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STUDY OF ALBUMIN USE PATTERN IN AYATOLLAH KASHANI TEACHING HOSPITAL OF SHAHREKORD IN 2015

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ABSTRACT

Human plasma albumin has many therapeutic indications and excessive and indiscriminate use of this product leads to high costs each year in many hospitals across the world. This study was conducted with the aim of studying albumin use pattern in Ayatollah Kashani Hospital, Shahrekord 2015. This cross-sectional study was a conducted within a period of three months in 2014 in the 300-bed Kashani Hospital on 57 patients. Data were analyzed by descriptive and deductive statistical tests in SPSS 22. The period of receiving albumin by patients was 1-39 days with mean period of 8.8 days. Total number of vials received during hospitalization period was 1-68 with mean number of 14.01. In this study, the patients admitted to the ICU received the greatest amount of albumin (71.9%, n=41). The majority of patients (19.3%, n=11) who received albumin were accidental patients with multiple trauma and coronary artery disease (14%, n=8). Surgical and anesthesia services, with 63.2% and 21.1%, respectively haf the most requests for albumin from pharmacy. Clearly, modifying pattern of utilization and using medicines rationally according to appropriate strategies is essential and highly important.

INTRODUCTION

Drug utilization research (DUR) is one of the approaches to investigate use of drugs qualitatively and quantitatively. The ultimate aim of DUR is to investigate whether pharmacotherapy is rational or not. According to the World Health Organization (WHO), rational use of drugs refers to appropriate use of drugs according to clinical needs, in doses that meet individual requirements, for an adequate period of time, and with the lowest cost to the patient and his/her community [1-2]. Rational use of drugs is representative of an individual approach to treatment. The success of treatment depends mainly on physician's ability to diagnose disease, select appropriate drug, dosage form, and proper prescription, predict potential response(s), side effects, and drug interactions, an prevent unnecessary and life-threatening repetitions in treatment.

Moreover, rational use of drugs depends on the performance of pharmacists in preparing drugs and nursing teams in prescribing those [3].
Studies of DUR is an approach to investigate use of drugs qualitatively and quantitatively. These studies are considered to be the basis to revolutionize pharmacotherapy in addition to controlling medical expenses. Clearly, modification of pattern of utilization and establishment of a system of drugs rational use are conducted by detection and, if possible, suggestion of appropriate strategies and it is essential to conduct studies on this area [4]. The ultimate aim of DUR is to investigate whether pharmacotherapy is rational or not. A review of DUR has shown that successful research on this field requires multidisciplinary cooperation among physicians, clinical pharmacologists, pharmacists, and epidemiologists, and if these studies are not supported, they will not be fruitful [5].

Human serum albumin is the most important water-soluble protein in human plasma. Albumin has many benefits; however, preparation and production of albumin is greatly costly. Moreover, albumin increases risk for transmitting blood-borne infections. Several studies have reported excessive use of this product [6-9].

Inappropriate use of albumin imposes stupendous costs on hospitals each year across the world. Studies have reported inappropriate prescription of albumin to be 50%-70% with great costs [10-11]. A study reported that over 90% of albumin was not prescribed according to the available guidelines and was inappropriate [12]. However, according to these guidelines, less expensive alternatives to albumin are available for many diseases.

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To develop a single standard protocol for rational prescription of albumin, first, pattern of its prescription for inpatients should be investigated by DUR. DUR are considered to be the basis for pharmacotherapy alongside contributing to control of treatment costs. The present study was conducted to investigate pattern of albumin use to achieve a standard guideline for prescription of albumin for patients in Kashani Hospital, Shahrekord.

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MATERIALS AND METHODS

This descriptive, cross-sectional study was conducted within three months in 2015 on the patients hospitalized in 300-bed Kashani Hospital, Shahrekord. During this period, the patients administered with human albumin hospitalized in each of the 17 wards of the hospital were studied. During this period, 57 patients were enrolled into the study. The study protocol consisted of four phases: Planning, data gathering and assessment, intervention, assessment programs.

The data were drawn from the software used for the inpatients' pharmacotherapy, the inpatients' medical file, and nursing report were used. To gather the data on the inpatients, a standard form of indications for treatment with albumin according to the available reliable guidelines was used. The demographic characteristics of the patients administered with albumin consisting of age, gender, weight, and the albumin-ordering service, clinical data on albumin prescription, reason for prescription, duration of administration, the number of used vials, and clinical and laboratory observations were recorded in a special form. If albumin was prescribed according to the standard guideline 2010, it was considered an appropriate prescription, and if not, it was considered an inappropriate prescription.
The data were analyzed by descriptive tests, ANOVA, independent t-test, Pearson's correlation coefficient, and chi-square in SPSS 22.

RESULTS

The mean age of the patients was 55.24 (range: 16-90) years. Most (n: 36 [63.2%]) patients were male and the rest (n: 21) female. The mean weight of the patients was 66.66 (range: 37-110) kg. The mean duration of the patients' stay in hospital was 26.42 (range: 3-87) days. The mean duration of albumin administration was 8.8 (range: 1-39) days. The total number of administered albumin vials during stay in hospital ranged from one to 68 vials with mean number of 14.01 vials. The mean albumin level of the patients, according to the laboratory findings, was 2.6 (range: 1.5-4.4) g/dL [Table 1].

Table 1: Comparison of total number of used albumin vials for age, gender, and the requesting service and physician

ANOVA test	Total number of used albumin vials (mean± SD)	Range	Variables
0/768	17/36±20/76	15-30	Age (year)
	11/42±9/25	30-45	
	9/55±9/21	45-60	
	16/58±20/53	60-75	
	12/30±13	Over 75	
0/05	8/61±7/51	Male	Gender
	17/16±19/03	Female	
0/241	15/07±17/89	ICU	Ward
	35±11/31	Burn	
	6/66±5/68	Surgery	
	7/80±6/41	Neurosurgery	
	8/66±5/71	Internal	
0/78	15/91±19/14	Surgery	Ordering service
	9/75±4/92	Internal	
	12/41±10/94	Anesthesia	
	2±0	Oncology	
	9±5/47	Neurology	
0/05	21/14±24/02	General surgeon	Ordering specialist
	12/20±15/02	Neurosurgeon	

	9/5±6/36	Internist	
	20/66±23/57	Neurologist	
	33/33±8/50	Plastic surgeon	
	10/44±8/61	Anesthetist	
	6/13±5/75	Cardiac surgeon	
	4±2/82	Sub oncologist	
0/94	19/60±25/22	Surgery resident	Ordering resident
	18/33±17/09	Anesthesia resident	

The highest dosage of albumin was administered to the patients in intensive care unit (ICU) (n: 41, [71.9%]). Moreover, most patients administered with albumin were patients with accident-induced injuries with multiple trauma (n: 11, [19.3%]) and coronary artery disease (n: 8, [14%]). Surgical and anesthesia services (63.1% and 21.1%, respectively) ordered albumin most frequently. Meanwhile, cardiologists (26.3%), anesthetists (15.8%), general surgeon (12.3%), and neurologists (10.5%) ordered albumin for patients most frequently.

Plasma freeze was the most common reason for ordering albumin followed by edema, and albumin ordering according to serum albumin level (7%, 7%, and 5.3%, respectively). Among 57 patients throughout the studied period, 15 (26.3%) deceased. Moreover, the number of used albumin vials was higher for the deceased patients than other ones (16.8 vs. 13) [Tables 2 and 3].

Table 2: Frequency and absolute frequency of reasons for albumin prescription and death among patients (n: 57)

Percentage	No.	Range	Variables
5/3	5	According to the albumin level in the test	**Reason for prescription**
0/7	4	Edema with Lasix	
1/8	1	Extensive burn	
1/8	1	Tonic	
3/5	2	malnutrition	
0/7	4	Plasma freeze	
1/8	1	Hypotension	
26/3	15	Yes	**Deceased**
37/7	42	No	

Table 3: Comparison of mean total amount of used albumin vials for prescription reasons and patients' decease

P-value of ANOVA test	Total number of used albumin vials (mean± SD)	Range	Variables
0/43	26±26/28	According to albumin level in the test	**Reason for prescription**
	5/75±1/05	Edema with Lasix	
	27±0	Extensive burn	
	7±0	Tonic	
	7/5±7/77	malnutrition	
	9±5/47	Plasma freeze	

	5±0	Hypotension	
0/43	13±14/93	Yes	**Deceased**
	16/86±19/76	No	

According to correlation coefficient test, the patients administered with greater number of albumin vials were hospitalized for a significantly longer period of time (P=0.004).

DISCUSSION

According to the findings in Kashani Hospital, Shahrekord, 4200 albumin vials, costing 2,400,000,000 Rials, were used within nine months (from March to February) in 2015. This figure is very great for this single drug in a teaching hospital compared to other commonly used drugs such as pantoperazole, ciprofloxacin, etc. Therefore, from economic and medical perspectives, it is necessary to ensure appropriate prescription of albumin. This study investigated the pattern of albumin use with reference to the available reliable guidelines.

According to the findings in this study, the highest dosage of albumin was administered to the patients in intensive care unit (ICU). Moreover, most patients administered with albumin were patients with accident-induced injuries with multiple trauma and coronary artery disease. Surgical and anesthesia services ordered albumin most frequently. Meanwhile, cardiologists, anesthetists, general surgeon, and neurologists ordered albumin for patients most frequently. In Jahangard et al. study, over 3/4 (over 870) vials of the used albumin was not prescribed according to the available guidelines referred to in the studied healthcare center. The most common inappropriate prescription of albumin was reported to be for cardiac surgery [13]. According to the majority of reliable guidelines, albumin is the last choice, following crystalloid and nonprotein colloid solutions, after open heart surgery.

Generally, nonprotein colloid solutions are not used in this hospital and albumin is used as the second-line treatment after crystalloid solutions. In Jahangard et al. study, a case of irrational prescription of albumin was for patients with malnutrition. For these patients, albumin was prescribed as a food supplement. The percentage of this inappropriate prescription was reported to be 46.6% [13]. In the present study, 15 of 57 patients deceased. Moreover, the mean number of used vials was greater for the deceased patients than other ones. Matos et al reported that among 3400 admitted patients, 40% were admitted to ICU and one third of all the admitted patients died. In this study, it was seen that use of over four albumin vials increased the likelihood of death up to 30% (even in cases that the prescription was conducted according to the severity and type of the services) [14].

It is argued that for patients with cardiac disease, albumin should not be prescribed even for short periods unless certain conditions such as hyperbilirubinemia, as an associated complication, occur. In Talasaz et al study, prescription of albumin was reported to be inappropriate for 36.2% of impatients. Hyperalbuminemia and food supplementation were the most common conditions for which albumin should not be prescribed. However, human albumin as protein source of energy should not be prescribed for the patients in need of receiving nutrients. Increased serum albumin concentration (for no specific reason) up to over 4 g/dL can cause increase in renal catabolism.

In this study, the number of used vials and the patients' mortality were significantly associated. Developing a pattern of albumin use in compliance with ASHP protocol not only determines the suitability of albumin prescription for the patients but also prevents associated problems, mortality, and additional treatment costs. Finally, it has been suggested that cooperation among physicians, pharmacists, and specialists in any hospitals to develop guidelines of albumin use helps optimize use of this important and valuable pharmaceutical product [15].

CONCLUSION

To develop a single standard protocol for rational prescription of albumin, first, pattern of its use in inpatients should be investigated by DUR. DUR is considered to be the basis for revolutionizing pharmacotherapy in addition to controlling treatment costs. Clearly, modification of utilization pattern and establishment of a system for drugs rational use is conducted through identification and, if possible, recommendation of appropriate strategies and it is necessary to do research in this field.

FINANCIAL DISCLOSURE
None

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