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Emergency psychiatric condition, mental illness behavior and lunar cycles: Is there a real or an imaginary association?

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Introduction. There is a fairly widespread belief regarding the influence of the moon phases on the psychological behavior in humans. This relationship could be more pronounced among patients with mental disorders.

Objective. To study the possible association between the incidence of psychiatric emergencies and moon phases and between the behaviors of psychiatric patients and moon phases.

Methods. Daily series of cases seen in psychiatric emergencies were established according to the condition, typical behaviors manifested and treatments received by patients admitted to the short-term in-patient psychiatric unit, and the brightness of the moon, from 11-1-2006 to 10-31-2007. The possible association between the first two with the second was examined by making cross-correlations in the tuning fork of delays from 0 to 7 days.

Results. No association appeared between moon phases and characteristics of psychiatric emergencies. In hospitalized patients, a correlation was observed between the moon phases and the bed occupancy rate, which was direct, weak but significant, decreasing until the third day after admission (0.20, 0.18, 0.16 and 0.11), while hypnotic medication intake increased with moon brightness moon until the second day after, also declining and significantly weakness (0.22, 0.19 and 0.15).

Conclusions. The only empirical relationship of the moon phases with psychiatric behavior of the mentally ill in our sample was manifested as an increase in the incidence of cases and greater disruption of sleep patterns.

Key words:

Moon. Mental disorders. Emergency services.

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Patología psiquiátrica de urgencias, comportamiento del enfermo mental y fases de la luna: ¿una asociación real o imaginaria?

Introducción. Existe una creencia bastante generalizada sobre la influencia que ejercen las fases de la luna en el comportamiento psíquico del ser humano. Esta relación tendría una manifestación más acentuada entre los pacientes con trastornos mentales.

Objetivo. Explorar la posible asociación entre la incidencia de patología psiquiátrica de urgencias y las fases lunares y entre las conductas manifestadas por los pacientes psiquiátricos y las fases lunares.

Métodos. Se conforman series diarias de casos atendidos en urgencias psiquiátricas según patología, de conductas típicas manifestadas y tratamientos recibidos por los pacientes ingresados en la unidad de internamiento breve psiquiátrico, y de la luminosidad de la luna, durante el periodo comprendido del 1-11-2006 al 31-10-2007. Se explora la posible asociación de las dos primeras con la segunda mediante las correlaciones cruzadas en el diapasón de retardos de 0 a 7 días.

Resultados. No aparece asociación entre las fases lunares y las características de las urgencias psiquiátricas. En los pacientes ingresados se observa una correlación entre las fases lunares y el índice de ocupación de camas, directa, débil pero significativa, decreciente hasta el tercer día después (0,20, 0,18, 0,16 y 0,11), mientras el consumo de hipnóticos aumenta con la luminosidad lunar hasta el segundo día después, también débil decreciente y significativa (0,22, 0,19 y 0,15).

Conclusiones. La única relación empírica de las fases lunares con el comportamiento psiquiátrico de los enfermos mentales de nuestra muestra se manifiesta en un aumento de la incidencia de casos y alteración de los patrones del sueño.

Palabras clave:

Luna. Enfermedades mentales. Urgencias psiquiátricas.

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INTRODUCTION

Mood phases have traditionally been related with human psychological behavior. This association is very well reflected when a person with an extravagant or dementia behavior is designated as «lunatic.» There are many anecdotes on the increase of the incidences of violent crimes, suicides, admissions to emergency wards, anxiety case and depression during the full moon. In the Vance DF¹ study carried out in the United States, it was estimated that 50% of North American citizens believe that the lunar cycle affects individual behavior and that psychiatric patients, emergency physicians and police hold this belief to a greater degree than other types of professionals.

However, there are also scientific studies that have examined the possible association between the moon phases and human behavior, with different results. Among those that have found a relationship is the work of Templer et al.² that found an increase in the abnormal behavior rate related with the lunar cycles. Wilkinson et al.³ found some association between the moon period and the number of medical visits due to anxiety and depression. In his study, Barr⁴ found that schizophrenic patients suffered deterioration in three areas of their psychopathology and in the quality of life related with the full moon. Hicks-Caskey et al.,⁵ in an institution for mentally retarded women in Tennessee, USA, found a greater frequency of abnormal behaviors on the days of the full moon. An investigation by Rööslí et al.⁶ found that sleep varied with the lunar cycles, this being shorter when there was a full moon and longer with the new moon. Jones et al.,⁷ in their analyses of a series of suicides from 1972 to 1975 in Ohio, observed an increase of the suicides during the new moon phase. Ivonneau⁸ found a similar result in his study.

Other studies have ruled out the association between moon phases and psychological behaviors. The investigation of McLay et al.,⁹ which studied the relationship between moon phases and the number of psychiatric patients who came to the emergency service and admissions of psychiatric patients, did not find any association. No relationship was observed between the lunar cycles, psychological alterations and need for isolation in the Mason¹⁰ study, in which the so-called «Transylvanian effect,» was studied, or the influence of the lunar cycles on psychological disorders in psychiatric patients with the possibility of being isolated for control and management of their outbreaks of violence in aggressivity. The study performed by Raison et al.¹¹ also found no association between moon phases and psychological behavior. This study speculated that the moon could have had an influence on persons with psychiatric disorders prior to the use of electric light, but that electricity has currently decreased the presence of moonlight, so that such associations are not produced. In their study, Schredl et al.¹² found that there was no association between moonlight and sleep deprivation. Owen et al.¹³ found that there was no relationship between lunar cycles and increase of vio-

lence and aggressive behaviors in hospitalized psychiatric patients. Gorvin et al.¹⁴ also did not find any relationship between moon phases and an increase in the hospital admission rate of psychiatric patients. Amaddeo et al.¹⁵ failed to find any relationship between lunar cycles and the rate of contact with the community psychiatric services. Martin et al.¹⁶ did not discover any relationship between lunar cycles and suicide attempts. In a study of the large series of suicide attempts, Mathew et al.¹⁷ did not find any association of these with the lunar cycles. Neither Gutiérrez García et al.¹⁸ nor Biermann et al.¹⁹ found any relationship between moon phases, or between it with completed suicides.

Due to the discordance of the results, it is obvious that this question has not been totally clarified and that additional studies are needed to shed more light on it. That is the aim of this present study. Our starting hypothesis is that there is no association between moon phases, estimated by their daily light, and the profile of the psychiatric patient seen in the emergency service and that this relationship between moon phases and behavior of the hospital mental patient also does not exist. In keeping with this hypothesis, the aim of this work is to evaluate the correlations between the daily series of the amount of cases seen in psychiatric emergencies and the type of mental problem that has motivated the care in these cases with the moon phases, on this day and up to seven days earlier, and to evaluate the correlations between the daily series of the acute psychiatric ward occupancy rate, the amount of admissions, the appearance of psychiatric alterations in the hospitalized patients and the administration of psychodrugs or application of physical measures in these patients, with the moon phases, during this day and up to seven days earlier.

MATERIAL AND METHODS

The study was performed in the short-term in-patient psychiatric unit and the psychiatric emergency unit of the Hospital Universitario Nuestra Señora de Candelaria de Santa Cruz of Tenerife, the Canary Islands, a tertiary health care center, which covers the South zone population of the island of Tenerife, the island of la Gomera and the island of El Hierro with the volume of approximately 707,941 persons, with 820 beds, 30 of which are for the care of acute psychiatric patients.

This study was performed between November 1, 2006 on October 31, 2007. It included all the patients who were seen in the psychiatric emergencies during this period and all of the patients admitted to the short-term in-patient unit. The only exclusion criterion used was emergencies of patients admitted or referred from all of the hospital services and the emergencies that remained in observation. This criterion aims to consider only the first evaluation of the patient.

The following were measured for each patient in the emergency included in this study: gender, age, date of care,

psychiatric reason for the visit, including suicide attempts. Based on the data variables, the daily series of patients attended to, the typology of problem that motivated the urgent psychiatric care, including suicide attempt as an added reason for the consultation at the beginning, was constructed. For each patient admitted to the ward, the date of admission, gender, age, civil status, work status, abnormal behaviors or psychic disorders manifested during each day of their stay were recorded. The latter were, for example, anxiety, manic state, expensiveness, manipulation, psychomotor agitation, irritability, restlessness and demand, the psychotropic drugs administered, such as hypnotics, benzodiazepines and neuroleptics, as well as the need for mechanical restraint motivated by a high degree of agitation. Daily series were constructed, such as that of admission, bed occupancy, frequency of the appearance of each behavior, drug administration and application of restraint measures, was constructed with all the information on the variables.

Each patient in the emergency service provided information only on the day of the visit, while in regards to patients admitted to the ward, information was provided regarding the patients hospitalized in the ward for each bed occupied on one day. To calculate the crossed correlation coefficient with a delay up to 7 days, with a relevance of at least 0.1 using bilateral hypothesis tests with a significance level of 0.05 and potency of 98%, at least 1500 patients were needed for the analysis between the moon brightness series and that corresponding to patients in emergency service and at least 1500 beds/day occupied for those corresponding to admissions.

For the nominal variables, the sample of urgent patients and those admitted to hospital are described using the relative frequencies of each one of the categories, for the not-normal, their median (Percentile 5- Percentile 95) and for the normal ones, their mean and standard deviation. The principal analysis is the estimation of the crossed correlation coefficients with delay of up to one week between the daily series of brightness and those obtained for emergency cares and admission to the ward. The significance tests of these coefficients are bilateral with an alpha significant level of 0.05 and beta of 0.02. The data processing was performed with the SPSS 15.0 statistical program.

RESULTS

A sample of 2224 persons attended was gathered regarding the part of the study done with psychiatric emergencies. This included 51% women with a mean age of 39 (7-91) years. Of these patients, if there was no diagnosis on the records and only the symptoms appeared, the psychiatric diagnosis was considered to be the most important symptom. These diagnoses or principal symptoms are shown in Table 1. Serious or mild suicide attempts, as added reason

Table 1

Relationship of diagnoses or principal symptom if the diagnosis does not appear recorded of the patients who come to the psychiatric emergencies of the Hospital Universitario Nuestra Señora de Candelaria, between 1-1-2006 and 31-10-2007

Diagnosis/Symptom	Amount (%)
Personality disorder	483 (22)
Depression	289 (13)
Schizophrenia	242 (11)
Psychotic disorder	232 (10)
Bipolar disorder	192 (7)
Adaptive disorder	157 (7)
Anxiety	151 (7)
Intoxications	89 (4)
Behavior disorder	105 (5)
Delusional ideas disorder	52 (2)
Psychomotor agitation	50 (2)
Dysthymia	27 (1)
Dissociative disorder	25 (1)
Others*	130 (6)
Total	2.224 (100)
*Each one of which represent less than 1% of the total	

for the psychiatric emergency, make up 594 cases (27% of the total).

No association was found between the moon phases, evaluated by their brightness, and any of the variables considered.

This section of the study with hospitalized patients was based on 374 admissions in the short-term in-patient psychiatric unit that occurred during the study period. This source of data production was made up of 57% man, with a mean age of 40 years (18-88), and main stay time of 24 days. This sample accounted for a mean occupancy of the service of 24.4 days with 8906 patients/day of observation during the study period, with 4917 events of interest that are described in detail in table 2.

No relationship was detected with the moon phases evaluated by their brightness among the behaviors of the patients admitted. The volume of daily admissions behaved in the same way. However, there was a correlation with the moon phases in regards to the occupancy rate of the service, or percentage of beds occupied of those that the service had and the daily value of hypnotic doses administered to the patients admitted to the unit. The daily values of bed

Table 2
Relationship of the daily behavior alterations in the patients hospitalized or other events occurring in the Short-term In-patient Psychiatric Unit of the Hospital Universitario Nuestra Señora de Candelaria, from 1-1-2006 to 31-10-2007

Diagnosis/Symptom	Amount (%)
Anxiety	215 (14)
Mania	61 (4)
Expansiveness	232 (15)
Manipulation	46 (3)
Irritability	418 (27)
Restlessness	241 (15)
Demanding attitude	241 (15)
Psychomotor agitation	78 (5)
Total	1532 (100)
Other events	Amount (%)
Extra IM Medication	330 (4)
Extra oral medication	83 (3)
Mechanical restraint	278 (10)
Administration of hypnotics	2694 (80)
Total	3385 (100)

occupancy rate and daily volume of administration of hypnotics during the study period are shown in Figure 1. As can be seen in the two graphs that make up figure 1, both the occupancy rate as well as the administration of hypnotics have a periodic oscillating behavior.

The occupancy rate of the service has a direct correlation with the moon phases, that is, the greater the brightness, the greater the occupancy rate and vice versa. This association includes the brightness of the moon at 3, 2, and 1 day before and on the same day in which the occupancy rate was evaluated. Another form of interpreting this result is that each moon phase is associated with the occupancy rate of the bed on this day and on the three following days. This association is stronger on the same day and loses weight when the condition of the moon is considered each day before, as is seen in the magnitude of the crossed correlation coefficients between both variables, which is shown in figure 2. In this graph, those coefficients that exceed the horizontal reference line, exceeding the value of 0.09, reach statistical significance at the 0.05 level.

Another association manifested is that of the moon phases with the daily volume of the administration of hyp-

notics. This correlation is also direct, that is, the greater the brightness of the moon, the greater the volume of the administration of hypnotics and vice versa, with recall of up to two days earlier of the moon brightness by the volume of hypnotics. This result is interpreted in the same way as the previous one and a loss of strength of the association is also observed as the days go by, as is seen in the magnitude of the coefficients of correlation that are shown in Figure 3. In this graph, those coefficients that exceed the horizontal reference line, exceeding the value of 0.11, reach the 0.05 statistical significance.

DISCUSSION

Our study has not corroborated the idea of the association of moon phases with changes in behavior of the psychiatric patients. It seems that both variables do not have a relationship in general. However, an increase was found in the psychiatric bed occupancy rate and the administration of hypnotics related with the moon brightness. This could point to an increase in the incidence of psychiatric condition and disruption of the sleep pattern associated with the moon phases.

In the psychiatric setting, the belief continues that the lunar cycles interfere with the behavior of psychiatric patients, manifested from the popular custom of calling mental patients «lunatics» to the use of theories and effects such as the «Transylvania» one that supports a lunar influence on psychopathological behavior and the greater frequency of violence and altered behaviors when there is a full moon.

The study made by Lieber²⁰ in Dade County, Florida, USA, found a relationship between homicides, suicides, traffic accidents, robberies and aggravating circumstances in psychiatric emergencies and the moon phases. Another study performed by Barr⁴ in the United Kingdom revealed that on the days of the full moon, schizophrenic patients had a significant deterioration in their psychopathological spheres and quality of life.

In the study carried out by Hicks-Caskey et al.⁵ in an institution for mentally-retarded women in Tennessee, USA, a greater frequency of abnormal behaviors on the days of the full moon was observed. Templer et al.² found a relationship between abnormal behaviors and lunar cycles. Wilkinson et al.³ also found a weak association between moon phases and the number of medical visits generated due to anxiety and depression. However, in most of the articles published in scientific journals with peer review that offered study results on the relationship of the moon phases and psychotic behaviors, no significant relationship was found. Thus, in the McLay et al.⁹ study, no association with moon phases was found between the volume of admissions of psychiatric patients and patients attended in psychiatric emergencies. In the Owen et al.¹³ study, no relationship was found be-

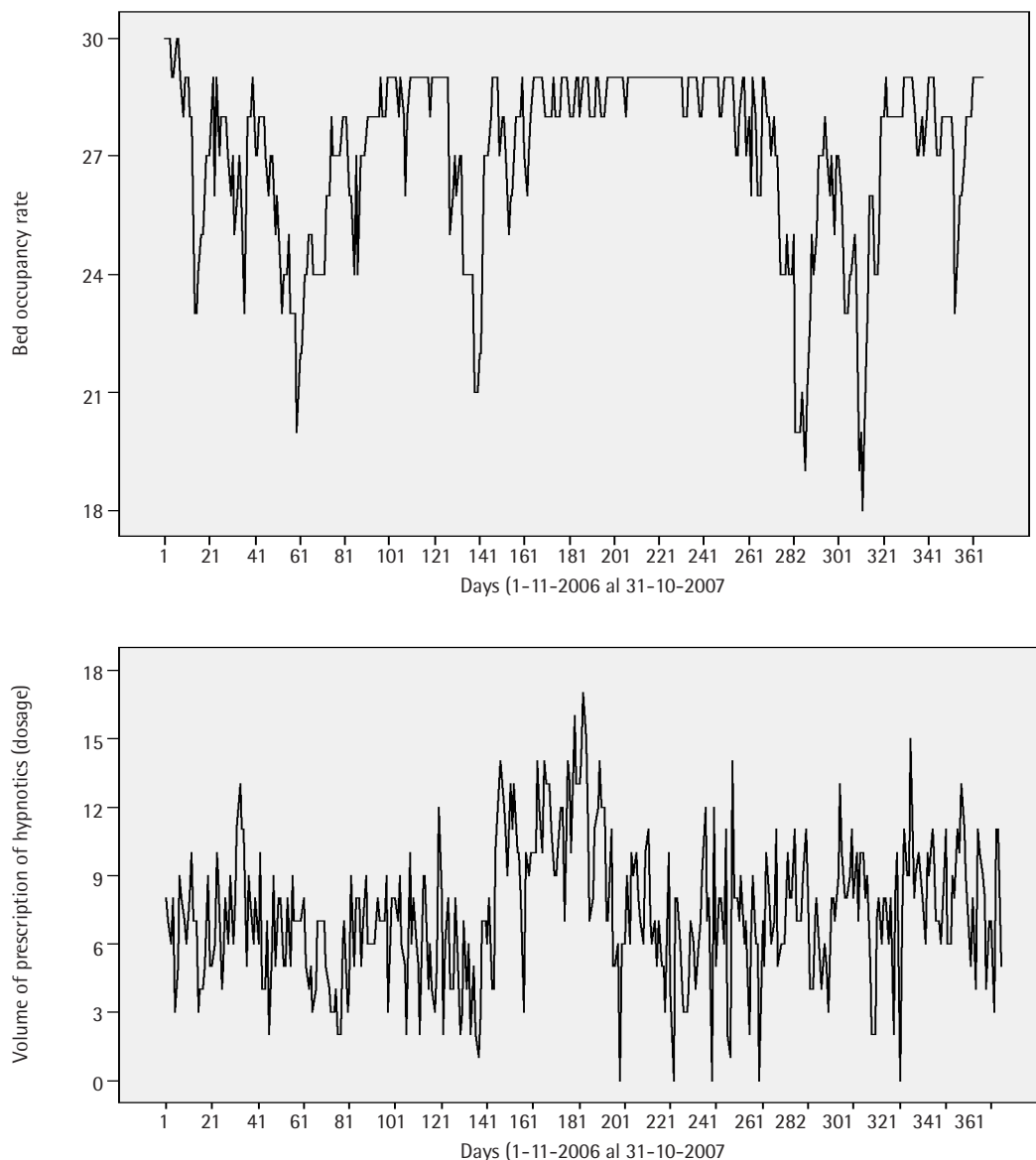


Figure 1 Behavior of daily bed occupancy rate and daily volume of administration of hypnotics to patients in the short-term in-patient psychiatric unit of the Hospital Nuestra Señora de Candelaria in the period ranging from 1-1-2006 to 31-10-2007.

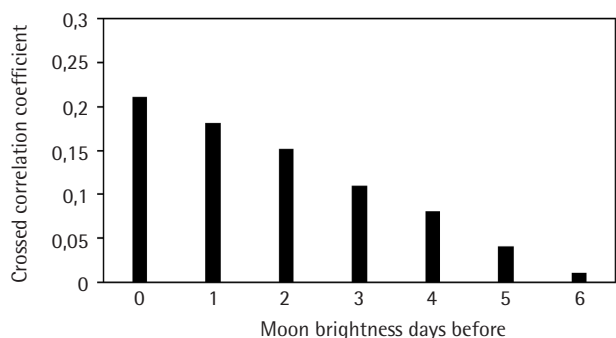
tween increases in violence or aggressive behaviors in psychiatric patients hospitalized and moon phases. Gorvin et al.¹⁴ also did not find any relationship between the moon phases and the variation of the hospital admission rate of psychiatric patients. Raison et al.¹¹ also found no relationship between moon brightness and psychiatric disorders.

The Núñez et al.²¹ study on the relationship between moon brightness and frequency of aggression victims attended in the hospital emergency service did not find any association. Amadeo F. et al.¹⁵ also did not find any relationship between frequency of contact with the psychiatric community services and lunar cycles. We observed a direct

relationship between lunar cycles and bed occupancy rates in the short-term in-patient psychiatric unit, bed occupancy rate with moon brightness and vice versa.

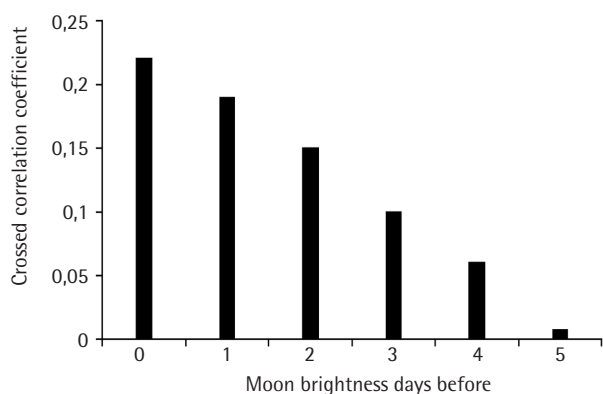
In the Rösli et al.⁶ study, it was found that sleep varies with the lunar cycles, this being shorter with the full moon and longer with the new moon. In our study, we observed that more hypnotics had to be administered coinciding with an increase in moon brightness. However et al.¹² did not find any association between the full moon and loss of sleep.

In relationship with the different psychiatric conditions attended in emergency service, our study did not find the ex-



The horizontal line at 0.09 level of the value of the crossed correlation coefficient indicates the statistical significance of each coefficient: the coefficient is significant if it exceeds it.

Figure 2 | Crossed correlations of up to 7 delays between the Bed Occupancy Rate in the short-term in-patient psychiatric unit of the Hospital Universitario Nuestra Señora de Candelaria and moon brightness from 1-1-2006 to 31-10-2007.



The horizontal line at 0.11 level of the value of the crossed correlation coefficient indicates the statistical significance of each coefficient: the coefficient is significant if it exceeds it.

Figure 3 | Crossed correlations of up to 7 delays between the volume of the prescriptions of the hypnotics in the short-term in-patient psychiatric unit of the Hospital Universitario Nuestra Señora de Candelaria and moon brightness from 1-1-2006 to 31-10-2007.

istence of an increase of them with increase in brightness, or changes in the behaviors of the patients hospitalized in the short-term in-patient psychiatric unit with this increase.

Regarding the suicide attempts in our study, we found no relationship at all between frequency and moon brightness. This coincided with Mathew et al.¹⁷ who did not find any association between frequency of suicides and lunar cycles. In regards to completed suicides, the studies of Gutiérrez García et al.¹⁸ and Bierman et al.¹⁹ also found no relationship with the moon phases.

In another study performed by Rogers et al.²² on the follow-up of hospital admission regarding parasuicide, they observed a synchronized variation with the four moon phases but could not show that this relationship was significant.

Our study has several limitations. The first one consisted in the fact that the symptoms were often described in the registries used instead of stating the diagnoses. This made it difficult to classify the reason for admission or attendance in the psychiatric emergencies of the patient. That is why many of the patients studied have not been classified as suffering a specific psychiatric disorder, but rather by the presence of certain associated symptoms. The second limitation is related with another problem of the recording of cases. This consists in the fact that the admissions were recorded during three different shifts on the same day. Thus, different behaviors could be recorded for the same patient on the same day, with changes during the day. An attempt was made to avoid this potential bias by defining the unit of analysis as the change in behavior during the day and not by the patient, so that several different episodes could be recorded for the same patient on the same day. A third limitation of our study is the amount of subjectivity that the classification of the behaviors could have, but this is a problem inherent to any psychiatric evaluation that produces a bias that is difficult to decrease.

Considering the previously-mentioned limitations, we can conclude that, in accordance with the results of our study, the relationships existing between the lunar cycles and mental disease do not seem to be founded, in general. However, they could be manifested specifically by an increase of the psychiatric incidence, as indicated by the higher rate of bed occupancy with the moon phases and some behavioral disorder such as that of the sleep pattern, as the increase of the hypnotic administration associated to moon phases seems to indicate. These results should be verified with other studies to corroborate the truthfulness of these associations.

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