

Epidemiological profile clinical, therapeutic, and prognostic characteristics of the upper aerodigestive tract cancers in Mauritania (2017 to 2023)

*Zeinebou Maaloum*¹, *EL Hafedh EL Mouhab*^{2,3}, *Saadbouh Regad*⁴, *Ahmedou Tolba*⁴ and *Akhouayri Omar*¹.

¹ Laboratory of Biology and Health, Ibn Tofail University, Kenitra, Morocco

² Departement of Biology, Faculty of Science and Technology, University of Nouakchott, Mauritania

³ Higher Institute of Technological Studies of Rosso

⁴ URMCD and Faculty of medicine, Pharmacy and Dentistry of Nouakchott, Mauritania

Abstract.

Upper aerodigestive tract (UADT) cancers are among the six most frequent malignancies worldwide. They are strongly associated with tobacco and alcohol exposure and mostly occur after the age of 50. In Mauritania, however, national data are still missing. This retrospective study describes UADT cancers diagnosed and treated at the National Oncology Center of Nouakchott between 2017 and 2023. It includes 325 confirmed cases involving the base of tongue, tonsils, soft palate, oropharynx, hypopharynx, and larynx. Data were analyzed with SPSS using chi-square tests for categorical variables. The mean age at diagnosis was 55.8 years, with men representing 63 % of cases (sex ratio = 1.7). Around one-quarter of patients reported tobacco use, whereas alcohol history was rarely documented. The hypopharynx was the most frequent tumor site, and the Trarza region recorded the highest number of cases. Diagnoses have increased steadily since 2017. This first national report shows a growing burden of UADT cancers in Mauritania and underlines the need for prevention focused on smoking, together with further research into genetic, environmental, and nutritional factors.

Keywords: Mauritania, Cancer, Tumor, Tobacco and Upper aerodigestive tract.

1. Introduction

Cancers of the upper aerodigestive tract (UADT) mainly involve the pharynx, oral cavity, and larynx, representing the majority of head-and-neck malignancies (1, 2). Globally, UADT cancers rank sixth among all cancer types (3). Recent GLOBOCAN data estimated about 890,000 new cases and 450,000 deaths in 2022 (4). By site, roughly 185,000 concern the larynx, 98,000 the oropharynx, 84,000 the hypopharynx, and 380,000 the oral cavity.

In men, UADT cancers rank fourth for incidence and fifth for mortality; in women, tenth and sixteenth respectively (9). They are rare before 35 years of age, with the highest frequency between 50 and 59 years, and remain common until around 80 years (10). Alcohol and tobacco are the main risk factors for VADS cancers. However, 15-20% of these cancers are diagnosed in young adults who do not smoke or drink. (5) The prognosis for these tumors is rather optimistic, with a low five-year survival estimated at 58% (6).

The prevalence of smoking in most countries has been reduced over the past 20 years, leading to a decline in the incidence of squamous cell carcinoma of the head and neck. However, infection with the carcinogenic human papillomavirus (HPV) has emerged as an important risk factor, leading to an increase in the incidence of oropharyngeal squamous cell carcinoma (OPSCC) over the same period (7)(8)(6).

Management of UADT patients depends on their histological subtype. In over 95% of cases, these cancers turn out to be squamous cell carcinomas. These cancers originate in the mucosa covering the organs. Other rarer histological forms include adenocarcinoma (cancer of the ethmoid and small glands scattered throughout the mucosa), malignant lymphoma (lymph node-like cancers

arising from lymphoid cells distributed throughout the mucosa) and sarcoma.

In Mauritania, the incidence of cancer has been rising for decades. According to recently published data, a total of 1244 new cases were recorded in 2020, with the most frequent cancers in men being lung cancer 10.2%, colorectal cancer 9.9% and prostate cancer 9.7%. Whereas in women, the dominant type was breast cancer 30.8%, followed by cervical cancer 13.7% and ovarian cancer 5.2%, and in both sexes the most common cancers were breast, cervical and colorectal 16.6%, 7.4% and 7.2% respectively. (11)

The implementation of national screening programs is of crucial importance for patients and healthcare professionals alike, as they promote early detection of cancer, and improve prognosis and quality of life for patients. These programs are based on epidemiological data relating to each cancer, without excluding association studies between cancer risk and various risk factors. Unfortunately, few epidemiological studies on cancer have been carried out in our country, resulting in a large lake of data specific to the Mauritanian population. To the best of our knowledge". The present study is the first to investigate the epidemiological profile of UADT cancer in Mauritania.

2. Population and method

2.1 Study setting:

This study was carried out at the Centre National d'Oncologie (CNO) in Nouakchott.

2.2 Population:

The present study is a single-center, descriptive, observational study based on retrospective data collection. A total of 402 patients were recruited at the National Oncology Centre in Nouakchott.

Inclusion criteria: any patient with histologically confirmed UADT cancer belonging to the National Oncology Center registry. Only the following locations were included in the study: base of tongue, tonsils, soft palate, oropharynx, hypopharynx and larynx, identified on the basis of ICD-O codes (International Classification of Disease for Oncology) as follows: C.01, C.09, C.05, C.10, C. 32 respectively.

UADT: upper aerodigestive tract

Exclusion criteria: any patient who does not have cancer of the upper aerodigestive tract (UADT). Any patient without an anapath report was excluded from the study (77 patients excluded).

Data collection: the following socio-economic and clinical information was collected: i) Patient identification: Medical record number, age, gender, location, region, patient outcome, biopsy date, type of treatment, and medical history (ATCD). ii) Clinical data relating to patient pathology: Date of diagnosis, date of last update, pathological findings.

Statistical analysis: Data were entered and analyzed using SPSS. Analysis included frequency distribution tables, graphs, Chi-square statistical test and Fisher's exact test when conditions for Chi-square application were not met. The significance level determines whether the results of a study is considered statistically significant, most often defined at 5% (0.05).

3. Results

1. Incidence

Number of cases of upper aerodigestive tract (UADT) cancer in recent years

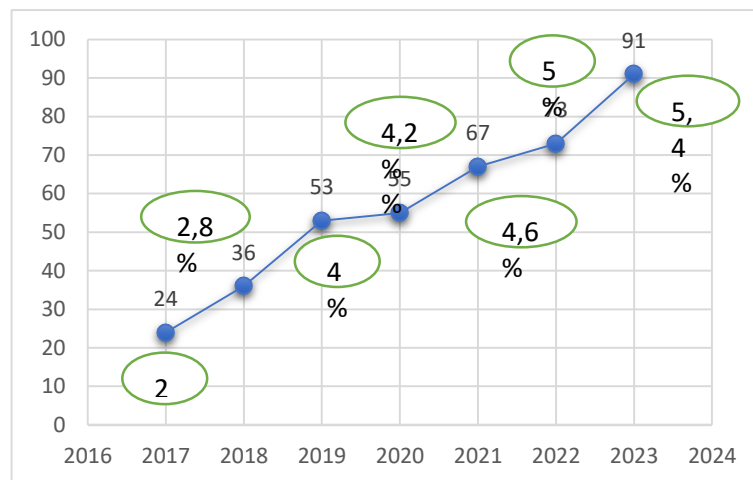


Fig. 1: The incidence of cancers of the upper aerodigestive tract (UADT)

The incidence of cancers of the upper aerodigestive tract (UADT) has been rising sharply over the years. Starting at 2% in 2017, followed by 2.8% in 2018, then 4% in 2019, 4.2% in 2020, 4.6% in 2021, 5% in 2022 and 5.4% in 2023. This trend indicates a gradual increase in prevalence overtime Prevalence.

2. Socio-economic and environmental characteristics

3.1 Patient distribution by gender and age

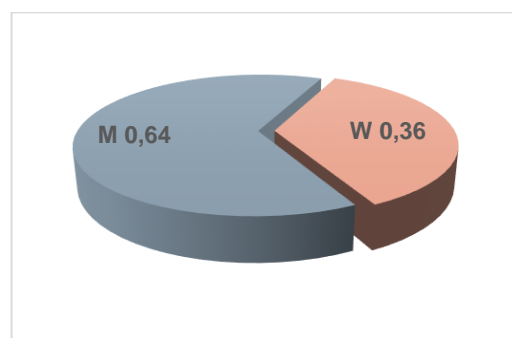


Fig. 2: Distribution of patients by sex

Analysis of the entire study population revealed a clear male predominance, with men accounting for 64% (207) of UADT cancer cases versus 36% (118) among women, with a sex ratio of 1.7.

Table 1: Distribution of patients by age

N	Average	Median	Standard deviation	Minimum	Maximum
325	55,84	57,00	14,860	14	93

The mean age of our population was 55.84±14.86 years, with a minimum of 14 years and a maximum of 93 years.

3.2 Patient distribution by age group

Table 2 : Patient distribution by Age group

Age group	Effective	Percentage
14-30	27	8,3
30-39	20	6,2
40-49	43	13,2
50-59	88	27,1
60-69	91	28
70-79	45	13,8
80+	11	3,4
Total	325	100

The highest percentage corresponds to the age group (60-69), at 28%, followed by (50-59), which accounts for 27.1% of the total.

3.3 Distribution of patients by region

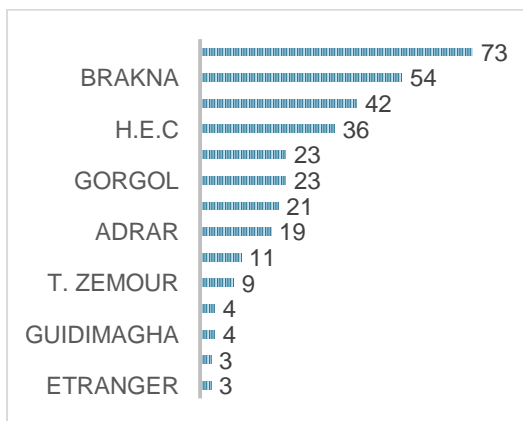


Fig. 3 : Distribution by region

The Trarza region is home to 73 patients (22.5%), followed by Brakna (16.6%).

3.4 Distribution by smoking status

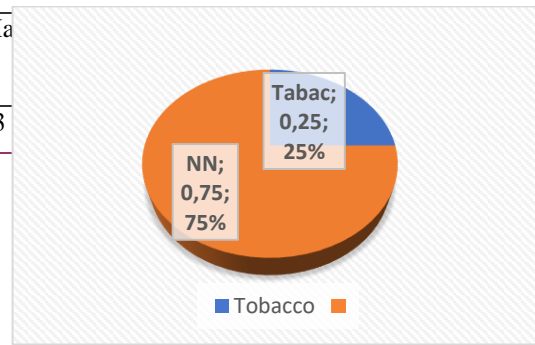


Fig. 4 : Distribution by smoking

Nearly 75% of the study population are neither smokers nor alcoholics.

4 Clinical characteristics

4.1 Distribution by location

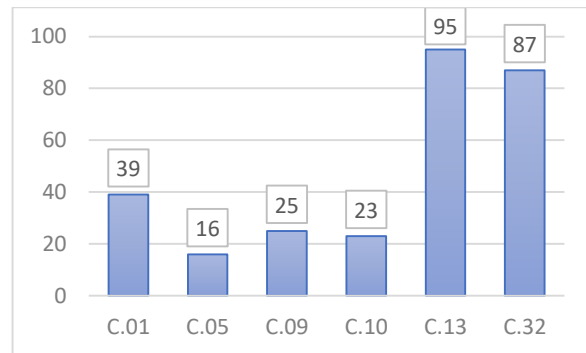


Fig. 5 : Distribution by location

Hypopharyngeal cancer emerged as the predominant malignancy among VADS cancers, accounting for 29%, followed by laryngeal cancer with 27.4%.

4.2 Patient distribution by treatment

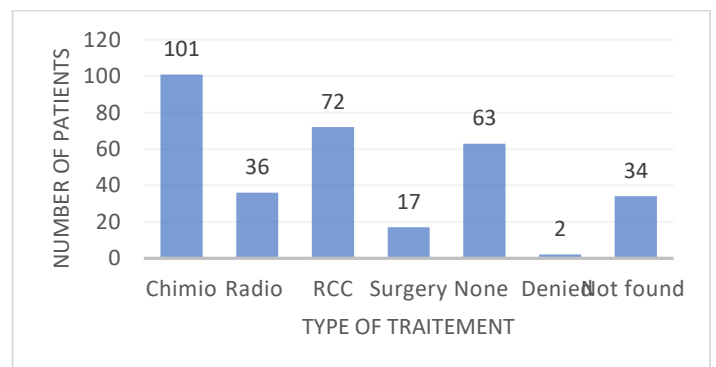


Fig. 6 : Patient distribution by treatment

Chemotherapy is the most widely used treatment, with a percentage of 31%, followed by concomitant radio-chemotherapy (22%).

4.3 Breakdown by patient outcome

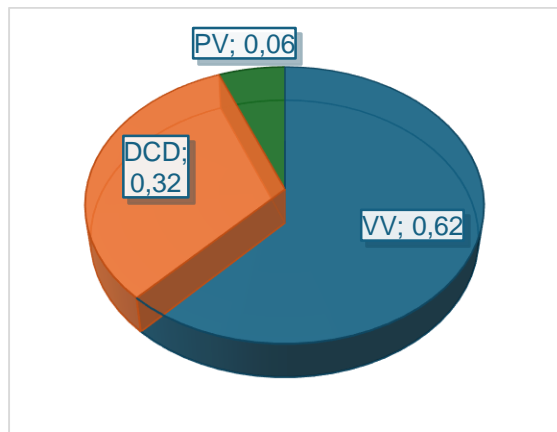


Fig. 7 : Breakdown by patient outcome

Approximately 62% of the patients were alive. Nearly, 32% has died and almost 6% is lost to follow-up.

5. Dominance

5.1 Male Predominance in Most Areas of Head and Neck Cancer

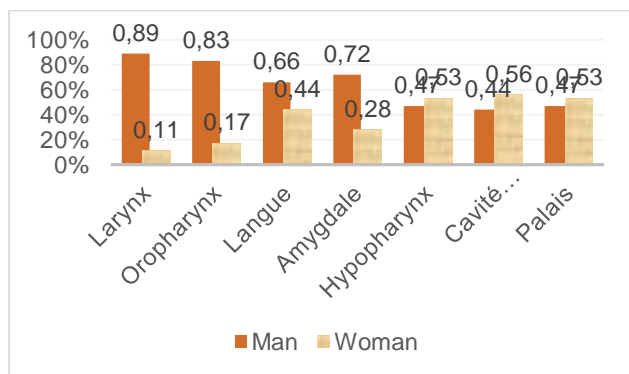


Fig. 8 : Male Predominance in Most Areas of Upper Aerodigestive Tract Cancers

A male predominance was observed in most areas of upper aerodigestive tract cancers, including the larynx (89% of cases in men versus 11% in women), the oropharynx (83% in men versus 17% in women), the tongue (66% in men versus 44% in women), and the tonsils (72% in men versus 28% in women). The hypopharynx, which ranks first, represents a high

percentage of women (53% versus 47% in men), followed by the oral cavity (56% in women and 44% in men), and the palate (53% in women and 47% in men). The hypopharynx ranks first in frequency and shows a higher proportion of female cases (53%) compared to males (47%). Similarly, the oral cavity and palate show a predominance of female cases (56% and 53%, respectively).

5.2 Distribution of deceased by age

Table 3 : Distribution of deaths by age

Age group	Deceased		Total
	Yes	Non	
14-30	10	17	27
30-39	4	16	20
40-49	14	29	43
50-59	29	59	88
60-69	27	64	91
70-79	15	30	45
80+	6	5	11
Total	105	220	325

The 50-59 and 60-69 age groups showed the highest mortality rates, at 27.62% and 25.71%, with a 7-year case fatality rate of 32.3%. The results of the age group crossover in relation to death were insignificant, $P = 0.79$.

5.3 Association between sex and mortality

Table 4 : Cross-tabulation of sex and death

Sex		Deceased		Total
		YES	NON	
Effective	Man	58	149	207
	Women	47	71	118
Total		105	220	325

The results of the sex and mortality association are significant with $P = 0.029$.

6. Discussion

Over the past decades, the rise in head-and-neck cancers has been linked to lifestyle habits and environmental exposure. Tobacco remains the principal risk factor, but poor diet, inadequate oral hygiene, and viral infections – particularly human papillomavirus (HPV) – also play major roles (12). In some high-income countries, HPV now accounts for most oropharyngeal squamous cell carcinomas, whereas in developing regions, tobacco is still predominant (13). Differences in lifestyle, immune status, and prevention programs may explain these contrasts.

In France in 2011, the number of new cases of head and neck cancer was estimated at 16,000 (12,770 in men, 3,230 in women). The number of deaths was 5,406 (4,515 in men, 891 in women). Their incidence rate was highest between 50 and 59 years of age but remained high up to 84 years of age. (9)

In the United States, the age-standardized incidence rate (per 100,000 population) of oral and oropharyngeal cancer during the period 2002-2006 is 15.4 in men and 6.1 in women. In Europe, there is a significant prevalence of oropharyngeal and oral cancers in men, particularly in Spain, Slovakia, France, and Slovenia. High figures are also observed in some developing countries in Asia (Pakistan, India) and South America (Brazil). In Southeast Asia, however, cancers of the oral mucosa account for approximately 40% of oral tumors. Similarly, over the last decade, cases of laryngeal cancer have increased by 23%. (14)

In 2020, Mauritania reported 1,244 new cases of cancer, representing 4.2% of UADT. (11) In terms of the topographical distribution of UADT cancer in Mauritania, hypopharyngeal cancer is the most common, followed by laryngeal and oral cavity cancers. This is not the case in our population. According to our study, a

strong male dominance is observed in cancers of the upper aerodigestive tract (UADT), cancers, with (64%) cases in men and a male/female ratio of approximately 1.7. These results are consistent with the findings of several epidemiological studies including a study from Burkina Faso in Africa, where men are more likely to contract UADT than women. (12) The male predominance in sex crossover compared to death in our population gives a significant result ($P = 0.029$). This study confirms previous research showing a high rate of UADT cancers in the 60-69 age group. (15) A national survey conducted in East Asia implicated smoking in 2.8–25% of cases, which is similar to the percentage of smokers in our population. (15)

In UADS, the male predominance, with the exception of hypopharyngeal and oral cavity cancers, which are the most common locations in women, differs somewhat from the literature, perhaps due to dietary habits, particularly the insufficient consumption of fruits and vegetables among women in Mauritania. Weight, physical activity, and diet are well-known nutritional factors that influence the emergence of different types of cancer. (13)

To our knowledge, this is the first study of the epidemiological profile of squamous cell carcinomas of the UADT, using data from cancer registries of the National Oncology Center based on the Mauritanian population. By studying different parameters of UADT cancer in various geographical regions of the country, our results provide valuable data on the epidemiological situation of UADT cancers in this population. This study is of paramount importance in order to clarify specific recommendations aimed at reducing the burden of UADT cancers in Mauritania.

This study has several limitations. Important information such as lifestyle habits (alcohol use, oral hygiene) and HPV infection status was missing from many records. Future prospective studies with broader data collection are needed to confirm these results and clarify the mechanisms that lead to UADT carcinogenesis in Mauritania. Despite these limitations, our findings provide the first

national overview of head-and-neck cancers in Mauritania. They emphasize the importance of modifiable factors – smoking, diet, and viral infections – in prevention and patient management. This work also opens the way for larger studies exploring how genetic background, environmental exposure, and nutrition interact in the development of UADT cancers.

Bibliography

1. Amana B, Foma W, Pegbessou E, Bissa H, Adam S, Amana E, et al. Primary oto-rhino-laryngological and cervico-maxillofacial cancers: epidemiological and histopathological aspects. *Pan Afr Med J [Internet]*. 2016 [cited 15 May 2023];25. Available at: <http://www.panafrican-med-journal.com/content/article/25/47/full/>
2. Marandas P. Cancers of the head and neck in history. *Ann Fr Oto-Rhino-Laryngol Pathol Cervico-Faciale*. Apr 2011;128(2):116-21.
3. Panarese I, Aquino G, Ronchi A, Longo F, Montella M, Cozzolino I, et al. Oral and Oropharyngeal Squamous Cell Carcinoma: Prognostic and Predictive Parameters in the Etiopathogenetic Route. *Expert Rev Anticancer Ther*. Feb 2019;19(2):105-19.
4. Barsouk A, Aluru JS, Rawla P, Saginala K, Barsouk A. Epidemiology, Risk Factors, and Prevention of Head and Neck Squamous Cell Carcinoma. *Med Sci*. Jun 13 2023;11(2):42.
5. Woto-Gaye G, M'Farrej MK, Doh K, Thiam I, Touré S, Diop R, et al. Human Papillomaviruses: Another Risk Factor for Upper Aerodigestive Tract Carcinomas. *Bull Société Pathol Exot*. Aug 2016;109(3):160-4.
6. Petito G, Carneiro MADS, Santos SHDR, Silva AMTC, Alencar RDC, Gontijo AP, et al. Human papillomavirus in oral cavity and oropharynx carcinomas in the central region of Brazil. *Braz J Otorhinolaryngol*. Jan 2017;83(1):38-44.
7. Lechner M, Liu J, Masterson L, Fenton TR. HPV-associated oropharyngeal cancer: epidemiology, molecular biology and clinical management. *Nat Rev Clin Oncol*. May 2022;19(5):306-27.
8. Lescaille G, Rochefort J, Macedo R, Le Moignic A, Baillou C, Mateo V, et al. Immunity and cancers of the upper aero-digestive tracts part 2. Immunotherapies for VADS cancers. *Oral Medicine Oral Surgery*. Oct 2014;20(4):245-52.
9. Cohen N, Fedewa S, Chen AY. Epidemiology and Demographics of the Head and Neck Cancer Population. *Oral Maxillofac Surg Clin N Am*. Nov 2018;30(4):381-95.
10. Lefebvre JL, Chevalier D. Epidemiology of Upper Aerodigestive Tract Cancers. *EMC - Oto-Rhino-Laryngol*. Jun 2012;7(2):1-11.
11. Mohamed Brahim S, Zein E, Houmeida A, Tolba A. General Oncology Care in Mauritania. In: Al-Shamsi HO, Abu-Gheida IH, Iqbal F, Al-Awadhi A, editors. *Cancer in the Arab World [Internet]*. Singapore: Springer Singapore; 2022 [cited 8 May 2023]. pp. 149-61. Available at: https://link.springer.com/10.1007/978-981-16-7945-2_10
12. Ouoba K, Dao M, Sano D, Guigma Y, Kabre M, Sanou A, et al. ENT AND CERVICAL FACIAL CANCERS IN BURKINA FASO: *Médecine Afr Noire*. 1997;
13. Vecchia CL, Tavani A, Franceschi S, Levi F, Corrao G. Epidemiology and Prevention of Oral Cancer.
14. Fitzmaurice C, Global Burden of Disease Cancer Collaboration. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 29 cancer groups, 2006 to 2016: A systematic analysis for the Global Burden of Disease study. *J Clin Oncol*. May 20, 2018;36(15_suppl):1568-1568.
15. Barry B, Ortholan C. Human papillomavirus and head and neck cancer. *Cancer/Radiotherapy*. Oct 2014;18(5-6):430-3.