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Article



# Back pain and work-related functional disabilities: records from the Notifiable Diseases Information System (SINAN/DATASUS)

*Dorsalgias e incapacidades funcionais relacionadas ao trabalho: registros do sistema de informação de agravos de notificação (SINAN/DATASUS)*

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## Abstract

*Introduction*: back pain and disabilities are occupational health problems with economic and social repercussions. *Objective*: to describe the reported cases of back pain and functional disability in Brazil. *Methods*: case series study of work-related back pain registered as Work-related Musculoskeletal Disorders (WMSD) in the Notifiable Diseases Information System (SINAN), Ministry of Health, in Brazil, from 2007 to 2012. Incidence rates (IR) for back pain and permanent disabilities were calculated as well as frequencies of sociodemographic and occupational variables. *Results*: 8,172 back pain cases were registered in the period. The IR of back pain was 1.1 per 100,000 workers in 2007 and 1.9 per 100,000 workers in 2012, and the IR of work-related functional disability was 0.12 per 100,000 in 2007 and 0.10 per 100,000 in 2012. Industrial goods and services workers and services workers/retail salespersons showed the highest percentages for back pains (54.4% and 20.7%) and permanent functional disability (54.7% and 16.3%). *Conclusions*: The increase in reports of occupational back pain and the reduction of functional disabilities represent an advance regarding the recognition, diagnosis, notification and attention to the problem, but are still a challenge to workers' health care.

**Keywords:** occupational diseases; workers' health surveillance; back pain; WMSD.

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## Introduction

Back pain is an occupational health problem, with economic and social implications, especially when associated with functional disabilities, reaching workers' productive capacity and keeping them away from work. Back pain is part of the broad spectrum of Work-related Musculoskeletal Disorders (WMSD), which, in turn, promote discussions on the operating mode, environment, lifestyle and health in the context of work. The genesis of WMSDs involves a silent process, marked by painful symptoms related to cumulative events and malfunctions that affect workers and their productive capacity[1].

WMSDs represent one third or more of all occupational diseases registered in the United States, in the Scandinavian countries, in Japan and in Brazil[2-4]. Currently, WMSD is increasing in various countries of the world, with epidemic dimensions and under different clinical forms. WMSDs lead the causes of pain, suffering and disability in American work environments[4]. In the European Union, 27% of workers show complaints of back pain and 23% show complaints of muscular pain[5]. In Brazil, diseases of the musculoskeletal system and of the connective tissue represent the main injury in absolute numbers of sick leaves, of work-related diseases and accident leaves (for both quantity and value) granted by the Social Security between 2011 and 2013, inferior only to external causes for urban accident leaves[6-7].

This disease does not constitute specific clinical entity, but encompasses various symptomatic conditions, such as inflammation of tendons and others (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica) and osteoarthrosis, as well as less standardized conditions, such as myalgia, lower back pain and other regional pain syndromes. The body regions most commonly affected are the lower back, neck, shoulder, forearm, wrist and hand, and inferior members[2].

Among WMSDs, spine pains are a common experience in adult workers, showing an estimated prevalence from 15 to 30%, and are the largest cause of disability, socioeconomic problems and loss of quality of life in developed countries[8]. All cervicalgia, cervicobrachial syndromes, pain in the thoracic spine, low back pain, sciatica and low back sciatica are considered as back pain. The highest frequency of back pain in the report of work-related diseases can be explained by the difficulty of differential diagnosis and by the non-specificity of the complaint[9].

Among the Social Security notifications of work-related diseases on the Social Security in 2013, back pains represented the third most frequent diagnosis in absolute number, after shoulder injuries, synovitis and tenosynovitis[7]. Among the diagnosis of back pain that generated disability retirements, the most frequent ones were back pain, low back pain with sciatica and lower back pain[9]. When we assess the load of low back pain, it was ranked first in the United States in 2010, when considered the measure of years lived with disability (YLD), and third to the measure of years of life lost by disability (DALY – Disability Adjusted Life of Years)[10]. Low back pain affects 10% of the world population, from light to very severe intensities[10]. When we consider the transitory and/or permanent character of functional disability associated with occupational back pain, we can verify the need for intersectoral strategic care, including actors of health, work, social security and employers in actions involving from the recognition of the problem to the planning of preventive and care actions.

The aim of this study was to describe the reported cases of back pain and work-related functional disability registered in the Notifiable Diseases Information System (SINAN/DATASUS), in Brazil, from 2007 to 2012.

## Methods

A case series study was held based on cases of work-related back pain registered as repetitive strain injury (RSI)/WMSD in Brazil, from 2007 to 2012. Secondary data of a public source of research from DATASUS were used, based on the Notifiable Diseases Information System (SINAN/DATASUS) and provided by the Collaborating Center for Surveillance to Work Accidents (CCVISAT) in www.ccvisat.ufba.br. Because this is a research with public data from secondary source, the study was not submitted to a Research Ethics Committee, but met the current principles of resolution no. 466 from the National Council of Health of 2012. The data do not have personal identifiers of the cases, containing only information concerning public health.

Back pains were classified based on the international classification of diseases ICD-10. Initially, all the reports with ICD Z57.9 (RSI/WMSD) informed on the reporting forms were evaluated. Then, for the classification of back pain, codes were used with specific diagnosis with ICD: M50 (Cervical disk disorders); M51 (Thoracic, thoracolumbar, and lumbosacral intervertebral disc disorders), M53 (Other and unspecified dorsopathies, not elsewhere classified); M54 (Dorsalgia).

The interest variables used in this study were: sociodemographic characteristics, such as sex (male and female), age group (18 to 35 years, 36 to 59

years, 60 years or more), education (some elementary or middle school, high school and higher education), race/color (white and non-white); characteristics of employment relationship (formal, informal and others), classification of major occupational groups according to the Brazilian Classification of Occupations (CBO), Work Accident Notification (CAT) emitted (yes and no); additionally, some dichotomous (yes/no) variables of work organization were also used, such as workload exceeding 6 hours, repetitive movement, reward for production, break during work and stressful environment at work.

Functional disability was assessed by the clinical/functional follow-up variable. Initially, the variable was described in three classes: cure, temporary disability and permanent disability. Deaths and missing data were removed. Then, for purposes of analysis, the items "total permanent disability" and "partial permanent disability" were considered as cases with permanent functional disability and the other items (cure, cure not confirmed, and temporary disability) were considered as absence of permanent functional disability.

In data analysis, absolute and relative frequencies were calculated to describe the variables of interest. Incidence rates (IR) were estimated for back pain and permanent functional disabilities. To that end, the number of Economically Active Population (PEAO) in Brazil was considered as denominator, by calendar year. And, for the year 2010, the PEAO expressed in the 2010 Demographic Census was adjusted by the values of the National Household Sample Survey (PNAD) of the other years[11]. The rates were multiplied by a base of $10^5$, for adjustment of the values. To evaluate the variation of these indicators in time, proportional percentage variations (PPV) were calculated for each indicator. Thus, the difference between the incidence rates (IR of the last year investigated subtracted from the IR of the first year investigated) is divided by the IR of the first year investigated and multiplied by a base of 100, which represents the magnitude of percentage variation.

The data were analyzed using the Statistical Package for the Social Sciences – SPSS v. 15. For better view of the data, charts were made with Microsoft Excel 2013.

## Results

From 2007 to 2012, 8,172 cases of back pain were registered among SRI/WMSD and 607 cases were reported as permanent functional disability by SINAN. The Incidence Rate of the work-related back pain for 2007 was 1.1 per 100,000 workers and 1.9 per 100,000 workers in 2012, representing a PPV of 72.7% for this period. The IR of work-related functional disability was 0.12 per 100,000 workers for 2007 and 0.10 per 100,000 workers for 2012, representing a negative PPV of 16.6% (**Figure 1**).

The analysis of back pain reports and of permanent functional disabilities by the Brazilian Classification of Occupation (CBO) showed two groups of workers with greater frequency for both (**Table 1**). The reports were concentrated in industrial goods and services workers and in services/retail salespersons, which showed higher percentages for back pain (54.4% and 20.7%, respectively).

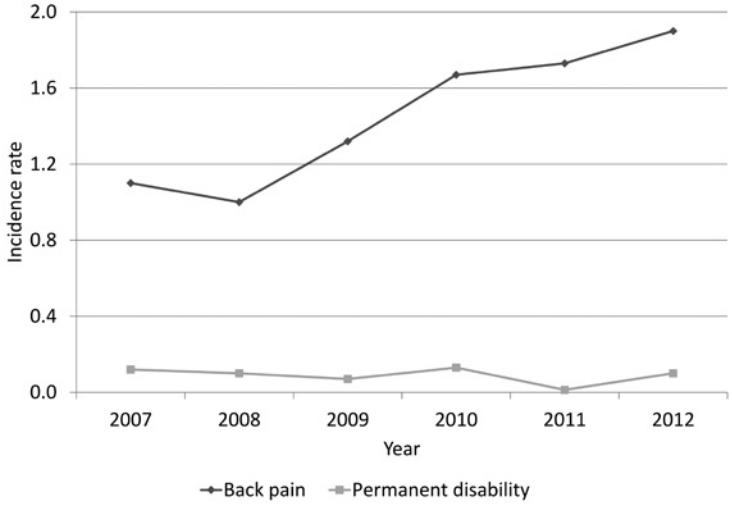


**Figure 1** Distribution of incidence rate (IR) of back pain and work-related permanent functional disability per 100,000 workers in Brazil, in the period from 2007 to 2012
Source: IBGE/SINAN/DATASUS: 2007-2012

**Table 1** Absolute and relative frequencies of back pain and permanent functional disability according to the Brazilian Classification of Occupations (CBO) registered in Brazil in the period from 2007 to 2012

| *Occupation* | *Back pain* | | *Permanent disability* | |
|---|---|---|---|---|
| | *n (7,899)* | *%* | *n (603)* | *%* |
| Public administrators/managers of companies | 49 | 0.6 | 2 | 0.3 |
| Professionals of sciences and arts | 193 | 2.4 | 24 | 4.0 |
| Medium level technicians | 347 | 4.4 | 26 | 4.3 |
| Administrative services workers | 604 | 7.6 | 37 | 6.1 |
| Service workers/retail salespersons | 1,629 | 20.7 | 98 | 16.3 |
| Agriculture/forestry/fishing workers | 459 | 5.8 | 58 | 9.6 |
| Workers of industrial goods and services | 4,291 | 54.4 | 330 | 54.7 |
| Workers of repair and maintenance services | 325 | 4.1 | 27 | 4.5 |
| Military, firefighters, police officers and armed forces | 2 | 0 | 1 | 0.2 |

Source: SINAN/DATASUS: 2007-2012

In relation to permanent functional disability, the records were also focused between these two groups (54.7% and 16.3%, respectively). Despite that, a poor filling in the field "occupation" was verified in the reporting forms, with a record of data loss of 3.3%.

Among the reported cases of back pain that evolved to permanent functional disability, most were characterized as males, aged between 36 and 59 years, with high school education and non-white race/color. In relation to occupational variables, the formal employment relationship and workload exceeding 6 hours were prevalent. In addition, most workers stated not winning reward for production (89.8%) and not having breaks during the working hours (57.4%). However, 89.6% of cases reported not performing repetitive movements and not working in stressful environment (63.8%), unlike the cases of back pain, which reported performing repetitive movements (89.4%) and predominance of stressful environment (61.1%). From the total cases reported, 62.1% of back pain and 64.5% of permanent functional disabilities had CAT notifications (**Table 2**).

In the evaluation of clinical/functional evolution, there was a decrease of cases that evolved to temporary and permanent functional disabilities and an increase in cases that evolved to cure. In 2007, 79.9% of cases evolved to temporary disability, 14.4% to permanent disability and 5.7% to cure. In 2012, 67.9% evolved to temporary disability, 6.3% to permanent disability and 25.8% to cure (**Figure 2**).

**Table 2** Sociodemographic and occupational features of the reported cases of work-related back pain and permanent functional disability in Brazil in the period from 2007 to 2012

| *Variable* | *Back pain* | | *Permanent disability* | |
|---|---|---|---|---|
| *w* | *n* | *%* | *n* | *%* |
| Sex | | | | |
| Male | 5,285 | 65.5 | 421 | 70.2 |
| Female | 2,778 | 34.5 | 179 | 29.8 |
| Age group | | | | |
| 18 to 35 years | 2,383 | 29.3 | 107 | 18.0 |
| 36 to 59 years | 5,628 | 68.8 | 471 | 79.0 |
| 60 or more | 161 | 1.9 | 18 | 3.0 |
| Education | | | | |
| Some elementary or middle school | 2,561 | 38.7 | 232 | 45.1 |
| High school | 3,628 | 54.8 | 257 | 50.0 |
| Higher education | 427 | 6.5 | 25 | 4.9 |
| Race/color | | | | |
| White | 2,900 | 45.8 | 159 | 32.5 |
| Non-white | 3,427 | 54.2 | 330 | 67,5 |

(To be continued)

**Table 2** Continuation…

| *Variable* | *Back pain* | | *Permanent disability* | |
|---|---|---|---|---|
| *w* | *n* | *%* | *n* | *%* |
| Employment relationship | | | | |
| Formal | 6,313 | 80.3 | 424 | 72.0 |
| Informal | 743 | 9.5 | 69 | 11.7 |
| Other | 801 | 10.2 | 96 | 16.3 |
| Workload > 6 hours | | | | |
| Yes | 6,546 | 92.5 | 521 | 92.5 |
| No | 530 | 7.5 | 42 | 7.5 |
| Reward for production | | | | |
| Yes | 926 | 17.2 | 43 | 10.2 |
| No | 4,448 | 82.8 | 379 | 89.8 |
| Break during work | | | | |
| Yes | 1,882 | 32.7 | 190 | 42.6 |
| No | 3,867 | 67.3 | 256 | 57.4 |
| Repetitive movements | | | | |
| Yes | 6,556 | 89.4 | 56 | 10.4 |
| No | 780 | 10.6 | 482 | 89.6 |
| Stressful environment | | | | |
| Yes | 3,514 | 61.1 | 171 | 36.2 |
| No | 2,236 | 38.9 | 301 | 63.8 |
| CAT* emitted | | | | |
| Yes | 3,733 | 62.1 | 289 | 64.5 |
| No | 230 | 37.9 | 159 | 35.5 |

*Work Accident Notification

Source: SINAN/DATASUS: 2007-2012

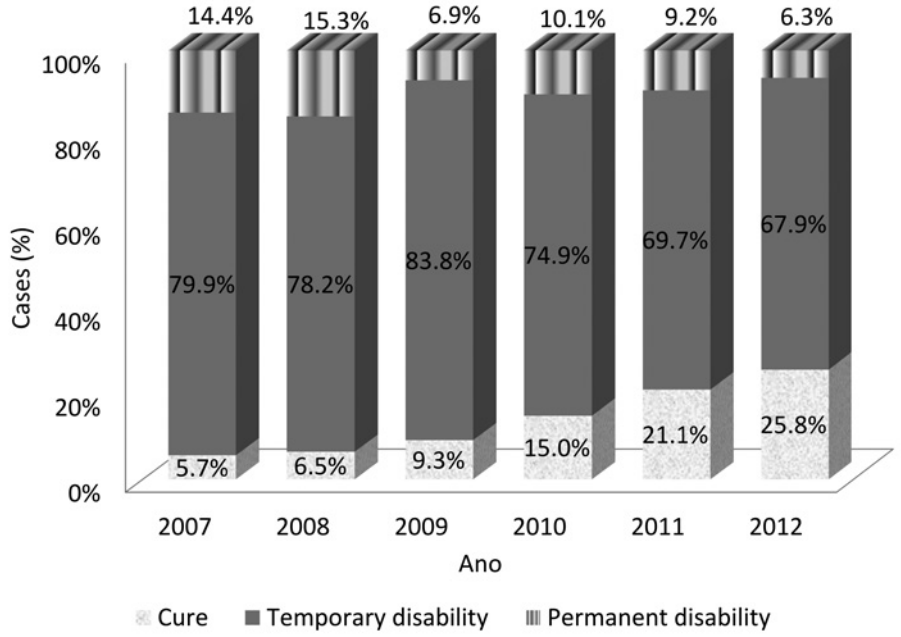


**Figure 2** Distribution of cases of work-related back pain according to functional/clinical evolution, in Brazil, in the period from 2007 to 2012

Source: SINAN/DATASUS: 2007-2012

## Discussion

Despite the increase in reported cases of back pain identified by the study in the period investigated, we observed a trend of increased cure of back pain and reduction of temporary or permanent functional disabilities related to that disease. These evidences are probably related to a greater sensitivity to the diagnosis and notification, both by health professionals and by sentinel units and Occupational Health Reference Centers (CEREST), which also leads to a better care of the cases, reducing disabilities and related sick/accident leaves. The creation of the National Network for Occupational Healthcare (RENAST), the expansion in the number of CERESTs, the approach of occupational health policies of the basic care, in addition to the Ministry of Health initiative of covenanting occupational health indicators in the Pacts for Life (component of the Pact for Health), has produced effects on the quantity and quality of work-related diseases notifications[12].

National and international studies have shown that workers from various fields of activities are exposed to working conditions that promote the occurrence and/or worsening of conditions related to WSMD, including workers from industry, manufacturing, services, trade and transportations[2-3,13]. In this study, the workers from industry and trade showed the highest volume of notifications both of back pain and of associated functional disabilities. Currently, among economic activities, industry – especially processing industry –, followed by trade and transportation, storage and postal service, showed the highest absolute number of diagnoses of the musculoskeletal system and connective tissue diseases among the accident leaves (accidents and work-related diseases) granted by the Social Security in Brazil[7].

It is worth highlighting the specific nature of the analysis presented here, since the notification reflect major occupational groups that coincide with the larger volume of formal employment relationships in these sectors of economic activity. According to data from PNAD[11], the percentage of workers paying for Social Security ranged from 64% to 76% for trade and industry and was only 20% for agricultural activity[11]. Social Security coverage suggests that these workers, in addition to being socially protected by the Labor Relations Code (CLT, Ministry of Labor and Employment), are also more informed about social rights related to work. Thus, it is possible to identify a notification bias, since, in addition to recognized risk factors present in the working environment of industry and trade – and not disregarding the risk factors of other economic activities such as agriculture – the records may reflect workers' greater confidence in the recognition and notification of health problems due to the stability of their employment.

While data from SINAN display a tendency of important increase in the studied period, Social Security records indicate a decrease in the number of cases registered in the same period. According to data from the Statistical Yearbook of Social Security[6], 270,452 cases of back pain were registered among the occupational diseases and work accidents between 2007 and 2012. The analysis of back pain diagnosis, considering the other intervertebral disc disorders and back problems (ICD: M50, M51, M53 and M54), revealed 319,587 cases for the same period, with a proportional variation of -25% over this period, i.e., a decrease in the number of recorded cases. The comparison of records from SINAN and from Social Security also demonstrates the discrepancy between these records, with SINAN registering approximately 40 times fewer cases than the Social Security. We also stress that, among the limitations of SINAN's database, it still has a limited range of cases registered among informal workers, since this would be a specificity of the Brazilian Unified Health System (SUS) information system in relation to the Social Security information system.

However, from these comparisons, it is also necessary to consider the nature of the events notified in both systems. The transitory and sometimes sharp nature of back pain can lead the worker to absenteeism, but may not configure an entry in the Social Security system. Otherwise, the permanent functional disabilities follow the same trend of reduction in the two systems, even considering the underreporting. In both systems, the information regarding disabilities, especially in SINAN, and sick leaves, in the Social Security, requires more specific investigations. In SINAN, the RSI/WMSD investigation form has fields for data collection about the signs and symptoms, exposure to risk factors and the evolution of cases, but in addition to the underregistration of these fields, the data quality can be associated with the self-reported account of the workers.

The functional disabilities affect the logic of employment, and one of the initial impacts of temporary functional disability is the turnover of workers, seeking to change occupations or reduce their workload because of health conditions; another portion of workers is temporarily and/or permanently moved away from occupational activities, representing relevant social costs[14]. Differences in the proportions of cases were identified between sex, age group, education and race/skin color. WMSDs and disabilities reach the population of both sexes in their economically productive phase. However, in Europe, the older workers mention more the

problem, despite the significant prevalence of WMSD among young workers[5].

Social conditions have been identified as predictors of working conditions. In general, workers with low education level and race/color brown/black are employed in unhealthy workplaces, where the work environment imposes risks for health[15-16]. Despite the formal employment relationship, workers with less schooling are usually allocated to positions that demand physical overload and often require strenuous activity, in addition to potential health risks of the work environment itself.

From the total permanent disability cases associated with back pain, characteristics related to the operationalization of work can be highlighted. Most workers with permanent functional disability had formal employment relationship. To understand the greater volume of reports, it is necessary to consider the changes in the process of assessing the causal link, established by the epidemiologic technical link (NTEP), which presumes the work-related disease considering the risk factors to which workers are subjected according to the economic activity. Moreover, the formal relationship ensures a series of rights that bring greater visibility to workers' physical demands[17].

The lack of rewards for productivity was observed among workers with functional disability. The work management based on the merit of the capabilities and accomplishments of the worker is common in the industries and has been discussed by the dual role it represents in the work routine[18]. On the one hand, the incentive to work associated with its practice reveals larger exposures of workers to risk factors arising from work. On the other, the absence of this artifice reflects working conditions that are less qualified and with physical demands for the worker.

In general, there was similarity between the characteristics evaluated in the cases of back pain and permanent functional disability. However, repetitive movements and stressful environments were more frequent among the cases of back pain, unlike the cases of permanent disability. The genesis of RSI/WMSD considers a number of factors associated with the work dynamics: repeatability, excessive strength, improper posture and vibration. The absence of pauses and consequent reduction of tissue recovery time affect gradually the functionality of the worker[18].

The back pains evaluated here relate with the overloads imposed to the worker's body while performing their tasks. Thus, the maintenance of activities in postures (static and/or dynamic), in addition to the pace of work without breaks produce impacts on the ability to work[18]. Despite this, WMSDs have an etiology that cannot be associated with the unique context of work: postural habits, history of trauma and inadequate physical activity produce effects that reproduce the symptomatic framework of WMSDs and that interfere in the differential diagnosis and in the relation with work[19].

The differential diagnosis for back pain and its multifactorial etiology may pose limitations in this research approach, because it implies difficulties to confirm the link between nexus and work. Although the NTEP implementation has supplanted some of the problems related to the recognition of the health-work relation, more specific evaluations of the body segments affected are still required, or a better characterization of the cases, including information about the worker's gestual, work environment and process, advancing toward the establishment of correlations between physical demands and clinical manifestations of back pain.

It is worth highlighting that, even with the underreporting and underregistration in SINAN's database, the use and publication of information from SUS indicate potentials and limits to be overcome for the planning of occupational health-care, which is the primary purpose of health surveillance. The report of RSI/WMSD was recently inserted in SINAN, by the Ordinance no. 777/GM, from the Ministry of Health, of 28 April, 2004[20], with the records being officially started from 2006 on, although many studies disregard the data of this first year because of the low quality of the records. Especially with regard to the expected amplitude in the data registry, which increases as SUS coverage extends, SINAN used in its full capacity could surpass Social Security records, since this is limited to cases between formal workers, that is, approximately 46% of the economically active population of Brazil[11].

## Conclusion

The increase in reports of occupational back pain and the reduction of functional disabilities represent an advance regarding the recognition, diagnosis, reporting and attention to the problem, but are still a challenge to the health-care of workers, mainly regarding the prevention measures. Health professionals' awareness of the need for interventions in the work environments and processes, in addition to the establishment of the disease/work relation of the disease with the work, regardless of the workers' employment relationship, follows as a perspective of overcoming the challenges in the workers' health care, especially in SUS.

It is worth mentioning that the profile of the worker with functional disability represents the social magnitude of the disease, with the illness of men in adult age (young) and with average schooling, i.e., affecting a significant portion of the Brazilian workforce. The functional disabilities indicate social costs of temporary and/or permanent retirement and precociously move workers away from the labor market in the fullness of their productive capacity. The need for health surveillance amplitude is thus signaled, incorporating the relationship between work and health, in addition to the efforts of the State in ensuring working conditions that maintain the health and the productive pattern of Brazilian workers, considering the different economic activities developed and insertions on the labor market.

## Authors' contribution

Santos, K.O.B.: substantial contribution in the project and design definition, in data collection and their analysis and interpretation; final approval of the version to be published. Almeida, M.M.C.: preparation of the manuscript and important contribution in its critical review; final approval of the version to be published. Gazerdin, D.: preparation of the manuscript and important contribution on its critical review.

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