Original Article

Cervical Cancer in Women Admitted at University Hospital Agostinho Neto, Cape Verde, from 2016-2020: A Cross-Sectional Study

Cancro do Colo do Útero em Mulheres Internadas no Hospital Universitário Agostinho Neto, Cabo Verde, 2016-2020: Um Estudo Transversal

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ABSTRACT

Introduction: Cervical cancer is the leading cause of cancer death among women in Cape Verde. Advanced-stage disease is often the initial diagnosis. This study aimed to characterize the profile of women with cervical cancer admitted to a referral hospital in Cape Verde.

Methods: This was a cross-sectional study. The clinical files of the first admission of 104 women with cervical cancer admitted to the Agostinho Neto University Hospital (HUAN) between January 2016 and December 2020 were reviewed. Descriptive statistics were used to analyze the data.

Results: At admission, the women's ages ranged from 26 to 89 and approximately 47.3% of them had a low level of education. Most of the women lived on the island of Santiago (75%) and were not employed (75%). Vaginal bleeding was the main symptom reported (72.7%) and stage I disease was only observed in 28% of cases at the time of diagnosis. Squamous cell carcinoma was the

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most frequent histological type (67.7%) and chemotherapy was the most prescribed treatment (73.9%). The median length of stay at HUAN was 24 days and the main discharge outcome was evacuation to health centers outside the country (36.7%).
Conclusion: Enhancing women's awareness and knowledge about cervical cancer, reducing barriers to screening and implementing strategies for timely diagnosis are critical steps in reducing the burden of the disease in Cape Verde.

Keywords: Cabo Verde; Delivery of Health Care; Hospitalization; Human Papillomavirus Viruses; Uterine Cervical Neoplasms

RESUMO

Introdução: O cancro do colo do útero é a principal causa de morte por cancro entre as mulheres em Cabo Verde. A doença em estadio avançado é frequentemente o diagnóstico inicial. Este estudo teve como objetivo caracterizar o perfil das mulheres com cancro do colo do útero admitidas no hospital de referência de Cabo Verde.
Métodos: Trata-se de um estudo transversal. Foram revistos os processos clínicos da primeira admissão de 104 mulheres com cancro do colo do útero, internadas no Hospital Universitário Agostinho Neto (HUAN), no período de janeiro de 2016 a dezembro de 2020. A estatística descritiva foi aplicada para a análise dos dados.
Resultados: À admissão, a idade das mulheres variou entre 26 e 89 anos e aproximadamente 47,3% delas possuíam baixo nível de escolaridade. A maioria das mulheres vivia na ilha de Santiago (75%) e não estava empregada (75%). O sangramento vaginal foi o principal sintoma relatado (72,7%) e a doença em estadio I somente foi observada em 28% dos casos no momento do diagnóstico. O carcinoma espinocelular foi o tipo histológico mais frequente (67,7%) e a quimioterapia foi o tratamento mais prescrito (73,9%). A mediana de tempo de permanência no HUAN foi de 24 dias e o principal desfecho de alta foi a evacuação para unidades de saúde fora do país (36,7%).
Conclusão: Aumentar a sensibilização e o conhecimento das mulheres sobre o cancro do colo do útero, reduzir as barreiras ao rastreio e implementar estratégias para o diagnóstico atempado são passos fundamentais para reduzir a carga da doença em Cabo Verde.

Palavras-chave: Cabo Verde; Hospitalização; Neoplasias do Colo do Útero; Papillomavirus Humano; Prestação de Cuidados de Saúde

INTRODUCTION

Cervical cancer is preventable and curable but still a leading cause of death among women worldwide. Around 660 000 new cases and 350 000 deaths occurred in 2022.[1] It is highly associated with genital female persistent infection with high-risk human papillomavirus (HPV).[1-3] Cervical cancer is a slow-evolving disease, often without noticeable symptoms in its early stages.[1] Routine screening is essential, as it can detect HPV infection and precancerous lesions.

Low- and middle-income countries are particularly affected, mainly by the lack of extensive screening coverage, but also by underserved communities, which remain unaware of the necessity and availability of such services.[4-6] The highest incidence and mortality rates are seen in the Sub-Saharan Africa region,[1,7] where up to 80% of cervical cancer cases were diagnosed at an advanced stage, often when treatment options are limited.[3,8]

Cape Verde is a sub-Saharan African archipelago country consisting of ten islands, with a total surface area of 4033 km^2. It is situated in the Atlantic Ocean, approximately 600 km from Africa continental. According to the 2021 Census, the country has an estimated population of 498 063 (49.8% female), with inhabitants living on nine islands.[9,10] The country's capital is Praia, a city on the island of Santiago, which is the largest and most inhabited.[11] As a resourced-constrained country,[12] its population faces many challenges and inequities in healthcare access.[1]

In Cape Verde, cervical cancer is the leading cause of cancer-related deaths in women and the second most incidence type of cancer among women,[13] and it is one of the primary causes of evacuation.[14] The last estimations pointed to an incidence of 46 new cases per 100 000 women/year and a mortality of 27 deaths per 100 000 women annually.[13]

In addition to HPV vaccination being introduced only in 2021, the absence of a comprehensive national screening program and advanced diagnostic and treatment facilities contribute to the high rates of cervical cancer incidence and mortality in Cape Verde.[15-19] The country lacks a population-based

program and relies on opportunistic screening, which depends on individual decisions and encounters with healthcare providers.[20] As far as we know, in addition to University Hospital Agostinho Neto, where 9892 cytology tests were performed between 2018-2023,[21] Cape Verdean women can get screened at regional hospitals, health delegates, primary healthcare services, and through campaigns organized by entities fighting against cancer. Despite this, most women undergo the screening test in private clinical facilities, bearing the cost of the exam. Additionally, many cytologic exams conducted in Cape Verde are sent to laboratories in Portugal for diagnosis.[17] Nonetheless, not much has been explored about cervical cancer women's profiles who are admitted to HUAN. In this context, our study aimed to characterize the first admissions of women with cervical cancer at HUAN from 2016 to 2020.

METHODS

This is a cross-sectional study conducted at University Hospital Agostinho Neto (HUAN) through a retrospective medical record review of the first admissions of women with cervical cancer hospitalized between January 2016 and December 2020. HUAN is located in the capital, Praia, on the island of Santiago and is the largest hospital in Cape Verde. It is committed to delivering secondary and tertiary health care for a resident population of around 153735 inhabitants from the leeward islands, islands of Sal and Boavista. HUAN also provides national coverage in some specialties and services, namely cancer diagnosis and management.[22]

From June to October 2022, we searched the hospital's archives for all women's medical records registered from 2016 to 2020 that indicated the diagnosis of cervical cancer as the reason for admission or hospital discharge. The HUAN Statistics Department's information system also identified some consultation processes. It guided the search for others in the oncology service and the maternity section (gynecology and obstetrics). Of the 121 records retrieved, 104 were included in the study. Seventeen records were excluded once they were subsequent admissions of women already included. For each woman admitted, we collected data on sociodemographic variables (age, marital status, educational level, employment status, domicile area); risk factors (gynecological and obstetric history, alcohol and tobacco use, family history of cancer and comorbidities); clinical and diagnostic features (first symptoms, diagnostic methods, cancer stage and histological type, treatment prescribed, existence of other primary tumors and hospitalization outcome); and healthcare pathways.

Microsoft Excel 2003 was used to collect raw data and perform statistical analyses to identify characteristics and data distribution. Frequencies were calculated for each categorical variable. Medians were presented for asymmetric continuous variables and discrete variables.

The study was conducted with the approval of the University Hospital Agostinho Neto administration office, the National Data Protection Commission, and the Cape Verde National Ethics and Research Committee in Health (Order No. 14/2022).

RESULTS

1. SOCIODEMOGRAPHICS CHARACTERISTICS

Women were aged between 26 and 89, with a median age of 51. Most were single (53.3%), lived on Santiago Island (75.5%), had a low level of education (74.7%), and were not employed (75%) (Table 1).

Table 1. Sociodemographic characteristics of women with cervical cancer admitted at HUAN[1] from 2016 to 2020

	n (%)
Age (years) (n=104)	
26 – 40	19 (18.3)
41 – 65	67 (64.4)
> 65	18 (17.3)
Marital status (n=92)	
Single	49 (53.3)
Married	33 (35.9)
Divorced/widowed	10 (10.8)
Educational level (n=91)	
Illiterate	25 (27.5)
Primary school	43 (47.3)
Secondary school	18 (19.8)
University degree	5 (5.5)
Employment status (n=88)	
Retired/Unemployed/Domestic	66 (75.0)
Personal, safety and security services personnel	17 (19.3)
Others[2]	5 (5.7)
Municipality of residence (n=98)	
Praia	40 (40.8)
Santa Catarina	11 (11.2)
Tarrafal	6 (6.1)
Ribeira Grande de Santiago	5 (5.1)
Sal	5 (5.1)
Santa Cruz	5 (5.1)
Others[3]	26 (26.5)
Island of residence (n=102)	
Santiago	77 (75.5)
Fogo	7 (6.9)
Sal	6 (5.9)
Others[4]	12 (11.8)

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Table 2. Gynaecological and obstetric history of women with cervical cancer admitted at HUAN[1] from 2016 to 2020

	Median (min; max)	n (%)
Sexual behaviour		
Age at the beginning of sexual activity (n=94)	17.0 (12; 29)	
Number of partners (n=101)	2.0 (1; 11)	
Pregnancies		
Number of pregnancies (n=98)	6.0 (0; 18)	
Number of abortions (n=97)	0 (0; 0)	
Births		
Age at first birth (n=2)	17.0 (17; 19)	
Number of births (n=98)	5.0 (0; 14)	
Contraceptive methods ever adopted during lifetime (n=58)		
Oral contraceptive pills		29 (50.0)
Injectables		10 (17.2)
Oral pills and injections		11 (19.0)
Female sterilisation / Bilateral salpingectomy		9 (15.5)
Condoms		6 (10.3)
Intrauterine devices		1 (1.7)

[1] University Hospital Agostinho Neto.

2. GYNAECOLOGICAL AND OBSTETRICS HISTORY

Half of the women (52) were experiencing menopause. The median age at which sexual activity began was 17 years old. The number of sexual partners throughout life varied between one and 11. The number of pregnancies varied between 0 and 18, with a median of 6 and 5 births per woman. Hormonal contraception was the primary contraceptive method recorded (Table 2). Sexually transmitted infections were documented for nine women, all with confirmed HIV-positive status. One of these women also had bacterial vaginosis and vaginal herpes.

3. FAMILY CANCER HISTORY

A family history of cancer was retrieved for only three women, including cervical, ovarian, or stomach cancer in their mother or sister.

4. PERSONAL BACKGROUNDS

Comorbidity information was available for only 56 medical processes, with some women presenting associated pathologies. Hypertension (50%) and diabetes mellitus (25%) were the main comorbidities recorded during the study period (Table 3). Other comorbidities recorded were hyperthyroidism, dyslipidemia, hypercholesterolemia, asthma, heart disease, chronic renal failure, neurological changes, depression, other psychiatric changes, gastritis, cataracts, blindness, other visual disability, and deep vein thrombosis.

About 5.2% of the records indicated tobacco use, while 2.1% indicated alcohol use (Table 3).

Table 3. Personal backgrounds of women with cervical cancer admitted at HUAN[1] from 2016 to 2020

	n (%)
Comorbidities (n=56)	
Systemic hypertension	28 (50.0)
Diabetes mellitus	14 (25.0)
Anemia	13 (23.2)
Others[2]	19 (33.9)
Habits	
Tobacco use (n=96)	5 (5.2)
Alcohol use (n=95)	2 (2.1)

[1] University Hospital Agostinho Neto.
[2] Hyperthyroidism, dyslipidemia, hypercholesterolemia, asthma, heart disease, chronic renal failure, neurological changes, depression, other psychiatric changes, gastritis, cataracts, blindness, other visual disability, and deep vein thrombosis.

5. CLINICAL FEATURES AND COMPLEMENTARY DIAGNOSTIC METHODS

Vaginal bleeding (72.7%) was the main symptom of cervical cancer. Squamous cell carcinoma was the most frequent histological type (67.7%), followed by non-specified carcinoma (22.6%) and adenocarcinoma (4.3%). Stage disease was retrieved for 97 women, with the majority (52.6%) presenting advanced-stage disease (stage III and IV). Among the 89 women with cervical cancer diagnosed during the study period, only 28% were found in stage I. For the remaining eight women (8.2%) who were hospitalized for cancer recurrence, all had stage IV at admission. Chemotherapy (73.9%) was the primary treatment prescribed (Table 4). No women were recorded as having another primary tumor. Metastatic disease was found in the vagina, ureter, parametria, bladder, and pelvic, retroperitoneal and intra-abdominal regions.

Table 4. Clinical features, diagnosis, stage and therapeutic of cervical cancer cases admitted at HUAN[1] from 2016 to 2020

	n (%)
First symptoms (n=66)	
Vaginal bleeding	48 (72.7)
Pelvic pain	18 (27.2)
Abnormal vaginal discharge	16 (24.2)
Sinusorrhagia	12 (18.1)
Metrorrhagia	10 (15.2)
Abdominal pain	5 (7.6)
Dyspareunia	3 (4.5)
Other symptoms[2]	22 (33.3)
Complementary diagnostic methods (n=92)	
Pelvic ultrasound	66 (71.7)
Abdominal, renal, bladder and urinary tract ultrasound alone or together	65 (70.7)
Chest X-ray	59 (64.1)
Bone X-rays	51 (55.4)
Cystoscopy	50 (54.3)
Rectosigmoidoscopy	34 (37.0)
Abdominal and pelvic computed tomography (CT) alone or together	25 (27.1)
Magnetic resonance imaging	9 (9.8)
Upper digestive endoscopy	8 (8.7)
Other[3]	12 (13.0)
Histological type (n=93)	
Squamous cell carcinoma	63 (67.7)
Unspecified carcinoma	21 (22.6)
Adenocarcinoma	4 (4.3)
Other	5 (5.4)
Cervical cancer stage (n=97)	
Women with cervical cancer admitted for the first time (n=89)	
Stage I (IA, IA1, IA2, IB1, IB2)	25 (28.0)
Stage II (II, IIA, IIA2, IIB)	21 (23.6)
Stage III (IIIA, IIIB, IIIC1)	32 (36.0)
Stage IV (IV, IVA, IVB)	11 (12.4)
Women with cervical cancer admitted for recurrence (n=8)	
Stage I (IA, IA1, IA2, IB1, IB2)	0
Stage II (II, IIA, IIA2, IIB)	0
Stage III (IIIA, IIIB, IIIC1)	0
Stage IV (IV, IVA, IVB)	8 (100)
Treatment or treatment forecast (n=69)	
Surgery	11 (15.9)
Chemotherapy	51 (73.9)
Radiotherapy	20 (28.0)
Palliative	8 (11.6)

[1] University Hospital Agostinho Neto.
[2] Low back pain, general malaise, chest pain, cough, fever, dysuria, haematuria, constipation, thigh/leg pain.
[3] Colonoscopy, colposcopy, chest CT scan, electrocardiogram.

6. HEALTHCARE PATHWAYS

The healthcare pathway was not indicated in all records, and it varied among the women depending on the registration of this information. Thirty-seven (35.6%) were referred to HUAN from other healthcare facilities, such as regional hospitals (21.9%), health delegations (16.2%), private clinics (16.2%), another central hospital (13.5%), and health centres (10.8%).

For 55 women, the median time between the first symptoms and seeking healthcare was two months (0; 24), and between the first symptoms and admission to HUAN was two months (0; 24). For 19 women, the median time between referral and admission to HUAN was four days (0; 51). Overall, the length of stay considering the whole group under study (104 women) varied between two and 155 days, with a median of 24.

The discharge outcomes for 98 women were medical evacuation outside Cape Verde (36.7%), out patient treatment/follow-up (26.5%), palliative care (15.3%), chemotherapy while awaiting evacuation (12.2%), cure (5.1%), improvement (2.0%), evasion (1.0%), and death (1.0%) (Table 5).

Table 5. Hospitalization outcome of women with cervical cancer admitted to HUAN[1] from 2016 to 2020

	n (%)
Discharge outcome (n=98)	
Evacuation	36 (36.7)
Outpatient treatment/follow-up	26 (26.5)
Palliative care	15 (15.3)
Chemotherapy while awaiting evacuation	12 (12.2)
Cure	5 (5.1)
Improved/favorable	2 (2.0)
Evasion	1 (1.0)
Death	1 (1.0)

[1] University Hospital Agostinho Neto

DISCUSSION

Cervical cancer is the second most common female cancer in women aged 15 to 44 years in Africa,[20,23] and it remains a significant public health concern in Cape Verde. In our study, the majority of women (64,4%) diagnosed with cervical cancer were between 41 and 65 years old, which is consistent with other studies.[24] Nonetheless, we found women aged 26 who were hospitalized with cervical cancer, which may be related to very early exposure to multiple risk factors. In Cape Verde, cervical cancer screening is preconised for women aged between 25 and 64 years.[25,26] However, young women under 29 have shown weak adherence to national recommendations.[27]

Single women comprised the majority (53.3%), contrasting with a previous study by Moreno.[28] According to the 2018 III Sexual and Reproductive Health Survey, in Cape Verde, 40.8% of women aged 15 to 49 were single.[29] In the country, women usually claim to be single if they do not live with their partner despite being sexually active and engaging in risky behavior.

In Cape Verde, it is estimated that in 2020, 13.1% of the population lived below the international poverty line (less than 1.90 dollars per day), with the most affected being the rural, the unemployed and the female population.[30] Studies have consistently shown disparities in awareness levels among women, influenced by socioeconomic status, education, cultural beliefs, and access to healthcare.[31-33] Moreover, financial deprivation and low socioeconomic and educational status are predictive factors for low health literacy.[34-36] These vulnerabilities might have hindered women's access to information and healthcare services, enlarging healthcare pathways and contributing to advanced-stage diagnoses upon admission, as observed in the group under study.[37,38] Nonetheless, a study conducted in 2022 found that, even in the higher education context, the majority of students in Cape Verde were unaware of the risk factors and symptoms associated with cervical cancer.[16] The scarcity of knowledge regarding cervical cancer among Cape Verdean women also threatens an early diagnosis, contributing to the country's disease burden.

Cost, convenience, perceived susceptibility, and healthcare provider recommendations influence women's decisions to undergo screening tests.[33,39] According to the Cape Verde Ministry of Health report from 2020, 57% of Cape Verdean women had never screened for cervical cancer, mainly women aged between 18-29 (76.4%).[27] The reasons stated were being unaware of where to get tested (36%), the test's high cost (13%), not having time (7.6%), and shame, fear and cultural beliefs (7.4%). For 43% of women who had ever tested, the last screening test was taken in private practice or clinic (43.6%); hospital (34.8%); mobile clinic, association or health center (20.1%), and 1,6% in other locations.[27-39]

According to the 2021 WHO report on cervical cancer for Cape Verde,[19] there were guidelines for the early detection of initial symptoms at the primary healthcare level. However, national guidelines or recommendations on cervical cancer management were not in place, and there was no clearly defined referral system from primary care to secondary and tertiary care. Additionally, cancer centers or cancer departments at the tertiary level, cancer diagnosis and treatment services, and cancer surgery were not generally available.

The most frequent risk factors for cervical cancer among the studied group were the number of pregnancies (median 6.0), births (median 5.0) and oral contraceptive intake (50%). Studies have shown that women who have had at least four pregnancies have a three times greater risk of developing invasive cancer than those who have had zero or one pregnancy, meaning that the high parity in sub-Saharan Africa may explain the persistence of high rates of the disease in this region.[40,41] Multiple sexual partners and condom resistance use are the main predisposing factors to HPV infection.[42,43] Our findings showed that the number of sexual partners varied between 1 and 11 and that the percentage of condom use was meager (10.3%). Although the HPV vaccine was only included in the Cape Verdean national vaccination schedule in 2021, all girls under 15 years old were fully covered by 2022 - a significant step in fighting cervical cancer.[17-19]

Hypertension (50%) and diabetes mellitus (25%) were the main comorbidities observed, and in fact, they are the two most prevalent non-communicable diseases among Cape Verdean women.[27,29] In our study, nine (8.7%) women were recorded as living with HIV. Women with HIV-positive status face a sixfold increased risk of developing cervical cancer compared to those without the virus.[44,45] For other risk factors such as tobacco, studies have shown that there is an association between smoking, mutagenic activity in cervical cells and persistent HPV infection.[2,46] However, the prevalence of tobacco (5.2%) and alcohol (2.1%) consumption was low among the women studied. The consumption of these substances is not high among Cape Verdean women,[27] which may be related to the strategies adopted by Cape Verde in the fight against alcohol and tobacco consumption, as well as cultural factors or financial barriers to access to these products.

Vaginal bleeding (72.7%) was the main symptom recorded in our study and is related to advanced-stage disease.[15,38] It is in line with the majority of women studied who were diagnosed at stage III (36%) and IV (19.6%). Squamous cell carcinoma is the most common type, accounting for up to 90% of cervical cancer cases,[47] with adenocarcinoma coming after. Nonetheless, its incidence was 67,7% among women admitted to HUAN between 2016 and 2020, followed by non-specific carcinoma (22.6%) with adenocarcinoma in the third position. Chemotherapy (58%) and radiotherapy (20%) were the prescribed treatments. Although radiotherapy plays an essential part in cervical cancer treatment, it is not carried out in the country. This positions Cape Verde among many African countries where radiotherapy treatment remains unfordable or limited.[19,38] Although evacuation costs overload the country, the patient, and her family, it justifies 36.7% of hospitalized women requiring evacuation to healthcare units outside Cape Verde, mainly to Portugal, given the agreement between the two countries.

Only one death due to cervical cancer was registered in the period 2016-2020 in HUAN, which may be due to discharges with referral to palliative care (15.3% of outcomes observed in our study) or requests for discharge to die at home or in other health structures closer to their home. According to reports, in Cape Verde, between 2016 and 2019, 594 women died from tumors and neoplasms, including 60 deaths from cervical cancer. According to the Ministry of Health,[48] 54.7% of these deaths (325) occurred at home.

The number of admissions for cervical cancer at HUAN decreased over the years under study, which may be attributed to prevention through awareness campaigns and opportunistic screenings. However, the disease still poses a public health concern as Cape Verde lacks adequate healthcare infrastructure and resources, limiting proper treatment and follow-up assistance for women with cervical cancer.[15]

In recent years, the country has made headway towards cervical cancer prevention measures, including the HPV vaccine and health communication tools. For the diagnosis and treatment of cancer, it counts on an oncologic department and pathologic and biomolecular labs located in University Hospital Agostinho Neto (since 2022) and an oncologic unit at São Vicente Island. Nonetheless, the treatments are limited to surgery and chemotherapy.

Our study has many limitations. The main barriers to conducting the study were the limited availability and accessibility of data, which made the data collection process more time-consuming and challenging. We could not explain some facts, such as the reduction in cervical cancer admissions between 2016 and 2020. It also left the impression that not all cervical cancer admissions at HUAN may have been found during the years under study. The lack of complete and detailed clinical records prevented an enriched and better characterization of admissions, which could have contributed to this or other work on the subject.

CONCLUSION

The study highlights the importance of targeted interventions in improving understanding of risk factors and behaviors associated with cervical cancer in Cape Verde. There is an urgent need for an accessible health support system capable of effectively welcoming, diagnosing and treating cervical cancer cases in Cape Verde, which may encourage more women to seek healthcare assistance for screening tests, providing a better quality of life and survival.

RESPONSABILIDADES ÉTICAS

Conflitos de Interesse: Os autores declaram a inexistência de conflitos de interesse na realização do presente trabalho.
Fontes de Financiamento: Não existiram fontes externas de financiamento para a realização deste artigo.
Confidencialidade dos Dados: Os autores declaram ter seguido os protocolos da sua instituição acerca da publicação dos dados de doentes.
Proteção de Pessoas e Animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pela Comissão de Ética responsável e de acordo com a Declaração de Helsínquia revista em 2024 e da Associação Médica Mundial.
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Confidentiality of Data: The authors declare that they have followed the protocols of their work center on the publication of patient data.

Protection of Human and Animal Subjects: The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and those of the Code of Ethics of the World Medical Association (Declaration of Helsinki as revised in 2024).

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CONTRIBUTORSHIP STATEMENT

DF: Conception of the work; literature review; acquisition, analysis and interpretation of data; structuring and drafting the article.
RL: Structuring and writing the article in English and revising the article.
HB: Conception of the work; data analysis and interpretation; revision of the article.
CC: Conception of the work; analysing and interpreting the data; structuring and revising the article.
All the authors approved the final version to be published.

DECLARAÇÃO DE CONTRIBUIÇÃO

DF: Concepção do trabalho; revisão de literatura; aquisição, análise e interpretação de dados; estruturação e elaboração do artigo.
RL: Estruturação e elaboração do artigo na língua inglesa e revisão do artigo.
HB: Concepção do trabalho; análise e interpretação de dados; revisão do artigo.
CC: Concepção do trabalho; análise e interpretação de dados; estruturação e revisão do artigo.
Todos os autores aprovaram a versão final a ser publicada.

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