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Aggressive behavior during the first 24 hours of psychiatric admission

Comportamento agressivo durante as primeiras 24 horas de internação psiquiátrica

Vitor Crestani Calegaro,¹ Amanda Bolson Dotto,² Denise Freitas,² Anderson Barcellos Brum,² Andrei Garziera Valerio,² Christina Chitolina Schetinger,³ Angelo B. M. Cunha⁴

Abstract

Objective: To investigate the association between aggression in the first 24 hours after admission and severity of psychopathology in psychiatric inpatients.

Methods: This cross-sectional study included psychiatric patients admitted to Hospital Universitário de Santa Maria, in Santa Maria, southern Brazil, from August 2012 to January 2013. At their arrival at the hospital, patients were interviewed to fill in the Brief Psychiatric Rating Scale (BPRS) form, and any aggressive episodes in the first 24 hours after admission were recorded using the Overt Aggression Scale (OAS). The Mann-Whitney *U* test was used to compare patients according to aggressiveness: aggressive versus non-aggressive, hostile versus violent, and aggressive against others only versus self-aggressive.

Results: The sample was composed of 110 patients. Aggressive patients in general had higher BPRS total scores ($p = 0.002$) and individual component scores, and their results showed more activation ($p < 0.001$) and thinking disorders ($p = 0.009$), but less anxious-depression ($p = 0.008$). Violent patients had more severe psychomotor agitation ($p = 0.027$), hallucinations ($p = 0.017$) and unusual thought content ($p = 0.020$). Additionally, self-aggressive patients had more disorientation ($p = 0.011$) and conceptual disorganization ($p = 0.007$).

Conclusions: Aggression in psychiatric patients in the first 24 hours after admission is associated with severity of psychopathology, and severity increases with severity of patient psychosis and agitation.

Keywords: Aggression, psychopathology, psychiatric emergency services, Brief Psychiatric Rating Scale.

Resumo

Objetivo: Avaliar a relação entre agressividade nas primeiras 24 horas após admissão e a gravidade da psicopatologia de pacientes psiquiátricos.

Métodos: Este estudo transversal foi realizado no Hospital Universitário de Santa Maria, na região sul do Brasil, com pacientes admitidos entre agosto de 2012 e janeiro de 2013. Ao chegar ao hospital, os pacientes foram entrevistados para completar a Escala Breve de Avaliação Psiquiátrica (BPRS), e todos os episódios de agressão nas primeiras 24 horas após a admissão foram registrados usando a Escala de Agressividade Declarada (OAS). O teste *U* de Mann-Whitney foi usado para as comparações entre pacientes agressivos e não-agressivos, hostis e violentos, e agressivos contra outros apenas ou autoagressivos.

Resultados: A amostra tinha 110 pacientes. Em geral, pacientes agressivos tiveram escores mais altos na escala BPRS ($p = 0.002$) e nos itens individuais, e exibiram mais ativação ($p < 0.001$) e distúrbios de pensamento ($p = 0.009$), mas menos ansiedade-depressão ($p = 0.008$). Os pacientes violentos tiveram escores mais altos para excitação ($p = 0.027$), comportamentos alucinatórios ($p = 0.017$) e alteração de conteúdo do pensamento ($p = 0.020$). Além disso, os pacientes autoagressivos mostraram maior desorientação ($p = 0.011$) e desorganização conceitual ($p = 0.007$).

Conclusões: A agressão em pacientes psiquiátricos nas primeiras 24 horas da admissão é relacionada a gravidade da psicopatologia, a qual aumenta à medida que a gravidade da psicose e a excitação do paciente aumentam.

Descritores: Agressão, psicopatologia, serviços de emergência psiquiátrica, Escala Breve de Avaliação Psiquiátrica

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Introduction

Aggression against others or towards oneself is an important reason why individuals with mental disorders are taken to psychiatric emergency services (PES).¹ Voluntary or involuntary hospitalization is often recommended to protect both patients and others.^{2,3} Aggressive behaviors, not unusual during psychiatric hospitalizations, may generate mild to severe physical and psychological damages for both patients and hospital staff. Moreover, they entail medical expenses, absences from work and legal charges.^{4,5}

Several studies have been conducted to identify associated risk factors, but cultural, ethnic, methodological and conceptual differences complicate generalizations, as results are often conflicting.^{6,7} Steinert conducted a review and concluded that the variables associated with aggression in psychiatric inpatients are different from those found in the general community, and that the most important predictor is life history of aggression. Studies in the literature report different findings regarding sex, age, diagnosis and alcohol abuse and aggression in hospital settings.^{6,7} These characteristics may play a minor role, whereas clinical and psychopathologic variables, such as delusions, are more prominent.⁷ Therefore, clinical and psychopathological features associated with aggression should be identified to recognize, at an early stage, patients at risk to become aggressive when hospitalized. The Brief Psychiatric Rating Scale (BPRS) has been used around the world for over 50 years and adapted over time.^{8,9} Although its main function is to compare changes in psychopathology, studies have revealed an association between factors of this scale and aggression in hospital environments.¹⁰⁻¹⁴ This study assessed the severity of psychopathology and investigated possible associations with aggressive behaviors in the first 24 hours after psychiatric hospitalization to define whether aggressiveness was associated with the severity of psychosis and psychomotor agitation.

Methods

Participants

This cross-sectional study was conducted in a public tertiary care general hospital, Hospital Universitário de Santa Maria (HUSM), in Santa Maria, southern Brazil, in which psychiatric services are provided in a psychiatric emergency department (PED) and a psychiatric unit (PU). HUSM is a reference hospital serving an area of 500,000 inhabitants in the central region of the state of Rio Grande do Sul, Brazil. The PED, the interface between

the population and the hospital, has an observation room with two beds. The PU is a mixed, closed-door unit with 25 beds for short-term hospitalizations.

Patients may be referred by health services of the region or arrive directly at the PED, the entrance to the hospital. In this department, patients may stay for up to 72 hours, after which they must be discharged or transferred to the PU or other hospitals. Admissions are registered using the Hospital Admission Authorization (HAA) form, a document signed when patients stay past midnight or when they are immediately transferred to the PU. In this study, we included registered admissions only and excluded patients that stayed in the hospital for observation only.

The psychiatric service of HUSM does not provide any specific treatment for substance abuse, but psychomotor agitation and aggressiveness are common in patients that use drugs. In these cases, admission is often necessary as an emergency procedure, and patients are transferred to other hospitals at the earliest time possible.

Inclusion criteria were: 1) psychiatric hospitalization; and 2) age between 18 and 65 years. Exclusion criteria were: 1) patients with delirium; and 2) substance use. These patients were excluded to avoid confounding factors in the study of psychotic characteristics. All patients underwent routine clinical examination and laboratory and imaging tests, if necessary, to rule out possible organic diseases. A physician was called for further evaluations in case any abnormality was found.

Measures

The following psychometric scales were used for assessments: BPRS and Overt Aggression Scale (OAS), both translated and validated for Portuguese. BPRS is widely used to assess psychopathologies. We used an 18-item anchored version scoring 0-6 according to the severity of the symptoms.¹⁵ A Structured Interview Guide was used to increase inter-rater reliability.¹⁶ The scale items may be classified into four components (factors): anxious-depression, withdrawal-retardation, thinking disorder and activation.¹⁷ The OAS, used in several other studies,^{18,19} is an instrument to measure aggressive episodes. Easily applicable, it classifies aggressive episodes into four types: verbal aggression, aggression against objects, self-aggression and physical aggression against others. A form was developed to collect variables about demographic characteristics, disease history, use of services, history of aggression, previous treatments and psychopathological features.

The study was conducted by the Psychiatry Research Laboratory team, which includes residents in psychiatry,

medicine undergraduates and a coordinator. All were trained to use the study instruments before data collection and during the pilot phase. On the first 40 days, a pilot study was carried out to correct possible flaws in data collection and gather data for sample calculation. At this stage, the scales were applied under the assistance of a supervisor. Inter-rater reliability was not been tested objectively. Thirty patients were included in the study.

Procedures

Data were collected from August 2012 to January 2013, and the sampling method was by convenience. An attempt was made to include all inpatients that met inclusion criteria in those 6 months. Some of the authors visited the PED daily, gathered data about hospitalizations in the last 24 hours, interviewed patients and reviewed medical records to fill out the study form.

One of the authors was exclusively assigned to apply the OAS scale by interviewing the patient and a family member, as well as talking to the nursing staff and the attending physicians. As several aggressive incidents may be part of the same episode, which may last for hours, we considered each 24-hour period as an episode.

Six resident physicians were responsible for filling out the scales after interviewing the patients, which should be done within 24 hours of admission, taking into account patient condition at admission.

Diagnosis were assessed by the PED and PU medical teams according to their service routines. During patient stay in the hospital, diagnosis were discussed with the resident's supervisor and recorded in the chart at discharge using the 10th revision of the International Classification of Diseases (ICD-10). No specific diagnostic instruments were used because of the practical difficulties of their application, such as the time necessary to fill in the questionnaire and the patient conditions in the emergency department, sometimes agitated and sometimes sedated. In addition, our purpose was not to associate diagnosis and aggression, because diagnoses were less important than clinical and psychopathological characteristics in our study.

Each admission was counted separately, regardless of how many times the patient had been admitted in the period. The same patients may have a different psychopathological condition each time they are admitted, and may be either aggressive or not.

When data collection was concluded, all the forms were reviewed. After that, data were entered into Excel by two operators, to avoid typing errors. This study was approved by the Research Ethics Committee of Universidade Federal de Santa Maria and was registered in the Brazilian Research Ethics Database (Plataforma Brasil; CAAE

02232612.3.0000.5346). An informed consent form was signed by the patients, their relatives or legal guardians.

Statistical analysis

Data were analyzed using PASW Statistics 17.0. Variables were analyzed descriptively, and results were distributed in frequency tables. Data that could not be retrieved were classified as lost and excluded from the analysis. We controlled data for age, sex, demographic characteristics and diagnosis, and a chi-square test and the Fisher exact test were used to compare differences between groups.

The sample was first divided into aggressive and non-aggressive individuals. Aggressive individuals were then separated into hostile (verbally aggressive and aggressive against objects) and violent (physically aggressive). After that, aggressive individuals were divided into those that were aggressive against others only (hetero-aggressive), and those that were also aggressive towards themselves (self-aggressive). The groups were compared using the Mann-Whitney *U* test. The level of significance was set at 5% ($\alpha = 0.05$). The prevalence of aggression was described with 95% confidence intervals (95%CI).

Results

During the study, 1,625 persons were seen in the PED, and 259 were taken to the observation room; 16% of the patients remained under observation, and only 9.4% were hospitalized. Of the eligible patients, 13 were discharged during the night, before the authors visited to the PED in the morning and were not included. Therefore, the final sample was composed of 110 subjects (Figure 1).

Sample characteristics

Most hospitalized patients were white and had little schooling (Table 1). Most men were young single adults without children, and women were 30 to 50 years old, married, with more than one child. The proportion of men and women did not differ statistically ($\chi^2_{(1)} = 0.582$; $p = 0.446$). Most patients in the sample presented had psychotic symptoms, such as delusions and hallucinations. Only a few reported suicide attempts leading to hospitalization, and most were admitted involuntarily because of the risk of aggression.

The analysis of diagnoses revealed a significant positive association between aggression and bipolar disorder, although not for manic episodes. Negative associations were found for depressive mood disorders.

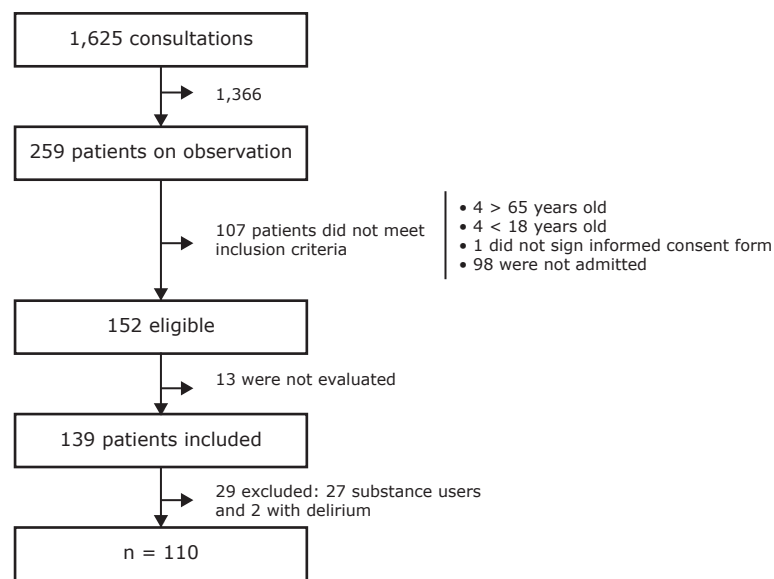


Figure 1 - Sample composition.

In the first 24 hours after admission, 40 (36.4%) patients showed some aggressiveness (Table 2). There was a predominance of verbal aggressiveness, in 37 (33.6%) patients, and of these, 24 (60.0%) were aggressive only verbally. Physical aggression and aggression against objects was found in 10 (9.1%) and 11 (10.0%) patients. Surprisingly, all self-aggressive patients were also verbally aggressive; three were aggressive against objects and two, physically aggressive against others, which revealed the high degree of aggressiveness of these patients.

Psychopathology and aggressive behavior

Aggressive patients had a higher BPRS mean score than non-aggressive patients (Table 3). The differences were significant, with a positive association for all components, except for withdrawal-retardation.

Aggressiveness was associated with psychomotor agitation, somatic anxiety and exaggerated self-esteem, in the group of activating symptoms. It was also associated with hostility, suspiciousness and conceptual disorganization, in the thinking disorder component.

Although aggressive patients had higher withdrawal-retardation scores, they were less willing to cooperate in the interview and had fewer negative symptoms, such as psychomotor retardation. In addition, aggressive individuals had fewer depressive symptoms (depressive mood and feelings of guilt).

We also compared the BPRS scores between hostile (verbally aggressive and aggressive against objects)

and violent (physically aggressive) patients, and violent individuals had a higher score (Table 4). A positive association was found for withdrawal-retardation and thinking disorder. Violent individuals showed more symptoms of psychomotor agitation and anger (hostility) than those who were only hostile, as mentioned above. However, they also had more hallucinations and delusions (unusual thought content), and their mean scores for these items were high. They also had higher scores for emotional withdrawal and specific motor disturbances. The comparison of violent and hostile patients did not reveal any significant association with exaggerated self-esteem and suspiciousness.

Finally, after comparing patients that were aggressive against others (only) and self-aggressive, we found that self-aggressive patients had greater psychomotor agitation, somatic anxiety, conceptual disorganization and disorientation, but no significant differences in depressive symptoms. Therefore, self-aggressive individuals had the most severe psychopathologies (greatest BPRS scores).

Discussion

This study revealed that the higher the BPRS scores, the more severe the aggression, and that self-aggressive individuals formed the most aggressive group. This result was true both for the scale as a whole and for its components, except for anxious-depression, which was negatively associated with aggressiveness (Figure 2).

Table 1 - Sample characteristics according to aggression during the first 24 hours (n = 110)

	No		Yes		p*
	n	%	n	%	
Age (years)					
18-25	6	8.6	8	20.0	0.400
26-35	27	38.6	13	32.5	
36-45	11	15.7	4	10.0	
46-55	18	25.7	12	30.0	
56-65	8	11.4	3	7.5	
Sex					
Male	35	50.0	24	60.0	0.312
Female	35	50.0	16	40.0	
Education					
Incomplete primary school	36	52.9	22	55.0	0.966
Complete primary school	9	13.2	5	12.5	
Complete high school	16	23.5	10	25.0	
Complete college	7	10.3	3	7.5	
Ethnicity					
White	52	74.3	24	60.0	0.119
Non-white	18	25.7	16	40.0	
Marital status					
Single	31	44.3	17	42.5	0.557
Married	20	28.6	14	35.0	
Divorced	16	22.9	9	22.5	
Widowed	3	4.3	0	0.0	
Occupational status					
Unemployed	33	47.1	23	57.5	0.291
Employed	14	20.0	6	15.0	
Illness aid	11	15.7	2	5.0	
Retired	12	17.1	9	22.5	
Clinical features					
Psychosis (delusions/hallucinations)	55	78.6	36	90.0	0.137
Suicide attempt	15	21.4	5	12.5	0.243
Diagnoses					
Axis I diagnoses					
Schizophrenia, schizotypal and delusional disorders (F20-F29)	16	22.9	7	17.5	0.628
Schizophrenia (F20)	6	8.6	2	5.0	0.708
Schizoaffective disorders (F25)	5	7.1	2	5.0	1.000
Psychosis not otherwise specified (F29)	5	7.1	3	7.5	1.000
Mood Disorders (F30-F39)	41	58.6	29	72.5	0.156
Bipolar affective disorder (F31)	30	42.9	29	72.5	0.003
Manic or mixed episode	23	76.7	26	89.7	0.299
Depressive episode	5	16.7	2	6.9	0.424
Major or recurrent depression (F32-F33)	11	15.7	0	0.0	0.007
Unspecified mood disorder (F39)	1	1.4	0	0.0	1.000
Other diagnosis	2	2.9	0	0.0	0.533
No axis I diagnosis	12	17.1	4	10.0	0.404
Axis II diagnoses					
Personality disorders (F60-F69)	31	44.3	13	32.5	0.312
Borderline personality disorder (F63)	15	21.4	5	12.5	0.309
Dissocial personality disorder (F62)	1	1.4	2	5.0	0.299
Personality disorders NOS (F60.9)	15	21.4	8	20.0	1.000
Mental retardation (F70-F79)	10	14.3	5	12.5	1.000

Data express column percentages.

* p values calculated using a chi-square test for general characteristics and the Fisher exact test for diagnoses.

Table 2 - Prevalence of aggression during the first 24 hours after psychiatric admission (n = 110)

	n	%	95%CI
Aggression (any type)	40	36.4	27.3-44.5
Verbal aggression	37	33.6	25.5-41.8
Aggression against objects	11	10.0	5.5-15.5
Physical aggression	10	9.1	3.6-14.5
Self-aggression	5	4.5	0.9-8.2

95%CI = 95% confidence interval.

According to Steinert, the most important predictors of aggressive behavior are life history of aggression and severity of pathology.⁷ We agree with Amore et al. and Biancosino et al., who claim that aggressive individuals have higher scores on the BPRS scale.^{10,11} In contrast, non-aggressive patients tend to have more depressive and negative symptoms.

Our findings are in accordance with those reported in previous studies. For example, Colasanti found that excitement/activation is more closely associated with verbal and physical aggression.¹² Raja & Azzoni demonstrated that hostile and violent individuals have higher scores on the hostility/agitation component and lower scores on the anxious-depression component than non-aggressive patients.¹⁴ Amore et al. confirmed the association of disorder severity (higher overall score on BPRS) and claimed additionally that the hostility/suspiciousness component is a predictor of verbal aggression turning into physical aggression.¹⁰ Huber et al. described a possible factor of excitement of BPRS, composed of hostility, excitement and lack of cooperation, and found that this factor is associated with aggressiveness, risk or attempt of suicide and involuntary hospitalization.¹³

In the analysis of the factors suggested by Crippa et al., we found a positive association between activation and thinking disorder, as well as a negative association with anxious-depression.¹⁷ Although no association was found for the withdrawal-retardation component, uncooperativeness had a positive association, which in our study seems to be actually associated with psychomotor agitation and psychotic symptoms. The Brazilian version of the BPRS scale has its own components, slightly different from those found in the foreign literature, but the associations found in our study point to the same direction and suggest that aggressiveness in the hospital is linked to agitation and psychosis.

Within the group of aggressive individuals, violent patients had the most severe psychopathologies. Hostility and psychomotor agitation are associated with any type of aggressiveness in the first 24

hours, and scores were higher for violent patients than for hostile patients. Nevertheless, these patients' behaviors were significantly influenced by hallucinations and delusions. Although most of the individuals in the sample had mood disorders, about 4 in 5 had psychotic symptoms. The simple presence of these symptoms was not associated with aggression. However, our findings suggested that the difference in violent patients was the fact that their behavior was affected by hallucinations and delusions in a context of psychomotor agitation and anger. The severity of psychosis may increase with severity of aggression. Moreover, violent patients exhibited more emotional withdrawal and specific motor disturbances, common symptoms of psychosis.

Table 3 - Mean scores obtained on the Brief Psychiatric Rating Scale and comparison between aggressive and non-aggressive patients (n = 101)

	Non aggressive	Aggressive	p
Total score	34.7	42.3	0.002*
Anxious-depression	8.6	5.1	0.008*
1. Somatic concern	1.0	0.6	0.079
2. Anxiety (psychic)	2.8	2.4	0.321
5. Self-depreciation and guilt feelings	2.0	1.1	0.033*
9. Depressive mood	2.8	1.1	0.001*
Withdrawal-retardation	6.0	7.5	0.149
3. Emotional withdrawal	1.9	2.0	0.890
13. Psychomotor retardation	0.9	0.2	0.009*
14. Uncooperativeness	0.7	2.4	< 0.001*
16. Blunted or inappropriate affect	1.4	1.1	0.228
18. Disorientation and confusion	1.1	1.8	0.248
Thinking disorder	14.7	18.4	0.009*
4. Conceptual disorganization	1.8	2.8	0.023*
10. Hostility	3.6	4.7	< 0.001*
11. Suspiciousness	3.0	4.1	0.039*
12. Hallucinations	2.8	2.9	0.761
15. Unusual thought content	3.5	4.1	0.212
Activation	5.5	11.3	< 0.001*
6. Anxiety (somatic)	1.8	3.7	< 0.001*
7. Specific motor disturbances	0.7	0.9	0.517
8. Exaggerated self-esteem	1.5	2.6	0.015*
17. Psychomotor agitation	1.6	4.2	< 0.001*

* Significant values.

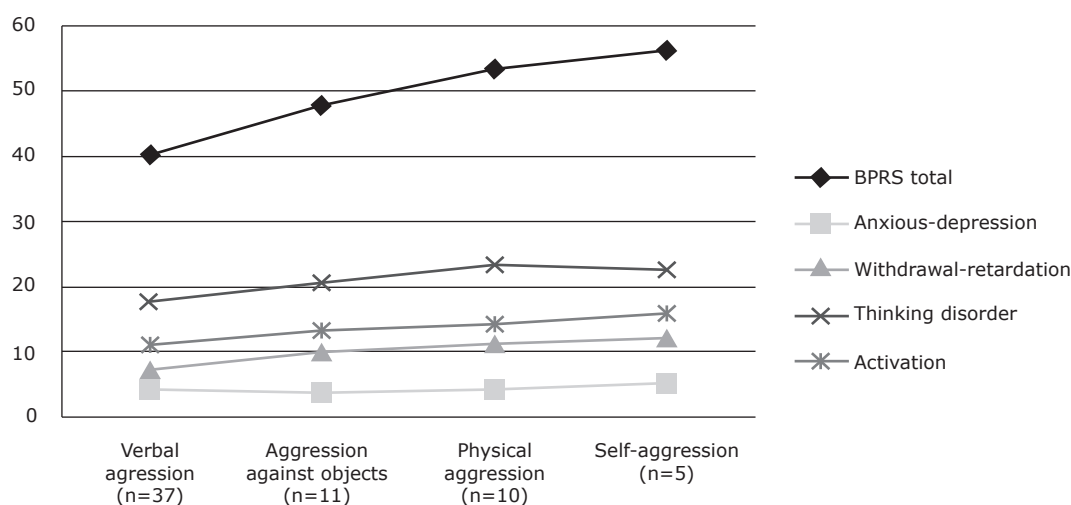


Figure 2 - Mean values of BPRS total score and its components according to the types of aggression. Groups include combined types of aggression (i.e., all verbally aggressive patients, not only verbally aggressive patients). BPRS = Brief Psychiatric Rating Scale.

The comparison of the subgroup of self-aggressive individuals with patients aggressive to others revealed that, in addition to psychomotor agitation and somatic anxiety, the self-aggressive patients also had more conceptual disorganization and disorientation/confusion, which was seen in their aggressive behavior. In fact, even aggressiveness itself was disorganized in these individuals, as their aggression had no objective or target and was chaotically expressed through psychomotor agitation and very intense psychosis.

The main limitation of this study was its relatively small sample, the consequent heterogeneity of its sample and the small proportion of the most severe types of aggression. Self-aggression was observed in patients with more severe pathologies, but, in most studies, physical aggression is the most serious form of aggression. Therefore, the proportion of severely disorganized patients in the self-aggressive group may be coincidental, rather than a constant in psychiatric emergency services.

Table 4 - Mean scores obtained on the Brief Psychiatric Rating Scale and comparison between hostile and violent patients (n = 51), and patients aggressive against others and self-aggressive patients (n = 53)

	Hostility/violence			Others only/self-aggression		
	Hostility	Violence	p	Others	Self	p
Total score	38.4	53.3	0.011*	40.5	54.6	0.096
Anxious-depression	5.0	5.3	0.761	5.2	4.2	0.774
1. Somatic concern	0.6	0.7	0.561	0.5	1.0	0.332
2. Anxiety (psychic)	2.2	3.0	0.296	2.4	2.6	0.841
5. Self-depreciation and guilt feelings	1.0	1.2	0.966	1.2	0.6	0.545
9. Depressive mood	1.3	0.4	0.469	1.2	0.0	0.183
Withdrawal-retardation	6.2	11.2	0.030*	6.9	11.8	0.087
3. Emotional withdrawal	1.5	3.5	0.047*	1.8	3.8	0.093
13. Psychomotor retardation	0.1	0.4	0.723	0.2	0.0	0.489
14. Uncooperativeness	2.1	3.4	0.157	2.4	2.8	0.756
16. Blunted or inappropriate affect	1.0	1.5	0.624	1.1	1.2	0.664
18. Disorientation and confusion	1.5	2.4	0.311	1.4	4.0	0.011*
Thinking disorder	16.7	23.0	0.007*	17.7	22.6	0.124
4. Conceptual disorganization	2.6	3.4	0.311	2.4	5.4	0.007*
10. Hostility	4.5	5.3	0.013*	4.7	4.6	0.549
11. Suspiciousness	3.8	4.7	0.127	4.1	4.0	0.873
12. Hallucinations	2.3	4.5	0.017*	2.7	4.0	0.367
15. Unusual thought content	3.7	5.1	0.020*	4.0	4.6	0.307
Activation	10.5	13.8	0.052	10.6	16.0	0.013*
6. Anxiety (somatic)	3.4	4.6	0.059	3.4	5.6	0.007*
7. Specific motor disturbances	0.5	1.8	0.038*	0.8	1.6	0.635
8. Exaggerated self-esteem	2.6	2.3	0.656	2.5	3.2	0.532
17. Psychomotor agitation	3.9	5.1	0.027*	4.0	5.6	0.022*

* Significant values.

Another limitation was that the sample was quite heterogeneous regarding diagnoses. However, 83% of the patients had psychosis as a common factor. The aggressive patients presented with psychosis and psychomotor agitation in which expansiveness, irritability, grandiose thoughts, paranoia and alterations of thinking characterize psychotic (medical related) aggressiveness.²⁰⁻²² There were few patients with mental retardation or antisocial personality, and alcohol and cocaine use disorders were excluded. In such cases, aggression may not be related to psychosis, but to impulsiveness and character traits.

Conclusion

Aggression was associated with severity of psychopathology. In comparison with non-aggressive individuals, aggressive patients showed greater excitement, motor restlessness, hostility and lack of cooperation in the interview, as well as more disorganized thinking, grandiose ideas and paranoia. However, the main contribution of this study was to determine a positive association between severity of aggressive behavior and severity of psychopathology. These findings suggest that patients with severe hallucinations and delusions tend to be physically aggressive in the first 24 hours of hospitalization. Furthermore, agitated and psychotic patients who present with disorientation and disintegration of thought may be more likely to be aggressive in a chaotic way. Such patients should be managed with special care, constant observation, more intense chemical restraint, longer lasting motor restraint, assistance of guards as well as distance from relatives in the first hours after admission.

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