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Clinicopathological Characteristics of Patients Having Nasopharyngeal Carcinoma Treated with Radiotherapy in Benghazi Libya

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Keywords: Nasopharyngeal Carcinoma (NPC); Histopathological type; Radiotherapy; Concurrent chemotherapy.

Abstract

Background: Nasopharyngeal Carcinoma (NPC) is a rare type of head and neck cancer that originates in the nasopharynx. Despite its rarity, NPC is associated with significant morbidity and mortality. Radiotherapy is the primary treatment modality for NPC; however, concerns regarding treatment failure rates and associated complications persist.

Aim: This study aims to evaluate the clinicopathological characteristics of NPC in our region retrospectively and to identify radiotherapy treatment strategies based on the clinical stage of the patients.

Materials and Methods: The clinicopathological data of 51 patients with Nasopharyngeal Carcinoma (NPC) who received radiotherapy between January 2018 and December 2022 were analyzed retrospectively. The study was conducted in the Department of Radiotherapy at the National Cancer Center, Benghazi, Libya. Parameters assessed included gender, age, histopathological type, clinical stage, and type of therapy (radiotherapy, concurrent chemotherapy, curative, and palliative therapy). Data collection and descriptive analysis were performed using Microsoft Excel.

Results: Among the 51 patients, the majority were male (68.6%) compared to female (31.4%), resulting in a male-to-female ratio of 2.5:1. The age range of patients was 10 to 79 years, with a mean age of 47.8 years. The highest prevalence of cases was observed in the age group of 60-69 years (25.49%). The most common histological type of NPC was non-keratinizing undifferentiated squamous cell carcinoma (NKUD), accounting for 84.3% of cases. Many patients were diagnosed at advanced stages, with 50.9% at stage IV and 27.45% at stage III. The proportion of NKUD increased with advancing clinical stage. This study highlights a predominant reliance on 3DCRT and combination therapies, suggesting a trend towards integrated treatment approaches in clinical practice.

Conclusion: Our findings indicate that advanced clinical stages are significantly associated with non-keratinizing undifferentiated squamous cell carcinoma in NPC patients. The histopathological classification and clinical staging of NPC may be critical tools for guiding treatment decisions.

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Introduction

Nasopharyngeal Carcinoma (NPC) is a distinct type of head and neck cancer that arises from the nasopharyngeal epithelium, characterized by its unique anatomical location and histological features [1]. It is most prevalent in Southeast Asia and North Africa, with varying incidence rates across various geographical regions [2]. The etiology of NPC is multifactorial, with Epstein-Barr Virus (EBV) infection, genetic predisposition, and environmental factors, including exposure to carcinogens such as formaldehyde, wood dust, and firewood fumes, alongside dietary factors like the consumption of salted fish rich in nitrosamines playing significant roles in its pathogenesis [3].

Radiotherapy remains the cornerstone of treatment for NPC, often employed as the primary modality due to its anatomical location and the tumor's inherent radiosensitivity. While significant advancements in radiotherapy techniques have improved local control and overall survival rates, the clinical outcomes can vary widely among patients [4]. Understanding the clinicopathological characteristics of patients with NPC is crucial for optimizing treatment protocols and predicting prognosis [5]. RT is often sufficient for early-stage NPC, yielding a 5-year Overall Survival (OS) rate of 87-96% for Stages I and II. However, in advanced stages, Concurrent Chemotherapy (CCRT) has been shown to enhance treatment efficacy, reducing the risk of distant metastasis and improving overall prognosis. Despite advancements from conventional Two-Dimensional Radiotherapy (2D-RT) to more sophisticated approaches like Three-Dimensional Conformal Radiotherapy (3DCRT) and Intensity-Modulated Radiotherapy (IMRT), the management of NPC still poses significant challenges 6,7]. Patients frequently experience acute toxicities and long-term complications, which can adversely affect their quality of life. The clinical outcomes of NPC are also significantly influenced by numerous prognostic factors, including disease stage, histological subtype, age, and gender [8,9].

This study explores the clinicopathological characteristics of NPC patients treated with radiotherapy in Benghazi, Libya, focusing on demographics, clinical staging, and treatment modalities employed. By providing insights into these characteristics, the research seeks to contribute to the existing body of knowledge on the management of NPC in this region and guide future research endeavors.

Materials and Methods

Study Design and Inclusion Criteria

This retrospective study was conducted using data collected from the archives of the Department of Radiotherapy, National Cancer Center, Benghazi, Libya, covering the period from January 2018 to December 2022. The inclusion criteria for the study were as follows: (1) Histologically confirmed diagnosis of nasopharyngeal carcinoma (NPC); (2) No history of previous malignancies; (3) No prior cancer treatments; (4) Absence of serious comorbid conditions (5) Successful completion of radiotherapy with or without chemotherapy; (6) patients aged 18 years or older; and (7) No gender restrictions.

A total of 51 patients with NPC who met the inclusion criteria were included in the analysis. Age was categorized into groups above and below 50 years. Patients were also classified by clinical stage according to the seventh edition of the Union for International Cancer Control/American Joint Committee on Cancer (UICC/AJCC) staging system.

Treatment Protocols

Patients with Nasopharyngeal Carcinoma (NPC) underwent treatment according to the established guidelines. The treatment types Included 3D-Conformal Radiotherapy (3DCRT), combination therapies (radiotherapy and chemotherapy), and neoadjuvant approaches. The nasopharyngeal region received a total planned dose of 68-70 Gy. Neoadjuvant chemotherapy regimens included (cisplatin 25 mg/m² IV on days 1-3, and 5-fluorouracil 750 mg/m² continuously IV on days 1-5).

Data were analyzed using Microsoft Excel, with descriptive statistics employed to summarize the clinicopathological characteristics of the patient cohort. The frequency of each treatment type was calculated, along with the percentage of patients receiving curative or palliative treatments

Result

Gender Distribution

The study population consisted of 51 patients with Nasopharyngeal Carcinoma (NPC). In this study, the gender difference was remarkable. The gender distribution showed a predominance of male patients, accounting for 68.63% (n=35) of the cases, while female patients represented 31.37% (n=16) of the cohort, with a M: F ratio of 2.5:1.1 (Figure 1).

Age distribution

The age of the NPC patients ranged from 10 to 79 years, with a mean age of 47.8 ± 16.4 years with 47.7 for men and 45.7 for women. The peak age was found to be 60-69 years in both genders, with the highest incidence in the 6th decade of life. The second highest number of cases 12 (23.53%), was reported in the 50-59 years age group, followed by the 40-49 years age group, which had 10 (19.61%) cases. The 10-19 years and 70-79 years age groups both had 3 (5.88%) cases each, representing the lowest incidence of NPC in the study population as presented in Table 1.

Clinicopathological Characteristics of NPC Patients

The analysis of histopathological subtypes revealed that the non-keratinizing squamous cell carcinoma, undifferentiated type (NKUD) was the predominant variant, observed in 43 (84.3%) of the NPC patients. This was followed by keratinizing squamous cell carcinoma (KSC) in 5 (9.8%) cases, while the least common variant was non-keratinizing carcinoma, differentiated type (NKD), observed in 3 (5.9%) patients (Table 2). Among all patients, 86.27%had lymph node involvement (N1, N2, and N3). 37.25% of patients were metastatic (M1) at the time of diagnosis. The most common sites of metastasis were bone, liver, lymph nodes, and lung. The majority of patients, 78.43%, had an advanced stage (III, IVa, IVb, IVc) of NPC at the time of diagnosis. While, early-stage disease (stages I and II) was found in 3 (5.88%) and 8 (15.69%) respectively as shown in Table 2.

Treatment Modalities of NPC

The most common treatment modality, 3D-Conformal Radiotherapy (3DCRT), is used in 50 cases (98.03%), a high frequency. This suggests that 3DCRT is the primary treatment approach for NPC patients to enhance the effectiveness of radiotherapy and improve patient outcomes. The second most frequent treatment, concurrent chemotherapy is used in 42 cases (82.35%). For more aggressive or advanced cases of NPC the use of neoadjuvant and concurrent therapy in 12 cases (23.5%) and neo-

adjuvant alone in 5 cases (9.8%). The most widely used drugs in neoadjuvant (induction) and palliative chemotherapy for Nasopharyngeal Carcinoma (NPC) are Cisplatin combined with 5-FU, Cisplatin combined with gemcitabine, and Carboplatin combined with 5-FU. The fact is that all metastatic patients (37.3%) received Curative/Palliative Treatment,while 23.5% did not receive curative treatment.

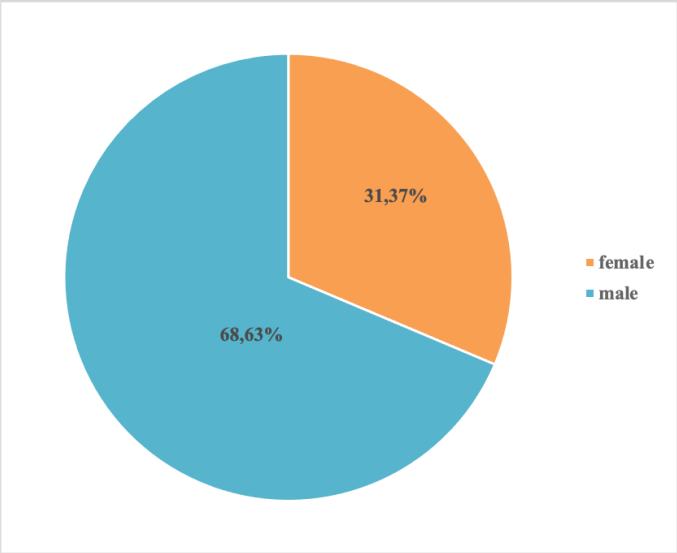

Figure 1: Gender distribution among studied cases.

Table 1: Distribution of NPC Cases by Age Group.

Age group	No. of NPC cases N(%)
10-19 Yrs	3 (5.88%)
20-29 Yrs	6 (11.76%)
30-39 Yrs	4 (7.84%)
40-49 Yrs	10 (19.61%)
50-59 Yrs	12 (23.53%)
60-69 Yrs	***13 (25.5%)***
70-79 Yrs	3 (5.88%)
Total	51 (100%)

Table 2: Clinicopathological Characteristics of NPC Patients in Our Study.

Histopathological Type	
NKUD	43 (84.3%)
KSC	5 (9.8%)
NKD	3 (5.9%)
TNM Classification	
T1	5 (9.8%)
T2	15 (29.4%)
T3	11 (21.6%)
T4	20 (39.2%)
N0	7 (13.7%)
N1	15 (29.4%)
N2	24 (47.1%)
N3	5 (9.8%)
M0	32 (62.7%)
M1	19 (37.3%)
Cancer Stage	
I	3 (5.9%)
II	8 (15.7%)
III	22 (43.1%)
IVa	10 (19.6%)
IVb	5 (9.8%)
IVc	3 (5.9%)

Abbreviation: T: Tumor size and extent; N: Lymph node involvement; M: Metastasis.

Table 3: Treatment modalities of NPC Patient.

Treatment type	Frequency	Percentage %
3D-conformal radiotherapy 3DCRT	50	98.03%
Radiotherapy and chemotherapy	42	82.35%
Neoadjuvant and concurrent	12	23.5%
Neoadjuvant alone	5	9.8%
Curative/Palliative Treatment:		
Received	37	72.54%
Not Received	14	23.5%

Discussion

This study aimed to retrospectively evaluate the clinicopathological profile of NPC in Benghazi; Libya based on gender, age, clinical stage, and type of therapy. According to the data presented above, Males exceed females by a ratio of 2.5:1.1, as indicated by the data above. A similar trend was observed in other study [10]. The resemblance could be the result of shared risk factors similarities for nasopharyngeal carcinoma. The age of patients with NPC in this study ranged from 10-79 years with the highest peak in the was in the 6th decade of life. This pattern is consistent with a study done by Xu, Y. et al found the highest number of patients in the 5th and 6th decades of life [11]. NPC in older age groups has been shown to present a diagnostic and therapeutic problem and prognosis is typically less promising as indicated in another study [12].

Regarding the predominance of the histopathological type according to WHO classification, our data revealed that Nonkeratinizing undifferentiated Nasopharyngeal Carcinoma (NK NPC) is the predominant histological type 43 (84.3%). The commonality of WHO type III can also be noted in other studies carried out by [13]. The studied cases present in an advanced stage of the disease (stage III, IVA, B, and C). Such findings were reported in other research [14]. This finding might be because NPC is difficult to diagnose early due to its invisible location and vague, non-specific symptoms, and the lack of screening programs as well as, the low levels of awareness [15]. The key findings of this study reveal a significant preference for 3D-conformal radiotherapy (3DCRT) as a primary treatment modality consistent with previous studies that advocate for its efficacy in providing targeted radiation while minimizing damage to surrounding healthy tissues [16]. The significant percentage of patients receiving combination therapies provide valuable evidence regarding the combination of radiotherapy with chemotherapy as the primary therapy modality for the treatment of advanced NPC. A similar study by Huncharek, M. et al showed that the addition of chemotherapy to standard radical radiation therapy for locoregionally advanced nasopharyngeal cancer increases both disease-free/progression-free and overall survival by 19 to 40% [17].

Conclusion

This study highlights the clinicopathological profile of Nasopharyngeal Carcinoma (NPC) in Benghazi, Libya, revealing a male predominance and an age distribution peaking in peak in the sixth decade of life. The findings indicate that nonkera-

tinizing undifferentiated nasopharyngeal carcinoma is the most common histological type, with patients often presenting at advanced stages due to diagnostic challenges. The study emphasizes the efficacy of 3D-Conformal Radiotherapy (3DCRT) as a preferred treatment modality, supported by evidence of improved outcomes when combined with chemotherapy. These insights contribute to a better understanding of NPC in this region and reinforce the need for increased awareness and early detection strategies.

Limitations: This study has limitations. The major limitation is the retrospective nature, which limits the strength of conclusions. Another limitation is the small number of patients limiting meaningful subset analyses to guide patient selection.

Future work: Further research on molecularly targeted therapies to gain insight into how best we can combine sequence and utilize the different treatment modalities, improving survival outcomes for the patients.

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