

# Prevalence, Clinical Presentation, and Histopathological Patterns of Nasopharyngeal Carcinoma At Kilimanjaro Christian Medical Centre, Tanzania

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## ABSTRACT

**Background:** Nasopharyngeal carcinoma (NPC) is a relatively common head and neck cancer in our environment and one of the most challenging malignancies to diagnose early. A definitive diagnosis relies on histopathological studies via biopsy, with treatment involving radiotherapy and chemotherapy based on WHO clinical staging. This study aims to determine the prevalence, clinical presentation, and histopathological patterns of NPC among patients at Kilimanjaro Christian Medical Centre (KCMC).

**Methods:** Pathological and clinical records for patients from 2012 to 2022 were identified and reviewed. Data were collected and analysed using Statistical Package for Social Sciences (SPSS) version 20.

**Results:** Out of 1598 patients with head and neck cancers studied 170 were NPC, resulting in a prevalence of 10.6% among patients diagnosed with head and neck malignancies. The majority of NPC patients (91.3%) presented with nasal obstruction, 85.0% had epistaxis, 87.5% experienced hearing loss and tinnitus, and 83.8% reported otalgia. A neck mass was observed in 96.3% of cases, while cranial nerve V and VI deficits were seen in 13.7%. Other symptoms included dysphagia (26.3%), change in voice (35.0%), and headache (97.5%). Histopathologically, 78.8% had non-keratinizing undifferentiated carcinoma (type III), 18.8% had keratinizing undifferentiated carcinoma (type II), and 2.5% had keratinizing squamous cell carcinoma (type I).

**Conclusion:** NPC is common in the middle productive and reproductive age groups, negatively impacting socioeconomic output. Neck mass, hearing loss, tinnitus, and headache were the most frequent symptoms, with non-keratinizing undifferentiated carcinoma (type III) being the predominant histopathologic variant, similar to patterns in endemic areas worldwide.

**Keywords:** clinical presentation, histopathological pattern, nasopharyngeal carcinoma, Moshi, Kilimanjaro, Tanzania

## INTRODUCTION

Nasopharyngeal carcinoma (NPC) refers to a malignant tumor arising from the epithelial cells that cover the surface lining of the nasopharynx [1]. The nasopharynx is the portion of the pharynx that is behind the nasal cavity and extends below the uvula. Its main function is to connect the nasal passage to the rest of the respiratory system. Eustachian tube openings and adenoids are the structures found in the nasopharynx, and nasopharyngeal carcinoma is one of the malignant conditions found in this anatomic region [2].

Globally, there is a steady increase in new cases of NPC, and males are more affected than females by 2:1 [3]. NPC is common in Southern China, with an incidence rate of 25 cases per 100,000, and in the Mediterranean basin area, including Southern Italy, Greece, Turkey, and North Africa, with an incidence rate of approximately 5 cases per 100,000 [4]. The treatment for NPC depends on the stage and histopathologic type, which can either be radiotherapy, surgery, chemotherapy, or combined thereapy [4].

Factors that are associated with the development of NPC could either be genetic predispositions<sup>5</sup>, environmental factors such as consuming salted and smoked fish, tobacco use, alcohol intake, occupational exposure to wood dust, or a previous history of head and neck irradiation [6]. Epstein barr virus (EBV) infection is also implicated in developing NPC [7].

Clinical presentation during diagnosis varies; most patients are asymptomatic, and only about 1% of them are diagnosed during health screening where abnormal EBV serology is detected. Eighty percent of patients with NPC are diagnosed between the ages of 30 and 60 [7]. Neck lumps are the most common presentation in NPC, accounting for about 96.3%, which can be due to nodal metastasis. Other presentations are blood-stained saliva or sputum (41.3%), epistaxis (85%), hearing loss with tinnitus (87.5%), and nasal obstruction. Headache is common in patients with intracranial disease extension and cranial nerve palsies (13.7%). NPC is diagnosed by histopathological confirmation of a nasopharynx biopsy [8].

Based on histopathological presentations, the World Health Organization (WHO) classified NPC into three categories: Type I keratinizing squamous cell carcinoma, which accounts for up to 25% of NPC cases. Type II keratinizing undifferentiated carcinoma and Type III non-keratinizing undifferentiated carcinoma account for up to 80% of cases [1].

Herein, the authors aim to determine the prevalence, clinical presentation, and histopathological characteristics of NPC among patients attending a tertiary referral facility in northern Tanzania.

## MATERIAL AND METHODS

### Study Design

This was a descriptive cross-sectional hospital based study conducted among patients who attended Kilimanjaro Christian Medical Centre (KCMC) hospital, and were diagnosed with NPC from 2012 to 2022.

### Study population, sample size, and sampling

The study population included patients who attended the otorhinolaryngology department of the KCMC hospital during the study period from 2012 to 2022. KCMC is a tertiary referral hospital located in the Kilimanjaro region of northern Tanzania. The hospital offers both general and specialized services, including otorhinolaryngology and oncology care. The convenience sampling method was used to obtain study participants, and all patients with NPC who attended KCMC and met inclusion criteria were

enrolled in the study. The inclusion criteria encompassed subjects with complete data, that is, patients diagnosed with NPC at KCMC with complete registry information such as clinical presentations and histopathological diagnosis. Conversely, the exclusion criteria excluded all patients with diagnoses of NPC whose information, such as clinical presentations and histopathological data, was missing.

#### **Data collection methods and tools**

Data of all patients diagnosed with head or neck malignancies who sought care from 2012 to 2022 at the otorhinolaryngology department of the KCMC were searched using the extraction tool by considering protocol and guidelines for data abstraction.

#### **Study variables**

The independent variables in this study were age, sex, residence, smoking, and alcohol intake, and the dependent variables were clinical presentation, and histopathological diagnosis.

#### **Data analysis**

The statistical package for social sciences, IBM SPSS version 20, was used to conduct the analysis. Descriptive statistics were used, involving frequency and percentages for categorical variables, while mean (SD) and median (IQR) were used to summarize numerical variables. Statistical tests like Pearson Chi-square or Fisher's exact were employed to compare categorical variables.

## **RESULTS**

### **Social demographic, and clinical characteristics of the participants**

A total of 274 patients with NPC were recorded during the study period. However, 104 patients had incomplete information, thus, excluded. Therefore, 170 patients met the eligibility criteria for analysis. The prevalence of NPC was calculated from a total of 1598 patients with head and neck cancer who attended KCMC during the study period. Of these, 170 patients had NPC, giving a prevalence of 10.6% (**Figure 1**).

There were one hundred and thirteen (66.5%) males, the age of participants ranged from 14 to 93 years, with a median age of 48.0 years. Most of them were between 34 and 53 (43.8%) years old, followed by 54 and 73 (30.0%) years old. The majority were from a local region: 74 (43.7%); 102 (60%) had a history of tobacco use, and 138 (81.3%) had a history of alcohol intake (**Table 1**).

### **Clinical presentations of nasopharyngeal cancer patients**

Nasal symptoms were presenting the majority of the cases, where 155 (91.3%) had nasal obstruction and 146 (86.0%) had epistaxis. Ear symptoms were manifested by hearing loss as the most frequently appearing symptom 149 (87.5%), followed by tinnitus 149 (87.5%), and otalgia 143 (83.8%), respectively. Neck manifestation was observed in 164 (96.3%) patients with neck mass. Twenty three (13.7%) had cranial nerve V and VI deficiencies. Other accompanying symptoms observed were dysphagia 45 (26.3%), change in voice 60 (35.0%), and headache 166 (97.5%), (**Table 2**).

### **Histopathological pattern of nasopharyngeal cancer patients**

Histopathological pattern observed that 134 (78.8%) patients with NPC were of non-keratinizing undifferentiated carcinoma (type III), and this was the most common histopathological variant. The keratinizing undifferentiated carcinoma (type II) accounted for 32 (18.8%), while the keratinizing squamous cell carcinoma (type I) was presented by 4 (2.5%) of the NPC cases, (**Table 3**).

## **DISCUSSION**

This study aimed to determine the magnitude, clinical presentation, and histopathological patterns of N-

PC at a tertiary hospital in Tanzania during the period from 2012 to 2022. The findings indicate a prevalence of NPC of 10.6%. The commonest clinical presentations included nasal obstruction (91.3%), epistaxis (85.0%), hearing loss (87.5%), tinnitus 149 (87.5%), followed by otalgia (83.8%). Similarly, neck mass was seen in the vast majority (96.3%) of cases. Other symptoms were dysphagia (26.3%), change in voice (35.0%), and headache (97.5%). Pathologically, non-keratinizing squamous cell carcinoma (type III) was the most common sub-type (78.8%).

In this study, the prevalence of NPC was estimated to be 10.6%, which is almost similar to results from a Nigerian study that reported a prevalence of 12.0% [4]. Similarly, a Ugandan study reported a prevalence of 11.8% [10]. However, a study done in Kenya reported a higher prevalence of 20.8% [11]. The results from our study and the previous studies suggest that NPC is a relatively common problem in Africa, possibly due to the high prevalence of exposures to the risk factors for NPC in this region [11].

In this study, the age of patients with NPC ranged from 14 to 93 years, with the highest peak in the fourth and fifth decades of life. The peak age incidence among studied patients correlates closely with what has been reported elsewhere, such as in Southeast Asia. NPC tumors affect both adult and young patients, with a predominance of males, including those without previous consumption of alcohol and tobacco, and they are diagnosed in advanced stages. The patterns of rhinologic symptoms and the cervical node involvement patterns reported in the present study appear to correlate with other studies conducted from different parts of the world [9, 10]. Such similarity may be due to shared similarities in terms of the etiopathogenesis of NPC.

This study found that, NPC patients attending KCMC presented with clinical features such as neck mass (96.3%), nasal obstruction (91.3%), epistaxis (86%), hearing loss (87.5%), tinnitus (87.5%), and otalgia (83.8%). These findings are similar to the studies done in Ethiopia [12] [13], where neck mass was predominant, followed by nasal discharge, nasal bleeding, and nasal obstruction, and the least common were tinnitus and hearing loss. Similar findings were also observed in a study done in Singapore, where patients with NPC presented with neck mass, nasal obstruction, epistaxis, and cranial nerve palsies. Other similar findings were observed in a study done in Ethiopia [14], which observed neck swelling as a leading symptom and voice change as the least presenting symptom. A similarity to these studies is probably due to the same study design used, which is descriptive and retrospective, using secondary data.

In this study, non-keratinizing undifferentiated NPC type (III) was found in (78.8%) of patients, while keratinizing undifferentiated carcinoma (type II) was observed in 32 (18.8%) patients, and lastly, keratinizing squamous cell carcinoma (type I) was observed in 4 (2.5%) patients. The findings in the present study is closely similar with a study conducted in Greece [15] which described 70.1% of the cases were non-keratinizing undifferentiated type (III), while keratinizing squamous cell carcinoma type I was the least presenting in 5.2% of the cases, while a study done in Ethiopia [12] observed non-keratinizing undifferentiated NPC (type III) to predominate by 85.9% followed by keratinizing undifferentiated carcinoma (type II) (8.4%) and the least was type I (keratinizing squamous cell carcinoma) in 5.7%, similar findings were observed in a study done in Tanzania [6,7] where type (III) non-keratinizing undifferentiated NPC was the most predominant followed by type II keratinizing undifferentiated carcinoma, and the keratinizing squamous cell carcinoma, respectively.

A key strength of this study is that it is among the few that provide insights into the epidemiological profile and clinical characteristics of nasopharyngeal carcinoma (NPC) in Tanzania, particularly in the northern zone.

However, several limitations should be acknowledged. The study employed a retrospective cross-sectional design at a single institution, offering only a descriptive account of patients diagnosed at that hospital. As such, the findings may not reflect the true distribution of NPC across the entire country. Additionally, data on the Epstein-Barr Virus (EBV) serologic status of participants were not collected, limiting the ability to explain the observed predominance of undifferentiated histopathologic variants. Furthermore, incomplete patient records led to the exclusion of many cases. Transitioning from paper-based charts to electronic health records may enhance the quality and completeness of medical data in future studies.

## CONCLUSION

This study indicates that nasopharyngeal carcinoma (NPC) is relatively common among individuals in their mid-productive and reproductive years, which carries significant socioeconomic implications. The most frequently reported symptoms include neck mass, nasal obstruction, hearing loss, tinnitus, and headache. The predominant histopathological type—non-keratinizing undifferentiated carcinoma (WHO type III)—is consistent with patterns observed in Epstein-Barr Virus (EBV) endemic regions.

Given these findings, clinicians should maintain a high index of suspicion for NPC in patients presenting with neck masses and nasal obstruction. Furthermore, additional research is warranted to explore other critical aspects of NPC, such as prognosis, treatment outcomes, and long-term surveillance. This study underscores the need for greater focus on improving the diagnosis and management of this aggressive malignancy.

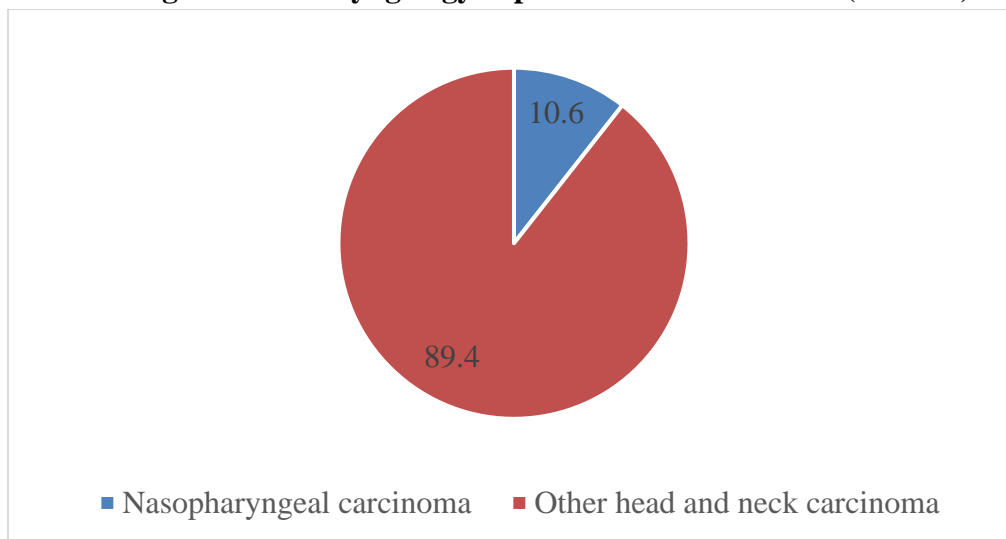
According to the findings of the present study, nasopharyngeal carcinoma is relatively common in the mid-productive and reproductive age groups, which has an impact in terms of their socioeconomic output. Neck mass, nasal obstruction, hearing loss and tinnitus, and headache are the most common symptoms, and non-keratinizing undifferentiated carcinoma type III, the predominant histopathologic variant, resembles that seen in EBV endemic areas of the world. Therefore, patients suffering from neck mass and nasal obstruction should have a high index of suspicion for this disease. Additionally, further studies are needed to generate evidence for other aspects of NPC, such as prognosis, treatment outcomes, and surveillance, since the current study clearly highlights that greater attention should be directed to improving the management of this aggressive malignancy.

**Table 1: Social demographic and clinical characteristics of the participants (N=170)**

Characteristic	Frequency	Percentage
Age(median,IQR)	48.0(39.0 – 63.0)	
Min – Max (Age)	14 - 85	
<b>Age group(years)</b>		
14 – 33	28	16.3
34 – 53	74	43.8
54 – 73	51	30.0
74 – 93	17	10.0
<b>Sex</b>		
Male	123	72.5
Female	47	27.5
<b>Residence</b>		

Kilimanjaro	74	43.7
Arusha	47	27.5
Manyara	49	28.8
<b>Smooking</b>	102	60.0
<b>Alcohol intake</b>	138	81.3

**Figure 1: Prevalence of nasopharyngeal cancer among patients with head and neck cancer attending Otorhinolaryngology department of the KCMC (N=1598).**



**Table 2: Clinical presentations of Nasopharyngeal Cancer patients (N=170)**

Clinical presentation	Frequency(%)
Nasal symptoms	168(98.8)
Epistaxis	146(85.0)
Anosmia	75(43.8)
Unilateral nasal obstruction	155(91.3)
Blood tinged nasal discharge	70(41.3)
Ear symptoms	166(97.5)
Otalgia	143(83.8)
Pus discharge from ear	43(25.0)
Hearing loss	149(87.5)
Tinnitus	149(87.5)
Neckmass	164(96.3)
Neuro presentation	
Cranial nerve V and VI palsy	23(13.7)
Dysphagia	45(26.3)

Change in voice	60(35.0)
Headache	166(97.5)

**Table 3: Histopathological patterns of Nasopharyngeal cancer patients (N=170)**

Histopathological pattern	n(%)
Squamous cell carcinoma(type I)	4(2.5)
Keratinizing undifferentiated carcinoma (type II)	32(18.8)
Non keratinizing undifferentiated carcinoma (type III)	134(78.8)

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