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Review article

Suicidal ideation and suicide attempts in psychiatric patients during the COVID-19: A systematic review and meta-analysis

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ARTICLE INFO

Keywords:
 COVID-19
 Suicide attempt
 Suicidal ideation
 Psychiatric
 Pandemic

ABSTRACT

Current suicidal ideation and suicide attempts among psychiatric patients during the COVID-19 pandemic were studied through systematic review and meta-analysis. We searched the following electronic databases using the relevant search terms: Medline, Embase, PubMed and Web of Science, with the search time as of January 31, 2022. Forest plots were obtained using Stata statistical software and a random-effects model was used to conduct a meta-analysis of the prevalence of suicidal ideation. We found 21 eligible studies, 11 of which provided suitable data for meta-analysis. 10 studies explored current suicidal ideation and reported a pooled prevalence of 20.4% (95%CI 14.0–26.8). Six studies examined suicide attempts, with a pooled prevalence of 11.4% (95%CI 6.2–16.6). The prevalence of suicidal ideation and suicide attempts varied by the study method used and by the study sites. This work highlights the need for real-time monitoring of suicidal ideation and suicide in psychiatric patients during the covid-19 pandemic to inform clinical practice and help identify research questions for future epidemiological studies.

Introduction

Since December 2019, the coronavirus disease (COVID-19) outbreak has spread rapidly from China to the entire world, causing to approximately 263 million reported cases and 5.2 million deaths globally as of January 30, 2022. (<https://www.who.int/emergencies/disease/novel-coronavirus-2019>). The infection, which originated in Wuhan, China, has turned to be a public health threat in less than two months and is creating a major impact on the global landscape, with all countries facing unprecedented challenges (Atzrodt et al., 2020). In the absence of an effective means to combat the Novel Coronavirus, isolation and social distancing are the main strategy in the fight against the virus, leading the states to impose lockdowns and disrupts the social fabric (Coroiu et al., 2020). There is evidence that social isolation and loneliness are associated with mental health problems (Leigh-Hunt et al., 2017), and the mental health effects of this pandemic are significantly more lasting than the infection itself.

For instance, a study observed that of the 1210 general population of 194 Chinese cities, 53.8% rated the psychological impact of the outbreak as moderate or severe; 16.5% showed moderate to major depressive

symptoms; 28.8% revealed moderate to severe anxiety symptoms, and 84.7% of respondents spent more than 20 h at home every day (Wang et al., 2020). Chinese researchers also investigated the mental health status among 1257 healthcare workers treating novel Coronavirus patients (Lai et al., 2020); 50.4% of study participants reported depression, 44.6% anxiety, 34.0% insomnia, and 71.5% distress. The participants faced a sudden separation from relatives and friends, restricted activities, and loss of freedom. They suffer from anxiety, depression, mood disorders, palpitations, and insomnia, leading to the development or aggravation of suicidal tendencies. The mental health consequences of the COVID-19 pandemic, including suicide-related behaviors, could persist for a long time.

The direct and indirect impact of suicide-related behavior during the COVID-19 pandemic is an essential public health concern. Suicidal ideation is the presence of negative thoughts about wanting to die or positive thoughts regarding suicide, but not the presence of suicidal behavior (Posner et al., 2007). Suicide attempts have been considered non-lethal, self-directed, and potentially harmful behavior causing any intentional death (Meyer et al., 2010). These behaviors can be intervened in advance and prevented (Mann et al., 2005). However, the

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epidemic will never affect all populations equally, and the psychological impact of COVID-19 could be more pronounced among people with Psychiatric patients (Yao et al., 2020). A large but vulnerable group whose voices are rarely heard despite the stigma and neglect of these prevalent societal conditions (Li et al., 2018). Psychiatric patients are more susceptible to novel coronavirus infections than the general public (Seminog and Goldacre, 2013). Second, with the sudden and dramatic impact of the COVID-19 outbreak on global healthcare resource allocation, their plans to access psychiatric services would face additional barriers (Montemurro, 2020). A study has depicted that psychiatric inpatient wards are excellent breeding grounds for novel coronavirus infections. Most stable psychiatric patients should be treated at home to reduce the risk of infection (Kim and Su, 2020). Finally, the stress sensitivity of psychiatric patients is high and should be regularly checked through the outpatient department (Purgato et al., 2018). COVID - 19 outbreak sparked fear, and anxiety, would bring them a more significant psychological burden, and cause existing mental health recurrence or deterioration. However, global blockade leads to mental disease, and regular visit is challenging. Therefore, studying the factors associated with suicidal ideation and attempt and those of psychiatric patients is imperative.

Data on the impact of COVID-19 on Psychiatric patients are still scarce, and the primary purpose of this review is 1. To assess the current prevalence of suicidal ideation and suicide attempts in patients having a mental illness. 2. Subgroup analysis was performed to identify differences affecting prevalence.

Methods

This systematic review and meta-analysis was followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement guidelines (PRISMA) (Moher et al., 2009).

Search strategy

From 3 October 2021 to 31 January 2022, the following electronic databases and platforms were searched; Medline, Embase, PubMed and Web of Science. A bibliography was searched for articles included in the full-text review phase. We used the following search terms: "COVID-19" OR "Sars-Cov-2" OR "Coronavirus" OR "COVID-19 pandemic" OR "coronavirus Pandemic" (All Fields), "suicide" OR "suicide attempt" OR "suicidal ideation" OR "self-harm" (All Fields), "psychiatric patients" OR "Psychiatric illness" OR "mental disorders" OR "Psychiatric hospitalization" OR "psychiatric department" OR "depressive symptoms" OR "obsessive-compulsive disorder" (All Fields). The search results were last updated in January 2022.

Study inclusion and exclusion criteria

We included quantitative and qualitative studies with varied study designs and case reports. We included all the studies of individuals reporting suicidal ideation or suicide attempt associated with the COVID-19 pandemic in any setting. The inclusion criteria for the studies were: 1) Contains data on suicidal ideation and suicide attempts during the COVID-19 pandemic, including individual studies; 2) Patients having a definite diagnosis of mental illness; 3) Information to calculate the percentage of participants who endorsed suicidal behavior during COVID-19. We did not restrict studies for inclusion based on the sample characteristics (e.g., age), publication type or language.

We excluded any studies not included in peer-review publications or did not include the original data.

Data extraction and collection

After the retrieval process and the selection of relevant abstracts are completed, examination of full-text articles for inclusion and data

extraction was completed by two reviewers independently. Disagreements about research choices are resolved by consensus or, where appropriate, by a third reviewer. We also manually searched the references to the article to identify other relevant articles.

A data extraction form was designed for the included studies, the following data were independently extracted by two researchers: publication date, first author, geographic location of study, study design (cross-sectional, longitudinal), study type (clinical, epidemiological), total sample size.

Risk of bias (quality assessment)

The quality of the study was assessed independently by two reviewers and cross-checked by a third reviewer using appropriate checklists. No intervention studies were included in this review, so observational studies were assessed for quality using the Newcastle-Ottawa Quality Assessment Scale, which is suitable for cross-sectional studies (Modesti et al., 2016).

Meta-analysis

We underwent a meta-analysis on the prevalence of suicidal ideation and suicide attempts through STATA16.0. These studies provided the percentage of participants with suicidal ideation and suicide attempts. A meta-analysis examined these ratios, and the pooled prevalence was reported with a 95% confidence interval (CI).

Many sources of heterogeneity were expected in these studies, including environment and research methods. Due to the high heterogeneity, a random-effects model was used to generalize results outside the included studies by assuming that selected studies as random samples from a larger population. The analysis aimed to generalize the findings to a larger population, including all possible studies (Cheung et al., 2012). We also examined the heterogeneity through the forest plot and reported the I^2 statistic as an indicator of the heterogeneity.

Results

The search returned 728 records. After removing duplicates, 425 titles were screened at the title phase. We screen 205 records at the abstract phase and excluded 122 records. We selected 83 articles for full-text examination, 62 records were excluded and we finally included 21 studies. The reasons for exclusion and details of study selection are given in the PRISMA diagram (Fig. 1).

Characteristics of included studies

A total of 21 studies were included in the systematic review and meta-analysis. Ten studies described the recent suicide ideation, seven described suicide attempts, and four described both suicide ideation and suicide attempts. Most studies were conducted in Europe ($N = 11$, 52.3%) and Asia ($N = 6$, 28.5%). Four were multicenter studies (19.0%). Three studies looked at patients having obsessive-compulsive disorder (14.2%), two at patients with mental illnesses (9.5%), and three at patients with depression (14.2%). In contrast, most studies had clinical samples from psychiatric emergency departments. In one study, the patient population was from college students, with only two investigating suicidality among the aged (9.5%).

Studies describing suicidal ideation

Of the 14 studies describing suicidal ideation summarized in Table 1, two were longitudinal, two were case-control, and 10 were cross-sectional studies. Out of these, 10 studies had data suitable for meta-analysis.

Seven studies compared relevant characteristics during the pandemic with the same period before the pandemic. One study

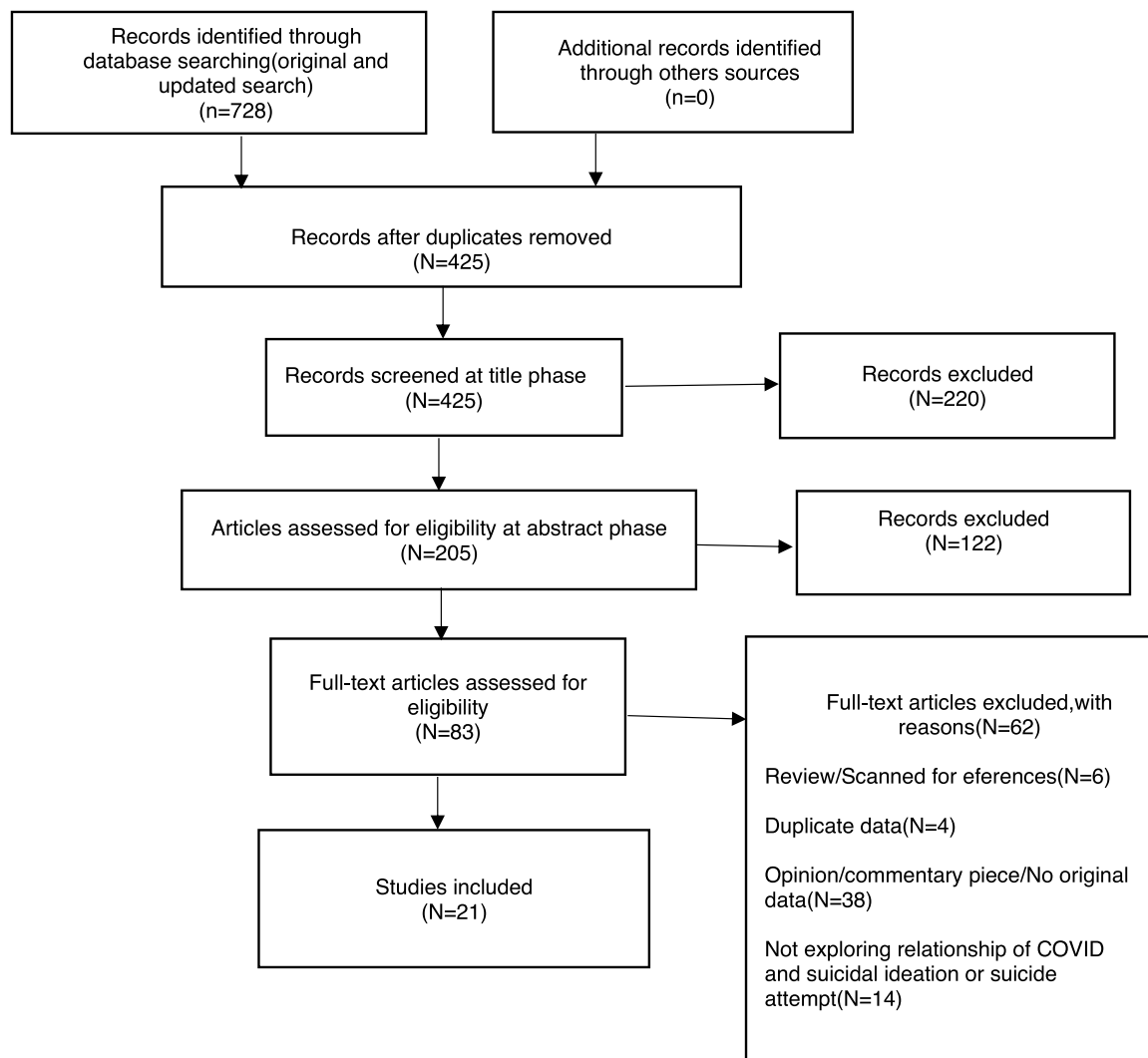


Fig. 1. Flow Chart of studies included in the systematic review and meta-analysis. Prevalence of suicidal ideation in psychiatric patients.

evaluating suicidal ideation among psychiatric patients admitted to the hospital before and during the COVID-19 pandemic and government lockdown restrictions observed no difference in suicidal ideation (33.4% vs 29.5%, $P = 0.289$) (Berardelli et al., 2021). Another study reported that 367 people (27.5%) depicted suicidal ideation during the pandemic, and 423 (30.6%) had suicidal ideation before that, without any difference observed in symptom levels of suicidal ideation (Titov et al., 2020). The same was true for this study of depressed and older Americans. The authors conducted semi-structured qualitative interviews with participants. Seven (10%) had suicidal ideation during and seven (10%) before the pandemic (Hamm et al., 2020). A multicenter study also described a 3.4% reduction in counseling for suicidal ideation among psychiatric patients during the lockdown, followed by an upward rebound post lockdown (Balestrieri et al., 2021). The remaining three studies depicted the opposite, all pointing to an increase in suicidal ideation among psychiatric patients during COVID-19 than a control group of patients at the same time in 2019 (Khosravani et al., 2021; Nomura et al., 2021; Seifert et al., 2021).

The rest of the studies were conducted during the COVID-19 pandemic. Two studies investigated the prevalence of suicidal ideation in patients having obsessive-compulsive disorder (OCD) (Alonso et al., 2021) and those with major depression (Olié et al., 2021), respectively, compared with healthy people from the same area. For patients with OCD, 5.5% described active suicidal ideation, and 23% reported passive

suicidal ideation, significantly higher than the general population. For people with depression, 26.6% reported the current suicidal ideation and were at higher risk of experiencing suicidal ideation than healthy controls. In another study, participants were obsessive-compulsive patients based on the presence of clinical deterioration. They were divided into two groups; clinical deterioration among patients accounted for more than a third of the sample, with new obsessive-compulsive disorder and significant decline of past symptoms, suicidal thoughts of four people (3.3%), only in obsessive-compulsive deterioration showed more frequent suicidal ideations (Benatti et al., 2020). This study compared healthy controls, nine (11.8%) Psychiatric patients, and one (0.9%) healthy control who reported moderate to severe suicidal ideation, having significantly higher levels of intense suicidal ideation (Hao et al., 2020).

In these studies, the following scales measured suicidal ideation. One study was based on the Hamilton Depression Scale (HDRS; item on suicide) for suicidal ideation (Hamilton, 1960). In both studies, current suicidal ideation depends on the Suicide Item in the Patient Health Questionnaire, PHQ-9 (Bauer et al., 2013). A study was also assessed using the Columbia Suicide Severity Rating Scale (C-SSRS) (Posner et al., 2011), and the construct was used to evaluate the severity of recent suicidal ideation. The Beck-Srivastava (BSSI) (Beck et al., 1979) is a self-report scale with 19 items assessing levels of suicidal ideation in the past week. Each scale item was scored from 0 (without suicidal ideation) to 2 (high suicidal ideation). A study also utilized the Geriatric Suicidal

Table 1
Studies reporting suicidal ideation.

Citation	Country	Study design	Participants	Main findings
Alonso et al., al. (2021)	Spain	Longitudinal study	(1) Patients with OCD ($n = 127$). (2) Healthy controls ($n = 237$).	For patients with OCD, 7(5.5%)described active suicidal ideation and 30(23%) reported passive suicidal ideation. percentages significantly higher than those in the general population
Olié et al., al. (2021)	French	Longitudinal study	(1) patients with a major depressive ($n = 346$). (2) Healthy controls ($n = 69$).	Current suicidal ideation in 9(26.6%) of major depressive and 1(1.5%) of healthy control
Hao et al. (2020)	China	case-control study	(1) Psychiatric patients with depression and anxiety ($n = 76$). (2) Healthy controls ($n = 109$).	Suicidal ideation present in 9 (11.6%) of psychiatric patients and 1(0.9%) of healthy control . More suicidal ideation in psychiatric patients ($P = 0.003$)
Benatti et al. (2020)	Italy	Cross-sectional study	Patients with OCD under tertiary psychiatric care ($n = 123$). Comparisonbetween those whose OCD worsened and those did not	4 (3.3%) had suicidal ideation, only in those with worsening OCD
Montalbani et al., al. (2021)	Italy	Cross-sectional study	divided the sample into two groups taking as a watershed March 11,2019,Group 1(133) before, group 2(58) after	the frequency of suicidal ideation was significantly higher in group 2(12.8%) than in group 1 (3.9%)
Seifert et al., al. (2021)	Germany	Cross-sectional study	(1) Patients admitted to the psychiatric emergency department ($n = 374$). (2) Same individuals before the pandemic($n = 476$).	Suicidal ideation present in 123 (32.9%) during the pandemic and 141 (29.6%) pre-pandemic
Jefsen et al. (2020)	Denmark	Cross-sectional study	Psychiatric patients with pandemic-related self-harm or suicidality ($n = 74$)	34 (45.9%) had suicidal ideation. 13 (17.6%) had a passive wish to die of COVID-19
Hamm et al. (2020)	USA	Cross-sectional study	(1) Older adults with treatment-resistant depression ($n = 72$). (2) Same individuals before the pandemic	7 (10%) had suicidal ideation during the pandemic and 7 (10%) before the pandemic.
Balestrieri et al., al.(2021)	Italy	Cross-sectional study	(1) psychiatric patients during lockdown and post-lockdown periods ($n = 2182$). (2) Same individuals before the pandemic($n = 3144$).	186(8.5%) had suicidal ideation during the pandemic and 270 (8.5%) before the pandemic.
Titov et al. (2020)	Australia	Cross-sectional study	(1) Individuals undergoing psychological assessments during pandemic ($n = 1334$). (2) Individuals undergoing psychological assessments in the previous months ($n = 1338$)	Suicidal ideation occurred in 367 (27.5%) during the pandemic and 423 (30.6%) prior to it. No evidence of difference ($\chi^2 = 3.11, P = 0.08$)
Berardelli et al., al.(2021)	Italy	Cross-sectional study	(1)Psychiatric patients admitted to a public psychiatric clinic ($n = 317$) (2) Same individuals before the pandemic($n = 315$).	suicidal ideation present in 33.4% during the pandemic and 29.5% pre-pandemic
Louie et al. (2021)	China	case-control study	(1) Psychiatric patients with late-life depression($n = 33$). (2) Healthy controls ($n = 31$).	Older people with LLD had a higher level of suicidal ideation than healthy controls
Khosravani et al., al. (2021)	Iran	Cross-sectional study	Psychiatric patients with obsessive-compulsive disorder($n = 304$)	Severe OCD were more likely to have suicidal ideation during the pandemic
Nomura et al., al.(2021)	Japan	Cross-sectional study	Psychiatric patients with depression in college($n = 2712$)	Suicidal ideation present in 18.4%

Ideation Scale (GSIS) (Chou et al., 2005). The scale determines suicidal ideation on a five-point scale, having better scores depicting higher levels of suicidal ideation (Heisel and Flett, 2006).

Studies on suicide attempts

In the 11 studies describing suicide attempts, as in Table 2, four were case reports, and seven were cross-sectional studies. In the four case reports, a woman with a mental disorder experienced paranoid delusions (Weise et al., 2020) and a man with depressive and anxiety symptoms, a disease exacerbated by the SARS-COV-2 pandemic and its sweeping social changes, which led to a suicide attempt (Hodžić et al., 2020). Another man with a history of depression and psychotic symptoms (intermittent auditory hallucinations and paranoid delusions) had tested positive for COVID-19 when he attempted suicide during the outbreak. Moreover, the patient tested negative for COVID-19 during his psychiatric stay but tested positive again later during his visit. The worsening of his emotional symptoms coincided with the positive test (Garakani, 2021). This patient suffered from depression and psychosis and the coronavirus during the COVID-19 outbreak. The patient had never been tested for COVID-19 but believed they were spreading the virus to others, felt severe guilt, and eventually committed a suicide attempt at home (Grover et al., 2021).

Five of the remaining seven studies from psychiatric emergency departments or psychiatric wards examined whether the frequency of suicidal attempts among psychiatric patients differed before and during the COVID-19 pandemic. Two studies depicted that suicide attempts are more frequent among psychiatric patients (Berardelli et al., 2021;

Capuzzi et al., 2020). Similarly, a multicenter study reported a more significant 35% increase among patients reporting suicidal ideation after lockdown than in the control period in 2018 and 2019 (Boldrini et al., 2021). All three studies were from Italy. The result of another study was the opposite. The incidence of suicide attempts during the pandemic was significantly lower than before. Patients in the study were more likely to have been diagnosed with anxiety, mood disorders, and psychiatric disorders and were less likely to commit suicide (Yalçın et al., 2021). The reason for this difference is different periods during the pandemic. In this study, suicide rates declined at the beginning of the pandemic (3.9%), which reversed with an even more significant increase (7.7%) after the lockdown (Montalbani et al., 2021). One study could also explain that significant differences exist between suicidal attempts during and after the lockdown (Balestrieri et al., 2021). The counseling for suicidal attempts declined rapidly (−3.4%) during the lockdown in 2020, followed by the same rebound. In addition, during the post-lockdown period in 2020, there was a higher consultation rate describing manic episodes and suicide attempts than in 2019. In contrast, the consultation rate for anxiety disorders was lower than in 2019. Thus, it could also be inferred that the result difference was associated with the type of psychiatric patients.

Meta-analysis

We used Meta-Analysis to calculate overall effects using random-effect models.

Table 2
Studies reporting suicide attempts.

Citation	Country	Study design	Participants	Main findings
Capuzzi et al., al. (2020)	Italy	Cross-sectional study	(1) Patients admitted to the psychiatric emergency department (n = 203). (2) Same individuals before the pandemic(n = 360).	Suicide attempt present in 59 (26.2%) during the pandemic and 68 (17.5%) pre-pandemic
Boldrini et al., al. (2021)	Italy	Cross-sectional study	(1) Patients admitted to the general hospital psychiatric wards (n = 1280). (2) Same individuals before the pandemic(n = 3270).	Suicide attempt present in 238 (37%) during the pandemic and 467 (14.3%) pre-pandemic
Montalbani et al., al. (2021)	Italy	Cross-sectional study	divided the sample into two groups taking as a watershed March 11,2019, Group 1(133) before, group 2(58) after	Suicide attempt in 5(3.9%) of group 1 and 4(7.7%)of healthy control
Yalçın et al., al.(2021)	Turkey	Cross-sectional study	(1) Patients admitted to the psychiatric emergency department (n = 2559). (2) Same individuals before the pandemic(n = 3046).	Suicide attempt present in 48 (1.8%) during the pandemic and 115 (3.6%) pre-pandemic
Jefsen et al. (2020)	Denmark	Cross-sectional study	Psychiatric patients with pandemic-related self-harm or suicidality (n = 74)	10 (9.8%) had suicide attempt.
Balestrieri et al., al. (2021)	Italy	Cross-sectional study	(1) psychiatric patients during lockdown and post-lockdown periods (n = 2182). (2) Same individuals before the pandemic(n = 3144).	Suicide attempt present in 168 (7.6%)during the pandemic and 199 (6.3%) pre-pandemic
Berardelli et al., al. (2021)	Italy	Cross-sectional study	(1)Psychiatric patients admitted to a public psychiatric clinic	Suicide attempt present in 19.2% during the pandemic and 13.0% pre-pandemic

Table 2 (continued)

Citation	Country	Study design	Participants	Main findings
Weise et al., al.(2020)	Germany	case report	(n = 317) (2) Same individuals before the pandemic(n = 315). Female, 60, suffers from paranoid delusions	By improving her overall condition, the patient gradually escaped another suicide attempt.
Amir Garakani. (2021)	USA	case report	Male, 44 years old with a history of depression and psychotic symptoms	Patients tested positive for COVID-19 when they tried to commit suicide during the outbreak, tested negative for COVID-19 during psychiatric hospitalizations, but tested positive again after hospitalization.
Hodžić et al. (2020)	Bosnia and Herzegovina	case report	Male, 50 years old, with depression and anxiety	The epidemic and restrictive measures were triggers for suicide attempts, which were triggered by doctor-patient communication barriers, fear of losing their jobs and problems.
Grover et al., al. (2021)	India	case report	27 year old female with persistent delusional disorder and secondary depression	Stressed and distressed during the COVID-19 outbreak, patients who had never been tested for COVID-19 but believed they were spreading the virus to others attempted suicide at home

The meta-analysis of the prevalence of suicidal ideation

The results are summarised in Fig. 2. Twelve datasets from 10 studies provided relevant data for meta-analysis. Seifert et al. were divided into two groups based on different psychiatric diagnoses in their study (Seifert et al., 2021). Balestrieri et al. had periods of lockdown and post-lockdown, thereby treating those separate datasets (Balestrieri et al., 2021). The total sample size in these studies was 5014. The pooled prevalence of suicidal ideation in these studies became 20.4% (95%CI 14.0–26.8).The level of heterogeneity was highly consistent with expectations. ($I^2 = 97.7\%$, $p = 0$). We conducted a subgroup analysis based on the study design and country of publication. The results are in Figs. 3–5. The cross-sectional study comprised the largest number of participants (= 4465) and a suicide ideation prevalence of 22.0% (95% CI 14.3 - 29.6). In contrast, the longitudinal study had a prevalence of 16% (95% CI –4.6 - 36.7). The rest were case-control studies with a prevalence of 15.8% (95%CI 7.6–24.0). The prevalence in different countries was: Spain 5.5% (95%CI 1.5–9.5), French 26.6% (95%CI 21.9–31.2), China 15.8% (95%CI 7.6–24.0), Italy 10.0% (95%CI 5.0–14.0), Germany 39.6% (95%CI 25.4–53.7), Denmark 45.9% (95%CI 34.6–57.3), United States of America 9.6% (95%CI 2.8–16.3), and

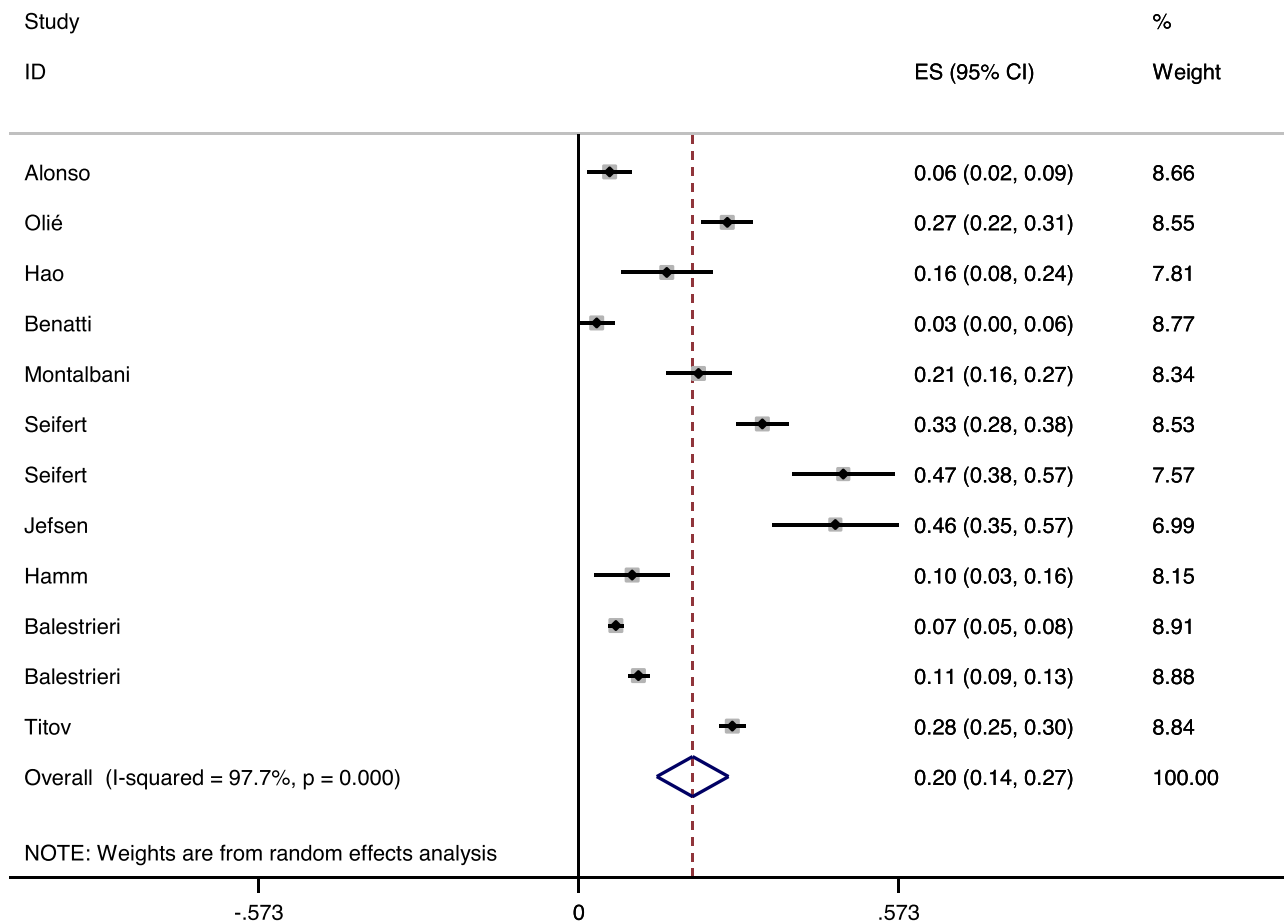


Fig. 2. Forest plot of the pooled prevalence of suicidal ideation among psychiatric patients. Random-effects meta-analysis.

Australian 27.5% (95%CI 25.1–29.9).

The meta-analysis of suicide attempts

Compared with suicidal ideation, there were relatively few studies on suicidal attempts, as described in Fig. 6. Six studies provided seven data for meta-analysis. Balestrieri et al. also had two groups in their study (Balestrieri et al., 2021). All the analyses were cross-sectional, and one survey by Yalçın et al. accounted for the most significant number of participants (Yalçın et al., 2021) (=2559). The total sample size in these studies was 6489. The combined prevalence of suicidal attempts was 11.4% (95%CI 6.2–16.6). The majority in different countries was : Italy 13.7% (95%CI 7.9–19.4), Turkey 1.9% (95%CI 1.4–2.4), and Denmark 13.5% (95%CI 5.7–21.3).

Discussion

The study conducted a systematic review and meta-analysis of the literature on suicidal ideation and suicide attempts based on psychiatric patients during the COVID-19 pandemic. This work highlights the importance of real-time monitoring of suicidal ideation and suicide attempts in psychiatric patients during the COVID-19 pandemic to involve clinical practice and help identify research questions within future epidemiology.

Due to the COVID-19 pandemic, global healthcare infrastructure, daily freedom of movement, and allocation of healthcare resources underwent significant changes that could substantially impact the mental health of psychiatric patients during unprecedented situations. Meta-analysis results indicated that the co-prevalence of suicidal ideation was 20.4% (95%CI 14.0–26.8), and that of suicide attempts was 11.4% (95%CI 6.2–16.6) among psychiatric patients affected during COVID-

19. The estimated prevalence of suicidal ideation and suicide attempts within 12 months was 2.0% and 0.3% in developed countries and 2.1% and 0.4% in developing countries, respectively. It was significantly higher than the world Mental Health Survey conducted by the World Health Organization (WHO) in 21 countries (Borges et al., 2010).

There is a link between severe mental illness and suicide-related behavior. Therefore, the severity of psychiatric symptoms among patients could be an essential risk factor for suicide attempts and prior suicidal ideation (Mitchell et al., 2018). Some of the studies we included were conducted through online questionnaires or telephone assessments due to the epidemic limitations, which limited the generalization of the sample of psychiatric patients due to the ability to complete online surveys or telephone assessments was indicative of their condition was not that severe. Thus the prevalence of suicide ideation, especially suicide attempts, associated with the current outbreak could be underestimated. However, caution is needed in interpreting these results. Large differences in non-standardized assessments of suicidal ideation and suicide attempts between countries measured the limitations inherent to this variable. More standardized suicide measurement tools or criteria must be developed in future work.

Since the current transmission of the Novel Coronavirus continues and the timing of a definitive end to the pandemic is unknown, a slight increase in suicides could affect several vital people. The clinical implications of these results are that psychiatrists should be aware that psychiatric patients are at higher risk for suicidal behavior and actively inquire about suicidal ideation and prior history of suicide attempts. Since most psychiatric patients do not report suicidal behavior, clinicians should pay special attention to communicating with suicidal ideation having psychiatric patients. "People who talk about killing themselves rarely die by suicide" is one of the most frequently cited

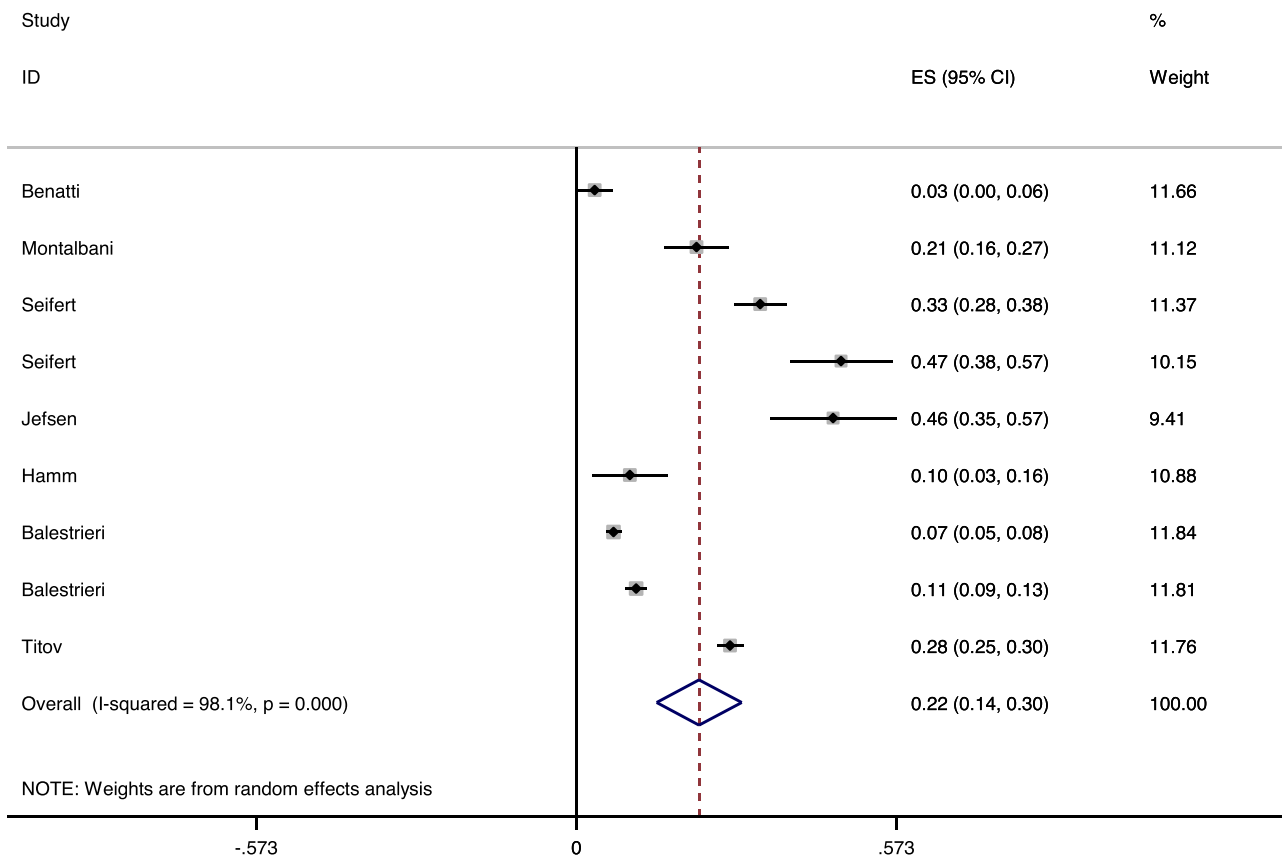


Fig. 3. Forest plot of the pooled prevalence of suicidal ideation in the cross-sectional study.

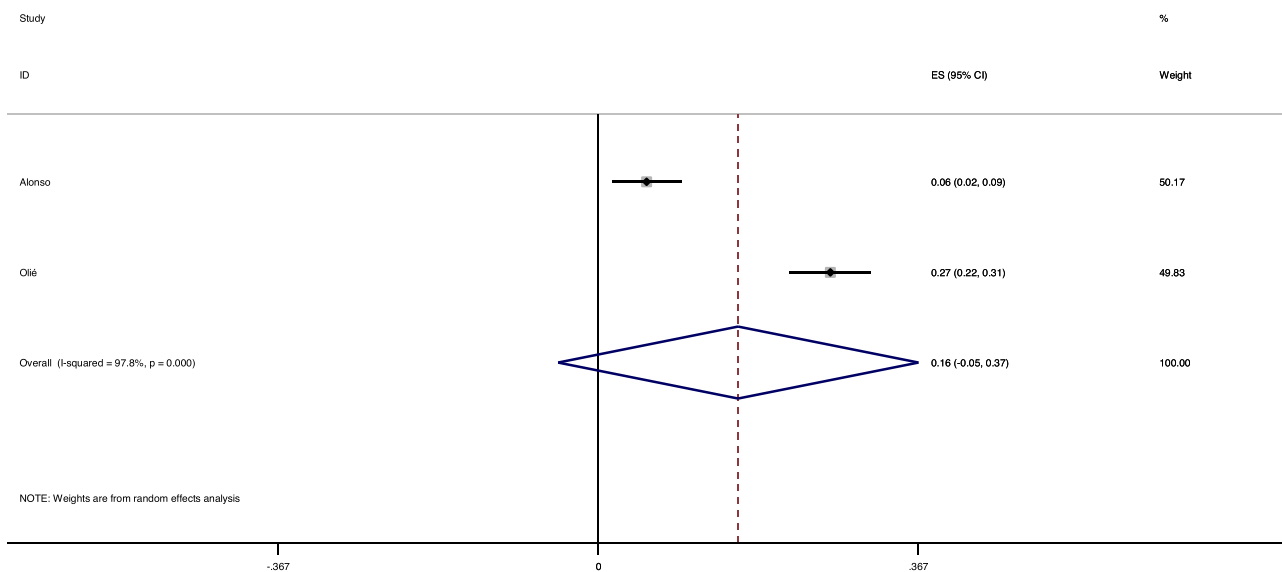


Fig. 4. Forest plot of the pooled prevalence of suicidal ideation in the longitudinal study.

myths about suicide. The same meta-analysis suggests that about half of people who eventually commit suicide have some suicidal communication (Pompili et al., 2016).

Estimates of the Prevalence of suicidal ideation (attempted) vary depending on the study method used and the study location (Biswas et al., 2020). Prevalence was 22.0% in cross-sectional studies (95% CI 14.3 - 29.6), 16% in longitudinal studies (95% CI -4.6 - 36.7), and 15.8% within case-control studies (95% CI 7.6-24.0). There were also significant differences between countries (1.9%-45.9%). Studies of

prevalence during COVID-19 are inconsistent and reveal that the impact of COVID-19 on prevalence is unpredictable across countries due to the assessment tools and criteria for identifying affective disorders vary widely between countries. In addition, empirical research on suicide ideation and suicide attempts associated with COVID-19 was limited, with evidence coming from developed countries. Further evidence is needed to understand the impact of the current pandemic over prevalence.

The impact of COVID-19 on psychiatric patients is complex, and

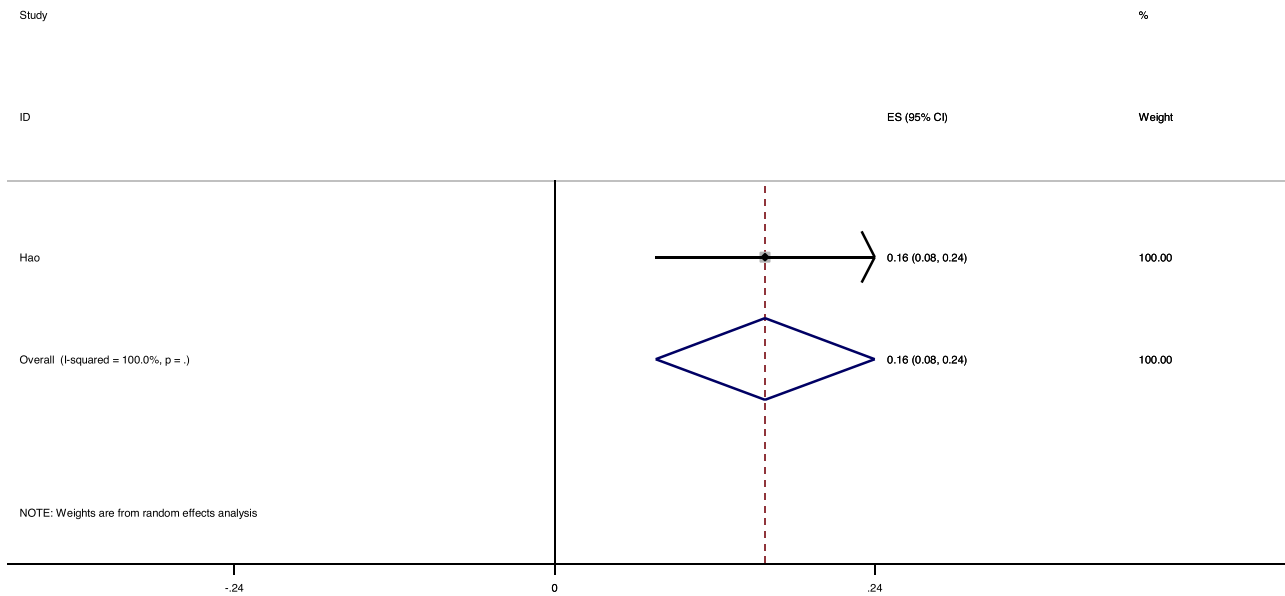


Fig. 5. Forest plot of the pooled prevalence of suicidal ideation in the case-control study. Prevalence of suicide attempt in psychiatric patients.

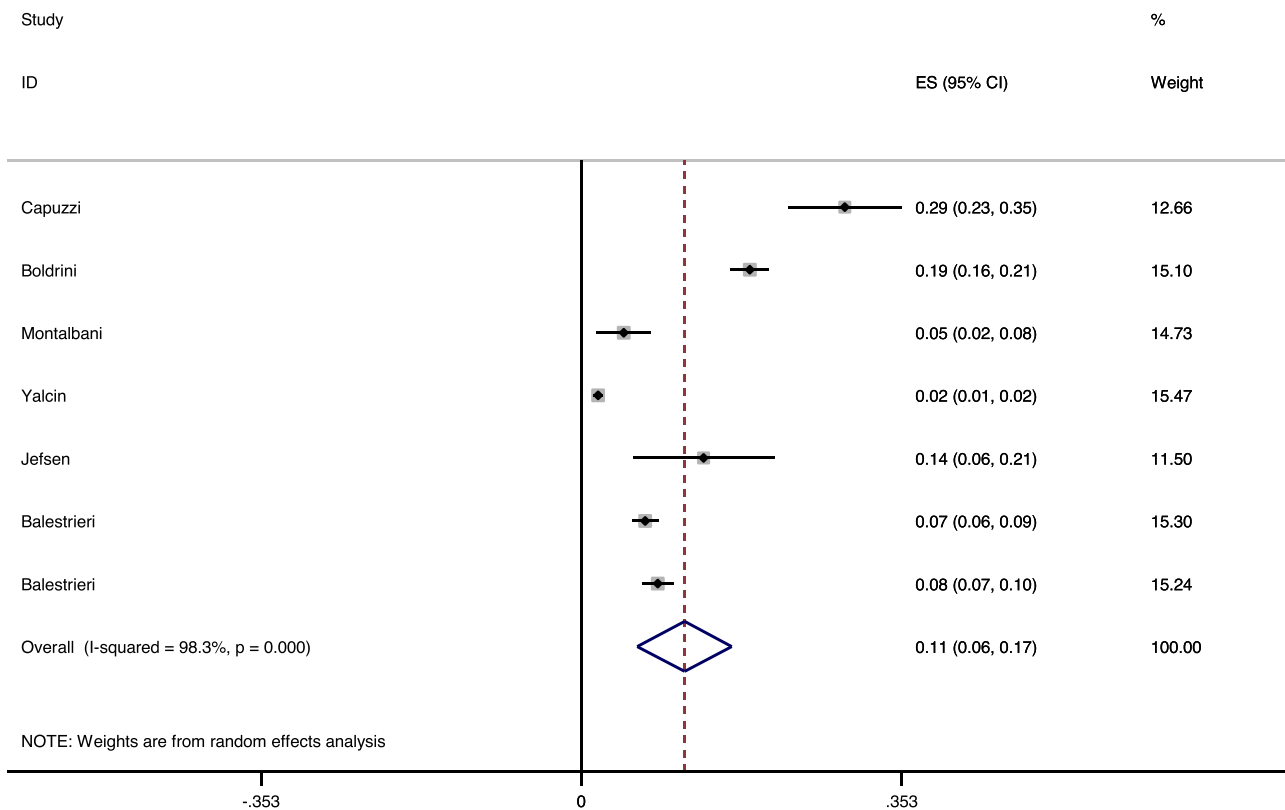


Fig. 6. Forest plot of the pooled prevalence of suicide attempt among psychiatric patients. Random-effects meta-analysis.

there are some indications that different diagnoses affect suicide-related behavior. In a large epidemiological study (Fernández de la Cruz et al., 2017), a lifetime diagnosis of an anxiety disorder (OCD) had a protective effect on suicidal behavior. The protective effect was to prevent suicide death, but the specific reason for the protective effect remains unclear. It could be hypothesized to be associated with the high trait level of harm avoidance (Rettew et al., 2006). In contrast, multiple studies have revealed that the severity of obsessive-compulsive disorder is associated with higher rates of suicidal ideation (Alonso et al., 2021; Capuzzi et al., 2020; Khosravani et al., 2021). Although the clinical manifestations of

OCD are very diverse, the fear of bacterial contamination is the most frequently reported distress among people having OCD (Murphy et al., 2010). In the context of the current COVID-19 pandemic, this question poses a current dilemma and treatment challenge for people having obsessive-compulsive disorder. In addition, they would frequently check for NEWS related to COVID-19 on TV, radio, and social media during the COVID-19 pandemic. This intense event could trigger new clinical symptoms or worsen existing symptoms, leading to increased suicidal ideation, especially for individuals having preexisting pollution symptoms (Benatti et al., 2020). Even if individuals are not directly affected

by COVID-19, using the Internet and reading sensational reports from physical isolation could increase concern, fear, and even suicidal thoughts (Gao et al., 2020). This situation requires the assurance of the correct information flow, which the World Health Organization recognizes. Therefore, a study from China reported that the main public access channel to health information is the Internet (93.5%). Almost all respondents (> 90%) require regular updates associated with the latest news, such as transmission route, vaccine availability and effectiveness, cases, and location, and more than 70% of respondents are satisfied based on the number of health information available (Wang et al., 2020).

In addition to obtaining the latest information about COVID-19 through the Internet, with the rapid development of technology, psychological intervention for the treatment of — cognitive and behavioral therapy (CBT) could also be provided. The COVID-19 pandemic is leading to a second mental health pandemic expected to affect the incidence and severity of clinical symptoms in psychotic patients (Brown et al., 2020), leading to extreme consequences such as suicide. Therefore, providing high-quality care for people with mental health conditions is urgent. CBT has become the dominant psychological approach to treating the disorders considered severe mental illnesses, substance use disorders, and suicidality (Keepers et al., 2020). However, traditional CBT requires face-to-face implementation, which is inconvenient for requiring lockdown, isolation, and social distancing during COVID-19 and is unavailable to most patients (Alavi et al., 2020). Internet-based cognitive behavioral therapy (I-CBT) has been an effective alternative to cognitive behavioral therapy to compensate for the deficiency, and there is also much evidence for this view (Olthuis et al., 2016; Robinson et al., 2010; Sijbrandij et al., 2016). This is particularly critical to reducing the risk of transmitted infections during the COVID-19 pandemic. Moreover, for psychotic patients who fear stigmatization and have avoidance disorders, I-CBT could be more acceptable and more flexible during face-to-face interventions (Amstadter et al., 2009).

We also found differences and even opposite outcomes during the prevalence of suicidal ideation and suicide attempts during and after the COVID-19 lockdown. During the lockdown, one study indicated that the incidence of suicide attempts among mentally ill patients was significantly lower than before COVID-19 (Yalçın et al., 2021). However, another showed that suicide attempts were more frequent than before COVID-19 (Berardelli et al., 2021). Two studies observed no difference in suicidal ideation from before COVID-19 (Hamm et al., 2020; Titov et al., 2020). These studies researched the lockdown and the post-lockdown period, and the results were consistent. The frequency of suicidal ideation (attempts) was higher within the lockdown period than during the post-lockdown period (Balestrieri et al., 2021; Montalbani et al., 2021). However, the etiology of suicidal ideation and attempts is complex, and COVID-19 could affect suicide-related behaviors in several ways. These conflicting results could be explained by the relatively small sample size of the studies, different trial design methods, and cultural differences between countries. Based on these studies, we could not determine the long-term effects of the novel coronavirus pandemic on suicidal ideation and suicide attempts among psychiatric patients. However, it is essential to note that suicidal ideation and attempts do not necessarily lead to suicide. But the psychosocial impact of the COVID-19 pandemic could be a significant risk factor for elevated suicidal ideation and attempts.

The main limitation of our study is that most of the studies included were cross-sectional, so we could not assess the severity of suicide ideation and suicide attempts over time, just a static image. Another limitation is that the meta-analysis used different tools to assess suicidal ideation and suicide attempts. Most of the study data were based on online interviews and questionnaires completed remotely, but are susceptible to selection bias due to Internet access and completion rate variability. Only two studies used specific, valid measures of suicide ideation, the Columbia Suicide Severity Assessment Scale (C-SSRS) and

the Geriatric Suicide Ideation Scale (GSIS). The rest of the studies relied on items based on the Depression Scale, the Stress scale, and even the health questionnaire on suicide or suicidal ideation, Hamilton Depression Scale (HDRS), the Patient Health Questionnaire-9 (PHQ-9), and Beck-Srivastava (BSSI), respectively used. This could make the estimates of suicidal ideation and suicide attempts unreliable. Furthermore, our meta-analysis and systematic review could not include studies on adolescent suicide. However, COVID-19 has been depicted to harm the health of adolescents disproportionately (Hawke et al., 2020). The current situation is affecting teenagers in a particular manner. Many countries closed schools, severely limited social activities, and screen time significantly enhanced. This stresses adolescents, leading to distress, mental health problems, and even suicidal thoughts, especially for those with preexisting mental illness. Studies have revealed that shortages of adolescent mental health care and services have existed even before the pandemic, and this treatment demand increased substantially during the COVID-19 pandemic (Revet et al., 2021). Moreover, economic loss due to the pandemic causes a significant elevation in domestic violence. In various cultures, different forms of abuse have been confirmed during the recession (Schneider et al., 2017), and the sequelae of this outbreak enhanced adolescent abuse, which could last for a lifetime. Finally, it could be necessary that the studies on suicide during the pandemic are particularly scarce. However, most journals published in Latin American countries were not obtained. Thus, less than 50% of the primary databases came from Latin American countries. A comprehensive search strategy was used, which could have missed some studies from low-and middle-income countries. Large populations have been affected by COVID-19, such as Brazil and India. However, suicide ideation and suicide attempts are primarily shaped by cultural and social contexts. Therefore, the impact of COVID-19 will affect different countries separately, requiring a degree of expertise to address. Differences in research findings between and within countries could be due to methodological differences and data collection time, public health precautions, economic problems, and the rates and severity of COVID-19 infection. Thus, based on the pandemic, studies of the effects of suicide on psychiatric patients and strong comparisons of time, geography, and policy to investigate the impact of such lockdown on suicide are necessary. These require a more extended follow-up period.

Despite these limitations, our systematic review and meta-analysis revealed several advantages. This is a comprehensive review of estimated suicidal ideation and suicide attempts in psychiatric patients during COVID-19. The authors followed the PRISMA guidelines and used reliable methods. In addition, we included quantitative and qualitative studies, mixed methods study design and case reports, and all studies that reported suicide ideation or suicide attempts related to the COVID-19 pandemic. This future information could help design intervention studies and epidemiology. It could guide public health and clinical decision-making to mitigate the impact of COVID-19 on suicide risk. Relevant practitioners such as medical and public health experts should regularly evaluate people with mental illness, screen for anxiety, depression, and suicidal mood, and then identify those at high risk of suicide. In addition, preventive interventions, including monitoring inflammatory markers associated with anxiety and depression, could be implemented. Social media-based campaigns to reduce suffering and enhance mental health. Patients must be encouraged to stay in touch with family and friends through phone or video. Enough sleep is required. Adequate daily exercise should also be maintained. Suicide prevention helplines should be available, which can be very useful for people with mental illness to prevent suicide. Integrating essential mental health services into outpatient primary care could help minimize the harmful psychology of people having mental illness (Sher, 2020).

Authors' contributions

Yingqian Zhu and Yanqing Li have contributed to study design, articles inclusion, data collection, data analysis interpretation of results,

and preparation of the manuscript. Xiuqun Xu have contributed to study design, preparation of the manuscript. All authors read and approved the final manuscript.

Declaration of Competing Interest

The author declares that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

Acknowledgments

We would like to extend our sincere gratitude to our patients who were willing to participate in our study, share their stories and experience with us, and help and support people around.

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