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Vitamins Deficiency in Traumatic Ill Patients Hospitalized in Intensive Care Units in Iran

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Abstract: Vitamins deficiency can increase the risk for systemic disorders and also for mortality and morbidity especially in critically ill patients. The objective of this study was to determine the burden of different types of vitamins deficiency in ICU traumatic patients among Iranian population. This was a retrospective study of 123 consecutive traumatic patients admitted to the ICU within a 6 month time period at Mobasher Kashani hospital in Hamadan, Iran. Need to vitamins on admission, daily need to vitamins and also mean daily intakes of vitamins were assessed. Patients experienced lower daily intake of different vitamins when compared with both needed vitamins on admission time as well as with daily needed vitamins. The ratio of daily vitamin intake to daily vitamin requirement was 0.35 for vitamin A, 0.34 for vitamin C, 0.36 for vitamin D, 0.35 for vitamin E, 0.69 for vitamin B6, 0.34 for vitamin B12, 0.37 for thiamine, 0.37 for riboflavin, 0.39 for niacin, 0.34 for folic acid, 0.36 for pantothenic acid and 0.32 for biotin. The highest and the lowest ratio of daily vitamin intake to daily vitamin requirement were specified to vitamin B6 and biotin, respectively. Most traumatic patients admitted to ICU wards dramatically suffered vitamins deficiencies that consist to almost all types of vitamins.

Key words: Intensive care, trauma, vitamin, patients, disordars

INTRODUCTION

Vitamins have critical roles in protecting cardiovascular disease, modulation of immune disease, effects as well as improvement of antimicrobial action. Also, vitamins have been also shown to have anti-inflammatory and anti-proliferative properties (Souberbielle *et al*., 2010). In this regard, vitamin deficiency can increase the risk for systemic disorders and also for mortality and morbidity especially in critically ill patients admitted to Intensive Care Unit (ICU) wards (Zittermann *et al*., 2009). Information regarding the association between vitamin levels and clinical outcome in patients hospitalized in ICUs is sparse with new reports suggesting the relationship of vitamins deficiency and an increase in mortality and morbidity in the critically ill (Lucidarme *et al*., 2010). Some studies demonstrate significant decreases invitamins status over the duration of the patient's ICU stay. Furthermore, low levels of vitamins have been showed to be associated with longer time to ICU discharge alive and a trend toward increased risk of ICU-acquired infection (Higgins *et al*., 2012). Vitamin deficiency particularly vitamins and K deficiency is a frequently reported medical problem as studies are reporting wide spread prevalence in all populations. For instance, the overall incidence of vitamin D deficiency in critically ill patients has been reported to range from as low as 17% to as high as 79% (Venkatram *et al*., 2011). However, the deficiency of different types of vitamins in critically ill patients was less studied. The objective of this study was to determine the burden of different types of vitamins deficiency in ICU traumatic patients among Iranian population.

MATERIALS AND METHODS

This was a retrospective study of 123 consecutive traumatic patients admitted to the ICU within a 6-month time period at Mobasher Kashani hospital in Hamadan, Iran. In this study, only those who were admitted to ICU ward within first 24 h of trauma were included. Those who readmitted to ICU during the same period of hospitalization were excluded. Clinical and laboratory variables including levels of serum vitamins obtained on admission and also weekly during hospitalization. According to stress factors related to the diseases, patients' needs to different vitamins were assessed. The calculated vitamins received based on the analysis of received vitamins from liquid lavage and also on the required nutrients calculated by anthropometric parameters multiply with 1.25 as coefficient for increased vitamins needs for traumatic patients. This study was approved by the research review board at Hamadan University of Medical Sciences and the need for informed consent was waived. Results were presented as mean±Standard Deviation (SD) for quantitative variables

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Table 1: Daily vitamin need and intake for different vitamins

Vitamin	Need to vitamins on admission	Daily need to vitamins	Daily intake of vitamins	Intaketoneedpercent
Vitamin A	845.53	845.95	300.36	35.5
Vitamin C	84.54	84.59	29.59	34.9
Vitamin D	5.37	5.30	1.93	36.4
Vitamin E	14.80	14.76	5.20	35.2
Vitamin B6	1.31	1.30	0.91	69.8
Vitamin B12	2.37	2.36	0.81	34.2
Vitamin B1	1.16	1.16	0.43	37.1
Vitamin B2	1.24	1.24	0.46	37.1
Niacin	15.40	15.39	6.02	39.1
Folic acid	395.12	393.92	136.69	34.7
Pantothenic acid	4.95	4.94	1.79	36.2
Biotin	33.72	32.89	10.77	32.7

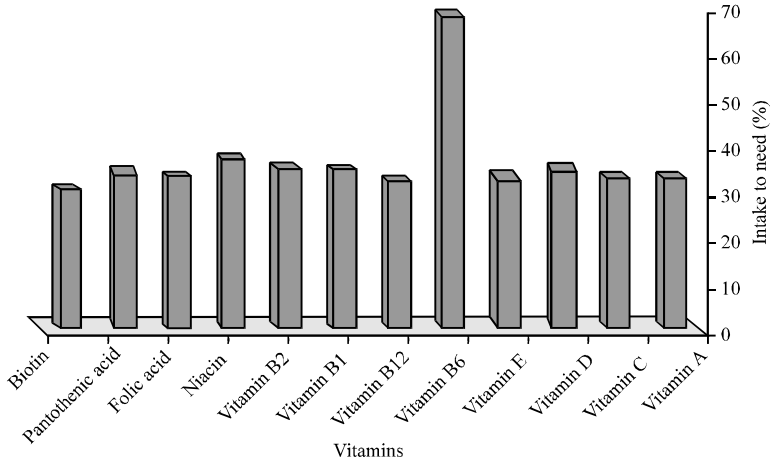

Fig. 1: Intake to need percent for all vitamins

and were summarized by frequency (percentage) for categorical variables. The trend of the changes in quantitative variables was measured using the repeated measure ANOVA test. Also, the paired t test was used to assess the difference in measured variables on admission and discharge times. For the statistical analysis, the statistical software SPSS Version 16.0 for windows (SPSS Inc., Chicago, IL) was used. The p-values of 0.05 or less were considered statistically significant (Table 1).

RESULTS AND DISCUSSSION

In total, 123 patients were assessed that 93 were hospitalized for shorter than one week but length of stay in hospital was two weeks in 18 patients, three weeks in 7 patients and four weeks in 5 patients. In, need to vitamins on admission, daily need to vitamins and also mean daily intake of vitamins is summarized. In this context, patients experienced lower daily intake of different vitamins when compared with both needed vitamins on admission time as well as with daily needed vitamins (Fig. 1). In fact, the ratio of daily vitamin intake to daily vitamin requirement was 0.35 for vitamin A, 0.34 for vitamin C, 0.36 for vitamin D, 0.35 for vitamin E, 0.69 for vitamin B6, 0.34 for vitamin B12, 0.37 for thiamine, 0.37 for riboflavin, 0.39 for niacin, 0.34 for folic acid, 0.36 for pantothenic acid and 0.32 for biotin. On the other hand, the highest and the lowest ratio of daily vitamin intake to daily vitamin requirement were specified to vitamin B6 and biotin, respectively.

The present study attempted to assess deficiency of different types of vitamins as the necessary micronutrients to synthesize vital materials in body organs in traumatic patients hospitalized in ICU wards. Most previous literatures focused vitamin D deficiency in critically ill patients in ICUs because of high rate of this vitamin deficiency in these patients; however our study could interestingly reveal deficiency in almost all types of vitamins in these patients. In this regard, the rate of deficiency defined as the ratio of daily vitamin intake to daily vitamin requirement ranged from 0.32-0.69. On the other hand, numerous patients suffered severe vitamins deficiencies on admission to ICU wards and also during ICU hospitalization. Because of specified role of each vitamin in necessary vital metabolic materials, occurring different metabolic disturbances leading organ failures and thus prolonged ICU stays in affected patients is expectable. Therefore, interventions with appropriate vitamins intake even using supplemental vitamins can effectively reduce mortality and poor outcome in the

patients. In this context and due to the lack of all types of vitamins, the use of parenteral multivitamins should be considered to reserve all types of necessary vitamins in body organs.

CONCLUSION

Regarding vital impacts of vitamins in outcome of critically ill patients in ICU wards, some studies showed a negative correlation between vitamins deficiency especially vitamin D deficiency and serum levels of inflammatory biomarkers, functional capacity and also impaired left ventricular function (Pilz *et al*., 2008, 2011; Kim *et al*., 2005; Schleithoff *et al*., 2006; Nibbelink *et al*., 2007; Tishkoff *et al*., 2008). Most of the vitamins acts on both the adaptive and innate immunity systems and thus vitamin deficiencies may lead to immune deficiency state in these patients predispose them to the variety of acute infections (Liu *et al*., 2006; Lee *et al*., 2009; Yim *et al*., 2007; Jeng *et al*., 2009). Furthermore, the cardiovascular system is an important target for vitamins and thus severe vitamin deficiency can cause life-threatening, even irreversible heart failure in the patients (Maiya *et al*., 2008). Moreover, some of these vitamins are needed for supporting respiratory function and thus preventing prolonged mechanical ventilation (Pfeifer *et al*., 2009; Sato *et al*., 2005; Fosnight *et al*., 2008). Thus, reserving all types of vitamins is necessary for traumatic patients in ICU wards to prevent occurrence of life-threatening events in these patients.

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