Adherence to Radiation Therapy among Cervical Cancer Patients at Cancer Diseases Hospital in Lusaka, Zambia

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Abstract

Background: Radiation therapy has the potential to improve cure rates and provide palliative relief for cervical cancer patients. Despite adherence to radiation therapy being a key treatment modality, patients rarely follow prescriptions. Poor adherence to radiation therapy is associated with low survival and high mortality rates. This study therefore sought to investigate the levels of adherence and factors influencing adherence to radiation therapy among cervical cancer patients being treated at Cancer Diseases Hospital. **Methods:** A cross-sectional analytical study design was used, 142 patients were selected from the outpatient department using a fishbowl sampling method. A structured interview schedule was used to collect data. Data was entered and analyzed using SPSS, the binary logistic regression analysis was used to predict levels of adherence to treatment and to identify factors associated with adherence to RT among cervical cancer patients. **Results:** The findings showed that 93% of the participants adhered to radiation therapy while 7% did not adhere to treatment. Majority of the patients 77.1% had experienced side effects of radiation therapy. About 28% of patients had severe psychological distress. By using binary logistic regression, there was a statistically significant association between adherence and perceived quality of health care services ($p = 0.001$). The analysis showed that patients who perceived poor quality of health care services were 0.005 (99.5%) times less likely to adhere to radiation therapy. The other independent variables were not statistically significant despite being associated with adherence among cervical cancer patients. **Conclusions and Recommendations:** The findings showed that patients who perceived good quality of health care services had higher chances of adherence compared to those who perceived poor quality of health care services. There is

therefore a need for quality service provision which could include good maintenance of radiation machines. Furthermore, there is a need to develop guidelines for follow-up in case of any disease outbreak to avoid interference with patients' treatment schedules and appointments for reviews.

Keywords

1. Introduction

Cervical Cancer (CaCx) is one of the most common female cancers in the world. It's the fourth frequently diagnosed and the fourth leading cause of death in women [1]. It is a critical public health issue in sub-Saharan Africa (SSA) and the second leading cause of female cancer/deaths [2]. The highest regional incidence and mortality rates are seen in Africa with rates elevated in Southern Africa *i.e.* Swaziland, Malawi and Zimbabwe [3].

According to Kalubula *et al.*, [4] Zambia is one of the Sub-Saharan African countries that have not been spared by the increasing burden of cervical cancer, with the prevalence of 34.3% of all cancers in Zambia. In Zambia, cervical cancer is the most common among women with the highest mortality rate [5]. Radiation therapy (RT) has the potential to improve cure rates and provide palliative relief for cancer patients worldwide [6]. This is based on the fact that approximately 50 percent of all cancer patients can benefit from RT in the management of their disease [7]. Although there are three main treatment modalities for cancer including surgery, chemotherapy, and radiation therapy, RT has been indicated as one of the most common treatments for most cancers worldwide [8]. It is generally indicated for more than 50% of all cervical cancer patients [9]. On the other hand, a combination of chemotherapy and radiation therapy is often recommended for patients with extra pelvic metastatic cervical cancer or in cervical cancer patients with recurrent disease who are not candidates for radiotherapy or extensive surgery [10].

Despite the documented role of RT in improving cure rate and palliation for cervical cancer cases, its effectiveness is highly dependent on the level of adherence [11]. Cervical cancer patients' adherence to medical advice and procedures is crucial for successful treatment as not adhering might lead to a poor prognosis of the disease which may even result in death [9]. According to the World Health Organization (WHO), adherence is a person's behavior concerning taking medication/treatment, following a diet, and making changes in lifestyle in accordance with medical or non-medical health professional recommendations [12]. Moelle *et al.* [11] indicated that patients who adhered to guideline-conforming RT had optimum survival.

Berry *et al.* [13], indicated that low adherence is the primary cause of a de-

creased clinical condition, and health workers often ignore this problem by not making follow-ups on patients who miss treatment appointments and reviews. This factor is relevant because it can increase the risk of relapse after treatment and reduce the effectiveness of anti-cancer therapies [13]. Some other factors which may reduce adherence to radiation therapy include educational barriers due to a poor understanding of the nature of the disease and the treatment as well as socioeconomic barriers and psychosocial barriers due to logistics and lack of appropriate counseling respectively [14]. Kamnda [9] also indicated that the poor adherence to RT among cervical cancer patients in low and middle-income countries can be attributed to a variety of factors. This includes inadequate cancer diagnostic and treatment facilities as well as difficulties in accessibility. The lack of trained personnel who should work in a multidisciplinary team also contributes to non-adherence to RT. The late presentation which often necessitates more intense treatment increases the risk of treatment-related mortality. Most of the patients also have a lot of comorbidities, including hypertension, diabetes, and HIV/AIDS which increase the rates of toxicity as well as death [9]. This study was therefore designed to investigate the levels of adherence and factors that influence adherence to radiation therapy treatment among cervical cancer patients being treated at Cancer Diseases Hospital in Lusaka, Zambia.

2. Materials and Methods

2.1. Study Design, Setting, and Participants

A descriptive analytical cross-section design was used to investigate adherence to radiation therapy among cervical cancer patients. The study was conducted at Cancer Diseases Hospital at the University Teaching Hospital in Lusaka, as it is the only Government hospital offering oncology services in Zambia. The population for the study comprised of CaCx patients aged 18 years and above was surveyed over a period of four months (from November 2021 to February 2022) at Cancer Diseases Hospital. They were considered eligible if they had CaCx, aged 18 years and above, had received radiation therapy treatment for 6-8 weeks and consented to participate in the study. The study excluded patients who were receiving RT treatment at the time of the study as it was not certain whether they were going to adhere to treatment as prescribed. The study was conducted from January 2019 to February 2022.

2.2. Data Collection Procedure

Ethical clearance and permission were sought from the University of Zambia Biomedical Research Ethics Committee and interviews were conducted over a period of 16 weeks. Participants were assured of anonymity and confidentiality by interviewing them in privacy individually after consenting to participate with their signature. The researcher administered a questionnaire in face-to-face interviews that lasted about 30 minutes. The researcher also engaged a psychosocial counselor and who was capable of meeting the psychological needs of the patients.

2.3. Instruments

A modified structured interview schedule was adopted from the brief adherence rating scale by Kane *et al.*, [15] and the screening for distress survey tool by Bodnarchuk *et al.*, [16] to assess the patient's adherence to radiation therapy. The scales are widely used and well-validated tools for measuring patients' adherence to treatment and psychological distress. The instrument comprised of a series of questions that were closed-ended and open-ended. The interview schedule contained questions under six sections; Section A obtained information on demographic characteristics which included age, education, marital status and church denomination. Section B assessed the economic status of the CaCx patients which contained monthly income and occupation, Section C assessed how psychological distress affects CaCx patients using the modified screening for distress survey tool [16], and Section D assessed how the perceived quality of the health care services affects adherence to RT. The modified brief adherence rating scale was adapted and was used in measuring the patient's adherence to radiation therapy under section E. The modified tool comprised of 7 questions ranging from Q24 to Q30. The modified brief adherence rating scale probed 7 parameters and each item was scored either good or poor. Adherence to radiation therapy treatment was graded as good if the patient scored above 3 questions on section E and was graded as poor if the patient scored 3 and below on questions in section E. Section F assessed how the stage of CaCx affects adherence to treatment and section H assessed the side effects of radiation therapy treatment.

2.4. Data Analysis

Data were analyzed using the IBM® Statistical Package for Social Sciences (SPSS®) for Windows version 24.0. The Chi-square test was used to determine an association between predictor variables (demographic factors, economic status, psychological distress, perceived quality of health care services, stage of cervical cancer and side effects of radiotherapy) and the outcome variable (adherence to radiation therapy treatment). For those cells having a frequency of less than 5 a Fisher's exact test was used. The Confidence Interval (CI) of (95%) was set and set level of significance at 5%. The binary logistic regression analysis was used to determine the true predictor of adherence to radiation therapy.

3. Results

The interview was conducted with 142 participants of whom more than half 55.6% of the participants were aged between 31 and 50 years. Close to half of the participants 46.5% had primary education, half of the participants 50.0% were unemployed and 57.0 % of the participants had a monthly income of less than K1000 as presented in Table 1.

Figure 1 shows that the majority 93% of the patients adhered to RT while 7% did not adhere to radiation therapy treatment.

Table 2 shows the overall assessments of patients' psychological distress when

Table 1. Demographic characteristics of the patients (n = 142).

Characteristics	Frequency	Percent
Age		
18 - 30 years	4	2.8%
31 - 50 years	79	55.6%
51 - 70 years	53	37.3%
71 - 90 years	6	4.2%
Marital status		
Single	17	12.0%
Married	75	52.8%
Widowed	39	27.5%
Divorced	11	7.7%
Education		
No formal education	9	6.3%
Primary	66	46.5%
Secondary	49	34.5%
Tertiary	18	12.9%
Occupation		
Civil servant	12	8.5%
Business	48	33.8%
Retired	2	1.4%
Unemployed	71	50.0%
General worker	6	3.2%
Private sector	2	1.4%
Non-governmental organization	1	0.7%
Economic status (Monthly income)		
Less than (K1000)	82	57.0%
Between (K1000 - K3000)	29	20.4%
Between (K3000 - K5000)	19	13.0%
Above (K5000)	12	8.5%

Table 2. Overall psychological distress among patients receiving radiation therapy (n = 142).

Characteristics	Frequency	Percentage
No distress	**85**	**59.9%**
Mild distress	17	11.9%
Severe distress	**40**	**28.2%**
Total	142	100%
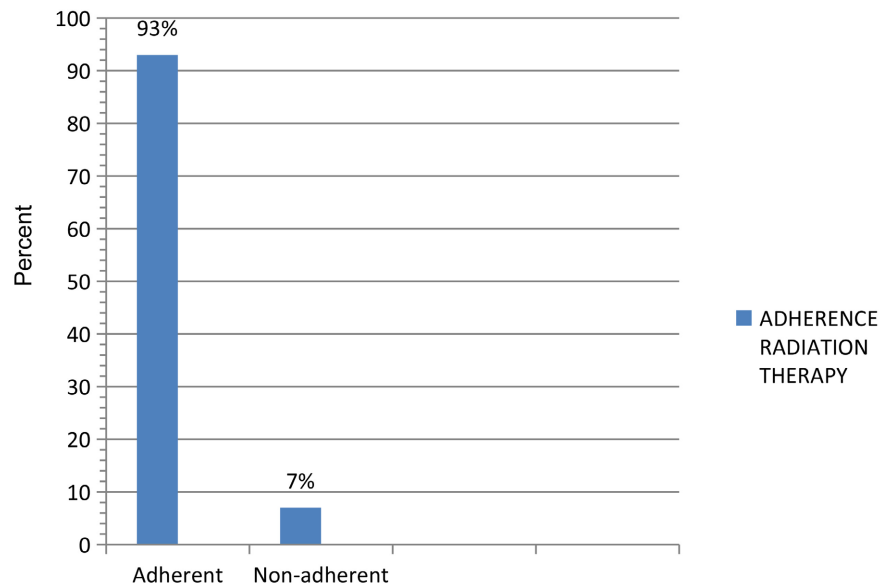
Figure 1. Patients' adherence to RT (n = 142).

receiving RT, and 59.9% of the patients did not experience any distress. The table also shows that 28.2% experienced severe distress while 11.9% experienced mild distress.

Table 3 shows that 134 (94%) participants perceived the health care system to be of good quality while 8 (6%) perceived it to be of poor quality.

Table 4 shows that there was a statistically significant association between adherence to RT treatment and the perceived quality of healthcare services as all the 8 participants who perceived the quality of healthcare services to be poor did not adhere to RT. However, there was no statistically significant association between adherence to RT and economic status, stage of disease, side effects and psychological distress.

Table 5 shows the Binary logistic regression analysis showed that holding other variables constant, patients who perceived to have received poor quality of health care services were 0.005 (99.5%) times less likely to adhere to RT treatment compared to those who had perceived to have received good healthcare services, and this effect was highly significant (OR: 0.005, CI: 0.004 - 0.062, P: < 0.001). Further analysis showed that patients with mild (OR: 2.9, CI: 0.11 - 74.1, P: 0.528) and severe (OR: 6.9, CI: 0.42 - 113.6, P: 0.177) psychological distress had increased odds of RT adherence. Similarly, the predictive effect of stage of disease at diagnosis on RT adherence was not statistically significant, although patients diagnosed with stage II (OR: 0.34, CI: 0.01 - 11.4, P: 0.546) and stage III (OR: 0.48, CI: 0.011 - 20.21, P: 0.69) cancer showed lower odds of RT adherence than patients diagnosed with stage I cancer.

4. Discussion of Findings

According to the study results, there was no significant association between adherence to RT (p > 0.05) and demographic factors, but in a study conducted by

Table 3. Perceived characteristics of quality of health care services (n = 142).

Characteristics	Frequency	Percentage
Good quality of health care services	134	94%
Poor quality of health care services	8	6%

Table 4. The relationship between adherence to RT and other factors (n = 142) using a cross tabulation analysis.

Characteristics		Adherence to RT		P value
		Adherent	Non-adherent	
Economic status (Monthly income)	<K1000	77 (93.9%)	5 (6.1%)	0.349
	K1000 - K3000	28 (96.6%)	1 (3.4%)	
	K3000 - K5000	17 (89.5%)	2 (10.5%)	
	>K5000	10 (83.3%)	2 (16.7%)	
Stage of disease at diagnosis	Stage I	16 (94.1%)	1 (5.9%)	1.000
	Stage II	79 (92.3%)	6 (7.1%)	
	Stage III	37 (92.5%)	3 (7.5%)	
Side effects	Mild	5 (83.3%)	1 (16.7%)	0.347
	Moderate	32 (91.4%)	3 (8.6%)	
	Severe	95 (94.1%)	6 (5.9%)	
Psychological distress	No distress	79 (92.9%)	6 (7.1%)	1.000
	Mild distress	16 (94.1%)	1 (5.9%)	
	Severe distress	37 (92.5%)	3 (7.5%)	
Perceived quality of health care services	Good	132 (98.5%)	2 (1.5%)	0.001
	Poor	0 (0%)	8 (100%)	

Table 5. Binary logistic regression analysis of the effect of psychological distress, perceived quality of healthcare services and disease stage on RT adherence.

Variables	Indicators	Adjusted estimates			p-value
		Odds Ratio	95% CI		
			Lower	Upper	
Level of psychological distress	No distress	Ref			
	Mild	2.85	0.109	74.12	0.528
	Severe	6.89	0.418	113.6	0.177
Perceived quality of healthcare	Good	Ref			
	Poor	0.005	0.004	0.062	<0.001
Disease stage at diagnosis	Stage I	Ref			
	Stage II	0.34	0.010	11.44	0.546
	Stage III	0.48	0.011	20.21	0.698

CI = Confidence Interval.

[9], age had a significant effect on adherence to RT which is contrary to this study as majority of patients adhered to RT regardless of their age group. In addition, education had no significant effect on adherence to RT as 93% of participants adhered to RT regardless of their level of education, this seems to differ with Kamnda [9] who found out that the level of education had a significant positive effect on adherence to RT, in his findings he alluded that patients with tertiary education were adherent to RT compared to those who had no formal education. More than half of the participants were in the age range of 31 - 50 years; this was expected as cervical cancer is common in the age group above 30. The prevalence of cervical cancer is higher among patients aged 30 years and above than those younger than 30 years [5]. The results of this study revealed that 93% of the patients adhered to RT while only 7% did not adhere to treatment. Almost all the patients in this study scored above 3 out of 7 using the modified brief adherence medication Scale. The level of adherence was surprisingly high compared to what was observed at the time of conceptualizing the study. One possible reason for the observed difference could be that the accessible population was limited because data collection was conducted during the Peak of the COVID-19 Pandemic. During this time there were travel restrictions and some patients were restricted from accessing hospital facilities a measure which was put by the hospital management to minimize the spread of Corona Virus. Probably what could have changed the situation is that the study was conducted in short period of time and observation for non-compliance was observed over a long duration. If the study was to be conducted over a long duration, probably the results could have been different. Similarly, a study conducted in the United States of America showed that the assumption they had at the beginning of the study was totally different from the results they obtained [17], they suggested that the change in their results was due to the short duration in which their study was conducted. Another reason could be that most of the patients interviewed had good moral, spiritual, physical and emotional support from their families, church denominations and significant others. The 7% that did not adhere to RT attributed it to experiencing poor health care services specifically the RT machine breakdown and COVID 19 outbreak. These factors interrupted the participant's schedule of treatment as they had stopped receiving RT for quite some time waiting for the machines to be fixed as well as for the institution to establish a workable schedule which could allow health workers to work amidst the pandemic in a safest possible way while preventing transmission of the virus. Only one patient had missed treatment due to poor health conditions, the participant was extremely sick and had multiple organ failures and hence could not continue due to a poor conditional health state. Mapanga *et al.* [18] also found out that some of the reasons some patients who could not adhere to radiation therapy in their study were actually due to health care systems.

There was a significant number of participants in the study that had experienced psychological distress similarly Radojevic *et al.*, [19] found that radiation

therapy treatment is likely to initiate mental and physical stress in patients such as anxiety, growing anger and hostility. Psychological factors are more likely to cause an impact on a patient's adherence behaviors and it can affect the female sexual response of which majority of the study participants 97.2% had experienced the loss of intimacy during RT indicating a great need for psychological counseling. The study findings indicate that 7% of participants who had perceived to have had experienced poor quality of health care services attributed them to the machine breakdown, COVID 19 outbreak, missing files and health-related problems. The majority 93% of the participants had perceived to have received good health care services and completed their prescribed treatment to RT successfully. In another study conducted by Ferreira da Silva *et al.*, [20] they observed that some health care services such as the time for treatment initiation mostly depended on the staging of the disease, treatment protocol definition, and the pre- radiation therapy referral, which included appraisal and pre chemo radiation tests resulting to treatment delay which leads to poor provision of health care services [20].

The binary logistic regression test was used to analyze the combined impact of dependent (adherence to RT) and independent variables (health care system), (psychological distress) and (stage of disease). All variables (dependent and independent variables) were coded. The results of the logistic regression analysis according to table 5 showed that holding other variables constant, patients who had perceived to have received poor quality healthcare services were 0.005 (99.5%) times less likely to adhere to RT treatment compared to those who had perceived receiving good quality healthcare care services, this effect was highly significant with the odds ratio of (OR: 0.005, CI: 0.004 - 0.062, P: <0.001). Further analysis showed that, controlling for the perceived quality of healthcare services and the stage of disease at diagnosis, patients who had experienced mild psychological distress and severe psychological distress had increased odds of RT adherence compared to patients with no psychological distress. However, this effect was not statistically significant. Similarly, taking other variables into account, the predictive effect of the cervical cancer stage at diagnosis on RT adherence was not statistically significant, although patients diagnosed with stage II cervical cancer and stage III cervical cancer showed lower odds of RT adherence than patients diagnosed with stage I cervical cancer. Therefore the effect of perceived quality of health care services was statistically significant ($p < 0.001$), implying that participants are likely to adhere to RT when provided with good quality of health care services such as good maintenance of machines and minimal abrupt stoppages to treatment schedules [11].

5. Conclusion

The study identified one factor (perceived quality of health care services) as being significant in influencing adherence to RT. This implies that in order to strengthen adherence to RT, there is a need for quality service provision which

could include good maintenance of radiation machines. Furthermore, the hospital should develop guidelines for follow-up in case of any disease outbreak so as not to interfere with patients' treatment schedules and appointments for reviews.

6. Limitations of the Study

This was a quantitative study; therefore it could not measure in-depth the information on factors that could affect adherence to RT from the cervical cancer patients' perspectives and further longitudinal and qualitative studies are needed especially on psychological effects which could not be fully explored in this study.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this article.

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Appendix. Semi-Structured Interview Schedule

Adherence to Radiation Therapy Treatment among Cervical Cancer Patients at Cancer Diseases Hospital Lusaka, Zambia.

Date of interview: _____

Place of interview: _____

Name of interviewer: _____

Serial number: _____

Instructions for the interviewer

1. Introduce yourself to the respondent.

2. Explain the reason for the interview.

3. Assure the respondent of confidentiality and anonymity

4. Do not write the name of the respondent on the interview schedule.

5. Fill in the most appropriate response to the question on the space provided.

6. Provide time for the respondent to ask questions at the end of the interview.

7. Refer the patients to a person who can answer the questions you are not sure of.

8. Thank the respondent at the end of each interview.

Section A: Demographic Data

1. How old are you?

2. What is your marital status?

a. Single   b. Married   c. Widowed   d. Divorced

3. What is your level of education?

a. No formal education   b. Primary   c. Secondary   d. Tertiary

4. What is your church denomination?

a. Catholic   b. Seventh Day Adventist   c. Jehovah witness

d. Pentecostal churches   e. Others (Specify)

Section B: Economic Factors

5. What is your occupation?

a. Civil Servant   b. Self-employed/Business   c. Retired

d. Unemployed   e. Other (specify)

6. How much is your monthly family Income?

a. >k5000   b. K3000 - k5000   c. K1000 - k3000   d. k1000 - No income

7. Who pays for your radiation therapy services and other treatment costs?

a. Out of pocket   b. National health insurance   c. Private insurance

d. Faith Based NGO   e. Social welfare   f. Others specifies:

8. What is the area of your residence?

a. Country   b. Province   c. District

d. Type of residential area (Premium, Medium, Low, Village)

Section C: Psychological Distress Using The Modified Screening For Distress Survey Tool.

9. Did you have any loss of interest in life when receiving RT?

a. Yes   b. No

10. Did you experience any lack of sleep or have difficulties in sleeping when

receiving RT?

a. Yes   b. No

If yes to the above question, how many times did you experience that?

_____

11. Did you experience any suicidal thoughts during the time of receiving RT?

a. Yes   b. No

12. Did you experience any anxiety when receiving RT treatment?

a. Yes   b. No

13. Did you feel like you were depressed when receiving RT treatment?

a. Yes   b. No

14. How anxious were you feeling about receiving radiotherapy treatment?

a. Very anxious   b. Not anxious at all

15. Did you experience any loss of interest in intimacy or sexuality when receiving RT?

a. Yes   b. No

16. Did you experience any frustration or anger when receiving RT?

a. Yes   b. No

17. Did the changes in appearance when receiving RT affect you in any way?

a. Yes   b. No

If yes to the above question, how did they affect you?

_____

18. Did you ever experience being sad when receiving RT?

a. Yes   b. No

Section D: Health Care System

19. Did you ever miss your RT treatment due to the machines breaking down?

a. Yes   b. No

If the answer is to question 19 is yes, how many times did you miss your treatment?

20. Have you ever missed your treatment due to any other health related problems?

a. Yes   b. No

If yes to the above question specify………………..,…..……….

21. Did you ever stop your treatment due to covid19 out break?

a. Yes   b. No

If yes to the above question, how many times did to abscond?

22. Did you ever miss your treatment due to missing blocks?

a. Yes   b. No

23. Did you ever miss your treatment due to your missing file?

a. Yes   b. No

Section E: Adherence to Radiation Therapy Using A Modified Brief Adherence Rating Scale

24. How many fractions of radiation therapy treatment were prescribed for you?

25. How many of the prescribed fractions of RT did you receive?

(If answers to question 19 and 20 are different), what was the reason for not receiving all the prescribed fractions?

26. For how long were you supposed to receive the prescribed fractions?

27. Were all the fractions received within the specified time?

a. Yes   b. No

(If the answer to question 27 is no), what was the time difference and reasons for not following the schedule?

28. Did you ever miss radiation therapy treatment due to personal reason?

a. Yes   b. No

(If yes to question 23), what was the reason of missing your RT treatment?

29. How many days were you away from your radiation therapy treatment?

30. Did you ever at any point in time during your RT treatment feel like stopping half way?

a. Yes   b. No

(If yes to question 25), what was the reason?

Section F: Stage of Cervical Cancer

31. Where you told the stage of your disease at diagnosis?

a. Yes b. No

(If yes to question 31), what was the stage of your disease?

(If No to question 26) interviewer to record the stage of the patient's disease according to the patients file?

32. Was there any treatment administered to you prior to receiving radiation therapy treatment?

a. Yes   b. No

(If yes to question 32), what treatment was administered to you?

Check in the file if participant does not know the answers to question 31 and 32.

33. If there was any treatment, was there any side affect you experienced?

a. Yes   b. No

If yes to question 28 what were the side effects that you experienced?

Section H: Side Effects of Radiation Therapy

34. Did you experience any side effects during receiving radiation therapy treatment?

a. Yes   b. No

(If yes to question 29), what were the side effects that you experienced?

Were the side effects the same as your prior knowledge before starting RT?

a. Yes   b. No

35. At what point did you start experiencing the side effects?

36. How severe were the side effects?

a. Mild *i.e.* vomiting, nausea, diarrhoea.

b. Moderate *i.e.* fatigue, skin problems, low blood cell counts..

c. Severe *i.e.* vaginal stenosis, premature menopause, radiation cystitis

d. Others specify……………………………………………………….

37. Did you ever think of stopping receiving RT due to the side affects you

experienced?

a. Yes   b. No

If yes to question 37; were there other special reasons for that facilitated your thoughts to stop receiving RT?

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We have reached the end, thank you very much for your participation.