

Insomnia as a predictor of high-lethality suicide attempts

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SUMMARY

Introduction: Research has demonstrated that patients with insomnia are at an increased risk of experiencing suicidal ideation and/or making a suicide attempt. **Objectives:** To evaluate the relation between insomnia and suicidal behaviour. **Aims:** To examine factors associated with a diagnosis of insomnia in patients admitted to an Emergency Department (ED) and assessed by the psychiatrist in charge. **Methods:** Participants were 843 patients consecutively admitted to the ED of Sant'Andrea Hospital in Rome, between January 2010 and December 2011. All patients admitted were referred to a psychiatrist. A clinical interview based on the Mini International Neuropsychiatric Interview (MINI) and a semi-structured interview was conducted. Patients were asked about 'ongoing' suicidal ideation or plans for suicide. **Results:** Forty-eight percent of patients received a diagnosis of bipolar disorder (BD), major depressive disorder (MDD) or an anxiety disorder; whereas, 17.1% were diagnosed with Schizophrenia or other non-affective psychosis. Patients with insomnia (compared to patients without insomnia) more frequently had a diagnosis of BD (23.9% vs. 12.4%) or MDD (13.3% vs. 9.5%; $p < 0.001$). Moreover, patients with insomnia less frequently had attempted suicide in the past 24 h (5.3% vs. 9.5%; $p < 0.05$) as compared with other patients, but those patients with insomnia who attempted suicide more frequently used a violent method (64.3% vs. 23.6%; $p < 0.01$) compared to other suicide attempters. **Conclusions:** Our results do not support an association between insomnia and suicidal behaviour. However, suicide attempters with insomnia more frequently used violent methods, and this phenomenon should be taken into serious consideration by clinicians.

Introduction

Recent research has demonstrated that patients with insomnia are at an increased risk of experiencing suicidal ideation and/or making a suicide attempt (1–4) with an odds ratio of 2.1 for suicidal ideation and 2.3 for suicide attempts (2). Goldstein et al. conducted a study based on psychological autopsies and found a significant relation between insomnia and suicide (completed) in adolescents and young adults (5). Patients with short sleep duration showed a significant increase in current and lifetime suicidal ideation and suicide attempts (5).

This association between suicidal ideation and sleep problems has also been found in the elderly populations (6). The presence of insomnia is significantly associated with suicidality, including suicide ideation (OR, odd ratio: 2.1), planning (OR: 2.6) and attempts (OR: 2.7) (4). More specifically, initial

What's known

Insomnia has been found to be a factor for both suicide attempts and completed suicides.

What's new

This article demonstrates that insomnia is not necessarily a risk factor for suicide attempt, but may contribute to lethality resulting in an increased degree of seriousness and life-threatening conditions.

insomnia is an important predictor of suicidal ideation (OR: 1.9) and planning (OR: 2.2), whereas difficulty staying asleep at night is an important predictor of suicidal ideation (OR: 2.0) and attempted suicide (OR: 3.0) (4).

Sleep disorders, including insomnia, are also important predictors of subsequent suicidal thoughts and suicide attempts in adolescents (7–10). Some authors have found that adolescents who sleep less than 8 h a night and have recurrent nightmares were at a significantly increased risk of suicide attempts (ORs of 2.89 and 2.43, respectively) (7). A recent study in college students (age 18–29) showed that suicidal ideation was significantly associated with insomnia ($p < 0.01$) and nightmares ($p < 0.01$), and that nightmares were associated with suicidal ideation even without symptoms of insomnia, depression and anxiety (9). There is also a strong relation between depression and insomnia. Depression has

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been frequently identified as a cause of chronic insomnia in many epidemiological and clinical samples (11,12). Depressed patients with insomnia revealed significantly higher scores on the Beck Scale for Suicidal Ideation (SSI) (7.39 ± 2.84) compared to the patients with hypersomnia (SSI: 3.68 ± 1.73) (1). The association between suicidal behaviour and insomnia has been also linked to neuroendocrine correlates with some studies demonstrating that they may both be related to the serotonergic system (13).

The aim of the present research was to examine factors associated with insomnia in patients admitted to an Emergency Department (ED) and assessed by the psychiatrist in charge.

Specifically, the study addressed to what extent: (i) psychiatric referrals suffering from insomnia differ from those without insomnia and (ii) insomnia is predictive of a suicide attempt among patients admitted to an ED requiring psychiatric consultation. Such issues are particularly salient given the importance of disturbed sleep patterns in individuals at risk for suicide and insomnia being a well-known warning sign for suicidality.

Methods

Design

The sample consisted of consecutive patients admitted from January 2010 to December 2011 to the ED of Sant'Andrea Hospital and assessed by the psychiatrist in charge satisfying the inclusion criteria (e.g. admission to the ED, ability to take part in the assessment procedure and provision of informed consent). Exclusion criteria included the presence of mental retardation (IQ < 70), delirium, and all other factors affecting the ability of the psychiatrist in charge to complete the assessment of mental status and sleep patterns. Patients participated voluntarily in the study and provided written informed consent. The study protocol was approved by the local research ethics review board.

Participants

A total of 885 patients seeking psychiatric consultation were admitted to the ED in the time frame considered for the study, and 843 gave their informed consent (response rate = 95.3%). Patients who denied informed consent and those included in the final sample did not differ for sex and age. For these patients, a detailed clinical record was provided by the ED physician, which included a comprehensive psychiatric evaluation conducted by the psychiatrist on duty. Depending on the seriousness of the symptoms, patients were referred either to outpatient

clinics or hospitalised. Of the 843 patients included in the final sample, 300 patients were hospitalised in the Department of Psychiatry (see Table 1 for socio-demographic variables). The initial evaluation was performed in the ED for each patient and was discussed in a diagnostic conference to determine the appropriate diagnosis (according to ICD-10 criteria, which is the official mode for providing diagnoses in the Italian Health Service) within 3 days of the admission.

Measures

All patients admitted to the ED suffering from psychiatric disorders and/or who had attempted suicide were referred to a psychiatrist while in the ED, where an interview was conducted. During the interviews, a complete mental examination was performed and patients were asked about 'ongoing' suicidal ideation or plans for suicide. According to the revised nomenclature (14,15), these acts should be labelled suicide attempts type II, that is, a self-destructive act with some degree of intent to end one's life and some identifiable injuries. Patients were interviewed as soon as the psychiatrist on call had medical clearance.

Ongoing suicidal ideation was defined as thoughts of serving as the agent of one's own death. Patients who were deemed suicidal ideators were those who were still thinking that suicide was a good option for their problems, wished that they were dead, or were unhappy to be rescued.

Clinicians performing the mental examination relied on the Mini International Neuropsychiatric Interview (MINI). In this study, MINI diagnoses were confirmed by clinical DSM-IV-TR diagnoses. Clinical diagnoses were assigned by a staff psychologists and the attending psychiatrist. Clinicians on duty at the ED were seven psychiatrists who were

Table 1 Sociodemographic characteristics of the sample

Variables	Statistics
Men	43.8%
Age – M ± SD (Min/Max)	45.66 ± 16.41 (15/98)
Italians	93.0%
Hospitalised in the Psychiatric Department	35.6%
Compulsory hospitalisation	9.6%
Physical comorbidity	24.8%
Triage: critical/urgent	53.3%
Insomnia	31.3%
Suicide attempt in the last 24 h	8.2%
Suicidal attempt with violent methods	2.6%
Persistent suicidal ideation	11.5%
Past suicide attempts	4.1%

trained to administer the MINI interview; inter-rater reliability between those performing such task was $\kappa = 0.89$.

Clinicians evaluated insomnia according to the estimate of sleep difficulties occurring during the last month before the assessment. The assessment of insomnia was based on a checklist of items on the Athens Insomnia Scale (16) which evaluated the frequency and severity of difficulties with sleep (e.g. time to fall asleep after turning-off the lights, awakenings during the night, final awakening earlier than desired), and the general quality of sleep (i.e. total sleep duration, overall quality of sleep). The patients were considered to have insomnia if difficulties occurred at least three times per week in the last month and were causing a markedly insufficient total sleep duration or a markedly unsatisfactory quality of sleep. Most patients had a combination of initiating and maintaining sleep (56%), some had difficulty initiating sleep (27%); only 17% of these patients had early morning awakening.

Statistical analysis

Chi-squared tests with Yates's correction, one-way Fisher's exact tests and *t*-tests were conducted for the bivariate analyses. Benjamini and Hochberg's (17) procedure was used to correct for multi-testing. Log-linear models were employed to assess the multivariate association among variables. Variables statistically significant ($p < 0.05$) after correction for multi-testing were selected for inclusion in the multivariate model. Odds Ratios (ORs) and their significance values were calculated. All statistical analyses were performed using the SPSS 19.0 statistical software package (IBM Corp., Armonk, NY, USA).

Results

Characteristics of the patients

Sociodemographic and clinical characteristics of the sample are listed in Tables 1 and 2. The patients admitted to the ED were mostly Italians (93.0%) and 98.7% of them were 18 years or older. Around 53% of the patients arrived at the ED with a critical urgent triage code. Forty-eight percent of them received a diagnosis of bipolar disorder (BD), major depressive disorder (MDD), or an anxiety disorder; whereas, 17.1% of the patients received a diagnosis of Schizophrenia or other non-affective psychosis. In our sample, substance abuse was infrequent (2.6% and 2.1%, respectively, for alcohol and drug abuse). Approximately 8% of the patients admitted to the ED attempted suicide in the last 24 h, and 2.6% used violent methods. Furthermore, 11.5% of the patients reported persistent suicidal ideation at the psychiatric

Table 2 Diagnoses and pharmacotherapy

	Frequency	Percent
None	69	8.0
Anxiety disorders	178	21.2
MDD	90	10.7
BD	135	16.1
(Hypo)-mania	35	34.3
Depressive	12	11.8
Mixed	55	53.9
Schizoaffective disorder	38	4.5
Schizophrenia or other psychosis	144	17.1
Alcohol abuse	22	2.6
Drug abuse	18	2.1
Eating disorders	4	0.5
Agitated confusion	95	11.3
Other specified disorders	50	5.9
Antidepressants	354	42.0
Antipsychotics	225	26.7
Mood stabilisers	167	19.8

MDD, major depressive disorder; BD, bipolar disorder.

assessment and 264 patients reported having sleep difficulties (31.3%). In the 3 months preceding the assessment, 42.0% of the patients were taking antidepressants, 26.7% were taking antipsychotics and 19.8% mood stabilisers.

Differences between patients with insomnia and those without

Groups differed on several variables (see Table 3). Patients with insomnia were diagnosed with BD (23.9% vs. 12.4%) or MDD (13.3% vs. 9.5%; $\chi^2_2 = 22.89$; $p < 0.001$) more frequently than other patients. BD patients with insomnia more frequently experienced a manic episode (43.9% vs. 22.2%), and less frequently experienced a depressive episode (1.8% vs. 24.4%; $\chi^2_2 = 14.44$; $p < 0.001$) as compared to BD patients without insomnia. Compared to other patients, individuals who reported insomnia less frequently showed agitated confusion (9.5% vs. 20.2%; $p < 0.001$) and physical comorbidity (14.6% vs. 29.4%; $p < 0.001$).

Furthermore, patients with insomnia less frequently attempted suicide in the past 24 h (5.3% vs. 9.5%; $p < 0.05$) compared to other patients; however, suicide attempters with insomnia more frequently used violent methods (64.3% vs. 23.6%; $p < 0.01$) as compared to suicide attempters without insomnia. Patients with insomnia also reported more frequent florid psychotic symptoms, such as delusions (27.3% vs. 13.7%; $p < 0.001$), hallucinations (17.0% vs. 10.9%; $p < 0.01$) and thought disorders (48.5% vs. 23.4%; $p < 0.001$) compared to patients

Table 3 Differences between groups

	Others (n = 579)	Insomnia (n = 264)	Test	P
Men	43.2%	45.1%		< 0.33
Age	45.42 ± 16.74	46.18 ± 15.68	$t_{832} = 0.62$	< 0.54
Mood disorders			$\chi^2_2 = 22.89$	<0.001**
None	78.1%	62.9%		
BD	12.4%	23.9%		
MDD	9.5%	13.3%		
Mood episodes			$\chi^2_2 = 14.44$	< 0.001**
Mania	22.2%	43.9%		
Depressive	24.4%	1.8%		
Mixed	53.3%	54.4%		
Anxiety disorders	25.6%	27.7%		< 0.29
Psychosis			$\chi^2_2 = 0.20$	< 0.90
None	78.8%	77.7%		
Schizophrenia and other non-affective psychosis	16.9%	17.4%		
Schizoaffective disorder	4.3%	4.9%		
Substance abuse	6.7%	5.3%		< 0.26
Other specified diagnoses	8.1%	4.9%		< 0.06
Agitated confusion	20.2%	9.5%		< 0.001**
PD	3.7%	3.4%		< 0.52
Past suicide attempts	4.7%	2.5%		< 0.16
Suicide attempts in the past 24 h	9.5%	5.3%		< 0.05*
Violent suicide attempts	23.6%	64.3%		< 0.01**
Persistent suicidal ideation	10.4%	13.6%		0.10
Delusions	13.7%	27.3%		< 0.001**
Hallucinations	10.9%	17.0%		< 0.01*
Thought disorders	23.4%	48.5%		< 0.001**
Physical comorbidity	29.4%	14.6%		< 0.001**
Admitted in the Psychiatric Department	29.0%	50.4%		< 0.001**
Compulsory hospitalisation	6.9%	15.5%		< 0.001**
Antidepressants	42.5%	43.7%		< 0.39
Antipsychotics	27.4%	27.0%		< 0.49
Mood stabilisers	19.9%	20.9%		< 0.40

Benjamini and Hochberg correction for multi-testing: *p < 0.05; **p < 0.01.

without insomnia. Further, patients with insomnia were more frequently admitted to the Department of Psychiatry (50.4% vs. 29.0%; $p < 0.001$), and more frequently the admission was compulsory (15.5% vs. 6.9%; $p < 0.001$) as compared to other patients.

The groups did not differ in age ($t_{832} = 0.62$; $p = 0.54$), sex ($p = 0.33$) and therapy they were taking in the 3 months before the assessment or for the diagnoses other than mood disorders (see Table 3). Also, the groups did not differ in past suicide attempts ($p = 0.16$) or for the presence of suicidal ideation at the psychiatric assessment ($p = 0.10$).

All of the variables that were significant at the bivariate level with the exclusion of the variables assessing mood episodes and violent methods were inserted as independent variables into a log-linear model with groups (patients with insomnia vs. other patients admitted at the ED) as the criterion variable

(Table 4). The model fit the data well (likelihood ratio $\chi^2_{757} = 153.69$; $p = 1.00$). Patients with insomnia (compared to those who did not have insomnia) were as follows: (i) 1.70–1.75 times more likely to be diagnosed with BD or MDD ($p < 0.05$); (ii) 2.41 times more likely to have thought disorders ($p < 0.001$); (iii) 2.63 times less likely to have agitated confusion ($p < 0.001$); (iv) 2.5 times less likely to have attempted suicide in the last 24 h ($p < 0.01$); and (v) 1.85 times less likely to have physical comorbidity ($p < 0.01$).

Discussion

Our study sought to characterise psychiatric referrals suffering from insomnia from those did not report such symptom. Although patients with insomnia in our sample less frequently made a suicide attempt in

the past 24 h (5.3% vs. 9.5%; $p < 0.05$) compared to other patients, our results demonstrated that suicide attempters with insomnia more frequently used violent methods in their attempt (64.3% vs. 23.6%; $p < 0.01$). Results from this study confirmed a relation between insomnia and suicidal behaviour, although our data differed from other studies. Specifically, our findings were inconsistent with the literature because patients with insomnia did not differ in past suicide attempts ($p = 0.16$) or for the presence of suicidal ideation at the psychiatric assessment ($p = 0.10$) from those without. Many studies have demonstrated that patients with insomnia have a significant increase in suicidal ideation and suicide attempts (1–4). A recent meta-analysis supported this finding and demonstrated that sleep disturbances are strongly associated with suicidal ideation, suicide attempt and completed suicide (18). Our results may diverge from the literature because we did not administer validated standardised psychometric measures to assess suicidal ideation during the evaluation at the ED. Our sample also included a mixture of diagnoses and age groups, which may have contributed to the unexpected findings. We also included patients with physical comorbidity, which may represent another internal bias of the study.

Many studies have also demonstrated that insomnia is an important predictor of suicidal ideation and suicide attempt (1–4). However, our findings add to the literature by suggesting that insomnia could be related to violent methods. This finding may have important implications in clinical practice. Individuals who have sleep disorders may not only be at risk for suicidal ideation and suicide attempts but may need to be considered an at risk population for violent suicidal acts and completed suicide. This association may be explained by the neuroendocrine correlates of suicidal behaviour and sleep disturbances, which are both related to serotonergic system (19). Interestingly, some studies also found an association between low CSF 5-HIAA levels and lethality of suicide attempt (13,20,21). These findings suggest that low serotonergic function is found in patients who attempted and/or completed suicide, particularly those who used violent methods to take their own life. Serotonergic dysfunction may be a possible underlying mechanism for both suicidal behaviour and sleep disturbances, and the same pattern could be related to impulsive behaviour or aggression dyscontrol (19). On the other hand, it has been suggested that hypersomnia may be a protective factor for suicide in depressed individuals (22).

There is also a strong relation between mood disorders and insomnia. Results from the literature demonstrated that 90% of patients with depression

complain about sleep problems (23). Many studies have demonstrated that insomnia is a potent risk factor for developing both MDD and BD (24). Moreover, studies have revealed that distress related to sleep problems is frequent in depressive disorders (13.6%), and individuals with sleep problems have the highest relative odds (7.6 times) of developing a new-onset depressive episode compared to those without sleep disorders. Our results also confirmed this association between mood disorders and insomnia; patients with insomnia were more frequently diagnosed with BD or MDD compared to other patients. Even when considered in a log-linear model with groups (patients with insomnia vs. other patients admitted at the ED) as the criterion variable, patients with insomnia (compared to those who did not have insomnia) were more likely to be diagnosed with BD or MDD. Our results also confirmed an association between BPs and insomnia, even during remission of BPs (25). As argued in a systematic review of prodromal symptoms among patients with BD, sleep disorders were found to be the most common prodrome for mania and the sixth most common prodrome for depression (26). Moreover, in our sample, BD patients with insomnia were more frequently experiencing a manic episode and less frequently experiencing a depressive episode compared to BD patients without insomnia, which confirmed the relation between insomnia and manic episode. These findings suggest the important role of sleep disturbance during bipolar episodes and treating sleep disturbance may prolong remission and prevent relapse (24).

Moreover, our results also demonstrate that patients with insomnia were more frequently admit-

Table 4 Log-linear model

Parameters	OR	LogOR	p
Insomnia × BD	1.75	0.56	< 0.05
Insomnia × MDD	1.70	0.53	< 0.05
Insomnia × agitated confusion	0.38	−0.96	< 0.001
Insomnia × suicide attempts in the past 24 h	0.40	−0.91	< 0.01
Insomnia × delusions	1.19	0.17	< 0.54
Insomnia × hallucinations	0.79	−0.23	< 0.41
Insomnia × thought disorders	2.41	0.88	< 0.001
Insomnia × physical comorbidity	0.54	−0.62	< 0.01
Insomnia × admitted in the Psychiatric Department	1.39	0.33	< 0.12
Insomnia × compulsory hospitalisation	1.55	0.44	< 0.14

Likelihood Ratio $\chi^2_{757} = 153.69$; $p = 1.00$. MDD, major depressive disorder; BD, bipolar disorder; OR, odd ratio.

ted to the Department of Psychiatry, and more frequently the admission was compulsory when compared to other patients. Thus, treating insomnia aggressively may also prevent a compulsory admission to the ED.

Limitations

This study also had a number of limitations. The sample is heterogeneous, we investigated a mixture of age group and diagnosis, which may affect the generalisability of the results; further research should be carried out taking into account patients affected by specific psychiatric conditions. In addition, we were not able to examine the effect of number of previous suicide attempts or analyse differences between first time and multiple attempters. Although all patients reported injuries of various degrees as a result of their suicide attempts, accurate measures of lethality could also not be obtained, so that we were unable to examine the effect of the lethality of the attempts. Although all of the clinicians performed a shared clinical assessment and discussed the cases with colleagues, there may nevertheless have been some heterogeneity in the methods different psychia-

trists on duty used to report data. Finally, validated standardised psychometric measures were not used to assess suicidal ideation when the patients were evaluated in the ED.

Conclusions

Taken together, results from this study do not confirm previous findings suggesting that the risk of self-harm is high in patients with insomnia; however, in our sample, suicide attempters with insomnia more frequently used violent methods in their attempts as compared to suicide attempters without insomnia. These results support the supposition that assessing the mental health of patients with insomnia should form part of the routine clinical evaluation. As demonstrated in many studies, insomnia should be considered as a risk factor for suicide and should be evaluated during the suicide risk assessment. Clinicians should also evaluate the association between insomnia and mood disorders, given the evidence that insomnia is a risk factor for developing both MDD and BD. Our results confirm that patients with insomnia should be assessed for suicidality on an ongoing regular basis.

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