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The Title should be a brief phrase describing the contents of the paper. The Title Page should include the authors’ full names and affiliations, the name of the corresponding author along with phone, fax and E-mail information. Present addresses of authors should appear as a footnote.

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Health related quality of life among breast cancer patients with unilateral arm lymphedema at cancer diseases hospital in Lusaka, Zambia

Victoria Mwiinga-Kalusopa, Catherine Ngoma and Kennedy Lishimpi
Full length Research

Health related quality of life among breast cancer patients with unilateral arm lymphedema at cancer diseases hospital in Lusaka, Zambia

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This study aims to determine health-related quality of life (HRQOL) of breast cancer patients with unilateral arm lymphedema one year after completion of treatment at Cancer Diseases Hospital. The study design comprises of a cross sectional study, where we assessed the HRQOL controlling for patient demographics, cancer stages and treatment types. Short form of 36 interview schedule was used to assess HRQol and to determine relationships among HRQoL components. The physical and functional well-being was significantly associated with lymphedema. Patients with moderate lymphedema were 10 times more likely to have physical impairment and 3 times more likely to have mild functionality impairment compared to patients with mild lymphedema. While patients with severe lymphedema were 25 times more likely to have mild functionality impairment compared to patients with mild lymphedema. The study showed that the physical and functional well-being were significantly affected by the presence of lymphedema after breast cancer treatment, lymphedema has an impact on long-term health related quality of life in survivors of breast cancer and its effects should not be underestimated.

Key words: Health related quality of life, breast cancer, patients, arm lymphedema.

INTRODUCTION

Due to advances in detection and treatment, increasing numbers of women are diagnosed with and surviving breast cancer each year in Zambia (Cancer Diseases Hospital, 2012). Breast cancer is the second most common cancer affecting women and accounts for 9% of all histologically proven cancers and accounts for 8% mortality rate among patients admitted at Cancer Diseases Hospital in Zambia (Cancer Diseases Hospital, 2012). Health related quality of life (HRQoL) is reported to be compromised in patients with chronic illness such as breast cancer, and alterations on HRQol have been seen in breast cancer patients with lymphedema in...
developed countries. Hence ensuring good HRQoL following breast treatment has become a focal point of cancer research and clinical interest.

HRQoL refers to the individual’s sense of well-being and ability to perform daily tasks, potentially affected by an illness and its treatment. It is a key concept in cancer care, encompassing several domains of health, including physical, psychological, social, and functional well-being directly affected by changes in health (Pearman, 2003). Physical well-being includes symptoms of pain, bleeding, fatigue and shortness of breath, while psychological well-being includes symptoms of depression, loss of fertility, problems related to sexual intercourse and anxiety. Social well-being includes engagement in activities or involvement with others. Functional well-being relates to whether a patient for example is able to manage a household, use the telephone or dress independently. Lymphedema or "big arm" is an increase in volume of the upper limb due to accumulation of water, protein and fats following damage to the lymphatic system caused by axillary lymph node clearance (Lawenda et al., 2009). Affected patients can experience swelling, pain, arm tightness, heaviness of the arm, and recurrent skin infections (Lawenda et al., 2009; Matawan and Mak, 2008). Breast Cancer-related lymphedema due to impaired lymphatic drainage from the arm secondary to axillary surgery and/or radiotherapy is one of the common side effects occurring in 12 to 54% of cases (Clark et al., 2005; Fu and Rosedale, 2009; Hayes et al., 2012).

As an incurable and progressive condition characterized by chronic swelling of the limb it can cause significant physical, functional, psychological, and social morbidity and may severely impact HRQoL, thus downgrading HRQoL (Keeley et al., 2010). Breast Cancer patients may find lymphedema more distressing than mastectomy, because hiding the physiological manifestations and loss of function of lymphedema is harder. Overall, these factors lead to decreased HRQoL for breast cancer patients (Pyszel, 2006). Breast Cancer patients do not die of lymphedema, but their HRQoL is severely impaired (Maree, 2011).

**METHODOLOGY**

The study was conducted at the Cancer Diseases Hospital (CDH) a modern specialized tertiary hospital offering radiation therapy, chemotherapy and hormonal cancer treatments. The hospital serves as a national referral centre for all cancers nationwide, the catchment population comprises all 107 districts and 10 provinces of Zambia. In addition to the Zambian population, the hospital also caters for patients from neighbouring countries.

A cross-sectional study design was used and 125 breast cancer patients who were willing to participate in the study were conveniently selected. The study population consisted of all breast cancer patients who had been visiting CDH breast review clinics from April, 2006 to December, 2013, were 18 years of age and above, had mastectomy and axillary dissection, completed Radiation therapy, had unilateral breast cancer with stage I, II, and III disease. Breast cancer patients who had Lymphedema in both upper limbs, had evidence of recurrent breast cancer in Axilla and stage 4 diseases were excluded. Based on 9% prevalence of breast cancer cases at CDH, 125 participants were enrolled in the study in order to identify true prevalence with precision of +/- 5% and 95% confidence interval. The purpose, risks and benefits of the study were explained to the participants to enable them make informed consent to participate in the study. The quality of life Short Form 36 (SF-36) item scale interview schedule was used to collect data from the study participants.

The tool had 4 sections Demographic data, arm circumference measurements, disease stage and type of treated received AND HRQoL questionnaire. The tool was chosen for this study because it met the HRQoL components of the study which were the physical, psychological, functional and social well-being among breast cancer patients post treatment (Ware and Kosinski, 2004). Arm circumferences of all breast cancer patients were measured to determine the prevalence of lymphedema, and then HRQoL was measured among those with lymphedema. This method is more practical in clinical settings (Fu and Rosedale, 2009). Circumferential measurement points were at 10 cm above elbow crease, 7 cm below elbow crease, wrist, and mid-palm level using a non-stretch measuring tape. The contra lateral arm circumference at corresponding levels was used as a reference to determine lymphedema. Lymphedema was defined as an increase in arm circumference at any level by 2 cm or more compared to the contra lateral side. The severity of lymphedema was divided into 3 degrees (a difference in circumference up to 2 cm indicates mild lymphedema, a difference of 2 to 5 cm shows moderate lymphedema, and a difference of more than 5 cm will be considered severe lymphedema. Age, sex, educational status, marital status, employment status, and religion were obtained from the participant as well as the participants’ files. The demographic data was required because it has been shown to influence HRQoL outcomes post breast cancer treatment.

Data was analyzed using STATA version 10. The prevalence of arm Lymphedema was estimated using Stata 10.0 command proportion with options specifying the sub-groups. The relationships between the different categories of HRQoL were investigated with Pearson’s Chi Squared test for association and further by fitting logistic regression models. The effect that Arm Lymphedema has on the physical, psychological, functional and social wellbeing were assessed with logistic regression analysis controlling for hypothesised confounders. Only the independent variables that were determined to be significantly associated with the outcome variables after bivariate Chi-square testing were included into the logistic regression model. From the chi-squared association analysis, only the physical impairment, mild and moderate functionality impairment were statistically associated with lymphedema. We hypothesised that age, sex, education status, and certain HRQoL indicators could confound the relationship between Lymphedema severity and outcome HRQoL variables.

Three logistic regression model were fitted, one for each of the outcomes to investigate the effect of lymphedema on HRQoL including all the possible confounding variables. Likelihood ratio tests were performed to determine the impact of each independent variable on the model.

**RESULTS**

Out of the 125 clients who participated in the study, 75 clients had mild lymphedema, 35 clients had moderate a mild form of arm lymphedema (100%). Very few participants had stage III breast cancer (mild 51.72,
lymphedema and 15 had severe lymphedema (Table 1). 13 clients had stage I disease, 54 had stage II disease while 58 had stage III disease (Table 2). Table 2 shows the distribution of lymphedema stages among the 125 participants and the prevalence of lymphedema in percentage. Out of the 125 participants recruited in the study, 75 (60%) of the participants developed mild lymphedema, 35 (28%) of them had moderate lymphedema and 15 (12%) of them had severe lymphedema. All participants received surgery, radiation therapy, chemotherapy and hormonal therapy (Table 3).

Three cancer stages were considered in this study. Table 3 indicates that 13 participants (10.4%) had stage I breast cancer, 54 (43.2%) had stage II breast cancer and 58 (46.4) had stage III disease. Therefore, stage III breast cancer was the commonest among the participants. All the participants with stage I disease were presented with a mild form of lymphedema (Figure 1). Figure 1 shows the prevalence of arm lymphedema stages across the three stages of breast cancer in percentages (stage I, II, III). All patients with stage I disease had moderate 34.49 and severe stage of lymphedema 13.79). From the chi-squared association analysis, physical well-being, mild and moderate functionality well-being were statistically associated with lymphedema (Table 4).

From the chi-squared association analysis, Physical well-being (p-value <0.001), mild (p-value 0.001) and moderate (p-value 0.015) functionality well-being were statistically associated with lymphedema as indicated by the significant p-values. Participant’s age (p-value <0.001), marital status (p-value <0.001) and patients education (p-value <0.001) were determined to be those that were associated either with the outcome or independent variable of interest. After controlling for confounders, it was determined that participants with moderate lymphedema were 10.17 times more likely to have physical impairment compared to patients with mild lymphedema (Table 5) After controlling for confounders, it was determined that participants with moderate lymphedema were 10.17 (95% CI 2.25 to 45.97) times more likely to have physical impairment compared to patients with mild lymphedema, p-value was significant at 0.003. Those with psychological impairment were 14.41 (95% CI 3.95 to 52.51) times more likely to have physical impairment than those not impaired, significant P-Value was 0.001. After considering the effect of confounders, it was determined that those with moderate lymphedema were 3 times more likely to have mild functionality impairment compared to patients with mild lymphedema (Table 6).

After considering the effect of confounders, it was determined that those with moderate lymphedema were 2.60 (95% CI 0.82 to 8.23) times more likely to have mild functionality impairment compared to patients with mild lymphedema as indicated by P-Value 0.105. Those with severe lymphedema were 25.11(95% CI 3.93 to 160.65) times more likely to have impaired mild functionality compared to patients with mild lymphedema as indicated by significant P-Value 0.001. After accounting for confounders, it was determined that those with moderate lymphedema were 3 times more likely to have moderate functionality impairment than those with mild lymphedema (Table 7) After accounting for confounders, it was determined that those with moderate lymphedema were 3.30 (95% CI 1.36 to 8.02) times more likely to have moderate functionality than those with mild lymphedema as its significant P-value was 0.008. Those with severe lymphedema were 5.99(95% CI 1.64 to 21.79) likely to develop impaired moderate functionality than those with mild lymphedema as indicated by a significant Z test P-value was at 0.007.

| Table 1. Categories of arm lymphedema among the respondents (n=125). |
|-----------------|---------|---------|
| Category        | Frequency | Percentage |
| Mild            | 75       | 60.0     |
| Moderate        | 35       | 28.0     |
| Severe          | 15       | 12.0     |
| Total           | 125      | 100      |

| Table 2. Lymphedema across cancer stages (n=125). |
|-----------------|---------|---------|
| Stage of cancer | Frequency | Percentage |
| Stage I         | 13       | 10.4     |
| Stage II        | 54       | 43.2     |
| Stage III       | 58       | 46.4     |
| Total           | 125      | 100      |

| Table 3. Breast cancer treatment received (n=125). |
|-----------------|---------|---------|
| Treatment type  | State   | Frequency | Percentage |
| Surgery         | No      | 0         | 0          |
|                 | Yes     | 125       | 100        |
| Radiation therapy | No    | 0         | 0          |
|                  | Yes    | 125       | 100        |
| Chemotherapy    | No      | 0         | 0          |
|                 | Yes    | 125       | 100        |
| Hormones        | No      | 0         | 0          |
|                 | Yes    | 125       | 100        |
| Total           | Yes     | 125       | 100        |
The prevalence of lymphedema in the current study is in the range of a study conducted by Hayes et al. (2012, 2008) in Australia which showed a range of 10 to 80%. The median for this study was 28% for the three stages of lymphedema. This result is in line with a study conducted by Clark et al. (2005) in the United Kingdom which reported the median prevalence range of lymphedema to be 11 to 36%. In addition, Armer and Stewart (2005) in a study conducted in United States of America reported similar findings.

A bivariate analysis with Pearson’s Chi-Squared test for association with p-value <0.05 between the hypothesized outcomes of interest among breast cancer patients with arm lymphedema was explored (Table 4). From the chi-squared association analysis, only the physical component (p-value <0.001), mild functional well-being components (p-value 0.001) and moderate functional well-being component (p-value 0.015) were statistically associated with lymphedema. In this study, age, gender, education and marital status were found to have a positive association with lymphedema, however, logistic regression fitting showed that lymphedema had a significant independent effect on the physical and functional well-being only. This could mean that presence of lymphedema one year following breast cancer treatment is associated with physical, mild and moderate functional impairment among breast cancer patients.

The results of this study collaborate with the results by So-Hyun et al. (2012) in a study conducted in China among Chinese women with breast cancer related lymphedema which showed that lymphedema is associated with inferior component of health related quality of life. Mak et al. (2009), in a study conducted in Korea reported that lymphedema was associated with an inferior quality of life and a higher level of arm-symptom associated distress. In addition, Beaulac et al. (2002) in a study conducted in the United States of America reported similar findings.

In this study, the psychological well-being (p-value 0.375) and social well-being (p-value 0.096) aspects were not affected by presence of lymphedema. These results are similar to a study conducted by Mak et al. (2009) in Korea which showed that the period of one year was sufficient time to adapt psychologically and socially to the disease and treatment in breast cancer patients regardless of the existence of lymphedema. The other reason is that most of the participants in this social and family life changed little due to the disease. This reason is in collaboration with So-Hyun et al. (2012) in a study conducted in China that reported similar results. It could therefore be suggested that breast cancer patients in our setting who complete breast cancer treatment and develop lymphedema should expect negative effects on their physical and functionality well-being.
Table 4. Bivariate analysis with observed association between covariates, Pearson’s chi-squared $p$ values <0.05 between the hypothesized outcomes of interest among breast cancer patients with arm lymphedema at cancer diseases hospital in Lusaka, Zambia (n=125).

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Physical wellbeing</th>
<th>Social wellbeing</th>
<th>Psychological wellbeing</th>
<th>Mild functionality</th>
<th>Moderate functionality</th>
<th>Vigorous functionality</th>
<th>Sexually functional</th>
<th>Lymphedema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical wellbeing</td>
<td>-</td>
<td>21.09 &lt;0.001*</td>
<td>34.30 &lt;0.001*</td>
<td>5.61; 0.018*</td>
<td>3.74; 0.053</td>
<td>6.02; 0.014*</td>
<td>19.67 &lt;0.001*</td>
<td>30.67 &lt;0.001*</td>
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<td>Social wellbeing</td>
<td>-</td>
<td>6.84; 0.009*</td>
<td>0.02; 0.892</td>
<td>3.81; 0.051</td>
<td>0.002; 0.970</td>
<td>0.7816; 0.377</td>
<td>4.71; 0.096</td>
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<td>Psychological wellbeing</td>
<td>-</td>
<td>-</td>
<td>12.63 &lt;0.001*</td>
<td>2.32; 0.128</td>
<td>3.47; 0.063</td>
<td>2.25; 0.133</td>
<td>1.96; 0.375</td>
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<tr>
<td>Mild functionality</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50.75; &lt;0.001*</td>
<td>14.02 &lt;0.001*</td>
<td>0.22; 0.643</td>
<td>14.69; 0.001*</td>
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</tr>
<tr>
<td>Moderate functionality</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14.51 &lt;0.001*</td>
<td>4.08; 0.044*</td>
<td>8.45; 0.015*</td>
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<tr>
<td>Vigorous functionality</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.54; 0.463</td>
<td>3.39; 0.183</td>
<td></td>
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<tr>
<td>Sexually functional</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.54; 0.170</td>
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<tr>
<td>Patient’s sex</td>
<td>1.55; 0.214</td>
<td>2.85; 0.091</td>
<td>2.00; 0.157</td>
<td>2.85; 0.091</td>
<td>2.13; 0.144</td>
<td>0.32; 0.572</td>
<td>0.67; 0.413</td>
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<tr>
<td>Patient’s age</td>
<td>3.64; 0.162</td>
<td>1.11; 0.574</td>
<td>1.61; 0.447</td>
<td>5.08; 0.079</td>
<td>0.01; 0.996</td>
<td>5.24; 0.073</td>
<td>10.82; 0.004*</td>
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<tr>
<td>Patient’s marital status</td>
<td>0.29; 0.588</td>
<td>3.98; 0.046*</td>
<td>3.93; 0.047*</td>
<td>0.07; 0.785</td>
<td>1.22; 0.270</td>
<td>0.01; 0.948</td>
<td>0.25; 0.617</td>
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<td>Patient’s education</td>
<td>1.48; 0.476</td>
<td>1.30; 0.522</td>
<td>7.96; 0.019*</td>
<td>14.39; 0.001*</td>
<td>3.86; 0.145</td>
<td>2.04; 0.361</td>
<td>0.88; 0.642</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Logistic regression model 1 output describing physical impairment (n=125).

<table>
<thead>
<tr>
<th>Logistic regression model statistics</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
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<tbody>
<tr>
<td>n</td>
<td>125</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Likelihood ratio Chi² statistic</td>
<td>73.9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chi² p value</td>
<td>&lt;0.001</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent/independent variables</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>Z test P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Physical Impairment</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moderate lymphedema vs. Mild</td>
<td>10.17</td>
<td>2.25</td>
<td>45.97</td>
</tr>
<tr>
<td>Psychological impairment vs. Not impaired</td>
<td>14.41</td>
<td>3.95</td>
<td>52.51</td>
</tr>
</tbody>
</table>

A logistic regression was performed to determine the effects of lymphedema on the physical, mild and moderate functionality well-being. The likelihood ratio tests were performed to determine the impact of each independent variable on the models. Using the odds ratio (OR), the results indicated a significant association between lymphedema and the physical, mild functionality and moderate functionality of breast cancer patients. It was determined that patients with moderate lymphedema were 10 times more likely to have physical impairment compared to patients with mild lymphedema.

**Conclusion**

From the mild functionality impairment, it was
Table 6. Logistic regression model 2 outputs describing mild functionality impairment (n=125).

<table>
<thead>
<tr>
<th>Logistic regression model statistics</th>
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<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>125</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Likelihood ratio Chi² statistic</td>
<td>42.3</td>
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</tr>
<tr>
<td>Chi² p value</td>
<td>&lt;0.001</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dependent/independent variables</td>
<td>Odds Ratio</td>
<td>95% CI</td>
<td>Z test</td>
<td>P Value</td>
</tr>
</tbody>
</table>

Model 2: Impairment Mild functionality

<table>
<thead>
<tr>
<th>Dependent/Independent variables</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>Z test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Lymphedema vs. Mild</td>
<td>2.60</td>
<td>0.82</td>
<td>8.23</td>
<td>0.105</td>
</tr>
<tr>
<td>Severe Lymphedema vs. Mild</td>
<td>25.11</td>
<td>3.93</td>
<td>160.65</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 7. Logistic regression model 3 output describing moderate functionality impairment (n=125).

<table>
<thead>
<tr>
<th>Logistic regression model statistics</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>125</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Likelihood ratio Chi² statistic</td>
<td>16.10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chi² p value</td>
<td>0.003</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dependent/independent variables</td>
<td>Odds Ratio</td>
<td>95% CI</td>
<td>Z test</td>
<td>P Value</td>
</tr>
</tbody>
</table>

Model 3: Impaired moderate functionality

<table>
<thead>
<tr>
<th>Dependent/Independent variables</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>Z test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Lymphedema vs. Mild</td>
<td>3.30</td>
<td>1.36</td>
<td>8.02</td>
<td>0.008</td>
</tr>
<tr>
<td>Severe Lymphedema vs. Mild</td>
<td>5.99</td>
<td>1.64</td>
<td>21.79</td>
<td>0.007</td>
</tr>
</tbody>
</table>

determined that patients with moderate lymphedema were 3 times more likely to have mild functionality impairment compared to patients with mild lymphedema. While patients with severe lymphedema were 25 times more likely to have mild functionality impairment compared to patients with mild lymphedema. The likelihood tests performed on moderate functionality impairment determined that patients with moderate lymphedema were 3 times more likely to have moderate functionality impairment compared to patients with mild lymphedema. While patients with severe lymphedema were 6 times more likely to have moderate functionality impairment compared to patients with mild lymphedema. The study suggest that preventing, diagnosing and treating lymphedema when it is mild is important because those with mild lymphedema make up the cohort that gives rise to preventable severe debilitating lymphedema.

The regression model results from the study could help nurses and clinicians in practice to know the physical and functional impairment that breast cancer patients with moderate and mild lymphedema encounter as they asses and manage these patients.

**Conflict of Interests**

The authors have not declared any conflict of interests.

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- Journal of Medicinal Plant Research
- Journal of Dentistry and Oral Hygiene
- African Journal of Pharmacy and Pharmacology
- Journal of Clinical Medicine and Research
- Clinical Reviews and Opinions
- Medical Practice and Reviews