Chapter 6

Screening Methods and Early Diagnose in Cervical Cancers

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Abstract

In this section, screening methods and early diagnose in cervical cancers, the anatomic and pathologic basis of visual inspection with acetic acid (VIAA), the results of early diagnose studies with VIAA, nurse's and midwife's role in protection and early diagnose have been given.

Early Diagnose in Cervical Cancer

In recent years, although important improvements have been made in cancer therapy early diagnose still remains its significance. In fact, to identify those cells that can be turned into cancer before the illness is onset is more important in terms of early diagnose and treatment and this constitutes the most fundamental point in terms of decreasing the cancer-related deaths [1-4].

Studies carried out on early diagnose of diseases in population show that in many diseases the known case count is lesser than the available case count. The term “diseases are like icebergs” was used for all the diseases that require early diagnose in population considering that the much larger part of the icebergs remains under the sea and is never visible. Because all the population cannot be screened systematically when screening is made for the purpose of early diagnose, if the screening is made by selecting those groups under risk, the success to be achieved considerably increases. Besides, if the disease is seen in population frequently, if its treatment takes longer time, if there is a method to be used in screenings and if to pre-
vent progression of the disease is possible then the efforts to be made for early diagnose will be appropriate [1,5].

One of the leading cancer types where early diagnose approach is very successful is cervical cancer. PAP-smear test is a very simple and has very successful responsiveness-selectiveness in terms of early diagnose of this disease. Cervical cancer can be caught at the stage of “in-situ” with the help of this method; to heal patients with the therapy to be performed at this stage is possible. As a result of advanced examinations when it is applied to 1,000 women for the purpose of early diagnose, 60 women seem “test-positive”; of these individuals an in-situ cancer is detected in 13 and invasive cervical cancer in 2 (Figure 1). In early diagnose intended studies the cost per person is 13 US dollars for PAP-smear and along with advanced examinations it reaches 34 US dollars; the therapy of an advanced cervical cancer is estimated to be over one million dollars [5-7].

Those women, who involve sexual relationship at the early age, make sex with individuals more than one and having malfunctioning immunologic system are under the cervical cancer risk. PAP-smear test must be applied to risk groups more often, because those cells that show alterations prior to cervical cancer turn into cancer after a long time, such as 5 to 10 years. Besides, the cervical cancer-related deaths decrease by 40% in women who has received smear test. In groups not under risk, smear test is recommended once a year. If three tests performed successively for three years are normal they may be performed less frequently [5,7].

In countries with lesser resources, alternative low-cost early diagnostic methods are needed, since regular follow-ups cannot be performed with expensive techniques. Visual Inspection with Acetic Acid (VIAA), with many features, is an attractive approach to be used in settings with less resource, because VIAA’s cost is very low compared to other early diagnostic methods [8-12].

The Anatomic and Pathologic Basis of Visual Inspection with Acetic Acid (VIAA)

Inspection of cervical uterine with naked eye after acetic acid of 4% was applied provides a simple test possibility for establishment of cervical precancerous lesions and early term invasive cancer at the early period.

![Figure 1: The results of early diagnosis study in cervical cancer.](image)
potential difficulties related to application of trauma tests based on cervical cytology to the settings with insufficient resources have led investigating the validity of alternative tests with lower technology (such as VIAA) in detection of cervical neoplasia [13,14]. VIAA results can be immediately obtained and do not require any laboratory support. The categorization of VIAA results depends on the color changes observed in cervix. To understood cervix’s anatomy, physiology and pathology clearly is highly important in terms of understanding the essence of the screenings made by using VIAA and interpreting the results obtained through these tests [15,16].

Pathophysiology of VIAA

It is believed that application of acetic acid of 4% causes reversible coagulation or precipitation of cell-related proteins. Besides, especially it leads to swelling of columnar, abnormal squamous epithelial regions and epithelial tissues and dehydration of cells. Acetic acid application helps cervix to clean mucus secretions and to coagulate. The normal squamous epithelium seems pink and the columnar epithelium seems red due to the light reflections coming from below the stroma rich in blood cells. If epithelium contains too many cellular proteins, acetic acid coagulates these proteins that can eliminate the color of stroma. The rest of the white cells are visible when the cervix is compared with normal pink color around the normal squamous epithelium; this effect can be seen with naked eye. So, the effect of acetic acid depends on the amount of cellular proteins available in epithelium. The region where nuclear activity increased and DNA content show most of the white alterations.

When acetic acid is applied to squamous epithelium some coagulation occurs on the superficial cellular layer. Despite deeper cells contain excessive nuclear proteins acetic acid may not affect them because the result of precipitation is not enough for elimination of color under the stroma. CIN area and invasive cancer undergo coagulation due to high nuclear protein content and block the upcoming light by passing through epithelium. Consequently, lower epithelium vascular sample vanishes and epithelium seems densely white.

White-cell appearance is not enough for early diagnose of CIN and cancer. Furthermore, there must be nuclear protein, squamous metaplasia, epithelium combined with inflammation, condyloma and hyperkeratos. When the white-cell appearance and CIN is combined and at the beginning of invasive cancer the edges are smaller, opaque, thin and denser. White cells are generally scattered within cervix because of infection and regional change has not been identified. Condyloma and hyperkeratosseem densely grayish-white after acetic acid was applied. The effect of acetic acid reverses almost at the same slowness in CIN lesions, inflammation and squamous metaplasia and onset
of preclinic invasive cancer. It may be three-five minutes late in CIN 2-3 cases and invasive cancers [17-19].

The Results of Early Diagnose Studies with VIAA

In many countries early detection of cervical cancer by using acetic acid was attempted. When the studies carried out were scrutinized; in a study by Belinson et al. (2001) sensitivity was 71% and specificity was 74%; Deny et al. (2000) found the sensitivity as 67% and specificity as 83%; In the scope of JHPIEGO (1999) project sensitivity was 77% and specificity was 64% [20-22]. The results of other studies were explained in the following table in detail [8-10,23,24]. When the studies performed were examined, it also seems that applications were performed by the personnel other than physicians. When other studies carried out by using acetic acid were scrutinized it was observed that VIAA sensitivity has changed between 60.3% and 100% and specificity between 30.4% and 96.8% [25-35]. When the studies carried out in previous years are considered, specificity of VIAA seems significantly reduced [8-10,20-22] (Table 1).

When the studies conducted in recent years are reviewed it appears that VIAA's sensitivity is between 25.0% and 94.4%, but its specificity has varied between 32.0% and 99.1% [36-47] (Table 2). When the studies conducted in previous years are considered it can be said that VIAA's specificity has shown in increase. Consequently, developing countries' seeking for cost-effective methods toward early diagnose of the cervical cancer is gratifying. VIAA can be used in developing countries as a low-cost, easily applicable and immediately result obtainable method.

Nurse’s and Midwife’s Role in Protection and Early Diagnose

Nurse's/midwife’s role in protection and early diagnose can be categorized under three topics; primary, secondary and tertiary. Primary protection can be achieved through staying away from risk factors and carcinogens and through vaccination methods and health training [48-50]. Health training which is one of the fundamental responsibilities of nurse/midwife has an important place in primary protection. Nurses and midwives who communicate with community and individuals constantly, should inform individuals concerning health habits by proving medical advice and collecting appropriate data [51]. In this context, informing population and especially individuals under risk concerning protection from cancer and symptoms of early diagnose is very important [52]. Usually humans do not go to overall health control unless they have a complaint. However, individuals under risk visit health institutes when they are warned by health personnel and they shift from passive role to active role [53,54].
The Organization for Prevention of Cervical Cancers, cooperate with five international organizations including WHO, stated that all health personnel working in information and training services should provide women with training related to protection from cervical cancers wherever and whenever they reach them [55].

Table 1: The Results of Early Diagnose Studies with VIAA.

<table>
<thead>
<tr>
<th>Author(s) (Year)</th>
<th>Country</th>
<th>No. of Women</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Research Makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vuyp et al. (2005)[34]</td>
<td>Nairobi (Kenya)</td>
<td>853</td>
<td>73.3</td>
<td>80.0</td>
<td>Not notified</td>
</tr>
<tr>
<td>Eftekhar et al. (2005)[28]</td>
<td>Iran</td>
<td>200</td>
<td>95.7</td>
<td>44.0</td>
<td>Gynecologists</td>
</tr>
<tr>
<td>Doh et al. (2005)[27]</td>
<td>Cameroon</td>
<td>4813</td>
<td>70.4</td>
<td>77.6</td>
<td>Nurse+obstetricians</td>
</tr>
<tr>
<td>Geel et al. (2005)[31]</td>
<td>New Delhi</td>
<td>400</td>
<td>96.7</td>
<td>36.4</td>
<td>Paramedical</td>
</tr>
<tr>
<td>Bonfim et al. (2005)[26]</td>
<td>Brazil</td>
<td>1154</td>
<td>100</td>
<td>78</td>
<td>Nurse + physicians</td>
</tr>
<tr>
<td>Sankaranarayanan et al. (2004)[32]</td>
<td>India</td>
<td>18.675</td>
<td>60.3</td>
<td>86.8</td>
<td>Independent health carepersonnel</td>
</tr>
<tr>
<td>Bhatla et al. (2004)[25]</td>
<td>India</td>
<td>100</td>
<td>100</td>
<td>53</td>
<td>Nurses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>87.5</td>
<td>63</td>
<td>Physicians</td>
</tr>
<tr>
<td>Tihammughami et al. (2004)[30]</td>
<td>Iran</td>
<td>1200</td>
<td>74.3</td>
<td>94</td>
<td>Gynecologists</td>
</tr>
<tr>
<td>El Shalakany et al. (2004)[29]</td>
<td>Egypt</td>
<td>2049</td>
<td>83.5</td>
<td>96.8</td>
<td>Gynecologists</td>
</tr>
<tr>
<td>Wu et al. (2003)[35]</td>
<td>China</td>
<td>1997</td>
<td>70.9</td>
<td>74.3</td>
<td>Oncology experts</td>
</tr>
<tr>
<td>Tareq et al. (2003)[33]</td>
<td>Pakistan</td>
<td>501</td>
<td>93.9</td>
<td>36.4</td>
<td>Gynecologists</td>
</tr>
<tr>
<td>Beilinson et al. (2001)[20]</td>
<td>China</td>
<td>1977</td>
<td>71</td>
<td>74</td>
<td>Gynecologic oncologist</td>
</tr>
<tr>
<td>Deny et al. (2000)</td>
<td>Africa</td>
<td>2.944</td>
<td>67</td>
<td>83</td>
<td>Nurse</td>
</tr>
<tr>
<td>Zandhavbe University (HIPPEGO) (1999)</td>
<td>Zandhavbe</td>
<td>2.203</td>
<td>77</td>
<td>64</td>
<td>Nurse-obstetrician</td>
</tr>
<tr>
<td>Sankaranarayanan et al. (1999)</td>
<td>India</td>
<td>1.351</td>
<td>96</td>
<td>68</td>
<td>Nurse</td>
</tr>
<tr>
<td>Sankaranarayanan et al. (1998)</td>
<td>India</td>
<td>3000</td>
<td>90</td>
<td>92</td>
<td>Cytology technician</td>
</tr>
<tr>
<td>Londhe et al. (1997)[24]</td>
<td>India</td>
<td>372</td>
<td>72</td>
<td>54</td>
<td>Not indicated</td>
</tr>
<tr>
<td>Megevand et al. (1996)[18]</td>
<td>South Africa</td>
<td>2.426</td>
<td>65</td>
<td>98</td>
<td>Nurse</td>
</tr>
<tr>
<td>Cechini et al. (1993)</td>
<td>Italy</td>
<td>2.105</td>
<td>83</td>
<td>83</td>
<td>Obstetricians</td>
</tr>
<tr>
<td>Siewson (1992)</td>
<td>United States</td>
<td>2.827</td>
<td>29</td>
<td>97</td>
<td>Clinicians</td>
</tr>
</tbody>
</table>

In secondary protection, nurse/midwife should tell individuals the importance of regular health screenings and early diagnose [51]. Thereby, early diagnose is achieved. Early diagnose is define as “all kinds of health activities carried out in order to catch a certain disease before its symptoms and findings appear by targeting whole of the healthy population or a part of it accepted to be under risk”[56]. The cervical cancer is at the forefront of the cancers preventable through screening. The reason for this is the presence of well-defined prolonged preinvasive period in cervical cancer [57].

Table 2: The Results of Early Diagnose Studies with VIAA in Last Year.

<table>
<thead>
<tr>
<th>Author(s) (Year)</th>
<th>Country</th>
<th>No. of Women</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khodakarami et al. (2011)</td>
<td>-</td>
<td>100</td>
<td>62.5</td>
<td>98.8</td>
</tr>
<tr>
<td>Lewis et al. (2011)[37]</td>
<td>Nairobi (Kenya)</td>
<td>490</td>
<td>93.0</td>
<td>32.0</td>
</tr>
<tr>
<td>Ibrahim et al. (2012)[38]</td>
<td>Sudan</td>
<td>934</td>
<td>74.2</td>
<td>41.9</td>
</tr>
<tr>
<td>Albert et al. (2012)[39]</td>
<td>Zaria</td>
<td>351</td>
<td>60.0</td>
<td>94.4</td>
</tr>
<tr>
<td>Sahastrubudhe et al. (2012)[40]</td>
<td>India</td>
<td>303</td>
<td>80.0</td>
<td>82.6</td>
</tr>
<tr>
<td>Begum et al. (2012)[41]</td>
<td>Bangabandhu Sheikh Mujib Medical University</td>
<td>300</td>
<td>94.4</td>
<td>97.8</td>
</tr>
<tr>
<td>Chung et al. (2013)[42]</td>
<td>Nairobi (Kenya)</td>
<td>500</td>
<td>92.7</td>
<td>99.1</td>
</tr>
<tr>
<td>Pimple and Shastri (2014)[43]</td>
<td>-</td>
<td>3629</td>
<td>93.0</td>
<td>91.0</td>
</tr>
<tr>
<td>Khan et al. (2015)[44]</td>
<td>Karachi</td>
<td>500</td>
<td>93.5</td>
<td>95.8</td>
</tr>
<tr>
<td>Tebeu et al. (2015)[45]</td>
<td>Cameroon</td>
<td>540</td>
<td>36.4</td>
<td>90.4</td>
</tr>
<tr>
<td>Faramad-Shahrak et al. (2015)[46]</td>
<td>Iran</td>
<td>1000</td>
<td>71.4</td>
<td>50.0</td>
</tr>
<tr>
<td>Bigoni et al. (2015)[47]</td>
<td>Africa</td>
<td>259</td>
<td>25.0</td>
<td>74.2</td>
</tr>
</tbody>
</table>
In screening studies carried out for the purpose of early diagnosis, screening only those groups under risk instead of whole population provided more successful results. Women under high risk are known as those who become sexually active during adolescent period and have predisposition to be polygamy [58].

In the scope of tertiary protection program nurses/midwives may prevent complications by training patients and monitoring regularly. Moreover, they can reduce disabilities by providing symptom control and paying immediate attention to complications [59].

**Conclusion**

Various methods are used in the diagnosis of early cervical cancer. Some of the most inexpensive and simple method is VIAA. VIAA is a method that can be used easily in developing countries. In addition, the methods used in the diagnosis of early cervical cancer nurse and midwife important roles in interested in.

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