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(Incidence of Dehydration In Stroke Patients in Baqubeh Teaching Hospital)

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بسم الله الرحمن الرحيم

﴿ وَلَمَّا بَلَغَ أَشُدَّهُ وَاسْتَوَىٰ آتَيْنَاهُ حُكْمًا وَعِلْمًا وَكَذَٰلِكَ نَجْزِي الْمُحْسِنِينَ ﴾

سورة القصص آية ١٤

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Abstract

Background

We aimed to determine the incidence of Dehydration In Stroke Patients in Baqubeh Teaching Hospital

Objective

To Evaluation incidence of Dehydration in Acute Stroke patients in Baqubeh Teaching Hospital

Patient and method

In this cross-sectional observational study, we included prospectively and consecutively patients with ischemic and hemorrhagic stroke.

The serum Urea/Creatinine ratio (U/C) was calculated at admission and 3 days after the stroke.

Patients were treated in accordance with the standard local hydration protocol.

Demographic and clinical data were collected. Neurological severity was evaluated at admission according to the NIHSS score. Unfavorable outcome was defined as mRS > 2.

Results

100 patients participated in this study was in Stroke .92 (92 %) ischemic stroke and 8 (8 %) hemorrhagic stroke . Their mean age was 57.68 (SD 12.34) . All of the patients were hydrated initially intravenously within the first 24 h of admission . Dehydration based on the blood U/C ratio . The mean SD and increasing in blood urea at first day was 33.57+_2.28 and in third day was 40.03+_ 2.84.

Conclusions

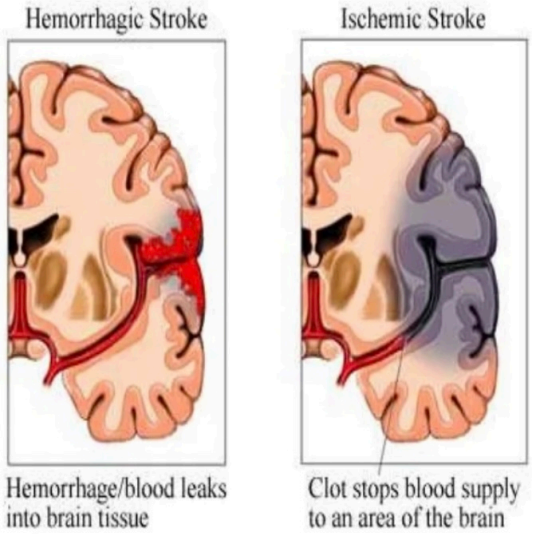
Dehydration is common and associated with poor outcomes. Further work is required to establish if these associations are causal and if preventing or treating dehydration improves outcomes.

Introduction

Stroke is an acute, focal brain dysfunction caused by vascular disease that is the third leading cause of death in high-income countries, following cancer and ischemic heart disease. It is also the leading cause of severe physical disability. Stroke is responsible for 11% of deaths in England and Wales; in the United States, over 750 000 new strokes occur each year, and about 150 000 people die from stroke. Around half of all stroke survivors require assistance with daily activities; even if a patient is able to return home, the impact on their jobs is severe. The underlying pathology that causes persistent stroke symptoms is either ischemic (infarction) (80%) or haemorrhagic (the other 20%). (20 percent)haemorrhage. Hemorrhage are divided to two types : intracranial and subarachnoid hemorrhage , while ischemia (infarction) is produced by either embolic (sudden) or thrombotic (slow) bleeding (gradual) . (1-2)

Ischaemic – most common type of stroke (approx 85%)

Hemorrhagic- less common type of stroke (approx 15%)



According to clinical standards, dehydration following a stroke leads to a worse vital and functional outcome (3-6) . Dehydration raises hemoconcentration and blood viscosity while lowering blood pressure, both of which can exacerbate the consequences of cerebral ischemia (7), leading to additional brain damage and symptoms. Dehydration is also linked to an increased risk of consequences including venous thrombosis. Stroke patients may be predisposed to dehydration due to decreased oral intake of water due to dysphagia (8) or a poor level of consciousness, among other things. Strokes are more common among the elderly, and dehydration is widespread among them (9). Dehydration has an economic impact as well, as dehydration at admission is linked to greater admission costs in acute ischemic stroke (10).There is a lot of diversity in how hydration status is defined and how dehydration is diagnosed (11). Dehydration has been detected by the blood Urea/Creatinine ratio (U/C) (12, 13), the blood urea nitrogen/Creatinine ratio (BUN/C) (8,10,14), and plasma osmolality (15). The use of multi-frequency bioelectrical impedance was also investigated, however it was found to be unhelpful in appropriately diagnosing dehydration after a stroke (16). These investigations

revealed that dehydration after a stroke is a common occurrence, with a prevalence of over 60% determined by the U/C ratio (12) and around 53% measured by the BUN/C ratio (8), and that it is linked to a poor prognosis (10, 12, 14, 15). These investigations, however, were retrospective and did not include a follow-up assessment. As a result, it's still uncertain whether dehydration has a substantial impact on the outcome

Our goal was to use a blood biomarker of dehydration as a diagnostic tool to identify the frequency and risk factors of dehydration after an acute stroke

Patient and methods

Data collection

This is a four-month cross-sectional observational study of patients who were enrolled prospectively and consecutively. A total of 100 patients were expected to be present throughout this time period.

A questionnaire that designed by the doctor for collect the patients data include **(Name, Age, Gender, Date of admission , chief complaint, If the patients have Dysphagia , Dry mucus membrane, skin turgor or not , Type of stroke , if there if previous stroke , past medical and drug history , estimated of urea and creatinine at admissions and after 3 days)**

Neuroimaging studies indicated that all of the patients had suffered an ischemic or hemorrhagic stroke (CT or MRI).

Statistical Analysis:

The Statistical Analysis System- SAS (2012) program was used to detect the effect of difference factors in study parameters. T-test was used to significant compare between means. Chi-square test was used to significant compare between percentage (0.05 and 0.01 probability) in this study. (17)

Parameters of this Study	
Urea at admission	Urea after 3 days of admission
Creatinine at admission	Creatinine after 3 days of admission
Urea: creatinine at admission	Urea: creatinine after 3 days of admission
Presence of Dysphagia	
Presence of Dry mucous membrane	
Presence of skin turgor	

Results

I evaluated 100 patients participated in this study was in Stroke .

92 (92 %) ischemic stroke and 8 (8 %) hemorrhagic stroke . Their mean age was 57.68 (SD 12.34) .All of the patients were hydrated initially intravenously within the first 24 h of admission . Dehydration based on the blood U/C ratio .

The mean SD and increasing in blood urea at first day was 33.57+_2.28 and in third day was 40.03+_ 2.84. (Figure 1)

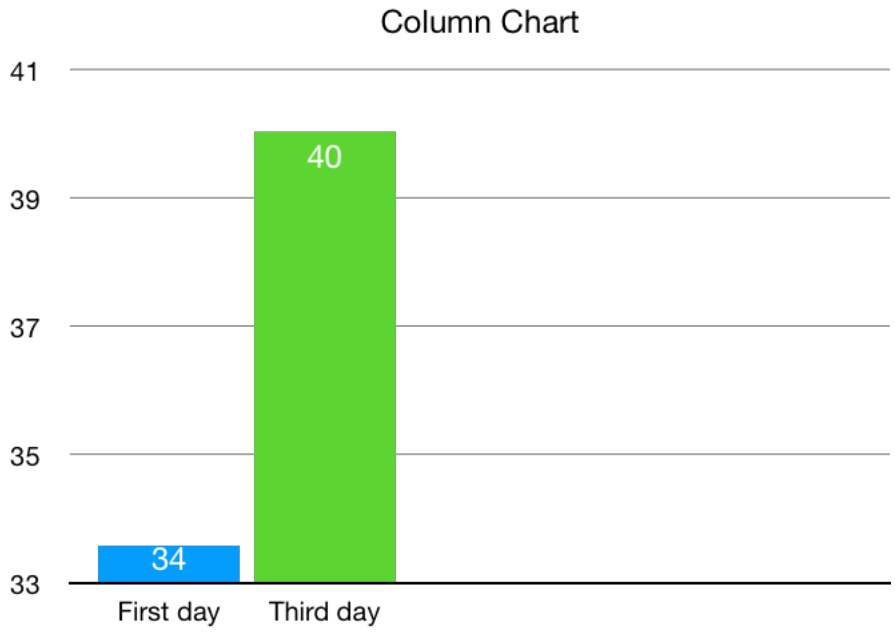
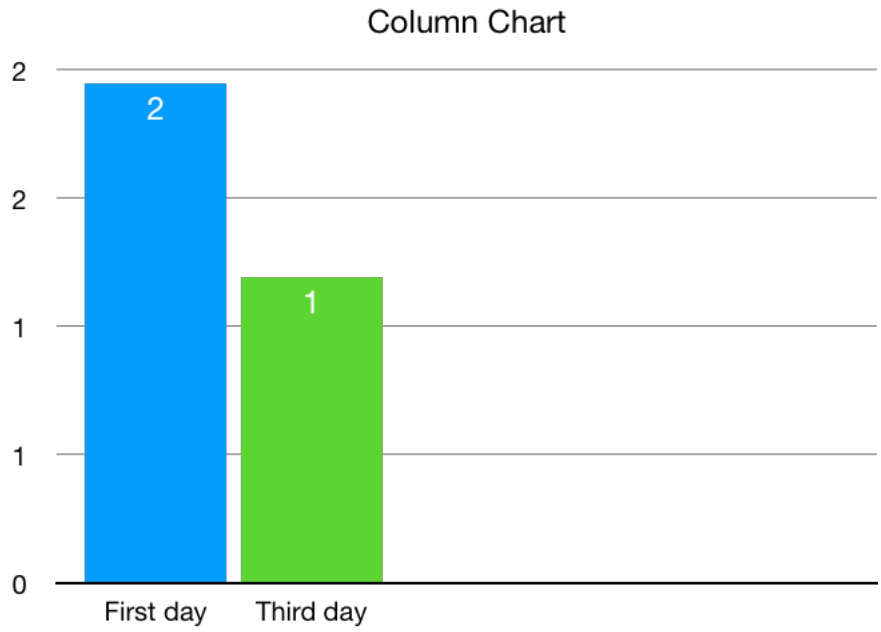


Figure 1 : comparison between 1st and 3rd day in Urea

And the mean SD and increasing in creatinine level at first day was 2.14 +_ 0.90 Nd at third day was 1.31 +_ 0.12 . (Figure 2)



Comparison 1st and 3rd day in creatinine level

So The mean increase of Urea/Creatinine level in 1st day was 40.76 ±7.07 and on 3rd day was 42.34 ±6.14 (Table 1).(figure 3)

P value was < 0.05 and its statistically significant.

Table 1: Comparison between 1 and 3 day in Urea and Creatinine

Day	Mean ± SE		
	Urea	Creatinine	Urea: Cr ratio
1st day	33.57 ±2.28	2.14 ±0.90	40.76 ±7.07
3rd day	40.03 ±2.84	1.31 ±0.12	42.34 ±6.14
T-test	6.018 *	0.962 NS	4.711 NS
P-value	0.0492	0.326	0.681
* (P≤0.05),Significant.			

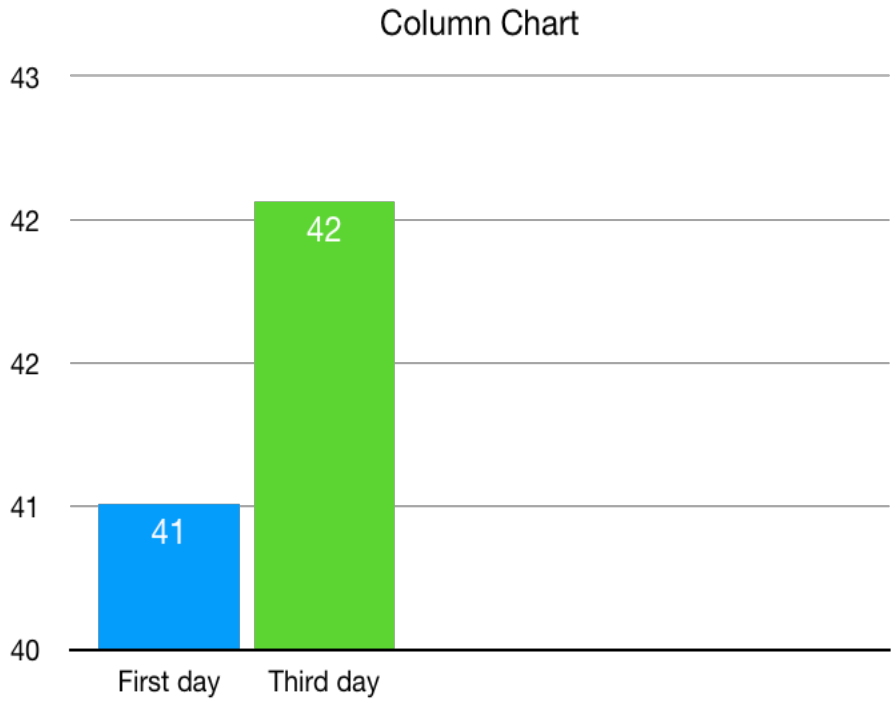


Figure 3 : Comparison 1st and 3rd day in urea: creatinine ratio

Presence of Dysphagia was highly significant among these patients (69% had dysphagia and 31 % had no dysphagia)

P value was (P≤0.01) (Table 2)

Table 2: Distribution of sample study according to Dysphagia

Dysphagia	No	Percentage (%)
Yes	69	69.00%
No	31	31.00%
Total	100	100%
Chi-Square (χ^2)	---	12.47 **
P-value	---	0.0001
** (P≤0.01).		

Also presence of dry mucus membrane was highly significant among these patients (79% had a dry mucus membrane and 21 % not had dry mucus membrane)

P value was (P≤0.01) (Table 3)

Table 3 : Distribution of sample study according to Dry mucus membrane

Dry mucus membrane	No	Percentage (%)
Yes	79	79.00%
No	21	21.00%
Total	100	100%
Chi-Square (χ^2)	---	14.07 **
P-value	---	0.0001
** (P≤0.01).		

Skin turgor in this study highly significant (23 % had skin turgor and 77% not have skin turgor)

P value was ** (P≤0.01). (Table 4)

Table 4: Distribution of sample study according to Skin turgor

Skin turgor	No	Percentage (%)
Yes	23	23.00%
No	77	77.00%
Total	100	100%
Chi-Square (χ^2)	---	12.97 **
P-value	---	0.0001
** (P≤0.01).		

Discussion

100 stroked patients participated in this study to evaluate the incidence of dehydration.mean age of those 100 patients was 57.68 . Mean arterial blood pressure in our study was 149/90.this indicate that stroke patients mostly have already high BP or hypertensive patients.So some studies such as study that published by Fred Stephen Sarfo , which explained that the incidence of stroke in patients with low or normal blood pressure was low. (18) . Comparison of Urea and creatinine ratio at first and second day was significant and P value < 0.05. Compared with other studies that also have this significant change and approved that The decrease in BUN/Cr is positively correlated with a better early neurological improvement in patients with stroke.(19)

More than one study showed that the urea and creatinine ratio has significant effect on prognosis of patients with stroke . Such as a study published by Dr. Gulati and Dr .Mishra that used Blood urea nitrogen/ creatinine ratio for prediction of poor outcome in patients with acute ischemic stroke and this study showed that A total of four studies involving 834 patients with acute ischemic stroke were used in the meta-analysis. Pooled analysis suggested, a significant association between high BUN/Creatinine ratio >15 ($p<0.001$) and poor outcome after acute ischemic stroke (20) .This agreed with with other study that published at September 2012 by Jon W. Schrock and Kristin Drogell which demonstrated same results(21). Percentage of Patients with dysphagia in our study was 69% we conducted that dysphagia occurs at time or time around the stroke but in a study which done by Nayeon Ko and Yun-Hee Kim MD that mentioned dysphagia occurred after 7

days of stroke (32 %) of 1940 patients was have this problem (22) . Another research done by Katsuhiko Sakai and Nobuyuki Matsuura that done on seventy patient with stroke and showed that Twenty participants (28.6%) had severe dysphagia, 31 participants (44.3%) had mild dysphagia, and 19 participants (27.1%) had normal swallowing function at discharge.(23). A study done bu Sapna Erat Sreedharan and Sylaja MD , showed that Minor strokes are disabling in a small fraction of patients. Over 10% of them can have significant post stroke dysphagia necessitating nasogastric feeding short term. This patient subgroup tend to have less favourable outcome on short and long term follow-up (24) . Distribution of dry mucous membranes and decreased skin turgor in this study was highly significant and P value was ($P \leq 0.01$) this indicates high incidence . A study that done by Jayantee Kalita and Usha Kant Misra demonstrated that Cerebral Salt Wasting Is the Most Common Cause of Hyponatremia in Stroke. One hundred patients with stroke were included: 47% had ischemic stroke and 53% had intracerebral hemorrhage. Forty-three percent of the patients had hyponatremia, 6% had hypernatremia, and 4% had both. Hyponatremia was due to Cerebral salt wasting in 19 (44.2%), SIADH in 3 (7%), miscellaneous causes in 14 (32.6%), and indeterminate in 7 (16.3%) patients (25) . Study done by S McLaren mentioned that Multiple factors can affect and lead to have led to a deterioration in pre stroke nutritional status, direct physical and psychosocial effects of stroke on the consumption of food and fluids following hospital admission, and organizational factors that can hinder efficient, effective meal delivery .Ethical and legal issues relating to hydration and nutritional support can arise in stroke management.The dry mucous membranes and reduced skin turgor is related to dehydration state in stroked patients (26) .

Finally our results indicate a positive association between dehydration and Stroke . We also found that the effect of dehydration on stroke patient increase on 3rd day of admission within a relatively short period of time.

Conclusions

Dehydration is a manageable risk factor for a poor functional outcome following patients with stroke . The increasing in urea and creatinine ratio between first and third day was significant. Also the distribution of dysphagia in those patients was highly significant.

Dry mucous and skin turgor among patients with stroke in this study was have influences and its highly significant.

References

1. Murray CJ Lopez AD Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet. 1997; 349: 1269-1276

2. Epidemiology of stroke.
Lancet. 1992; 339: 342-344 https://pubmed.ncbi.nlm.nih.gov/1346420/

3. Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, et al. . 2018 guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. (2018) 49:e46–e110. 10.1161/STR.0000000000000158 [PubMed] [CrossRef] [Google Scholar]

4. Hemphill JC, III, Greenberg SM, Anderson CS, Becker K, Bendok BR, Cushman M, et al. . Guidelines for the management of spontaneous intracerebral hemorrhage: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. (2015) 46:2032–60. 10.1161/STR.0000000000000069 [PubMed] [CrossRef] [Google Scholar]

5. European Stroke Organisation (ESO) Executive Committee ESO Writing Committee Guidelines for management of ischaemic stroke and transient ischaemic attack 2008. Cerebrovasc Dis. (2008) 25:457–507. 10.1159/000131083 [PubMed] [CrossRef] [Google Scholar]

6 . Alonso de Leciñana M, Egido JA, Casado I, Ribó M, Dávalos A, Masjuan J, et al. . Guidelines for the treatment of acute ischaemic stroke. Neurología. (2014) 29:102–22. 10.1016/j.nrl.2011.09.012 [PubMed] [CrossRef] [Google Scholar]

7. Yamaguchi T, Minematsu K, Hasegawa Y. General care in acute stroke. Cerebrovasc Dis. (1997) 7:12–17. 10.1159/000108247 [CrossRef] [Google Scholar]

8. Crary MA, Humphrey JL, Carnaby-Mann G, Sambandam R, Miller L, Silliman S. Dysphagia, nutrition, and hydration in ischemic stroke patients at admission and discharge from acute care. Dysphagia. (2013) 28:69–76. 10.1007/s00455-012-9414-0 [PubMed] [CrossRef] [Google Scholar]

9. Gross CR, Lindquist RD, Woolley AC, Granieri R, Allard K, Webster B. Clinical indicators of dehydration severity in elderly patients. J Emerg Med. (1992) 10:267–74. 10.1016/0736-4679(92)90331-M [PubMed] [CrossRef] [Google Scholar]

10. Liu CH, Lin SC, Lin JR, Yang JT, Chang YJ, Chang CH, et al. . Dehydration is an independent predictor of discharge outcome and admission cost in acute ischaemic stroke. Eur J Neurol. (2014) 21:1184–91. 10.1111/ene.12452 [PubMed] [CrossRef] [Google Scholar]

11 . Bahouth MN, Gottesman RF, Szanton SL. Primary 'dehydration' and acute stroke: a systematic research review. J Neurol. (2018) 265:2167–81. 10.1007/s00415-018-8799-6 [PubMed] [CrossRef] [Google Scholar]

12. Rowat A, Graham C, Dennis M. Dehydration in hospital-admitted stroke patients: detection, frequency, and association. Stroke. (2012) 43:857–9. 10.1161/STROKEAHA.111.640821 [PubMed] [CrossRef] [Google Scholar]

13. Kelly J, Hunt BJ, Lewis RR, Swaminathan R, Moody A, Seed PT, et al. . Dehydration and venous thromboembolism after acute stroke. QJM. (2004) 97:293–6. 10.1093/qjmed/hch050 [PubMed] [CrossRef] [Google Scholar]

14. Rowat A, Graham C, Dennis M. Dehydration in hospital-admitted stroke patients: detection, frequency, and association. Stroke. (2012) 43:857–9. 10.1161/STROKEAHA.111.640821 [PubMed] [CrossRef] [Google Scholar]

15. Kelly J, Hunt BJ, Lewis RR, Swaminathan R, Moody A, Seed PT, et al. . Dehydration and venous thromboembolism after acute stroke. QJM. (2004) 97:293–6. 10.1093/qjmed/hch050 [PubMed] [CrossRef] [Google Scholar]

16. Schrock JW, Glasenapp M, Drogell K. Elevated blood urea nitrogen/creatinine ratio is associated with poor outcome in patients with ischemic stroke. Clin Neurol Neurosurg. (2012) 114:881–4. 10.1016/j.clineuro.2012.01.031 [PubMed] [CrossRef] [Google Scholar]

17. **SAS. 2018.** Statistical Analysis System, User's Guide. Statistical Version 9.6th ed. SAS. Inst. Inc. Cary. N.C. USA.

18 . Fred Stephen Sarfo,Department of Medicine, Kwame Nkrumah University of Science & Technology, Kumasi, Ghana https://www.sciencedirect.com/science/article/abs/pii/S0022510X20301064

19 .Wei-Feng Jiang ,Meng-Ling Deng , Prognostic impact of blood urea nitrogen/creatinine ratio changes in patients with acute ischemic stroke https://www.sciencedirect.com/science/article/abs/pii/S0303846722000853

20. S. Gulati ,S. Mishra Blood urea nitrogen/creatinine ratio for prediction of poor outcome in patients with acute ischemic stroke: A meta-analysis https://www.sciencedirect.com/science/article/pii/S0022510X19311657

21.Jon W. Schrock ,Kristin Drogell ,Elevated blood urea nitrogen/ creatinine ratio is associated with poor outcome in patients with ischemic stroke https://www.sciencedirect.com/science/article/abs/pii/S0303846712000637

22.Nayeon Ko MD, PT, Yun-Hee Kim MD, PhD Status Of Dysphagia After Ischemic Stroke: A Korean Nationwide Study https://www.sciencedirect.com/science/article/abs/pii/S0003999321013137

23. Katsuhiko Sakai , Nobuyuki Matsuura Temporal muscle thickness is associated with the severity of dysphagia in patients with acute strokehttps://www.sciencedirect.com/science/article/abs/pii/S0167494321001023

24 .Sapna Erat Sreedharan MD, DM ,PN Sylaja MD, DM Dysphagia and disability in minor strokes – An institutional study https://www.sciencedirect.com/science/article/abs/pii/S1052305720304882

25. Jayantee Kalita MD, DM ,Usha Kant Misra MD, DM https://www.sciencedirect.com/science/article/abs/pii/S1052305716306085

26. S McLaren, London South Bank University, London, UK https://www.sciencedirect.com/sdfe/pdf/download/eid/3-s2.0-B0122266943002921/first-page-pdf