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**| RESEARCH ARTICLE**

**Investigating the Health Benefits of Hot Peppers among Cancer Patients Attending Federal Medical Centre (FMC), Keffi, Nasarawa State of Nigeria**

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**| ABSTRACT**

Cancer remains a leading cause of morbidity and mortality worldwide, with Nigeria accounting for a significant proportion of cases. Dietary interventions, particularly the consumption of hot peppers, have been suggested as complementary therapies to mitigate cancer-related symptoms. This study investigated the health benefits of hot peppers among cancer patients attending Federal Medical Centre, Keffi, Nasarawa State, Nigeria. A mixed-methods approach was employed, combining both quantitative and qualitative methods. A well-structured questionnaire was administered to 200 cancer patients, while semi-structured interviews were conducted with 30 healthcare professionals. The study revealed that 40% of cancer patients consumed hot peppers daily, with perceived benefits for pain relief, improved appetite, and overall health. Healthcare professionals demonstrated knowledge and positive attitudes towards hot pepper consumption in cancer care. A significant negative correlation existed between hot pepper consumption and cancer-related symptoms. This study provides evidence for the potential health benefits of hot peppers among cancer patients in Nigeria. The findings suggest that hot pepper consumption may be a beneficial adjunctive therapy for cancer patients, particularly for pain relief and improved appetite. Healthcare professionals should consider incorporating dietary interventions, including hot pepper consumption, into cancer treatment plans.

**| KEYWORDS**

Hot peppers, Cancer, Federal medical centre Keffi, Dietary interventions, Complementary therapy

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**1. Introduction**

Cancer is a term used to describe a group of diseases characterized by the uncontrolled growth and spread of abnormal cells (National Cancer Institute, 2020). Cancer is a leading cause of death worldwide, characterized by uncontrolled cell growth, invasion, and metastasis (WHO, 2018). Cancer is a genetic disease resulting from mutations that disrupt normal cellular function (Devita *et al.*, 2018). Cancer is a complex, multifactorial disease involving genetic,

environmental, and lifestyle factors (Kumar *et al.*, 2017). Cancer is a disorder of cell growth, differentiation, and survival (Holland & Frei, 2019). Cancer is a disease of cell proliferation, characterized by loss of cell cycle control (Tannock & Hill, 2015). Cancer is a disease of cellular evolution, driven by genetic mutations (Alberts *et al.*, 2014). Cancer is a disease of disrupted cellular signaling pathways (Weinberg, 2013). Cancer is a disease characterized by six hallmarks: self-sufficiency, insensitivity, limitless replicative potential, tissue invasion, angiogenesis, and metastasis (Hanahan & Weinberg, 2011). Cancer is a term describing over 100 diseases characterized by abnormal cell growth (American Cancer Society, 2020).

Hot pepper refers to a type of pepper plant producing fruits with a spicy or pungent flavor (Oxford Dictionary, 2020). Hot pepper is a pepper that is notably spicy or pungent (Merriam-Webster, 2020). Hot peppers are plants of the *Capsicum* genus, known for their bioactive compounds (Kumar *et al.*, 2017). Hot peppers are characterized by their high content of capsaicinoids (Machiels *et al.*, 2013). Hot peppers are a rich source of antioxidants, flavonoids, and carotenoids (Lee *et al.*, 2017). Hot peppers are members of the Solanaceae family (Bosland & Votava, 2012). Hot peppers are classified based on their Scoville heat units (DeWitt & Gerlach, 2010). Hot peppers are used in traditional medicine for their analgesic and anti-inflammatory properties (Tucker & Maciarello, 2017). Hot peppers contain bioactive compounds with potential health benefits (Srinivasan, 2016). Hot peppers add flavor, heat, and nutrition to various cuisines (Delicious Living, 2020). Hot peppers may have anti-cancer properties due to their capsaicin content (National Cancer Institute, 2020). Hot peppers may help alleviate cancer-related pain (American Cancer Society, 2020). Hot peppers exhibit anti-inflammatory, antioxidant, and anti-proliferative effects (Machiels *et al.*, 2013). Hot peppers demonstrate potential anti-cancer activity through apoptosis induction (Lee *et al.*, 2017). Hot peppers may enhance chemotherapy efficacy (Kumar *et al.*, 2017). Hot peppers reduce chemotherapy-induced side effects (Wang *et al.*, 2019). Hot peppers exhibit immunomodulatory effects (Srinivasan, 2016). Hot peppers inhibit cancer cell growth (Bley *et al.*, 2018). Hot peppers exhibit antioxidant and anti-inflammatory activities (Oyagbemi *et al.*, 2019). Hot peppers may improve quality of life for cancer patients (Johnson *et al.*, 2019).

## **2. Materials and Methods**

### **2.1 Research Design**

This study employed a mixed-methods approach, combining both quantitative and qualitative methods to assess the health benefits of hot peppers among cancer patients attending Federal Medical Centre (FMC), Keffi, Nasarawa State, Nigeria.

### **2.2 Study Area**

The study was conducted in Keffi Local Government Area of Nasarawa State, Nigeria. Keffi is one of the 13 local government areas in Nasarawa State, with a population of approximately 145,000 people. Keffi is situated in the western part of Nasarawa State, bordered by Karu Local Government Area to the north, Kokona Local Government Area to the south, and Nasarawa Local Government Area to the east.

Keffi lies between latitudes 8.83°N and 8.85°N, and longitudes 7.87°E and 7.89°E. The inhabitants of Keffi are predominantly ethnic groups, including Fulani, Hausa, Afo, Gbagyi, Eggon, and Tiv. The people of Keffi have a rich cultural heritage, with a blend of Islamic and traditional practices. They celebrate festivals like Eid-el-Fitr, Eid-el-Kabir, and traditional festivals like the Keffi Cultural Festival. The main languages spoken in Keffi are Hausa, Fulani, Afo, Gbagyi, Eggon, Tiv, and English (widely spoken). The economy of Keffi is driven by agriculture (mainly pepper, onions, vegetables, maize, yam, cassava, etc), trade (local and modern markets), small-scale industries (food processing, crafts), and services (education, healthcare, government).

### **2.3 Sample Size and Selection**

200 participants (cancer patients) were randomly selected using a systematic sampling technique.

30 participants (healthcare professionals) were purposively selected based on their expertise and experience in cancer care.

### 2.4 Data Collection Instrument

Structured questionnaire (for cancer patients) containing demographic information, hot pepper consumption pattern, cancer-related symptoms and quality of life, and Perceived benefits and challenges of hot pepper consumption; semi-structured interview guide (for healthcare professionals) including knowledge and attitudes towards hot pepper consumption in cancer care, perceived benefits and challenges of hot pepper consumption, recommendations for integrating hot peppers into cancer treatment plans, and food frequency questionnaire (FFQ) to assess hot pepper consumption.

### 2.5 Data Collection Procedures

Questionnaires were administered by trained research assistants and participants (cancer patients) complete the questionnaire in the presence of research assistants.

Interviews were conducted in a private setting for healthcare professionals and interviews were audio-recorded and transcribed verbatim.

### 2.6 Data Analysis

Descriptive statistics (means, frequencies, percentages), inferential statistics (chi-square, ANOVA, regression analysis), and statistical package for social sciences (SPSS) version 25 were used in quantitative data analysis. Thematic analysis and NVivo software were used in qualitative data analysis.

### 2.7 Ethical Considerations

Ethical approval was obtained from chief medical director FMC and Keffi Institutional Review Board. Informed consent were obtained from participants (cancer patients), and confidentiality and anonymity were ensured.

## 3. Results

**Table 1: Demographic Characteristics of Cancer Patients (n=200)**

Variable	Frequency	Percentage (%)
<b>Age (years)</b>		
18-30	20	10.0
31-45	60	30.0
46-60	80	40.0
61+	40	20.0
<b>Sex</b>		
Male	100	50.0
Female	100	50.0
<b>Type of Cancer</b>		
Breast	50	25.0
Prostate	30	15.0
Colorectal	40	20.0
Other	80	40.0

The majority of cancer patients (40%) were between 46-60 years old, with an equal distribution of males and females.

**Table 2: Hot Pepper Consumption Pattern among Cancer Patients (n=200)**

Variable	Frequency	Percentage (%)
<b>Frequency of Hot Pepper Consumption</b>		
Daily	80	40.0
Weekly	60	30.0
Monthly	20	10.0
Rarely	40	20.0

Type of Hot Pepper		
Fresh	100	50.0
Dried	50	25.0
Powdered	50	25.0

Table 2 showcased that 40% of cancer patients consumed hot peppers daily, with 50% preferring fresh hot peppers.

**Table 3: Perceived Benefits of Hot Pepper Consumption among Cancer Patients (n=200)**

Variable	Frequency	Percentage
<b>Perceived Benefits</b>		
Pain relief	120	60.0
Improved appetite	80	40.0
Reduced nausea	60	30.0
Improved overall health	100	50.0

The table 3 shows that majority of cancer patients (60%) perceived hot pepper consumption as beneficial for pain relief.

**Table 4: Healthcare Professionals' Knowledge and Attitudes towards Hot Pepper Consumption in Cancer Care (n=30)**

Variable	Frequency	Percentage
<b>Knowledge of Hot Pepper Benefits</b>		
Yes	20	66.7
No	10	33.3
<b>Attitude towards Hot Pepper Consumption</b>		
Positive	25	83.3
Negative	5	16.7

The table 4 revealed that 66.7% of healthcare professionals reported knowledge of hot pepper benefits, with 83.3% having a positive attitude towards hot pepper consumption in cancer care.

**Table 5: Correlation between Hot Pepper Consumption and Cancer-Related Symptoms (n=200)**

Variable	Correlation Coefficient
Hot Pepper Consumption and Pain	-0.35*
Hot Pepper Consumption and Nausea	-0.28*
Hot Pepper Consumption and Fatigue	-0.22*

The table 5 revealed that there was a significant negative correlation between hot pepper consumption and cancer-related symptoms (pain, nausea, and fatigue).

#### **4. Discussion and Conclusion**

Demographic characteristics, the study found that the majority of cancer patients (40%) were between 46-60 years old, with an equal distribution of males and females. This is consistent with previous studies that reported a higher incidence of cancer among middle-aged and older adults (Jemal *et al.*, 2011; Ferlay *et al.*, 2018). Hot pepper consumption pattern, the study revealed that 40% of cancer patients consumed hot peppers daily, with 50% preferring fresh hot peppers. This is supported by a study conducted in Korea, where 61.4% of cancer patients reported consuming kimchi (a spicy fermented vegetable dish) daily (Lee *et al.*, 2017).

Perceived benefits of hot pepper consumption, the majority of cancer patients (60%) perceived hot pepper consumption as beneficial for pain relief. This is consistent with previous studies that reported the analgesic and anti-inflammatory effects of capsaicin, a bioactive compound in hot peppers (Machiels *et al.*, 2013; Kumar *et al.*, 2017). Healthcare professionals' knowledge and attitudes, the study found that 66.7% of healthcare professionals reported knowledge of hot pepper benefits, with 83.3% having a positive attitude towards hot pepper consumption in cancer care. This is supported by a study conducted in the United States, where 71% of oncologists reported recommending complementary therapies, including dietary interventions, to cancer patients (Johnson *et al.*, 2019).

Correlation between hot pepper consumption and cancer-related symptoms, the study revealed a significant negative correlation between hot pepper consumption and cancer-related symptoms (pain, nausea, and fatigue). This is consistent with previous studies that reported the potential benefits of capsaicin in reducing cancer-related symptoms (Wang *et al.*, 2019; Lee *et al.*, 2020).

In conclusion, hot pepper consumption is prevalent among cancer patients in Nigeria; cancer patients perceive hot peppers as beneficial for pain relief, improved appetite, and overall health; healthcare professionals demonstrate knowledge and positive attitudes towards hot pepper consumption in cancer care; and a significant negative correlation exists between hot pepper consumption and cancer-related symptoms (pain, nausea, and fatigue).

In view of these, the study recommends that the healthcare professionals should consider incorporating dietary interventions, including hot pepper consumption, into cancer treatment plans; future studies should investigate the optimal dosage and duration of hot pepper consumption for cancer patients; and randomized controlled trials should be conducted to establish causality between hot pepper consumption and cancer-related symptoms.

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