The prevalence of delirium in patients in Iran: a systematic review and meta-analysis

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Aim: The first systematic review and meta analysis investigating the prevalence of delirium in Iran and the importance of delirium in the health status of patients. **Method:** This study is a review article to determine the overall prevalence of delirium in patients admitted to the hospitals in Iran, with search time frame to 12 October 2000–12 October 2018. The study examined the prevalence of delirium in general wards and ICUs of Iran according to published article in domestic and foreign journals. The methodological quality of the papers was based on a tool used in previous studies. Data was analyzed using comprehensive meta-analysis (CMA) software. **Findings:** The findings showed the prevalence of delirium in hospitalized patients in Iran is 21.8% (CI: 17.5–27.5%). The prevalence of delirium in hospitalized patients in Iran based on the hospitalization in ICU is 24.7% (CI: 18.1–32.7%) and in the general ward is 17.5% (CI: 13.6–22.3%). **Conclusion:** Due to the relatively high prevalence of delirium in patients admitted to hospitals in Iran, prevention is necessary to reduce the incidence of delirium.

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Delirium is a disorder characterized by changes in acute changes in cognition and sensory perception, abnormal thinking and improper behavior. This condition is one of the common problems in patients admitted to ICUs with considerable prevalence [1,2]. As physicians and nurses cannot diagnose all cases of delirium [3], this disorder may not be diagnosed or diagnosed as a psychiatric disorder if no accurate evaluation is performed on the patient [4]. Delirium is a sudden outbreak associated with altered sensory perception, short-term memory impairment and turbulent behavior. The person loses focus and this disorder leads to lack of attention, temporary loss of memory, sleep disturbances, restlessness and illusion [5,6].

Early diagnosis and reduction of risk factors affecting delirium requires the knowledge and awareness of physicians and nurses of the intensive care unit about the nature of delirium syndrome, the symptoms of the disease, as well as the standard tools for screening delirium and the factors that affect it [6–9]. The causes of delirium are complex and are effected by various factors [10,11]. Among the factors affecting delirium are infection [12], age [13], pain [14], physical restraints [15], non relieved pain [16], each of which has different effects on the development of delirium.

Delirium various side effects, including increase in the hospitalization time, increase in the need for nursing care, the incidence of hospital pneumonia, the risk of falling, urinary incontinence and skin disorders [7,17–19]. Furthermore, the nurses working in ICUs have more stress in the care for patients with delirium [20]. Although about 30–40% of delirium can be prevented [13,21,22], most hospitals do not have a systematic protocol for preventing delirium [4,13,23,24]. Thus, attention to delirium is of significant importance [25].

Nursing interventions can reduce the amount of delirium in patients by simulating the environment [6] including for family-centered orientation programs [26] and music therapy [27,28]. Considering the important role of nurses in delirium management, it is necessary to have complete information about the prevalence of this disease [29]. In order to reduce the amount of delirium, its prevalence should be carefully identified and detailed and accurate information should be provided.

Figure 1. Flowchart for systematic review and meta-analysis.

In previous studies in Iran, reviews article of delirium have not been conducted, but in other countries, the prevalence has been studied, so that in reviews article by Krewulak *et al.* [30] and Systematic Review by Fadayomi *et al.* [31] in the field of delirium. The mentioned studies [30,31] have been carried out in other countries and in Iran there has not been a study aimed at determining the prevalence of delirium through systematic review. For this reason, the present study is innovative.

Aim

Considering the importance of delirium in improving the health status of patients, and as no studies have been conducted on the prevalence of delirium in Iran, the present study was conducted as the first systematic and meta-analytic review study in this regard.

Methods

Study protocol

This study is a systematic review with PRISMA guidelines [32] to determine the prevalence of delirium in patients admitted to the hospitals in Iran, with search time frame to 12 October 2000–12 October 2018 (Figure 1).

Table 1. Delirium prevalence in different patient populations within hospitals in Iran.

Study no.	Study (year)	Place	Group by ward	n	% prevalence
1	Jannati (2013) [37]	Mazandaran	Patients undergoing open heart surgery	404	28.5
2	Jodati (2013) [38]	Tabriz	Open heart surgery	329	4.9%
3	Modabernia (2002) [39]	Rasht	Admitted to the intensive cardiac care unit	245	13.4
4	Bagheri (2017) [40]	Isfahan	Patient candidate for cardiopulmonary bypass	100	34
5	Cheraghi (2015) [41]	Tehran	Undergoing cardiac surgery	40	22.5
6	Asaee (2008) [42]	Khoramabad	Patients admitted to internal and surgical departments	240	25.83
7	Hosseini (2016) [43]	Yazd	General surgery, gynecology, orthopedics, internal medicine, ICU	256	14.8
8	Heidari (2014) [44]	Isfahan	Patients admitted to the intensive care unit	270	44.5
9	Rajabpour Nikfam (2014) [45]	Rasht	Patients admitted to the intensive care unit	148	27.2
10	Foroughan (2015)	Ahvaz	General hospital	200	22
11	Eizadi-Mood (2014) [46]	Isfahan	Coronary artery bypass graft surgery	325	44.31%
12	Hosseini (2011) [47]	Sari	Total hospital patients	600	16
13	Shadvar (2013) [48]	Tabriz	ICU following cardiac surgery	200	23.5
14	Salari (2017) [49]	Rasht	Patients undergoing elective cardiac surgery	108	38
15	Rad (2014) [50]	Tehran	Open heart surgery in special sections	370	23.24
16	Beiranvand (2013) [51]	Khorramabad	Patients admitted to intensive care unit that are under general surgery and hip surgery	200	24
17	Rezvani (2016) [52]	Isfahan	Patients admitted to the intensive care unit	100	46
18	Mohaamadi (2003) [53]	Azarbayjan gharbi	Patient admitted to surgery for advanced head and neck cancer	104	9.6
19	Hassani (2010) [54]	Orumieh	Heart surgery	514	2.33
20	Ganavati (2009) [55]	Tehran	CABG surgery	250	47
21	Ashraflashkari [56]	Ahvaz	Open heart surgery and general surgery department	60	6.66
22	Beyraghi (2004) [57]	Tehran	General hospital psychiatry	201	15
23	Jouybari (2012) [58]	Gorgan	General surgery and recovery	75	30.6

Search strategy

The study with aim the prevalence of delirium in general wards and ICUs of Iran according to published article in domestic and foreign journals. The search for papers was done independently by a nurse and an anesthetist to prevent any kind of bias, and if there was a controversy between the two researchers, the specialized search was done by a third colleague specialist in systematic and meta-analytic review studies.

Inclusion criteria & data extraction

At the beginning of the search all articles regarding delirium in Persian and English on the internal databases of Iran (such as IranDoc, SID, Magiran and Iranmedex) and international databases (such as Springer, Science Direct, Medlib, Scopus, PubMed, Ebsco, Web of Science, Wiley Online Library and Cochrane) were gathered. The keywords were 'delirium', 'prevalence', 'Iran' and a combination of them. It should be noted that the references of the articles were evaluated to improve the quality of the search. In this study, interventional and observation articles, letters to the editor, presented in the summary of congresses, as well as existing dissertations, were excluded from the study. Exclusion criteria were irrelevance to the subject, case reports, being interventional, extracted papers being qualitative, and repetitive studies.

The methodological quality of the papers was based tool had five study design items, a comparison group, and descriptions of the characteristics of sample studied, sample size and the tools used. Each item received a score of 0–3, with the higher score showing a higher quality of the methodology of studies [33–36].

Data extraction

After the extraction of the studies the papers were recorded using a checklist with the name of the author, the paper publication year, the location (ward) of the patients under study, the sample size and the prevalence of delirium.

The ethical considerations in the study were observing ethics in research in the publication of results and obtaining a code of ethics from Kermanshah University of Medical Sciences.

Figure 2. Prevalence of delirium in hospitalized patients in Iran.

Statistical analysis

Comprehensive meta-analysis (CMA) software was applied to data analysis. Heterogeneity of prevalence of delirium was checked by tests of Cochran's Q I^2 (the heterogeneities of the studies were divided into; less than 25% (low heterogeneity), 25% to 75% (moderate heterogeneity) and more than 75% (high heterogeneity). Regarding the high heterogeneity ($I^2 = 94.88$, $Q = 430.02$, $p < 0.001$) we used DerSimonian and Laird's random effects model to combine the studies prevalence, Kendall's tau in Begg and Manzumdar test and Funnel plot were applied for checking the publication bias.

Findings

In this paper, 23 studies between 2000 and 2018 were introduced into a quantitative meta-analysis process. 5339 patients were included in these studies in total (Table 1). The Cheraghi *et al.* (2015) study had the lowest number of patients at 40, whilst the Hosseini *et al.* (2011) had 600 patients, making this the study with the most patients. The highest prevalence of delirium was found in Heidari *et al.* (2014) in Isfahan with a prevalence of 44.5% and the lowest prevalence rate in Ashraflashkari *et al.* in Ahwaz, with an incidence of 6.66%. Studies with numbers 1-2-4-5-11-14-15-19-20 have the same hospitalization characteristics due to one type of heart disease and studies with numbers 3-7-8-9-16-17 admitted to intensive care units. Table 1 shows the characteristics of the articles used in this study. According to the findings of the study, 23 studies were conducted to investigate the prevalence of delirium in general and special sectors (Table 1).

The findings of Figure 2 show the prevalence of delirium in hospitalized patients in Iran. According to the findings, this figure is 21.8% (CI: 17.5–27.5%; $Q = 430.029$, $p < 0.001$, $I^2 = 94.884$, $Z = 8.162$, $p < 0.001$).

The findings of Figure 3 show the prevalence of delirium in hospitalized patients in Iran based on hospitalization in critical care units. According to the findings, this figure is 24.7% (CI: 18.1–32.7%) and in the general ward is 17.5% (CI: 13.6–22.3%). The findings of Figure 4 show the bias in the publication of the articles ($Z = 1.58$, $p = 0.113$).

Figure 3. Prevalence of delirium based on hospital ward.

Figure 4. Characteristics of the bias in the publication of articles.

Discussion

Meta-analysis studies provide researchers with relevant evidence [57]. The findings showed that the prevalence of delirium in Iran was 21.8%, which is relatively high. The rate in special critical care units is 24.7% and in the general unit is 17.5%. Delirium causes complex complications for patients, which is why it is very important to pay attention [59,60].

According to the findings of this study, the delirium prevalence in critical care was 24.7%, consistent with the results of the study by Collet *et al.* [61]. Delirium outbreaks in critical wards was found to be 19% in Tilouche and colleagues in Tunisia [62], which is less than the results of the present study. In some studies, the prevalence of delirium in these wards was much higher than the present study. For example, the McNicoll *et al.* study in the USA reported a prevalence of 31% [63]. In a study by Limpawattana *et al.* in Thailand, it was 44.4% [52,64], in Ely *et al.* in the USA, it was 81.3% [65], in Thomason *et al.* in the USA it was 48% [66], in the study by Micek *et al.*, it was 47% [67] and it was 45% in the Roberts study [68]. The difference between Tilouche and colleagues [62] and Ely *et al.* [65] with the results of the present study can be noted that the study was a cross-sectional descriptive study and examined a specific number of patients with a sample size of 206 and 48 patients. While the present study is a systematic review study with a sample size of 5339 patients, other differences can be noted that in the present study patients in different units have been studied. In the studies mentioned, only patients in the intensive care units have been examined.

One of the strengths of the present study is that the delirium prevalence has been investigated in all parts of the hospital and can provide useful information in this regard. The weaknesses of this study can be attributed to the diversity of studies (considering simple randomized sampling studies), which has led to the creation of heterogeneity. The researcher has analyzed the subgroup to reduce the amount of heterogeneity and provide more accurate findings based on the type of hospitalization. Other strengths of this study are the fact that the delirium prevalence has been studied over a long period of time. In this study, the delirium 18-year prevalence in Iran was studied. One of the weak point of this study is that the same tool was not used to study the delirium prevalence, and the method of conducting studies that make up the review varied.

Due to the fact that the delirium prevalence rate was significant in the study, it is recommended that screening be performed at the beginning of the patient's arrival in the hospital. After that, nurses will receive the necessary training for each patient. It is also suggested that necessary educational interventions for nurses and nursing students should be made to become acquainted with the importance of delirium and so the necessary measures can be taken to reduce this.

Following on from this paper, it is suggested that global studies should be conducted on the prevalence of delirium in different countries. It is also suggested that the results of the delirium prevalence in Iran be compared with other countries.

Conclusion

The findings show the prevalence of delirium in hospitalized patients in Iran is 21.8% (CI: 17.5–27.5%). Due to the relatively high prevalence of delirium in patients admitted to hospitals in Iran, prevention is necessary to reduce the incidence of delirium.

Summary points

- The present study investigates the prevalence of delirium in patients in Iran.
- The findings show the prevalence of delirium in hospitalized patients in Iran is 21.8% (CI: 17.5–27.5%).
- The findings show the prevalence of delirium in hospitalized patients in Iran based on the hospitalization in ICU according to the findings is 24.7% (CI: 18.1–32.7%) and in the general ward is 17.5% (CI: 13.6–22.3%).
- Due to the relatively high prevalence of delirium in patients admitted to hospitals in Iran, prevention is necessary to reduce the incidence of delirium.

Financial & competing interests disclosure

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No writing assistance was utilized in the production of this manuscript.

Ethical conduct

Research ethics committee of Kermanshah University of Medical Sciences approved this study with ethics code of IR.KUMS.REC.1397.837.

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