Epidemiology and georeferencing of squamous cell carcinoma cases and their relationship with pesticides

Epidemiologia e georreferenciamento dos casos de carcinoma epidermóide de boca e sua relação com agrotóxicos

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ABSTRACT

Objective
To assess the prevalence of epidermoid carcinoma cases, georeference their locations, and seek to correlate them to areas with higher agricultural production and use of pesticides.

Methods
This was a cross-sectional, descriptive and retrospective study conducted by searching the histopathological reports with confirmed diagnosis of epidermoid carcinoma of the mouth issued from August 2005 to December 2011 by the public oral pathology laboratory of the State of Mato Grosso, Brazil. Data were plotted with the IBM SPSS Statistics software and spatial analysis used the ArcGIS 10.1 software.

Results
There were a higher number of diagnoses in 2007 (26.6%); 99 cases (75%) of patients were male; 96 cases (72.8%) were patients aged between 41 and 70 years; and the cities of Cuiabá, Várzea Grande and Rondonópolis respectively showed the highest number of occurrences.

Conclusion
No relationship was found between the occurrence of cases of epidermoid carcinoma and the municipalities with high agricultural production and pesticide use.

Indexing terms: Carcinoma, squamous cell. Diagnosis, oral. Epidemiology. Mouth neoplasms. Pathology, oral. Spatial analysis.

RESUMO

Objetivo
Analisar a prevalência dos casos de carcinoma epidermóide e fazer seu georreferenciamento, buscando correlaciona-los às áreas de maior produção agrícola e utilização de agrotóxicos.

Métodos
Trata-se de um estudo transversal, descritivo e retrospectivo realizado por meio de pesquisa dos laudos histopatológicos com diagnóstico confirmado de carcinoma epidermóide de boca emitidos de agosto de 2005 a dezembro de 2011 pelo serviço de patologia bucal do laboratório público do Estado de Mato Grosso. Os dados foram tabulados com o software IBM SPSS Statistics e a análise espacial utilizou o software ArcGIS 10.1.

Resultados
Houve um maior número de diagnósticos no ano de 2007 (26,6%), 99 casos (75%) eram de pacientes do sexo masculino; 96 casos (72,8%) eram de pacientes na faixa etária compreendida entre 41 e 70 anos e os municípios de Cuiabá, Várzea Grande e Rondonópolis apresentam respectivamente o maior número de ocorrências.

Conclusão
Não foi encontrada relação entre a ocorrência dos casos de carcinoma epidermóide de boca e os municípios com grande produção agrícola e elevado uso de agrotóxicos.

Termos de indexação: Carcinoma de células escamosas. Diagnóstico bucal. Epidemiologia. Neoplasias bucais. Patologia bucal. Análise espacial.

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INTRODUCTION

Cancer of the mouth is ranked the 5th most frequent type of cancer worldwide, being more frequent in Asia, where it represents fifty percent of all diagnoses of cancer[1]. It mainly affects men over the age of 40 years and the risk factors most associated with its occurrence are smoking[2], alcoholism[2], the Papilloma virus (HPV)[2-5], and solar radiation[2], in addition to deficient oral hygiene and a diet poor in proteins, vitamins and minerals, and rich in fats[2,6].

However, some studies have suggested that the use of pesticides has been related to the occurrence of cancers[7-10] in some regions, such as in the state of Mato Grosso[11].

Therefore, the aim of this study was to analyze the prevalence of epidermoid carcinoma cases and georeference them, seeking to correlate them to areas with higher agricultural production and use of pesticides.

METHODS

The project with reference to this research was submitted to the Research Ethics Committee of the São Leopoldo Mandic Dental School, Process Number 2012/0512, and received a favorable report.

This was a cross-sectional, descriptive, retrospective study conducted by searching documents associated with the use of geoprocessing and georeferencing.

As the source of research, histopathological reports were used from the database of the oral pathology service of the public laboratory of the State of Mato Grosso (MT Laboratory). This is the only public laboratory that performed pathological anatomy exams, and is a reference in performing histopathological exams of the mouth for the 1.255 health case establishments belonging to the Brazilian National health service - SUS located in Mato Grosso. The only reports included were those of patients with confirmed diagnosis of epidermoid carcinoma of the mouth, issued from August 2005 to December 2011.

Each histopathological report was associated with a request for an anatomopathology exam, from which the information was obtained with reference to the year of diagnosis, sex, age, origin of the patient, and location of the lesion.

For tabulating the number of cases diagnosed in the study period and description of the profile of patients corresponding to the histopathological reports, the software program IBM SPSS Statistics (Statistical Package for the Social Sciences) was used.

The spatial database used in the research was provided by the map server of the Secretary of State for Planning and General Coordination of the State of Mato Grosso. For spatial analysis, the software ArcGIS 10.1 (ESRI, Redlands, California, U.S.A) was used.

RESULTS

Distribution of the cases of epidermoid carcinoma diagnosed by oral lesions, in Mato Grosso, in the period studied showed a larger number of diagnoses in the year 2007 (26.6%), followed by 2006 and 2009 (18.9%) and 2008 (14.4%). The years that showed a lower number of diagnoses of epidermoid carcinoma in the studied period were 2010 (12.1%), 2011 (6.1%) and 2005 (3.0%).

Table 1. Distribution of epidermoid carcinoma cases diagnosed by oral lesion in a Public Laboratory in the State of Mato Grosso, according to year of diagnosis, in the period from 2005 to 2011.

Year of diagnosis	n	%
2005	4	3.0
2006	25	18.9
2007	35	26.6
2008	19	14.4
2009	25	18.9
2010	16	12.1
2011	8	6.1
Total	132	100

Table 2. Distribution of epidermoid carcinoma cases diagnosed by oral lesion in a Public Laboratory in the State of Mato Grosso, according to sex and age of patient, in the period from 2005 to 2011.

Variaables	n	%
Sex		
Male	99	75
Female	33	25
Total	132	100
Age		
< 11 years	0	0
11 - 20 years.	1	0.7
21 - 30 years.	1	0.7
31 - 40 years.	5	3.8
41 - 50 years.	22	16.7
51 - 60 years.	45	34.1
61 - 70 years.	29	22.0
71 - 80 years.	17	12.9
> 80 years	12	9.1
Total	132	100

Among the cases of epidermoid carcinoma diagnosed by oral lesions, in Mato Grosso, in the period of 2005 to 2011,99 cases (75%) were in patients of the male sex and 33 cases (25%) in those of the female sex.

The distribution of epidermoid carcinoma cases in the above table show the relationship of age group, in which 96 cases (72.8%) were patients in the age-range between 41 and 70 years; 29 cases (22.0%) were patients in the age group of over 71 years; and only two cases of patients in the age group of under 31 years (1.4%).

By crossing the location of these lesions and sex of the patient, predominance of the occurrence of lesions was found in all regions in the male sex, with exception of the upper lip.

Table 3. Distribution of epidermoid carcinoma cases diagnosed by oral lesion in a Public Laboratory in the State of Mato Grosso, according to location of the lesion and sex of patient, in the period from 2005 to 2011.

Location of lesion	Sex				Total	
	Male		Female			
	n	%	n	%	n	%
Floor of the mouth	7	7.1	1	3.0	8	5.1
Bottom lip	5	5.1	4	12.1	9	8.6
Upper lip	1	1.0	2	6.0	3	3.5
Tongue	6	6.1	0	0.0	6	3.0
Tongue and mandible	1	1.0	0	0.0	1	0.5
Mandible	2	2.0	0	0.0	2	1.0
Maxilla	2	2.0	0	0.0	2	1.0
Oral mucosa not specified	69	69.7	25	75.8	94	72.7
Jugal mucosa	2	2.0	0	0.0	2	1.0
Oropharyngeal mucosa	1	1.0	0	0.0	1	0.5
Soft Palate	2	2.0	1	3.0	3	2.5
Mentonian region	1	1.0	0	0.0	1	0.5
Total	99	100	33	100	132	100

Epidermoid carcinoma cases were georeferenced and identified on the map according to the number of cases per municipality. The municipalities of Cuiabá, Várzea Grande and Rondonópolis presented the highest number of occurrences, respectively.
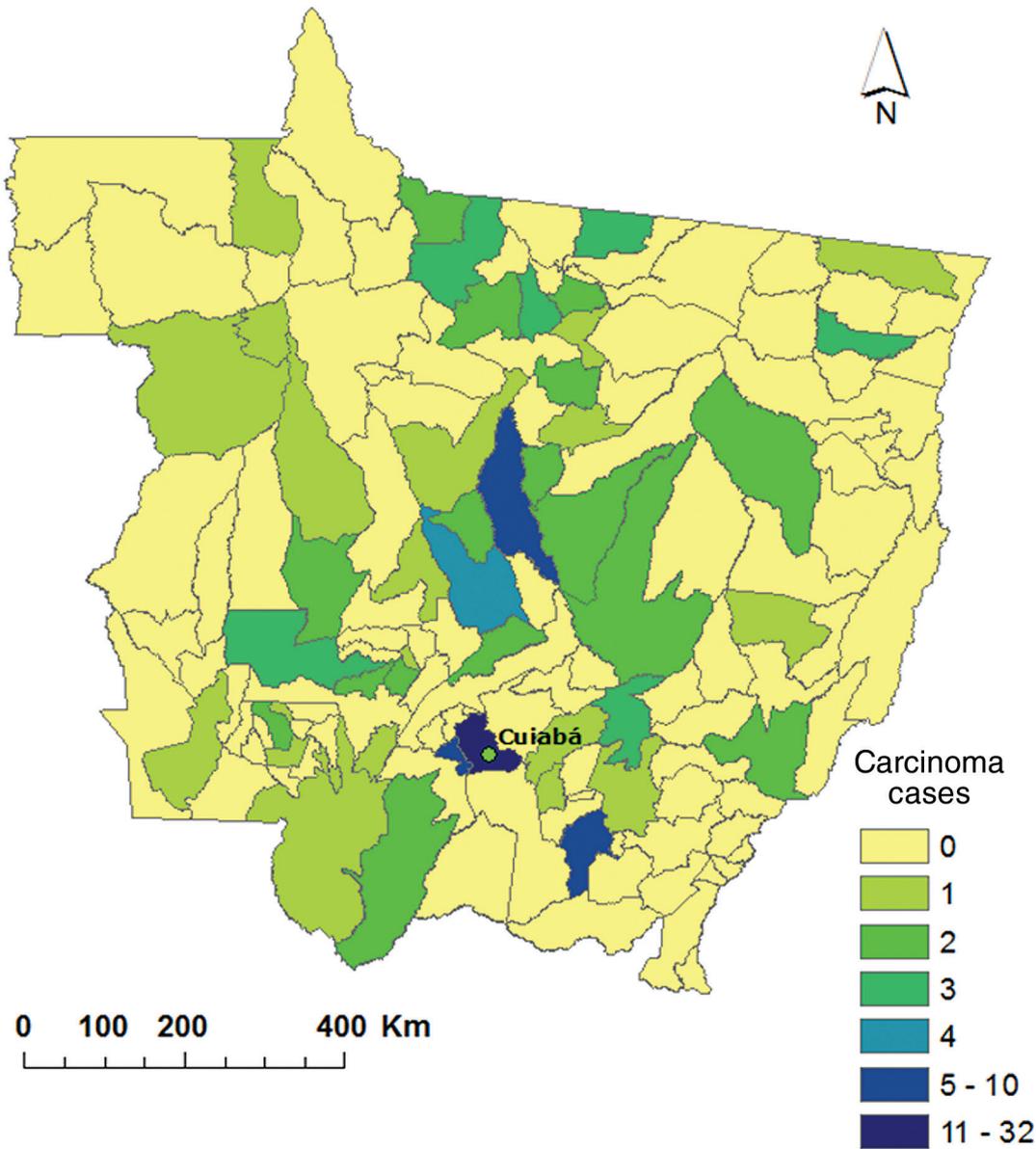
Figure 1. State Map of Mato Grosso, showing the georeferencing of epidermoid carcinoma cases diagnosed by oral lesion in a Public Laboratory in the State of Mato Grosso, according to year of diagnosis, in the period from 2005 to 2011.

DISCUSSION

The survey of epidermoid carcinoma cases was possible to conduct due to the institution of the Policy of Care for Diseases of the Mouth and Face by means of State Laws No.8342/2005 and No. 8344/2005[12].

State Law No. 8342/2005, published on June 30, 2005, Article 2 provides that care of patients with lesions

of the mouth and face must begin in the primary health care units, which must act in activities of prevention, and performing diagnostic exams of lesions in the bucco maxillofacial region. In the following article, the law provides that the MT Laboratory must act as state reference for performing cytology and/or histopathological exams[13].

As the MT Laboratory became the reference for sending the histopathological and cytology exams of the mouth and face performed in the public health units in the state of Mato Grosso (and was the only public anatomopathology laboratory), it began to concentrate the diagnoses of lesions of the mouth and face of the entire state in their archives, as well as data with reference to these cases, such as sex, age and address of origin of the patient and the health unit where the biopsy and/or exfoliative cytology exams were performed[13].

The concentration of the reports in only one laboratory facilitated the survey to conduct this study. The use of the histopathological report of these oral lesions is supported because this is considered the gold standard for the diagnosis of neoplasias[14].

However, in spite of the exams being sent to a centralized laboratory, the authors of this study observed that the professionals who had sent these reports had filled them out incomplete details of the patient's full address and exact location of the lesions. As a result, there was a high occurrence of lesions in unspecified oral mucosa.

After publication of State Law No. 8342, an increase in cases diagnosed was observed, because there was intense movement in training and qualifying professionals in the pole municipalities (those with better infrastructure that served as reference for referring patients from satellite municipalities) by the professionals of the secretary of state for health.

Borges et al.[12] showed that the register of cancer of the mouth in the MT Laboratory increased by 266% between 2005 and 2006, and that in the two years 1,324 diagnostic reports were issued. Of these, 44 cases (3%) corresponded to cancer of the mouth mainly affecting men at a productive age, coming from the interior of the state. The present study confirmed the higher number of cases of epidermoid carcinoma of the mouth occurring in men and in the age-range from 41 to 70 years, confirming the findings of other surveys[2,12,15-16].

During five years the number of cases was similar, whereas in 2011 there was a decline in the number of diagnoses made by the MT Laboratory. This may have occurred due to the active search carried out by the state and municipalities in the years from 2006 to 2010, characterizing this period as a mark in the early detection of cancer of the mouth in the state, and approximating the number of cases diagnosed with those of the estimates of the International Neuroendocrine Cancer Alliance (INCA)[17]. In 2011 interruption of the training programs and campaigns for prevention and early diagnosis of oral lesions by the state secretary for health, as detailed in Law No. 8344/2005, may explain the drop in the number of diagnoses in the last year studied. Considering that cancer of the mouth is an under-notified disease[12], there is clear need for actively seeking new cases, in addition to insisting on qualifying, training, and reminding professionals of their role in the active search for neoplastic lesions. The actions of seeking and early diagnosis of cancer of the mouth are important, because they minimize the damage oncological treatment causes, such as mutilation and high cost of treatment, which in the majority of cases, includes surgery, chemotherapy and radiotherapy[18]. The life expectancy and cure of oncological patients is also directly related to early diagnosis, and so is the continuity of public policies for reducing late and/or untreatable diagnoses, diminishing the sequelae, treatment costs and improving the post-treatment quality of life of patients[18].

The role of funding and organizing care for cancer of the mouth is within the scope of the State, by promoting discussion, providing support for specific actions of health promotion, prevention, assistance; as well as guiding the organization of the municipal services in a microregional logic as regards diagnosis; and in a macroregional logic by providing confirmed cases of cancer of the mouth with assistance[12]. Therefore, encouraging and qualifying dentists in the primary health care network, providing support for this network to perform diagnostic exams (until primary health care no longer needs this support), offering oral pathology service and guaranteeing care for patients with confirmed diagnosis, appears to be a reasonable role of the states. All of this could be organized by spending fewer resources than can be imagined, until a level of municipal organization is reached, allowing the municipalities to assume the role of management and monitoring. The key element for this deconcentration is permanent education in health, that is to say, qualification in service[12].

The distribution of the cases of epidermoid carcinoma according to the male sex and location presented greater prevalence in the unspecific oral

mucosa region (69.7%), followed by the regions of the floor of the mouth (7.1%) tongue (6.1%), and bottom lip (5.1%). For the female sex, the most prevalent region was also the unspecified oral mucosa region (75.8%), followed by the regions of the bottom lip (12.1%) and upper lip (6.1 %), in agreement with the data in the literature[2,6,17,19-21] that cite the region of the tongue as having higher prevalence.

In addition to this survey about the occurrence of epidermoid carcinoma of the mouth in the State of Mato Grosso presenting epidemiological data related to the cases, it was innovative, by distributing the cases spatially, and identifying the locations with higher or lower concentration, favoring the actions of public policies in places of greater prevalence.

The major intention of this study was to relate the cases of epidermoid carcinoma of the mouth to the municipalities where the soybean, cotton and corn plantations are concentrated, particularly those in which elevated levels were found of pesticides with carcinogenic effects on the water table, rivers, and mother's milk[11,22].

Considering that these pesticides in some way pass through the digestive tract, it may be though that continued exposure to and contact with these regions, could contribute to the genesis of cancer of the mouth and other carcinogenic forms in the body as a whole, over the course of time. Moreira et al.[11] suggested the potential of environmental and human contamination by pesticides used in the production of grains and cotton in the state of Mato Grosso, and their impacts on the biota, however, more in depth studies are required to characterize this impact. Studies must also be conducted with this population in the short, medium and long term with the purpose of following-up the evolution of its health, seeking to analyze the increase in or appearance of neoplasias in this group;

However, the concentration of cases of epidermoid carcinoma was greater in the municipalities of Cuiabá, Várzea Grande and Rondonópolis, with 50 cases (38.7%), contrary to the hypothesis raised. Other studies have found higher concentrations of cases of epidermoid carcinoma in large cities[2,6,17,19-21] and have related this finding to the greater exposure to risk factors such as smoking and alcoholism, in addition to occupational factors[21].

The municipalities of Lucas do Rio Verde and Campo Verde, in the interior of Mato Grosso, are large grain producers and consumers of a large volume of pesticides. The study conducted by Moreira et al.,[11] in the 62 samples of water from artesian wells, found the presence of residues of atrazine, metolachlor, chlorpyrifos, apha and beta endosulfan, flutriafol, and permethrin. Remembering that the use of endosulfan was prohibited in the European Union due to its carcinogenic potential. These pesticides are disseminated into the air by means of aircraft or spray tractors and that in some way will attain the soil, rivers and/or water tables. Afterwards the population will be in contact by aspiration (affecting the lungs), bathing (contact with the skin), or ingesting the water from wells and rivers, leading some form of these to the digestive system, from which they will follow the entire pathway through the body, from absorption, distribution by blood, metabolism through to excretion.

Therein lies the importance of the in depth search for environmental factors that may be related to the genesis of cancer, such as local, cultural, demographic, socioeconomic and epidemiological factors. Thought should be given to including in the anamnesis of patients with suspected pre-neoplastic or neoplastic lesions, information about where they come from, whether they have had any direct or indirect contact with pesticide substances (ingestion of contaminated water, fish, meats, fruits, vegetables, bathing in rivers or dams, aspiration by air, among others), or whether they reside near cities where there are extensive agricultural centers.

Also important is the use of maps as a means of analyzing sanitary events with spatial expression thereby contributing to planning, preventing and understanding of the process of the population becoming ill, in addition to helping with health surveillance. Studies based on data of the incidence and geographical distribution of diseases must also be constantly updated from the aspect of providing managers, planners in the area of health and sanitary specialists with updated information about the occurrence and spatial distribution of diseases, endeavoring to correlate them with probable risk factors, with a view to guiding specific public health actions in the areas of greater occurrence of disease.

CONCLUSION

Epidermoid carcinoma was more prevalent in the unspecified oral mucosa region, among men, and in the age-range from 41-70 years. The major portion of cases were patients coming from the most populated municipalities of the State of Mato Grosso. No relationship was found

between the occurrence of the cases of epidermoid carcinoma of the mouth and the municipalities of large agricultural production and elevated use of pesticides.

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Collaborators

PHS CASTRO participated in data collection and writing the article. NS ARAÚJO participated in conception of the study and revising the article. AA CARVALHOSA participated in revision of the article and data analysis. J ARIEIRA participated in the spatial analysis of cases and their spatial distribution. LER VOLPATO participated in conception of the study, analysis and revision of the final version of the manuscript.

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