear and concluded that the VIA procedure is quicker, not painful, and affordable (Adsul, Manjunath, Srinivas, Arun, & Madhivanan, 2017).

More operating rooms, more nurses, and doctors were recommended by the patients as they had to wait in long queues before been assisted. This will help by finishing the procedures fast and able to assist more people at a time. Furthermore, health care workers should give more health education in the community for women to go seek for cervical cancer screening.

CHAPTER SIX

CONCLUSIONS, LIMITATIONS AND RECOMMEDATIONS

6.1 Conclusion

Cervical cancer screening seeks to detect and treat abnormalities and precancerous lesions in the cervical region in order to prevent cervical cancer progression and reduce the incidence, mortality, and morbidity associated with it. (Arbyn, Weiderpass, Bruni, De sanjoe, Saraiya, Ferlay & Bray, 2018).

The focus of this study was to explore the effects of VIA and Cryotherapy procedures on Human Papillomavirus infected patients at Katutura and Central Hospitals in Windhoek. Having an understanding of the impressions of patients about the VIA and Cryotherapy procedures and the side effect on patients thereafter.

The goal of this research is to look into the effects of visual inspection with acetic acid and Cryotherapy in Namibia. The 250 women that participated in the study ranged from 25-50 years of age. The majority 178 (71.2%) of the patients who sought VIA and Cryotherapy treatments were in their forties. Among the participants' majority, 43 (17.2%) were from Havana. Most of the patients who had the procedure done 155 (62%) are single and Oshiwambo 188 (75.2%) and 36 (14.4%) Herero speaking. Women from these tribes seem to be well informed as compared to the other tribes investigated in this study.

Most patients who had the procedure done were either 112 (44.8%) unemployed or 92 (36.8%) self-employed. These groups of participants might not afford private health care facilities. In the study 139 (55.6%) women were HIV positive and the remaining 111 (44.4%) were HIV negative. 56 (22.4%) patients were using family planning by injection. The 36-50 age group has more kids. The majority of women 151 (60.4%) with HPV infection participated in the study have more than 3 children. Interestingly, a correlation analysis was conducted between para gravida and HPV infection. Results of the Pearson correlation indicated a non-statistical significance with very small negative relationship between para gravida and HPV positive, ($r(5) = 0.18$, $p = 0.7$) as well as with para gravida and HPV negative, ($r(5) = 0.7$, $p = .0811$). 27.6% of the participants acknowledged a

family history of cancer. 99 (39.6%) received Pap smear procedures with negative results in the past. Among 250 women, 132 (52.8%) did cryotherapy while 19 (7.6%) women did colposcopy.

6.2 Limitations

Patients that came for Pap smear routine follow up required a lot of time by waiting for them to start giving health education at the same time with others as they usually come one by one and this delayed the study to be done on time as expected.

6.3 Recommendations

Based on the conclusion, the following suggestions are made:

6.3.1 Community

We recommend that community-based health education programs about cervical cancer should be introduced to create awareness and knowledge in the community about cervical cancer and to address the existing or current methods (VIA and Cryotherapy).

6.3.2 Ministry of Education

The findings from this study should be included in the schools/universities curriculum to address the importance of cervical cancer screening.

6.3.3 Ministry of Health and Social Services

The findings of this study should be put in booklets and distributed to patients in hospitals, so that they are aware of the necessity of cervical cancer screening and the new screening technologies.

6.3.4 Future research

Information about the effects of VIA and Cryotherapy in the Namibian context is limited and scarce as such it poses a challenge to readers who want to acquaint themselves with such information. The following is a recommendation for further research:

- Further research should be conducted on the effects of VIA and Cryotherapy in other regions in Namibia.
- Any researcher can use a different study design to compare the finding with the same topic research at the same health facility.

- The study will be placed in the university's library for future references.

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Annex 1: Consent form

Dear Participant

Request for consent from participant to conduct the research project

My name is Aune Ndategako Mbadhi, a permanent employee of the Ministry of Health and Social Services working as a Registered Nurse at Central Hospital. I am currently furthering my studies at Namibia University of Science and Technology towards the Master of Health Sciences. Research is one of the module that enables me to complete my study. The study title is **INVESTIGATING THE EFFECTS OF VIA AND CRYOTHERAPY METHODS ON HUMAN PAPILLOMAVIRUS INFECTED PATIENTS AT KATUTURA AND CENTRAL HOSPITALS, NAMIBIA**, under the supervision of Dr Yapo Aboua and Dr Larai Aku Akai.

Pap smear is a cervical cancer screening procedure that detects precancerous and cancerous cells in the cervix colon.
In poor nations, visual inspection with acetic acid (VIA) and cryotherapy treatments are gradually replacing Pap smear.
In 2018, Katutura and Central Hospital were introduced to the two therapy processes.
The consequences of these strategies, however, have yet to be studied in Namibia.

The aim of the study is to investigate the effects of VIA and Cryotherapy methods on Human Papillomavirus infected patients at the two facilities. The objectives of the study are to analyze the psychological and emotional experiences of HPV infected women who had VIA and Cryotherapy, to evaluate the side effects experienced by HPV infected who had VIA and Cryotherapy procedures and to potentially evaluate the protocols and monitoring HPV infected patients after VIA and Cryotherapy procedures.

The project will be useful for other researchers to gain valuable information about the two procedures. The finding from the project will also highlight the experiences of women who underwent VIA and Cryotherapy and compare the finding in the two facilities. This will create awareness among health workers regarding issues identified and might inform creation or review of standard operating procedures and protocols for the procedures in the various facilities and could potentially inform formulation of policies by the Ministry of Health and Social Services on VIA and Cryotherapy.

With your permission you will answer the questions whereby you will be asked to explain your experience after VIA and Cryotherapy methods. The interview will only take less than 30 minutes

to complete. The researcher will only share this information with the supervisor and coordinator of the study. I vouch to safe guard your anonymity by omitting the use of names when conducting the study.

Please sign the consent form if you accept to participate. With full knowledge of the purpose and nature of the procedure below. You have the right to withdraw your consent at any stage of the study. It is clearly understood that you are under no obligation to participate in this research project. Participation will be voluntary.

Your participation in this research will be greatly valued.

I……agree to participate in the research project proposed above.

Participant's signature……. Researcher's signature……..

Date…… Date……..

Annex 2: Questionnaire for quantitative

Answer the questions below and cross in the appropriate box

SECTION A: DEMOGRAPHIC INFORMATION

1. Age……..
2. Location……..
3. Ethnicity…….
4. Occupation……
5. Marital Status…….
6. Hospital……

SECTION B: MAIN QUESTIONS

☐ 7. HIV status: Negative Known positive☐ Unknown☐

8. Family planning : Pills☐ Injection☐ None☐
9. Pregnancy: Pregnant☐ Not pregnant☐ Not done ☐
10. Are you sexually active? : Yes☐ No☐
11. Number of sexual partners……..
12. Number of pregnancies…….
13. Number of children…….
14. Any type of cancer in your family? Yes☐ No☐

If yes mention the type of cancer…….

15. Have you ever been checked for cervical cancer in the past? If no explain why

……

……

……

……

If the answer is yes,

When did you get screened for cervical cancer? ……

Screening was through what? : Pap smear☐ Not sure☐

What was the results: Negative ☐ Positive ☐

If the results were positive, type of treatment: Loop Electrical Excision Procedure (LLETZ) ☐ Not sure ☐

When did you get the treatment? .....

16. What was the results for the new procedure? Negative ☐ Positive ☐ Not sure ☐

If positive,

Received Cryotherapy treatment ☐ Referred to a doctor for further management ☐

How was your feeling before the procedure being done on you? .....

……

17. Any improvements health care workers need to do on these two procedures? Yes/No

(If yes explain)

.....

.....

..

Thank you!

Annex 3: Interview guide for qualitative

1. How did you receive the information on the new procedure (VIA)? Explain

……

2. State the procedure that was done on you and explain your experiences after the procedure……

   ……

3. Describe the side effects that you have experienced

   ……

   ……

   ….

4. Between VIA and Pap smear which one do you recommend the Ministry of Health and Social Services to keep on using countrywide? Explain

   ……

   ……. .....

Thank you!