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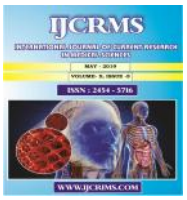

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Prevalence of hyponatremia in Iranian children diagnosed with seizure: a systematic review and meta-analysis

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Abstract

Objective:
The aim of this systematic review and meta-analysis was to evaluate the prevalence of hyponatremia in Iranian children diagnosed with seizure

Methods:
The searches were conducted in English and Persian by two independent scholars in international databases (pubMed, Web of science, Scopus and Google scholar) and domestic ones (SID, Magiran) to find relevant studies with a time span from the very onset of the database until September 2018 (without time limit). The keywords used in the searching strategy included " hyponatremia","seizure" "children","prevalence" and "Iran" which were combined with Boolean operators, AND, OR and NOT.

Results:
Five studies conducted on 2323 Iranian children were included in the meta-analysis, the overall Prevalence of hyponatremia in 2323 Iranian children was 7.1% (95% CI: 6.1, 8; I^2 = 98.8%).

Conclusion:
Seizure is a symptom that can be caused by various causes; the subject who has experienced seizure can be discharged without the need for continued anticonvulsant treatment, or long-term treatment of an articular or multiple drug. The most common causes of seizure include fever, hypoglycemia, hypocalcemia, infection, head trauma, poisoning and excessive use of medications. Also, some neurological diseases, such as brain tumors and neurological anomalies, can enhance the possibility of the occurrence and recurrence of seizures. In addition, any factor that reduces oxygen transferred to the brain can cause seizures.

Keywords: Hyponatremia, seizure, children, Iran, prevalence.

Introduction

Seizure attacks are common neurological disorders occurring during adolescence; the prevalence rate varies from 4 to 6 per 1,000 among children in the society (6). Seizure is one of the common causes of hospitalization of children and it can cause various complications among patients(7).In dealing with a child who is experiencing his first seizure attack, the recurrence of seizure is a possibility to consider in all cases (8). One third of children with seizures will experience recurrence and 10% of children will have three or more seizure attacks (9). Age is one of the most important risk factors for seizure recurrence; the lower the age at which seizure attack occurs, the more possible the recurrence will occur (50% at the age of one and 20% at the age of 3 years) (10).Since a child's experiencing seizure is always a terrible experience for parents, preventing the recurrence of seizure is very important; on the other hand, the use of anticonvulsants is not uncomplicated; therefore, it seems that the importance of identifying the predisposing factors of recurrence is crystal clear for everyone (11). Since the first seizure in children leads to hospitalization and para-clinical tests, it was decided to evaluate the prevalence of hyponatremia in Iranian children with seizure.

Materials and Methods

The methods used in the present systematic review were developed in accordance with the instructions in the PRISMA checklist [17]. Cross-sectional, case-control, and cohort studies were included in the present research; case series, letter to editors, case reports, clinical trials, study protocols, systematic review and narrative review are not included.

Searching strategy

The searches were conducted in English and Persian by two independent scholars in international databases (pubMed, Web of science, Scopus and Google scholar) and domestic ones (SID, Magiran) to find relevant studies with a time span from the very onset of the database until September 2018 (without time limit). The keywords used in the searching strategy included " hyponatremia","seizure""children","prevalence" and "Iran" which were combined with Boolean operators, AND, OR and NOT.

Study selection and data extraction

Two researchers reviewed the titles and abstracts independently, taking into account the eligibility criteria. After removing repeat studies, the full text of the studies was evaluated based on eligibility criteria and, if needed, the required information was obtained from the authors.

Quality assessment

Hui et al tools were used to evaluate the quality of the methodology and the risk of bias in each individual observational study [18]. Meta-analysis was conducted using STATA 14.

Results

Study selection

The initial searching process yielded a total number of 394 articles from various sources. 263 studies turned out to be non-repetitive, out of which 131 studies were excluded due to unrelated titles during title and review process. 5 out of 15 studies met eligibility criteria. 10 other studies were removed for different reasons, 1 were reviews, 2 were letters to editor, and 7 did not have the minimum required to be included the study.

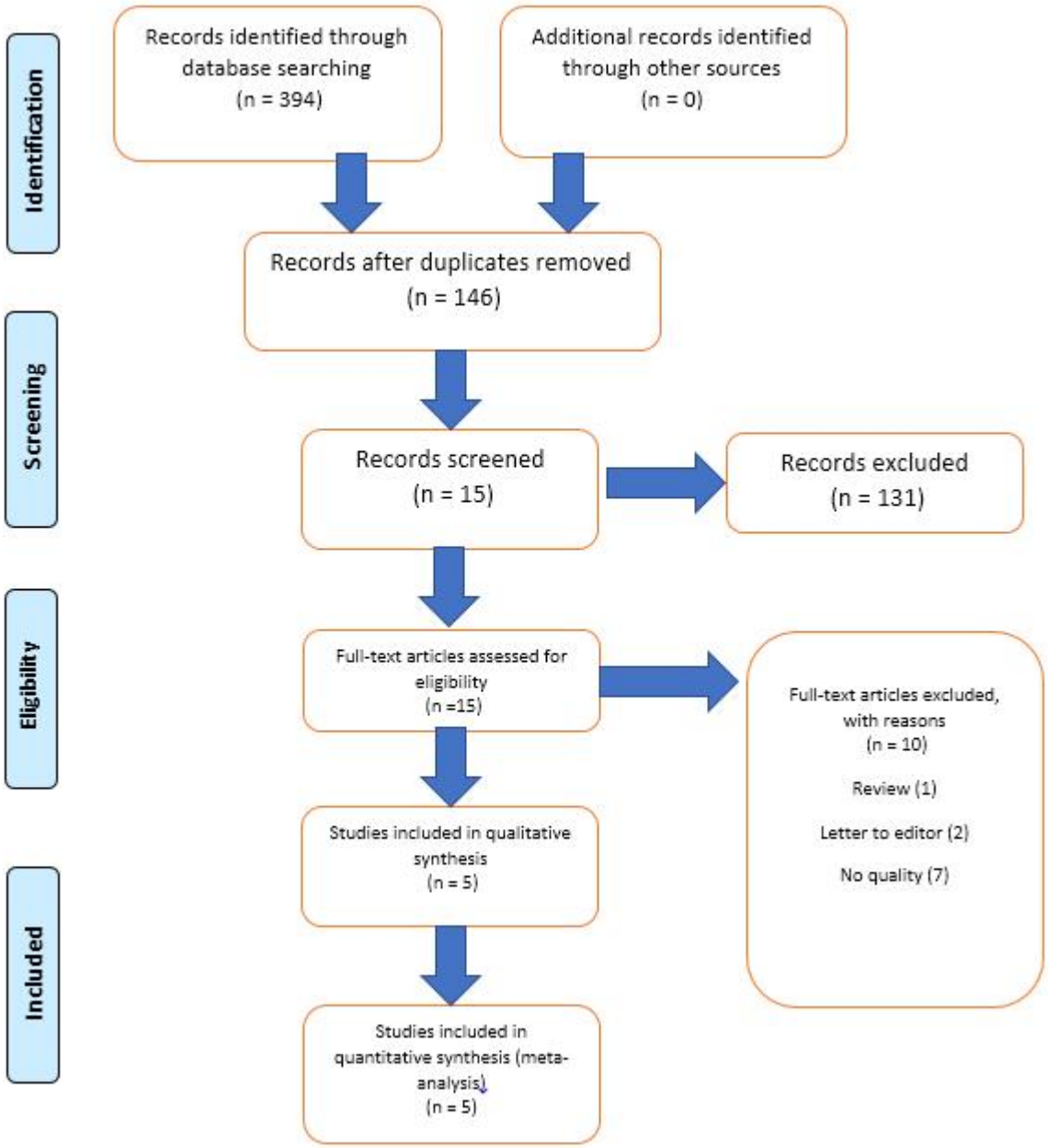

Fig 1. PRISMA flow diagram

Study Specifications:

Studies had been conducted on 2323 patients. The age range of the subjects was between 1 and 14 years old. 5 studies, which underwent the review process, were obtained from five provinces, Isfahan, Tehran, Mashhad, Ilam and Kashan. The most common sampling methods turned out to be simple sampling, purpose-based, census-based, and simple random sequences. More than 75% of studies turned out to have minor risk of bias; one study was removed due to poor quality. The most common site at which studies had been conducted was hospital (n = 5) (Table 1).

Prevalence of hyponatremia in Iranian children diagnosed with seizure:

Five studies conducted on 2323 Iranian children were included in the meta-analysis, the overall Prevalence of hyponatremia in 2323 Iranian children was 7.1% (95% CI: 6.1, 8; I^2 = 98.8%).

Table 1. Studies included in the systematic review and Prevalence of hyponatremia in Iranian children diagnosed with seizure

ID	First Author	Year	Province	Sample size	ES	95% CI for ES		% Weight	Risk of bias
						Low	Up		
1	Talebian[1]	2015	Kashan	100	0.120	0.056	0.184	2.34	Low
2	Amini[2]	2008	Isfahan	1486	0.060	0.048	0.072	65.89	Low
3	Khorasani[3]	2005	Mashhad	365	0.500	0.449	0.551	3.60	Moderate
4	Taherian[4]	2017	Tehran	200	0.020	0.001	0.039	25.53	Low
5	Mohammadi[5]	2009	Ilam	172	0.200	0.140	0.260	2.65	Low
--	Pooled ES	----	------	2323	0.071	0.061	0.080	100	-----

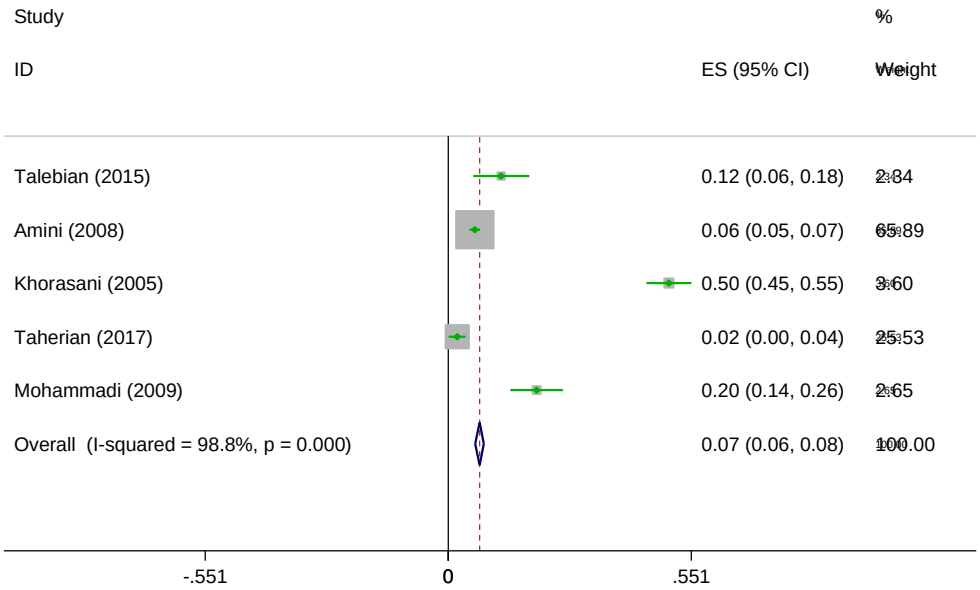

Fig. 2 : The Prevalence of hyponatremia in Iranian children diagnosed with seizure and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study. The oval sign shows Prevalence of hyponatremia in Iranian children diagnosed with seizure for all studies

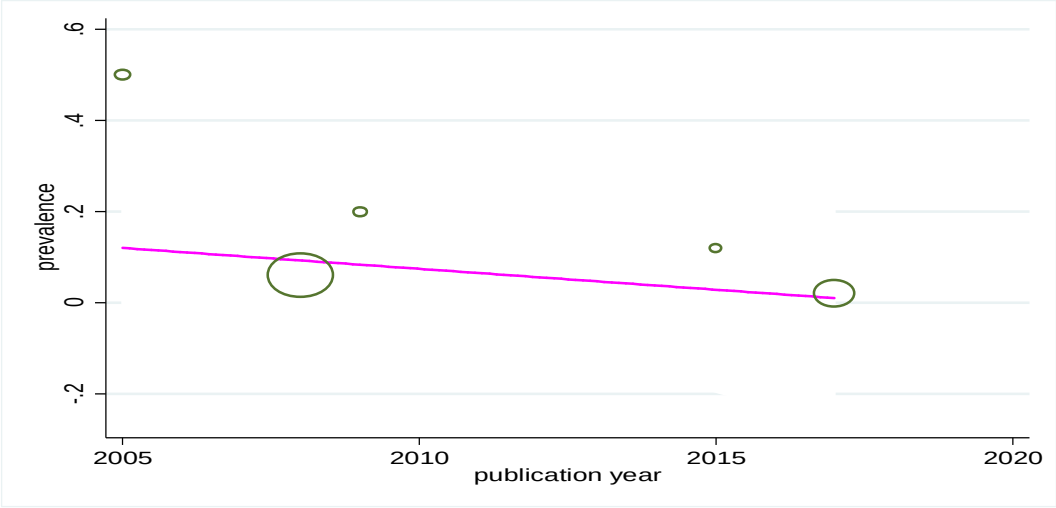

FIG. 3. Meta-regression between publication year and Prevalence of hyponatremia in Iranian children diagnosed with seizure

Discussion

Five studies conducted on 2323 Iranian children were included in the meta-analysis, the overall Prevalence of hyponatremia in 2323 Iranian children was 7.1% (95% CI: 6.1, 8; I^2 = 98.8%) .Despite being benign in the majority of cases, the frequency of seizures requiring special treatment, diagnosis and planning, is so high that every child must undergo a complete description, careful examination and para-clinical assessment (12). Therefore, diagnostic evaluation affects decision-making, family counseling, and the need for hospitalization and follow-up of these patients (13). The provision of accurate evidence of attacks over time helps identify the factors that trigger and intensify the attacks; the nurse can take advantage of such information to control and decrease the frequency of attacks, prevent them and reduce complications (14).

Seizure is a symptom that can be caused by various causes; the subject who has experienced seizure can be discharged without the need for continued anticonvulsant treatment, or long-term treatment of an articular or multiple drug (15). The most common causes of seizure include fever, hypoglycemia, hypocalcemia, infection, head trauma, poisoning and excessive use of medications. Also, some neurological diseases, such as brain tumors and neurological anomalies, can enhance the possibility of the occurrence and recurrence of seizures. In addition, any factor that reduces oxygen transferred to the brain can cause seizures (16).

Conducting such studies and analyzing the causes of seizures in other parts of the country and other age groups seems to be useful in achieving a more comprehensive and accurate outcome. Other researches are, also, recommended to consider the mechanism of the relationship between different causes of seizure in children with variables such as age, gender and season of the year and blood electrolytes.

References

1. TALEBIAN A, JAHANGIRI M, RABIEE M, ALAVI NM, AKBARI H, SADAT Z. The etiology and clinical evaluations of neonatal seizures in Kashan, Iran. Iranian journal of child neurology. 2015;9(2):29.
2. Amini A, Kazemi A, Ghorbani A. Causes of seizure in children hospitalized in Amin and Alzahra hospitals in Isfahan.
3. NematKhorasani E, Mansouri F, Espahbodi E. Frequency of seizure in children hospitalized in the burning wards of Imam Reza Hospital (Mashhad, 1998-1999).
4. Taherian R, Feshangchi-Bonab M, Rezayi A, Jahandideh M. The etiologic profile of the pediatric seizure: an epidemiological study from Iran. International Clinical Neuroscience Journal. 2017 Sep 10;4(3):98-102.
5. mohammadi J. Biochemical disorders in children with febrile seizure.
6. Frizelle FA, Colls BM. Hyponatremia and seizures after bowel preparation: report of three cases. Diseases of the colon & rectum. 2005 Feb 1;48(2):393.
7. Smith TJ, Gill JC, Ambruso DR, Hathaway WE. Hyponatremia and seizures in young children given DDAVP. American journal of hematology. 1989 Jul;31(3):199-202.
8. Sarnaik AP, Meert KA, Hackbarth RI, Fleischmann LA. Management of hyponatremic seizures in children with hypertonic saline: a safe and effective strategy. Critical care medicine. 1991 Jun;19(6):758-62.
9. Nardone R, Brigo F, Trinka E. Acute symptomatic seizures caused by electrolyte disturbances. Journal of Clinical Neurology. 2016 Jan 1;12(1):21-33.
10. Thumfart J, Roehr CC, Kapelari K, Querfeld U, Eggert P, MÜller D. Desmopressin associated symptomatic hyponatremic hypervolemia in children. Are there predictive factors?. The Journal of urology. 2005 Jul 1;174(1):294-8.

11. Moritz ML, Ayus JC. New aspects in the pathogenesis, prevention, and treatment of hyponatremic encephalopathy in children. Pediatric Nephrology. 2010 Jul 1;25(7):1225-38.
12. Au AK, Ray PE, McBryde KD, Newman KD, Weinstein SL, Bell MJ. Incidence of postoperative hyponatremia and complications in critically-ill children treated with hypotonic and normotonic solutions. The Journal of pediatrics. 2008 Jan 1;152(1):33-8.
13. Mehran Hesaraki, Mohammad Hasan Mohammadi. (2018). Frequency of urinary tract infection in children Mohammadi MH, Hesaraki M. Acidemia inthe fetus: A review. International Journal ofPharmaceutical and Biological ScienceArchive. 2018 May 28;6(03).
14. Carpenter J, Weinstein S, Myseros J, Vezina G, Bell MJ. Inadvertent hyponatremia leading to acute cerebral edema and early evidence of herniation. Neurocritical care. 2007 Jun 1;6(3):195-9.
15. Heydarian FA, Ashrafzadeh F, Kam S. Simple febrile seizure: The role of serum sodium levels in prediction of seizure recurrence during the first 24 hours. Iranian Journal of Child Neurology. 2009 Aug 17;3(2):31-4.
16. Mehran Hesaraki ,Mohammad Hasan Mohammadi. (2018). Evaluating the frequency of bacteremia in Iranian neonates admitted with jaundice: A systematic review and meta analysis. Int. J. Adv. Res. Biol. Sci. (12): 75-80
17. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med 2009;6:e1000097
18. Hoy D, Brooks P, Woolf A, Blyth F, March L, Bain C, Baker P, Smith E, Buchbinder R (2012) Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. J ClinEpidemiol 65(9):934–939

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