● **Original article**

MONITORING OF MESOTHELIOMA IN SOUTHERN BRAZIL: A SITUATION TO BE INVESTIGATED*

Francisco José Koller[1], Leila Maria Mansano Sarquis[2], Maria de Fátima Mantovani[2], Fernanda Moura D'Almeida Miranda[3], Dario Consonni[4], Carolina Mensi[5]

ABSTRACT: Brazil is one of the world's greatest producers of chrysotile, but the occurrence of mesothelioma is apparently low. However, identification of cases of mesothelioma is difficult due to errors of diagnosis and registries of deaths. This is an epidemiological, descriptive and retrospective study of hospital records of Brazil's National Institute of Cancer (INCA). Records of pleural cancer or mesothelioma histology from the 2001-2014 period were selected. We identified 208 records, but only 58 cases of mesothelioma histology. Notably, 13 (22%) had been incorrectly coded as lung cancer. In half the cases, there was no registration of the latest occupations of the patients. We conclude that hospital data on mesothelioma is still imprecise and was incorrectly coded. Besides, the registries do not include information on the workplace and occupation. These findings confirm the need for a proper registry of cases of mesothelioma.
DESCRIPTORS: Mesothelioma; Asbestos; Epidemiology.

MONITORAMENTO DO MESOTELIOMA NO SUL DO BRASIL: UMA REALIDADE AINDA A SER ESTUDADA

RESUMO: O Brasil é um dos maiores produtores de crisotila do mundo, mas a ocorrência de mesotelioma é aparentemente baixa. No entanto, a identificação dos casos torna-se difícil por causa de erros de diagnóstico e registro de morte. Este é um estudo epidemiológico, descritivo e retrospectivo de registros hospitalares do Instituto Nacional de Câncer do Brasil, foram selecionados registros câncer de pleura ou histologia do mesotelioma entre 2001-2014. Foram identificados 208 registros, entretanto apenas 58 casos com histologia de mesotelioma. Notavelmente, 13 (22%) tinham sido codificados incorretamente como câncer de pulmão. A última atividade laboral estava ausente em metade dos casos. Concluiu-se que os dados hospitalares existentes em relação ao mesotelioma ainda são inadequados por imprecisão e codificação errônea. Além disso, nos registros ainda não existem informações do local de trabalho, bem como da ocupação. Estes achados confirmam a necessidade de um registro de casos de mesotelioma.
DESCRITORES: Mesotelioma; Amianto; Epidemiologia.

INSPECCIÓN DEL MESOTELIOMA EN SUR DE BRASIL: UNA REALIDAD QUE TODAVÍA DEBE SER ESTUDIADA

RESUMEN: Mientras se apunta que Brasil es un de los mayores productores de crisotila en el mundo, la ocurrencia de mesotelioma es aparentemente baja. Sin embargo, la identificación de los casos es dificil a causa de errores de diagnóstico y registro de muerte. Este es un estudio epidemiológico, descriptivo y retrospectivo de registros hospitalarios del Instituto Nacional de Cáncer de Brasil. Fueron seleccionados registros de cáncer de pleura o histología del mesotelioma entre 2001 y 2014. Se identificaron 208 registros, pero solamente 58 casos con histología de mesotelioma. Se constató que 13 (22%) fueron codificados de modo incorrecto como cáncer de pulmón. La última actividad laboral no estaba presente en mitad de los casos. Se concluye que los datos hospitalarios existentes acerca del mesotelioma todavía son inadecuados por imprecisión y codificación errónea. Además, en los registros no hay informaciones del local de trabajo, así como de la ocupación del paciente. Estos hallados confirman la necesidad de un registro de casos de mesotelioma.
DESCRIPTORES: Mesotelioma; Asbesto; Epidemiología.

---

[1]Nurse. Master in Nursing. Professor at Faculdade Integrada Santa Cruz. Curitiba, PR, Brazil.
[2]Nurse. PhD in Nursing . Professor of the Undergraduate and Graduate Courses of Universidade Federal do Paraná. Curitiba, PR, Brazil.
[3]Nurse. PhD in Nursing. Coordinator of the Graduate Course in Occupational Health Nursing at Universidade Positivo. Curitiba, PR, Brazil
[4]Physician. PhD in Occupational Health. Professor at Universidade de Milão. Milan – Italy. Unidade de Epidemiologia Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan – Italy.
5 Biologist. PhD in Public Health. Epidemiologist of the sector of mesothelioma registries of Lombardia. Milan – Italy. Unidade de Epidemiologia. Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan – Italy.

Corresponding author:
Francisco José Koller
Universidade Federal do Paraná
Av. Prefeito Lothário Meissner, 632 - 80210-170 - Curitiba, PR, Brasil
E-mail: enfkoller@yahoo.com.br

● INTRODUCTION

Mesothelioma is one of the deadliest types of cancer, with a growing incidence worldwide. Therefore, it is necessary to monitor its incidence, identify sources of exposure to asbestos, provide medical and legal assistance to patients and their families and predict the impact of future trends [1-2]. The first accurate description of mesothelioma was made in 1767 by Joseph Lieutaud. However, only in 1931 the word "mesothelioma" was used by Klemper et Rabim to designate some pleural tumors [3]. The mesothelioma is a malignant neoplasm originated from the mesothelial and submesothelial cells that form the pleural layers, the pericardium, the peritoneum and the tunica vaginalis of the testis. It is an aggressive and incurable cancer, with prolonged latency after exposure to the etiological factor [4].

Inhalation of asbestos fibers is one the leading causes of cancer [5]. According to the literature, around 90% of the cases of mesothelioma are related to exposure to this mineral, and in most cases, contact with asbestos fibers occurs in the workplace [1-6].

Brazil is the world's third largest producer of asbestos, and has not implemented the necessary asbestos ban policies in the industrial chain [7].

In 2010, approximately 300,000 workers were exposed to asbestos and approximately 20,000 were employed in the primary industry, e.g. in workshops that offered brake and clutch services and in civil construction, and were not followed up by the occupational health service. Therefore, such exposure to asbestos did not have the necessary visibility and consequent monitoring [2].

Regarding the Brazilian production of asbestos, 40% is destined to the domestic market, especially to the states of Paraná, São Paulo, Rio de Janeiro, Goiás, Rio Grande do Sul, Minas Gerais, Bahia, Santa Catarina and Alagoas. Brazil also imports 44,000 tons of chrysotile from China for use in fiber cement artifacts, acquisition and renovation of equipment, technological and system innovations, infrastructure, environment and health and safety at work [8].

The clinical manifestations of pleural mesothelioma include dry cough, dyspnea, chest pain, significant weight loss in a short period of time, weakness and pleural effusion with hemorrhagic characteristics. Due to the metastases, leukemoid reactions and metabolic abnormalities [9] may occur up to 30 years after exposure to asbestos fibers and is three times more common in men than in women, with an increase in the number of people affected by the disease after 60 years of age [10].

Pathology diagnosis of mesothelioma is difficult to make. The median survival rate of individuals affected by mesothelioma is approximately 08-12 months, and patients usually have signs and symptoms of significant volume depletion, making it difficult for them to undergo invasive procedures [11].

The present study aimed to describe the cases of mesothelioma in Southern Brazil, recorded at the System of Hospital Cancer Registry.

● METHOD

Epidemiological, descriptive and retrospective study that used data from the Integrated Hospital-based Cancer Registry (IRHC) System, a centralized database provided by the National Cancer Institute José Alena da Silva - Brazil.

In the January 2001 – December 2014 period (14 years) cases with ICD 10 C38.4 (pleural cancer) and C34 (lung cancer) were extracted for obtaining the types or morphologies of mesothelioma (9053/3: biphasic; 9052/3: epithelioid; 9051/3: fibrous and 9050/3 unspecified).

The variables were demographic (gender, age, race, educational level and occupation) and clinical (morphological type, tumor location, stage, treatment performed and final status after the first treatment performed).

This study is compliant with applicable international ethical principles and was approved under 677.015 statement of purpose, of May 29, 2014, according to Resolution no 466/12.

● RESULTS

Of the 208 cases extracted, 194 (93.2%) were classified as pleural cancer and 14 (6.8%) as lung cancer. Registries not related to mesothelioma were excluded: 26 (12.5%) were adenocarcinomas, 20 (9.6%) were lymphomas, 07 (3.4%) were carcinomas, 08 (3.8%) sarcomas, 02 (1%) myelomas and 12 (5.8%) of other types or morphologies. Seventy-five (75) registries with generic term "malignant neoplasm" were also excluded. The final mesothelioma sample resulted in 58 (27.9%) cases: 10 (17.2%) epithelioid type, 5 (8.6%) fibrous type, 1 (1.7%) biphasic type, while most, 42 (72.4%) of unspecified morphology (Table 1).

Table 1 - Characterization of the cases of mesothelioma, according to gender, age group and morphology. Curitiba, PR, Brazil, 2014.

CHARACTERISTIC	VARIABLE	PARANÁ		RIO GRANDE DO SUL		SANTA CATARINA	
		N.	%	N.	%	N.	%
GENDER	Female	5	33.3	5	17.8	7	46.6
	Male	10	66.7	23	82.2	8	53.4
AGE GROUP	Before the age of 49	3	20	9	32.3	4	26.7
	From 50 to 59 years	4	26.7	8	28.5	3	20
	From 60 to 69 years	5	33.3	4	14.2	4	26.7
	Over 70 years	3	20	7	25	4	27.6
MORPHOLOGY	Biphasic mesothelioma	0	0	1	3.6	0	0
	Epithelioid esothelioma	4	26.6	5	17.8	1	6.6
	Fibrous mesothelioma	2	13.4	2	7.2	1	6.7
	Unspecified mesothelioma	9	60	20	71.4	13	86.7

Source: IRHC/SIDRH/INCA (2016)

Most cases occurred in Rio Grande do Sul. The occupational activities performed in the past three months were identified in 29 cases (50%), in the following sectors: civil construction, metallurgy, transports and agriculture.

In most cases, patients had an average age of 58, were male individuals, 41 (70.7%), white 48 (82.8%), married 32 (55.2%) and had completed primary education, 15 (25.9%). Regarding the characteristics of the mesothelioma, most of them were in stage IV, 18 (31%) initially received chemotherapy treatment, 18 (31%), and 12 (20.7%) registries concerned patients who did not undergo any treatment.

● DISCUSSION

There is scarce epidemiological research on mesothelioma in Brazil [12]. This is probably due to underreporting of cases to the health information systems available in the country. It is necessary to improve the IRHC, because this system is one of the sources of information that makes it possible to assess the quality of care to cancer patients, survival rates and temporal phenomena associated with cancer [13]. However, inaccurate patient records jeopardize the quality of IRHC registries, which fail to provide access to information related to patients, diagnoses, tumor characterization, type or treatment performed, as well as patient evolution [14].

Regarding the coding of mesothelioma by the IRHC system, the use of the International Classification of Diseases, (ICD) should be analysis, because until 1995 pleural mesothelioma was classified as pleural cancer, according to the code 163 of the 9th Revision of the ICD. For further clarifying the classification, the 10th Revision of the ICD, adopted by Brazil in 1996, established a specific code for mesothelioma:

the C 45 code with specifiers C45.0 (pleural mesothelioma), C45. 1 (peritoneum mesothelioma), C45.2 (pericardial mesothelioma), C45.7 (mesothelioma of other sites) and C45.9 (unspecified mesothelioma) [15].

However, this type of information system is based on an edition of the International Classification of Diseases for Oncology – ICD-O/3 to specify tumor topography and morphology and the subsequent tabulations and selection of cases for clinical and epidemiological studies, including comparative temporal and interinstitutional studies, classifying the cases of pleural mesothelioma through C38.4 site and assigning morphological codes [16].

Concerning the cases recorded based on ICD - 10, some studies have stressed that this classification has been maintained, so that cases with morphological characteristics of malignant mesothelioma are still being reported as pleural cancer, classified as C38.4 code instead of C45, which has been identified as "escape" or "deviation". Since the harm caused by asbestos is recognized as a historical problem, some countries like Great Britain have been annually monitoring the levels of "escape" mesothelioma [17].

A study on mortality by mesothelioma conducted in Brazil showed an analysis of the deaths occurred between January 2000 and December 2012, of 929 and 1,379 deaths caused by diseases coded as C45 and C38.4, respectively [2].

Mesothelioma is a type of cancer caused by exposure of people to asbestos fibers. In many countries, the incidence of mesothelioma is increasing despite the ban on the commercialization and handling of this mineral in more than 60 countries [15].

The developed countries have high incidence rates of mesothelioma and implement tracking policies and quality systems to control the cases [18, 19].

Compared to other countries Brazil, displays a 15-20 year lag in estimated mesothelioma mortality, which is consistent with the lag of asbestos consumption in the country. Some researchers are investigating the subject, and future studies shall expose the magnitude of the problem [2].

One study conducted in Rio de Janeiro, in the 1979-2000 period, with 83 cases of mesothelioma showed a 2:1 male to female ratio regarding exposure to asbestos [20]. In Santa Catarina, there were 30 deaths from mesothelioma from 1998 to 2009, revealing the occurrence of pleural mesothelioma in workers in the armed forces, police and firefighters, as well as workers who performed repair and maintenance services [21]. In Rio Grande do Sul, there were 25 deaths from mesothelioma, mainly pensioners, farmers and domestic servants/ housewives, from 1999 to 2003 [22].

The present study detected inaccurate identification of the occupations of the patients in one third of cases. The study conducted in 2008, in Rio de Janeiro, had similar findings: 221 patient records were analyzed, and it was concluded that the system failed to properly record the occupations of the patients upon admission, since 45% of information related to occupations was missing or incompletely filled out, making it difficult to perform an analysis of cancer etiology [13].

The information was complete, though not useful because it comprised only the latest three months of labor activity. Since mesothelioma has an extremely long latency period, it is necessary to obtain a complete history of the labor activities of the patients to determine occupational exposure to asbestos.

The use of these results is aimed to the assessment of the quality of care to patients with mesothelioma. It is necessary to raise awareness of hospital staff and managers of the importance of proper filling of medical records in order to maintain accurate documentation about patients, diagnoses, tumor characterization, treatment, and patient evolution and death [23].

This study had some limitations, particularly the fact that the data recording system is insufficient to correctly identify cases of mesothelioma, as well as to provide information on the histological type and a complete history of the patients' occupations. In short, the IRHC cannot properly identify this type of cancer.

● CONCLUSION

Since the above-mentioned instrument cannot satisfactorily monitor the incidence of mesothelioma because of its inability to provide complete data, a system entirely dedicated to recording data on this disease should be implemented. For every case confirmed, a complete history of the patient's occupations should be recorded, stimulating the production of key knowledge on the risks caused by asbestos, through surveillance actions. These measures are necessary to support public actions, as well as initiatives of social organizations aimed to ban asbestos and provide care to patients and families suffering from mesothelioma.

● REFERENCES

1. Mensi C, de Matteis S , Dallari B, Riboldi L, Bertazzi PA, Consonni D. Incidence of mesothelioma in Lombardy, Italy: exposure to asbestos, time patterns and future projections. Occup. Environ. Med. [Internet] 2016;73(9) [acesso em 07 dez 2016]. Disponível: http://dx.doi.org//10.1136/oemed-2016-103652.

2. Algranti E, Saito CA, Carneiro APS, Moreira B, Mendonça EMC, Bussacos MA. The next mesothelioma wave: mortality trends and forecast to 2030 in Brazil. Cancer Epidemiol. [Internet] 2015;39(5) [acesso em 30 nov 2016]. Disponível: http://dx.doi.org/10.1016/j.canep.2015.08.007.

3. Roe OD, Stella GM. Malignant pleural mesothelioma: history, controversy and future of a manmade epidemic. Eur Respir Rev. [Internet] 2015;24(135) [acesso em 30 nov 2016]. Disponível: http://dx.doi.org//10.1183/09059180.00007014.

4. Neumann V, Löseke S, Nowak D, Herth FJF, Tannapfel A. Malignant pleural mesothelioma: incidence, etiology, diagnosis, treatment, and occupational health. Dtsch Arztebl Int. [Internet] 2013;110(18) [acesso em 05 dez 2016]. Disponível: http://dx.doi.org/10.3238/arztebl.2013.0319.

5. International Agency for Research on Cancer. Asbestos, (chrysotile, amosite, crocidolite, tremolite, actinolite, and anthophyllite). In: Metals, arsenic, dusts and fibres. A review of human carcinogens. Lyon: IARC (Monograph on the Evaluation of Carcinogenic Risks to Humans vol. 100C) [Internet] 2012 [acesso em 07 dez 2016]. Disponível: http://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C.pdf.

6. Pawełczyk A, Božek F. Health risk associated with airborne asbestos. Environ Monit Assess. [Internet] 2015;(187) [acesso em 25 nov 2016]. Disponível: http://dx.doi.org//10.1007/s10661-015-4614-3.

7. Kazan-Allen L. International Ban Asbestos Secretariat. Current asbestos bans and restrictions. [Internet] 2014 [acesso em 30 nov 2016]. Disponível: http://ibasecretariat.org/asbestos_ban_list.php.

8. Brasil. Departamento Nacional de Produção Mineral. Sumário Mineral. [Internet] Brasília: Departamento Nacional de Produção Mineral; 2016 [acesso em 30 nov 2016]. Disponível: http://www.dnpm.gov.br/dnpm/sumarios/sumario-mineral-2015.

9. Ahmed I, Tipu SA, Ishtiaq S. Malignant mesothelioma. Pak. J. Med. Sci. [Internet] 2013;29(6) [acesso em 05 dez 2011]. Disponível: http://dx.doi.org/10.12669/pjms.296.3938.

10. McCormack V, Peto J, Byrnes G, Straif K, Boffetta P. Estimating the asbestos-related lung cancer burden from mesothelioma mortality. Br J Cancer. [Internet] 2012;106(3) [acesso em 25 nov 2016]. Disponível: http://dx.doi.org//10.1038/bjc.2011.563.

11. Leong SL, Gary Lee SG, Robinson BW, Creaney J. Role of Mesothelin Measurement in Patients With Cytology-Negative Pleural Effusion Undergoing Medical Thoracoscopy. PLEURA. [Internet] 2015 [acesso em 30 nov 2016]. Disponível: http://dx.doi.org//10.1177/2373997515579639.

12. Forouzanfar MH, Alexander L, Anderson HR, Bachman VF, Biryukov S, Brauer S et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. [Internet] 2015;386(10010) [acesso em 07 dez 2016]. Disponível: http://dx.doi.org/10.1016/S0140-6736(15)00128-2.

13. Tabalipa MM, Boccolini PMM, Simões DR, Chrisman JR, Otero UB, Garbin HBR, et al. Informação sobre ocupação em registros hospitalares de câncer no estado do Rio de Janeiro. Cad. saúde colet. [Internet] 2011;19(3)

[acesso em 07 dez 2016]. Disponível: http://www.iesc.ufrj.br/cadernos/images/csc/2011_3/artigos/csc_v19n3_278-286.pdf.

14. Branco BPC, Carvalho FA, Paiva FA, Branco ITC. Dificuldades no diagnóstico diferencial entre mesotelioma pleural e adenocarcinoma metastático para pleura patológica. Jornal Brasileiro de Pneumologia. [Internet] 2013;101(6) [acesso em 05 dez 2016]. Disponível: http://files.bvs.br/upload/S/0047-2077/2013/v101n6/a4016.pdf.

15. Stayner L, Welch LS, Lemen R. The worldwide pandemic of asbestos-related diseases. Annu Rev Public Health. [Internet] 2013;(34) [acesso em 25 nov 2016] Disponível: http://dx.doi.org//10.1146/annurev-publhealth-031811-124704.

16. Ministério da Saúde (BR). Instituto Nacional do Câncer José de Alencar Gomes da Silva (INCA). Registro Hospitalares de Câncer: Planejamento e Gestão. Rio de Janeiro: Ministério da Saúde; Inca; 2010.

17. Pedra F, da Silva PO, Mattos IE, Castro HA. Mortalidade por Mesotelioma no Brasil, 1980 a 2010 / Mortalidade por Mesotelioma in Brasil, 1980 a 2010. Rev. Bras. Cancerol. [Internet] 2014;60(3) [acesso em 30 nov 2016]. Disponível: http://www1.inca.gov.br/rbc/n_60/v03/pdf/03-artigo-mesothelioma-mortality-rate-in-brazil-1980-to-2010.pdf.

18. Park EK, Takahashi K, Hoshuyama T, Cheng TJ, Delgermaa V, Le GV, et al. Global magnitude of reported and unreported mesothelioma. Environ Health Perspect. [Internet] 2011;119(4) [acesso em 05 nov 2016]. Disponível: http://dx.doi.org/10.1289/ehp.1002845.

19. Delgermaa V, Takahashi K, Park EK, Vinh Le G, Hara T, Sorahan T. Global mesothelioma deaths reported to the World Health Organization between 1994 and 2008. Bull World Health Organ. [Internet] 2011;89(10) [acesso em 30 nov 2016]. Disponível: http://dx.doi.org/10.2471/BLT.11.086678.

20. Pinheiro GA, Antao VCS, Monteiro MMT, Capelozzi VL, Terra-Filho M. Mortality from pleural mesothelioma in Rio de Janeiro, Brazil, 1979-2000: Estimation from death certificates, hospital records, and histopathologic assessments. Int. J. Occup. Environ. Health. [Internet] 2003;9(2) [acesso em 30 nov 2016]. Disponível: http://dx.doi.org/10.1179/oeh.2003.9.2.147.

21. Mattos GR, Pinheiro RDC. Perfil dos óbitos por mesotelioma registrados no sistema de informação de mortalidade em Santa Catarina, no período de 1998-2009. Rev. Saúde Pública. [Internet] 2011;4(1) [acesso em 26 nov 2016]. Disponível: http://esp.saude.sc.gov.br/sistemas/revista/index.php/inicio/article/viewArticle/98.

22. Nussbaumer L, Dapper V. Investigação de óbitos por mesotelioma no Rio Grande do Sul, 1999 a 2003. Bol. Epidemiológico. [Internet] 2007;9(1) [acesso em 30 nov 2016]. Disponível: www.abrea.com.br/mesoteliomargs.pdf.

23. Pinto IV, Ramos DN, da Costa MCE, Ferreira CBT, Rebelo MS. Completude e consistência dos dados dos registros hospitalares de câncer no Brasil. Cad. Saúde Colet. [Internet] 2012;20(1) [acesso em 30 nov 2016]. Disponível: www.iesc.ufrj.br/cadernos/images/csc/2012_1/artigos/CSC_v20n1_113-120.pdf.