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Mechanical Restraint in Nursing Homes in Brazil: a cross-sectional study

Contenção mecânica em instituição de Longa Permanência para Idosos: estudo transversal

Contención Mecánica en Hogares para Ancianos: studio transversal

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ABSTRACT

Objective: to estimate the mechanical restraint prevalence in Nursing Homes in Brazil and the factors associated with its performance. **Methods:** this cross-sectional study was carried out in 14 institutions, with a final sample of 443 elderly people. Mechanical restraint was considered as a dependent variable. **Results:** there was a 7.45% prevalence of mechanical restraint considering bed rails and 3.84% without considering bed rails. Main justification for restraint use was risk of falls (66.7%), and restraint duration was 24 hours (84.8%). The factors associated with the dependent variable were: wandering (p=0.000); MMSE, with cognitive loss (p=0.000); Katz Index, with dependence for Activities of Daily Living (p=0.000); and Alzheimer's comorbidity (p=0.001) **Conclusion:** prevalence was lower than international studies, but there was an association with worsening of wandering, dependence, cognitive worsening, and Alzheimer's Disease, showing the need for alternative interventions to mechanical restraint.
Descriptors: Homes for the Aged; Restraint, Physical; Aged; Geriatric Nursing; Health of the Elderly.

RESUMO

Objetivo: estimar a prevalência da contenção mecânica em Instituições de Longa Permanência para Idosos e os fatores associados à sua realização. **Métodos:** estudo transversal, realizado em 14 instituições, com amostra final de 443 idosos. Considerou-se como variável dependente a ocorrência de contenção mecânica. **Resultados:** obteve-se prevalência de 7,45% de contenção mecânica considerando grades no leito e 3,84% sem considerar a grade no leito. Principal justificativa para a utilização da contenção foi o risco de quedas (66,7%), e a duração da contenção foi de 24 horas (84,8%). Os fatores associados à variável dependente foram: deambula (p=0,000); MEEM, com perda cognitiva (p=0,000); Índice de Katz, com dependência para Atividades de Vida Diária (p=0,000); e comorbidade Alzheimer (p=0,001). **Conclusão:** a prevalência foi menor que os estudos internacionais, porém houve associação com a piora na deambulação, dependência, piora cognitiva, e Doença de Alzheimer, demonstrando a necessidade de intervenções alternativas à contenção mecânica.
Descritores: Instituição de Longa Permanência para Idosos; Restrição Física; Idoso; Enfermagem Geriátrica; Saúde do Idoso.

RESUMEN

Objetivo: estimar la prevalencia de la contención mecánica en Hogares para Ancianos y los factores asociados con su realización. **Métodos:** estudio transversal, realizado en 14 instituciones, con una muestra final de 443 personas mayores. La ocurrencia de contención mecánica se consideró como una variable dependiente. **Resultados:** hubo una prevalencia del 7,45% para la contención mecánica considerando las barandas de la cama y el 3,84% sin considerar las barandas de la cama. La principal justificación para usar la restricción fue el riesgo de caídas (66.7%), y la duración de la restricción fue de 24 horas (84.8%). Los factores asociados con la variable dependiente fueron: caminar (p = 0.000); MEEM, con pérdida cognitiva (p=0.000); Índice de Katz, con dependencia para las actividades de la vida diaria (p=0.000); y comorbilidad de Alzheimer (p=0.001). **Conclusión:** la prevalencia fue menor que los estudios internacionales, pero hubo una asociación con el empeoramiento de la marcha, la dependencia, el empeoramiento cognitivo y la enfermedad de Alzheimer, lo que demuestra la necesidad de intervenciones alternativas a la restricción mecánica.
Descriptores: Hogares para Ancianos; Restricción Física; Anciano; Enfermería Geriátrica; Salud del Anciano.

INTRODUCTION

Mechanical restraint is a common practice used in health care settings, although there are few studies that determine scientific evidence of its benefits and/or harms[1]. Mechanical restraint can be defined as any manual or physical method, mechanical equipment or attached material or adjacent to the individual's body, which cannot be easily withdrawn, limiting freedom or movement or normal access to one's own body, including bed rails[2].

Examples of mechanical restraint include use of wrist or ankle immobilizers, side rails, abdominal straps, vests, and restraint straps. This restraint type has been used as means of safety and damage prevention, especially falls and challenging behavior situations[2-3]. However, devices used in specific areas of the body, such as orthopedics, surgery, dressings, are not included among the types of mechanical restraint. Moreover, there are other protective methods for patients, such as physically restraining patients for routine examinations or tests, or in urgent and emergency situations to move patients[3].

Although there are no data in Brazil on the practice of mechanical restraint in Nursing Homes (NHs), the international literature describes a variation between 15% and 66%, depending on the restraint type used, in most cases used by a period of more than 03 months and as an institutional routine measure[3].

In a recently published integrative review, mechanical restraint prevalence in NHs ranging between 4% and 85% was found, with the profile generally of elderly people with functional disabilities, high dependence on daily activities, mobility problems, cognitive disorders, behavior problems and several falls[3-5]. Moreover, the lack of professionals in assistance and requests from family members to perform mechanical restraint influenced the method and the decision to perform or not mechanical restraint[5].

Mechanical restraint use can cause irreversible damage to patients, and should only be used after all available alternatives have been exhausted. To regulate mechanical restraint use, the Federal Nursing Council (*Conselho Federal de Enfermagem*) published Resolution 427, of 2012, which provides for possible adverse events from its use, standardizes nursing procedures such as rigorous monitoring from 1 to 1 hour, under supervision of nurses, among other routines[5].

Among the factors associated with mechanical restraint use are: ulcers to the body, arms, legs, and trunks, fractures, ischemic ulcers to the hands and arms, contusion, limb dislocation, decreased physical mobility, increased agitation, delirium, ulcer pressure, double incontinence, hip fractures, breathing problems, constipation, malnutrition, increased dependence on Activities of Daily Living (ADL), decreased muscle strength and balance, decreased cardiovascular resistance, increased risk of death from strangulation or serious ulcers, for instance, trauma to the skull, fractures, and death from asphyxia[6]. Therefore, despite being adopted as a safety measure to reduce falls or control aggressive and/or challenging behavior, there are serious adverse events related to its use that deserve attention and training of the team for correct clinical decision of the type, reason, and mechanical restraint time[7].

In Brazil, scientific production on mechanical restraint, prevalence, and associated factors is scarce, so the knowledge gap can be triggered with regard to mechanical restraint use given the commitment of professional practice to elderly safety.

OBJECTIVE

To estimate the mechanical restraint prevalence in Nursing Homes in Brazil and the factors associated with its performance.

METHODS

Ethical aspects

The protocol was initiated after approval by the Research Ethics Committee on April 5, 2017 and complied with Resolution 466/12 of the Brazilian National Research Ethics Commission (*Comissão Nacional de Ética em Pesquisa*, abbreviated CONEP).

Study design, period, and place

This cross-sectional study was carried out in Nursing Homes randomly viplaced by the Specialized Technical Support Group Institutions and Social Rights (*Grupo de Apoio Técnico Especializado Instituições e Direitos Sociais*, abbreviated GATE/IEDS) of the Public Ministry of the State of Rio de Janeiro, from August 2017 to December 2017. The checklist Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) was used to elaborate the study[08].

Population and sample; inclusion and exclusion criteria

Sample was defined by the elderly population institutionalized in NHs in the State of Rio de Janeiro. It is estimated that the State of Rio de Janeiro has 380 NHs and that the average number of elderly people served at each NH is 60 elderly people. Based on this information, the estimated population of interest was N=60x380=22,800 cases.

To reach the desired results and due to the impossibility of interviewing the entire population, a random sample of the universe previously defined was taken**.**

The main objective of the study was to estimate a P prevalence, according to the minimum sample size (*n*) for a maximum global margin of error *e*, with correction for the population size *N*. The 95% confidence interval was used, whose value corresponding to the area in the normal curve of 1.96. "*p*" is the preliminary estimate of the prevalence of interest P, and *e* refers to the resulting global margin of error (in this case, a maximum global margin of error of 5%=0.05 is desired). Due to the preliminary insufficiency of estimation for P and for the other proportions to be estimated in the study, the product p $(1 - p)$ was replaced by its maximum value of 0.25.

Thus, the minimum size of the estimated study sample was 378 elderly, however, there was a greater attendance of the sample number than estimated with a final sample of 443 elderly. And the survey was subject to maximum errors of 5% in prevalence and, in any estimated proportion, to the 95% confidence level.

Inclusion criteria were defined as: elderly residents in NHs in the State of Rio de Janeiro, who met at the time of inspection at the institution, and all those who were in mechanical restraint to characterize the mechanical restraint. There were no exclusion criteria adopted.

Data collection

Data collection started with NH observation and characteristic note of the study place, then proceeded with the filling in of the individual information of the elderly in mechanical restraint.

The research form consisted of sex, comorbidities, time of institutionalization, information on wandering and wheelchair use, restraint type used, justification for restraint use, medications in use, assessment of the level of dependence through Katz Activities of Daily Living Scale[9]. This scale investigates the patient's ability to perform tasks without assistance, with partial or total assistance. It is used to measure the degree of dependence and is linked to physical mobility and ADL. Elderly were considered dependents (Katz F and G) by performing the mental status assessment through the Mini-Mental State Examination (MMSE)[10], also known as the Folstein test, the most widely used test in the world for screening cognitive impairments. Elderly with cognitive loss MMSE under 13 and Pressure Ulcer assessment (PU) were considered for presence and characteristics.

There was also medical record use, and in the absence of reports, information in the survey form with the institution employees was collected. On average, observation time in each institution and collection was from 2 hours to 3 hours depending on the number of elderly people collected.

To investigate the existence of variables associated with the practice of mechanical restraint, data were also collected from patients not restrained selected at random from the number of restrained patients found in the institution. If there were 7 elderly people restrained, for instance, another 7 elderly people were randomly selected to be evaluated with the complete survey form.

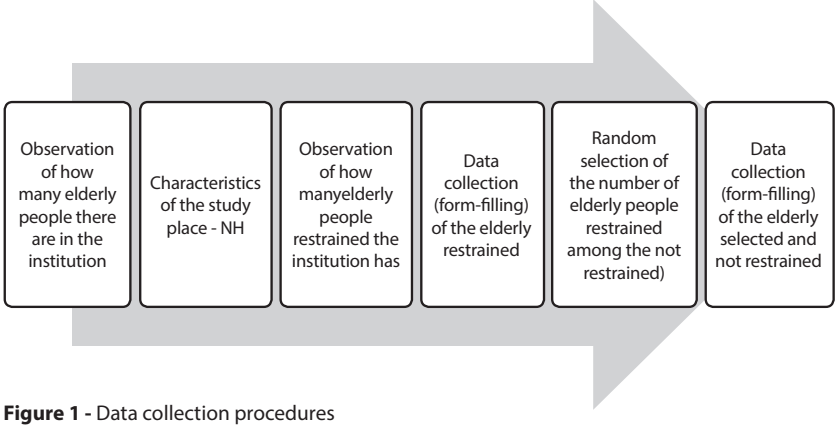

Figure 1 - Data collection procedures

The study's dependent variable was occurrence of mechanical restraint, and the independent variables were: elderly's degree of dependence, ulcer caused by friction, pressure ulcer, immobilization syndrome, sex, age, diagnosis, institutionalization time, medication use, restraint prescription, and mechanical restraint use time.

Analysis of results, and statistics

The data were stored and organized in Excel spreadsheets, being analyzed using descriptive, uni, and multivariate statistical techniques through the SPSS program. For sample characterization, in the descriptive analysis of the behavior of the variables, the data were synthesized by calculating descriptive statistics (mean, median, minimum, maximum, standard deviation, coefficient of variation, proportions of interest), graphs, distributions of simple frequencies, and cross tables. Chi-square test was performed to verify the association between mechanical restraint and the variables studied. Fisher's exact test was properly performed when the previous test was inconclusive.

In the inferential analysis of quantitative variables, the hypothesis of normality of distribution was verified by the Kolmogorov-Smirnov and Shapiro-Wilk tests. If the hypothesis of normal distribution was not rejected in the groups, the comparison of two independent groups would be made using the Student's t-test. The equality of variances, necessary to carry out the Student's t-test without correction, was assessed by the Levene test. If the hypothesis of normality of the distribution was rejected in any of the groups, the comparison of the two groups would be made using the Mann-Whitney nonparametric test.

Odds Ratio calculation was used to calculate the ratio between the chance of an event occurring in the restrained group and the chance of occurring in the elderly not restrained group. Prevalence ratio or *Odds Ratio* and the respective confidence intervals were recommended in cross-sectional studies. The Spearman Correlation Coefficient Matrix, or simply "Pearson's ρ" measures the degree of correlation (and the direction of this correlation - whether positive or negative) between two metric scale variables, being used to compare multiple variables. All discussions were conducted considering a maximum significance level of 5% (0.05).

RESULTS

Mechanical restraint prevalence

Of the 443 elderly people evaluated in the NHs, 33 elderly people were found in mechanical restraint. None of the institutions had a protocol for carrying out mechanical restraint, and there was at least one elderly person restrained in all institutions.

Based on these data, mechanical restraint prevalence was estimated at 7.45%, with a forecast error of 2.45% at the 95% confidence level, in the NHs of the State of Rio de Janeiro. The interval estimate of the restraint prevalence is considered to be from 5.00% to 9.89%, i.e., the probability that restraint prevalence will occur is between 5.00% and 9.89% (95%).

However, when suppressing the cases of bed restraint, the number of elderly people in mechanical restraint would be 17. Most institutions would have restraint below the global estimated average. From these data, it is estimated that the restraint prevalence in the NHs in the State of Rio de Janeiro, without considering bed rail, is 3.84%, with a forecast error of 1.79% at the 95% confidence level. Therefore, the interval estimate of the restraint prevalence in institutions in the State of Rio de Janeiro, without considering bed rail, is between 2.05% and 5.63%.

Table 1 - Total elderly in each institution, number of elderly people restrained, and restraint prevalence in each institution, Rio de Janeiro, Rio de Janeiro, Brazil, 2019

Institution	Total elderly	Elderly people restrained, without considering bed rail	Elderly people restrained General	Restraint prevalence, without considering bed rail	Restraint prevalence General
NH 01	39	1	1	2.56	2.56
NH 02	36	0	1	0.00	2.78
NH 03	33	1	1	3.03	3.03
NH 04	27	0	1	0.00	3.70
NH 05	24	0	1	0.00	4.17
NH 06	46	0	2	0.00	4.35
NH 07	60	3	3	5.00	5.00
NH 08	9	1	1	11.11	11.11
NH 09	44	4	5	9.09	11.36
NH 10	50	1	6	2.00	12.00
NH 11	16	0	2	0.00	12.50
NH 12	24	3	3	12.50	12.50
NH 13	18	0	3	0.00	16.67
NH 14	17	3	3	17.65	17.65
Global	443	17	33	3.84	7.45

Typically, restraint occurs in a hospital bed (45.5% of the cases), being of the rail type in the bed of the hospital bed (45.5%). Risk of falls was the main reason for restraint (66.7%), lasting 24 hours a day (84.8%). In a case, mechanical restraint of an elderly person was recorded for 4 hours in a wheelchair and, subsequently, his maintenance in a hospital bed with railing use. In two cases, the removal of the elderly from the bed with wheelchair use was reported, only for bathing, weekly sunbathing and meals, one of which was only removed for bathing and, eventually, for meals.

Mechanical restraint characteristics

The mechanical restraint characteristics in NHs are shown in Table 2.

Table 2 - Frequency distributions to characterize restraints in NHs (n=33), Rio de Janeiro, Rio de Janeiro, Brazil, 2019

Restraint characteristics	f	%
Restraint place		
Wheelchair	9	27.3
Plastic chair	6	18.2
Wooden bed	1	3.0
Hospital bed	15	45.5
Sofa	2	6.1
Restraint type		
Bandage	1	3.0
Bed rail	15	45.5
Adapted wooden rail	1	3.0
Sheeting	16	48.5
Justification for restraint		
Risk of falls	22	66.7
Agitation, aggressiveness, and wandering	6	21.2
Institutional protocol	3	9.1
Risk of falls and medical request	1	3.0
Restraint duration		
4 hours a day	1	3.0
12 hours a day	4	12.1
24 hours a day	28	84.8

Factors associated with restraint

For each elderly person restrained, an elderly person was randomly chosen to profile the elderly in both groups and investigate significant differences that could distinguish the factors associated with restraint.

In both groups, there was a predominance of female elderly. Among the elderly restrained, 81.8% of them were female, among the elderly not restrained, 72.7% were women. The coefficient of variation (CV) shows that the age variability was low in both groups, with no significant association between age and restraint, that is, age was not a significant factor for the practice of restraint. Through the CV, it was observed that institution time was high in both groups. Concerning medications, a high number of medications used by the elderly restrained and not restrained was noted, therefore, there was no correlation between factors. Likewise, the number of psychotropic drugs used by the elderly was high in both groups, not being related.

Table 3 - Distribution of characteristics of elderly people restrained and not restrained (n=66), Rio de Janeiro, Rio de Janeiro, Brazil, 2019

Variables	Statistics						*p* value
	n	%	n	%	n	%	
Sex	Female		Male		Global		
Not restrained	24	72.7	9	27.3	33	100.0	
Restrained	27	81.8	6	18.2	33	100.0	0.418†
Wandering	No		With Assistance		Yes		
Not restrained	8	24.2	3	9.1	22	66.7	**0.000**†
Restrained	24	72.7	2	6.1	7	21.2	
Immobility Syndrome	Yes		No		Total		
Not restrained	25	46.3	29	53.7	54	100.0	0.202†
Restrained	8	66.7	4	33.3	12	100.0	
Age	Mean		SD		CV **		
Not restrained	79.8		10.1		0.13		0.083¥
Restrained	83.8		7.8		0.09		
Institutionalization time	Mean		SD*		CV**		
Not restrained	4.30		4.1		0.96		0.598¥
Restrained	4.85		4.1		0.84		
Number of medications	Mean		SD*		CV**		
Not restrained	5.8		4.0		0.70		0.773δ
Restrained	6.1		3.6		0.59		
Number of psychotropic drugs	Mean		SD*		CV**		
Not restrained	1.4		1.2		0.90		0.140¥
Restrained	1.9		1.3		0.70		
Katz Index	Mean		SD*		CV**		
Not restrained	4.1		2.1		0.50		**0.000**¥
Restrained	0.5		1.0		2.21		
MMSE	Mean		SD*		CV**		
Not restrained	15.6		9.6		0.61		**0.000**¥
Restrained	3.3		5.5		1.66		

*Note: *SD - Standard Deviation; **CV – coefficient of variation; †Chi-square test (χ2); ¥ Mann-Whitney test; δStudent's t-test.*

The proportions of elderly people who do not wander were significantly higher in the group of restrained (72.7%), so there was a difference between the two groups (p=0.000). Other data significantly associated with mechanical restraint were dependence for ADL (Katz Index p=0.000) and cognitive deficit (MMSE, p=0.000). In other words, elderly people with greater need for nursing and

rehabilitation care are more prone to mechanical restraint.

However, Immobility Syndrome is measured by the presence of major criteria: medium to severe cognitive impairment and multiple contractures; and minor criteria: signs of cutaneous suffering, or PU, mild to severe dysphagia, double incontinence and aphasia. To be classified as Immobility Syndrome, the elderly must have 2 major criteria and at least 2 minor criteria[11]. Of the data collected, 12 elderly people were identified with the Immobility Syndrome, with an 18.2% prevalence, and among those who have Immobility Syndrome, mechanical restraint prevalence was 66.7%. Although the restraint prevalence among those with the Immobility Syndrome is higher, for this sample, the chi-square test did not reveal the existence of a significant association between the Immobility Syndrome and physical restraint (p=0.202). That is, immobility may be the result of a long-term event of physical restriction, low motor, and cognitive stimulation. However, studies are needed, with the construction of a linear regression model, as well as a coefficient test to forecast the Immobility Syndrome related to wandering and mechanical restraint factors.

Table 4 - Correlation of comorbidities in the elderly restrained and not restrained groups (n=66), Rio de Janeiro, Rio de Janeiro, Brazil, 2019

Comorbidity	Not restrained		Restrained		*P* value of chi-square test	OR	OR CI
	F	(%)	F	(%)			
Alzheimer's Disease	2	6.1	14	42.4	0.001	11.4	2.3 - 55.8
Heart disease	8	24.2	2	6.1	0.032	0.2	0.04 - 1.04
Hypertension	27	81.8	19	57.6	0.032	0.3	0.098 - 0.926
Diabetes Mellitus	13	39.4	7	21.2	0.108	0.41	0.14 - 1.23
Femoral fracture	3	9.1	0	0.0	0.230*	nc	nc
Osteoporosis	6	18.2	2	6.1	0.258*	0.29	0.05 - 1.56
Arthritis	2	6.1	0	0.0	0.492*	nc	nc
Parkinson's Disease	2	6.1	0	0.0	0.492*	nc	nc
Ulcer caused by friction	1	3.0	3	9.1	0.613*	3.2	0.32 - 32.5
Stroke	3	9.1	5	15.2	0.708*	1.8	0.39 - 8.17
Gastritis	7	21.2	6	18.2	0.757	0.82	0.25 - 2.79
Cataract	3	9.1	2	6.1	1.000*	0.65	0.10 - 4.14
Chronic Obstructive Lung Disease	2	6.1	1	3.0	1.000*	0.48	0.04 - 5.62
Glaucoma	0	0.0	1	3.0	1.000*	nc	nc
Amaurosis	1	3.0	0	0.0	1.000*	nc	nc
Seizure	0	0.0	1	3.0	1.000*	nc	nc
Neurodegenerative dementia	0	0.0	1	3.0	1.000*	nc	nc
Depression	1	3.0	0	0.0	1.000*	nc	nc
Senile dementia	1	3.0	2	6.1	1.000*	nc	nc
Schizophrenia	1	3.0	1	3.0	1.000*	1.00	0.06 - 16.7
Gatrostomy	0	0.0	1	3.0	1.000*	nc	nc
Hypothyroidism	3	9.1	3	9.1	1.000*	1.00	0.19 - 5.36
Venous Insufficiency	2	6.1	1	3.0	1.000*	nc	nc

*Note: *Fisher's exact test; nc - not calculable due to the null frequency in one of the groups.*

Table 5 - Description of patients' Pressure Ulcer assessment cases (n=66), Rio de Janeiro, Rio de Janeiro, Brazil, 2019

Group	Ulcer stage	Ulcer region	Restraint type	Restraint place	Restraint time
Not restrained	II	Sacrococcygeal	-	-	-
Restrained	IV	Sacrococcygeal	Sheeting	Wheelchair	12
	I	Calcaneus	Bandage	Wheelchair/hospital bed with railing	4/20
	II	Calcaneus and Sacrococcygeal	Sheeting	Wheelchair	24
	I	Right arm and Left leg	Hospital rail bed	Hospital bed	24
	I	Right knee	Hospital rail bed	Hospital bed	24
	II	Malleolus D			

Comorbidities

Table 4 shows the correlation of comorbidities in the elderly restrained and not restrained groups, p values of chi-square tests, *Odds Ratio,* and 95% confidence level (95% CI).

It was observed that the only significant comorbidity for restraint was Alzheimer's Disease (p=0.001). In the elderly not restrained group, there were only two cases (6.1%), and in the elderly restrained group, 14, representing 42.4%. The chance of a patient with Alzheimer's Disease being restrained was 11.4 times greater, and could be up to 55.8 times, with 95% CI. The result also demonstrates that the two groups differ significantly with regard to heart disease and hypertension prevalence, comorbidities significantly higher in the elderly not restrained group.

Pressure ulcer

Table 5 shows the description of ulcers in both groups. PU prevalence was one case in the elderly not restrained group (3.0%) and five elderly people (15.2%) in the restrained group. Although a larger number of ulcers occurred quantitatively in the elderly restrained group, as one elderly person had more than one ulcer (9 in all in the 5 patients restrained), the data did not show this difference in the two groups (p=0.197).

Nursing team

It was also investigated whether mechanical restraint was correlated with the number of professionals in each institution (Table 6).

When correlating the variables by Spearman's coefficient, the only strong and significant correlations found were the natural correlations between the number of beds and the total number of employees (0.70; p=0.005) and the total number of employees and the number

of nursing technicians (0.70; p=0.005), i.e., mechanical restraint was not associated with the number of people on the nursing team.

Table 6 - Characteristics of the number of beds and professionals in each institution

Institution	Number of Beds	Nurse	Nurs. Tech.	Nurs. Ass.	Caregiver	Total Employees	Restrained
NH 07	60	1	10	0	13	24	3
NH 14	17	1	2	0	2	5	3
NH 04	27	1	7	0	0	8	1
NH 08	9	1	0	0	5	6	1
NH 11	16	1	3	0	3	7	2
NH 13	18	1	5	0	4	10	3
NH 06	46	1	12	0	8	21	2
NH 05	24	1	4	0	2	7	1
NH 01	40	1	5	0	4	10	1
NH 10	50	3	2	2	4	11	6
NH 12	24	3	6	0	3	12	3
NH 09	44	1	6	0	0	7	5
NH 03	33	0	3	0	6	9	1
NH 02	36	3	11	0	0	14	1

Note: Nurs. Tech.: nursing technician; Nurs. Ass.: nursing assistant.

DISCUSSION

The main finding of this study was the 7.45% prevalence of elderly people in NHs in the State of Rio de Janeiro. In a study that compared eight different countries on mechanical restraint in NHs, it was found that the rate varied between 9% in Japan and Iceland, 15 to 17% in France, Italy, Sweden and the United States, and 40% in Spain. In these studies, bed rail did not characterize restraint. When bed rail is considered as restraint, restraint prevalence in several scenarios increases. For instance, a 62% prevalence was found in mechanical restraint use in Taiwan[11]. This reflects the type of policy implementation to reduce the mechanical restraint adopted. In Italy, for instance, specifically in the city of Trieste, a zero-restraint policy is in place and some cases are reported to the police as aggression and abuse of health power. Spain has a policy of institutions that are free from restraint, with quality certifications. Japan adopts a policy centered on valuing the education and training of care teams for alternative practices to restraint[11-14]. Therefore, the practice of mechanical restraint in NHs varies according to the policy of professional conduct and education in the countries and also with the type of restraint employed.

It is necessary to emphasize that rails that are not easily removed should be used in situations of extreme need, such as when transporting patients. Unlike this, bar use for patients with cognitive impairment or a state of mental confusion can lead to severe consequences and even death, because agitation due to loss of freedom can cause patients to fall when trying to overcome their "safety barrier"[12]. The determination of patients to get out of bed can prevent them from evaluating the consequences of their act, causing serious incidents and even death[6].

Independent elderly patients and in preserved cognitive status should not be subjected to bars, as mechanical restraint is considered a risk factor for the development of delirium, mainly due to the feeling of entrapment that this causes[13]. The rational use of railing promotes patient safety and comfort, assisting in mobilization maneuvers, for instance, but their use without prior evaluation and inappropriately generates risks that negatively contribute to the patient's health, generating a feeling of lack of autonomy and freedom[12].

When analyzing the NHs individually, it was found that five of the NHs perform mechanical restraint above the global average of 3.84, reaching a 17.65% prevalence in a given NH. These rates indicate a high mechanical restraint prevalence, even disregarding bed railings[12-13]. Another important fact that should be discussed was that NHs with a small number of elderly people had high numbers of elderly people restrained. In one of the NHs that had 17 elderly people, for instance, there were three elderly people restrained at the time of inspection, representing 17.65%. Likewise, NHs with a higher number of elderly people also obtained a percentage of restraint above the global average. NH-10, for instance, housed 50 elderly people and six restrained elderly people, representing a percentage of 12%.

In a Dutch study, which followed a total of 259 NHs over a period of one year, divided into two groups, the control group was composed of 135 traditional NHs, with at least 20 residents per ward. The experimental group consisted of 124 NHs with a reduced number of elderly people, with a maximum of eight elderly people per NH. Bed railing was included as a mechanical retainer. The result was that traditional NHs with a higher number of elderly people use mechanical restraint more frequently than NHs with a lower number of elderly people[14].

Regarding the characteristics of the type of restraint adopted, the restraint performed in a plastic chair stood out. No reports were found in the scientific articles or mention of the restraint made in a plastic chair; a fact that seems to be something characteristic of Brazilian culture. The plastic chair is found very frequently in NHs, and the elderly found in the plastic chairs were sitting on the chair and restrained in it by bandages or a sheet. This type of restraint had the objective of maintaining the posture of the elderly upright in some cases, and in others, it aimed to avoid wandering. Restraining an elderly person who wanders in a plastic chair will not prevent him from getting up and wandering, it will only increase the chances that the elderly person will fall, increasing the severity[15].

In a study that compared eight different countries, it was found that in Sweden and the United States the most used form of restraint was made on the trunk. In Spain, the most common way was by the chair with a tray to prevent falls. In Denmark, three types of restraint were found: tray, to prevent falls, mechanical restraint on the trunk and limbs. The most found form in France, Iceland, Italy and Japan was the chair with tray to prevent falls[16]. In another literature review, the most common form of mechanical restraint was by the wrists, represented by the percentage of 50%. Then, waist restraint, found in 25% of cases and carried out by placing a vest over the torso, in 22% of cases[17].

In the present study, the first reason for using mechanical restraint was due to agitation and risk of falls, data that support the results of a study carried out in Spain. This study proposed to determine the situations in which restraint use is employed, identifying that in most records it is described that mechanical restraint is important in preventing falls and to avoid the removal of devices[10].

On the other hand, the most common justification for carrying out restraint is the prevention of falls, although this is also

pointed out in the literature as a consequence[18-20]. Studies show that the reduction in restraint does not result in an increase in the number of falls, however restraint use is related to a physical, psychological and social worsening. A study conducted in Quebec reported that 51% of the elderly are restrained by factors associated with aggressive behavior resulting from physical aggression[15]. Paradoxically, restraint use causes greater immobility, incontinence, pressure ulcers, depression, agitation, aggressiveness, and mortality in elderly people living in NHs[21].

Such findings are in line with current literature, which already points out harmful effects of restraint use such as a sense of terror, humiliation, asphyxiation, thrombosis, among others, including death. 22 cases of deaths were identified exclusively by restraint use at the autopsy performed at the *Instituto de Medicina Forense de Monique* (Forensic Medication Monique Institute)[18]. The practice of mechanical restraint is still associated with incontinence, worsening delirium, PU[19]. In this study, there was a significant association with wandering and low scores on the Katz and MMSE scale, reflecting the high degree of dependence and the fact that the elderly are restrained.

Research data show that Immobility Syndrome prevalence in NHs in the State of Rio de Janeiro was 18.2%. When Immobility Syndrome was related to the elderly found restrained, 66.7% chance of having Immobility Syndrome and being restrained prevalence was obtained. In other words, worsening of wandering associated with restraint may generate a future Immobility Syndrome. Therefore, studies that point out the relationship between high degree of dependence, low mobility and decreased cognition with mechanical restraint are supported[12,15,20].

Among the tested comorbidities, the only significant data was the diagnosis of Alzheimer's Disease. This data may be associated with the second justification for restraint, agitation, aggression and wandering (21.2%), being a way to restrict challenging behavior in Alzheimer's Disease, to deal with communication barriers, with episodes of aggression and agitation. Behavioral and psychological symptoms of dementia are more prevalent in the elderly with advanced cognitive disorder[17,21].

Although the association between mechanical restraint and PU is not significant, it is noteworthy that the elderly restrained had a quantitatively higher number of ulcers[20-21]. There is a need for studies that deepen the type of ulcer with the type of mechanical restraint adopted, as well as the time of restraint with the severity of the ulcer.

The relationship between restrained elderly, number of beds and number of employees helped in the discussion of the non-association of restraint with purely institutional reasons. Therefore, it seems reasonable to deepen the theme in studies that assess the degree of importance of the professional decision to restrain, to evaluate if this suffers personal, cultural, educational and religious influences, deserving further investigation[16,21]. Thus, it is concluded that restraint does not depend on the number of beds and the number of professionals in the institution.

Study limitations

The findings found during the survey demonstrate that restraint is prevalent in the State of Rio de Janeiro, and its prevalence may be higher than that described in the survey, as the survey was conducted only during the morning period. The other possible limitation of the study occurs with the accounting of the elderly restrained at the time of data collection, so, even if all beds at the NH had bars, if the elderly person was not in bed with the bars raised at the time of inspection, would be counted as restrained. The prevalence found was lower than other studies documented in the international literature. Thus, it is recommended that this study be reproduced in other states to guarantee a robustness of data to explore the reality of the Brazilian scenario in the face of mechanical restraint. Another limitation of the study is that a cause-effect relationship cannot be provided. Therefore, further studies are needed in order to establish a causal relationship in the outcomes of functional dependence, worsening cognitive function, wandering, and Alzheimer's Disease.

Contributions to the field

It is noteworthy that the present study is an unprecedented, original research, which describes the prevalence rates of elderly restraint in NHs in the State of Rio de Janeiro, types and reasons, restraint time, institution characteristics, and possible factors associated with the practice of restraint. Therefore, it contributes with data that can assist nurses in the decision and training of the team in practice and, thus, contribute to the improvement of the quality of care.

CONCLUSION

Prevalence was lower than international studies, but there was an association with worsening of wandering, dependence, cognitive worsening, and Alzheimer's Disease, showing the need for alternative interventions to mechanical restraint. As recommendations, guidelines for challenging behavior, cognitive stimulation, and gerontological rehabilitation should be instituted to ensure rehabilitative nursing care, focused on encouraging the potential still existing in each subject, and human freedom.

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