ORIGINAL ARTICLE

The Effect of Medication Administration Associated Factors on Anxiety and Depression of Hospitalized Patients

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Abstract

Context: Hospital anxiety and depression can lead to higher length of stay in hospitals. **Aims:** The aim of this study was to evaluate the relationship between drug administration associated factors and anxiety and depression of hospitalized patients in infectious ward and also to evaluate the impacts of clinical pharmacist interventions on anxiety and depression of hospitalized patients in infectious ward through administering medications. **Settings and Design:** This study conducted in the infectious ward of Afzalipour Hospital affiliated to Kerman Medical University and had two parts. The first part was a cross-sectional study and the second part was a randomized clinical trial. **Subjects and Methods:** Patients on the 3rd or 4th day of hospitalization, who were between 16 and 85-year-old were included in this study. To measure anxiety and depression in patients, we used the Hospital Anxiety and Depression Scale. **Statistical Analysis used:** We used Spearman rank test, Mann–Whitney *U*-test, Kruskal–Wallis one-way analysis of variance, and Chi-square test. **Results:** In the first part, 156 patients participated. It was found that the number of medication and frequency of medication administration had a direct correlation with both anxiety and depression. In the second part, 104 patients enrolled. It was found that the presence of clinical pharmacist did not have any significant effect on anxiety, depression, frequency of medications administration, and the number of medications. **Conclusions:** It was concluded that drugs associated factors had a significant effect on anxiety and depression of hospitalized patients.

Key words: Anxiety, depression, medicines

INTRODUCTION

Depression is a major psychiatric disorder in populations and a leading predictor of functional disability.[1] Depression makes significant economic problems. Anxiety is one of the most common manifestation of depressive disorders and is considered to be a part of the spectrum of mood disorders.[2] Anxiety and depression are common psychiatric disorder in hospitalized patients[3] and can lead to higher length of stay in hospitals, increase in cost, reduction in the quality of life of patients and their family.[4] The prevalence rates of anxiety and depression in hospitalized patients vary in different studies, and they depend on disease category, treatment settings, and case-finding procedures.[5] Hadi *et al*. reported that the prevalence of anxiety (64.9%) and depression (42.3%) in adult hospitalized patients in internal and surgical wards of a hospital in Iran.[6] Many factors such as severity of disease,[7] day of hospitalization,[8] chronic diseases,[9] nursing,[10,11] and isolation,[12] affect anxiety and depression of hospitalized patients. High rates of depression have been observed in many studies in patients with a major chronic medical. For instance, the rate of depression is particularly high in cardiovascular disorders,[13] cancer,[9] and human immunodeficiency virus (HIV) infection.[14] Furthermore, patients with depression are more likely to be at stake for chronic medical diseases such as diabetes and coronary artery disease.[15] It is very likely that major depression comes after anxiety disorders.[2] Some drugs such as corticosteroids cause mild depressive symptoms.[16]

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Received: 20-10-2015
Revised: 27-03-2016
Accepted: 04-04-2016

Clinical pharmacy services have clinical, economic, and humanistic benefits.[17] The goal of clinical pharmacy practice is to manage drug administration and avoid medication errors.[18] The valuable role of clinical pharmacists has been verified in different sections including adult intensive care unit (ICU),[17] pediatric ICU,[19] hospitalized cardiovascular patients,[20] and renal transplant recipients.[21] The aim of this study was to evaluate the relationship between drug administration associated factors such as route of administration, frequency and number of medication and anxiety and depression of hospitalized patients in infectious ward and also to evaluate the impacts of clinical pharmacists' intervention on anxiety and depression of hospitalized patients in infectious ward through administering medications.

SUBJECTS AND METHODS

This study had two parts. The first part of this study was a cross-sectional study conducted in the infectious ward of Afzalipour Hospital affiliated to Kerman Medical University, in Kerman, Iran, during January 2014 to July 2014. The study protocol was approved by the Ethical Committee of Kerman Medical University. The participants signed an informed contest form, and the terms of consent were explained to them unpretentiously. 156 patients participated in the first part of this study. Patients on the 3rd or 4th day of hospitalization, who were between 16 and 85-year-old were included in this study. Patients with chronic disease such as chronic obstructive pulmonary disease (COPD), HIV infection, cancer and also patients with a history of any mental disorder were excluded from this study. The patients' demographic data (such as name, age, and sex, diagnosis, file number, admission date, discharge date, past medical history, drug history, clinical pharmacist existence, date of intervention, recently medications, number of medication, route of administration, frequency of administration) and lab data (such as erythrocyte sedimentation rate, C-reactive protein, Hg, white blood cell, Na, K, urea and Cr) were also recorded. The route of administration categorized as parental drugs, oral drugs, parental and oral drugs, parental drugs with other routes, oral drugs with other routes, parental and oral and other routes, and do not have any medications. Other routes meant to apply inhalation or local dosage forms. To measure anxiety and depression in patients, a trained pharmacist used a validated Persian version[22] of the well-known Hospital Anxiety and Depression Scale (HADS). This self-report questionnaire consists of 14 items and measures two constructs, anxiety (7 items) and depression (7 items) with cut-off points for severity (scores: 0-7 normal; 8-10 mild; 11-15 moderate; 16-21 severe). Each item was rated from 0 to 3.

The second part of this study was a randomized clinical trial registered at the Iranian Registry of Clinical Trials; its identity number is IRCT201404216026N2. About 104 patients who had been participated in the first part of this study were also included in the trial part. The inclusion and exclusion criteria of this trial were the same as first part. The seasons have approved effects on anxiety and depression,[23] so patients hospitalized in spring, only participated in this trial. Participants were divided into two groups (intervention and placebo) using simple randomization. 52 patients were allocated to the intervention group and 52 patients to the placebo group. The clinical pharmacist visited patients in the intervention group on the 2nd or 3rd day of hospitalization and provided medication therapy evaluations and did not visit patients in the control group. The patients in intervention group were informed that clinical pharmacist was going to visit them and the next day after clinical pharmacist visited them they filled out HADS questionnaire. All participants completed HADS on the 3rd or 4th day of hospitalization according to inclusion criteria. We used the statistical package of social science version 16 for statistical analysis. The distribution of our data was not normal according to Kolmogorov–Smirnov test. We also used Spearman rank test to analyze the correlation between HADS scores and other quantitative variables. Because of multiple comparisons, $P < 0.01$ was considered as statistically significant for this test. We also applied the non-parametric Mann–Whitney *U*-test to determine the significant differences in quantitative data between the two groups. Moreover, we used the Kruskal–Wallis one-way analysis of variance to compare more than two quantitative variables. Chi-square test was used to calculate the interaction between qualitative factors and two mentioned groups (placebo and intervention). $P < 0.05$ were considered to be statistically significant for mentioned tests.

RESULTS

From the 156 patients in the cross-sectional part of this study, 58 (37.2%) were male and 98 (62.8%) were female. The mean ± standard deviation age of participants was 47.21 ± 19.58 years. The median ± interquartile range (IQR) of anxiety and depression for total participants were 4 ± 4 and 0 ± 1, respectively. The distribution of routes of medication administration, depression, and anxiety for participants were showed in Table 1. The median ± IQR of number of medication and frequency of medication for total participants were 6.5 ± 5 and 4 ± 2, respectively. The number of medication and frequency of medication administration had direct correlation with both anxiety and depression. There was a strong correlation between measured degree of anxiety and depression. Furthermore, neither the anxiety nor depression exhibited a significant correlation with age and lab data. The detailed description of measured correlations was presented in Table 2. The route of medication had significant correlation with anxiety ($P = 0.024$) and depression ($P = 0.001$). The order of medication route that causes least anxiety was as follows: Oral and other, parenteral, oral, parenteral and oral, parenteral and other, parenteral and oral and other and do not have any medications. The order of medication route that caused least depression was as follows: Oral, parenteral, parenteral and other, parenteral and oral, parenteral and oral and other, oral and other and do not have any medications.

The severity of anxiety and depression, route of administration and demographic characteristics of patients in placebo and intervention groups of the clinical trial part of this study were presented in Table 3. The median ± IQR of anxiety for placebo and intervention groups were 4 ± 4 and 3.50 ± 3.75, respectively. The median ± IQR of depression for placebo and intervention groups were 0 ± 1.75 and 0 ± 0.75, respectively. The presence of clinical pharmacist did not have any significant effect on anxiety ($P = 0.06$), depression ($P = 0.185$), frequency of medication administration ($P = 0.821$) and number of medication ($P = 0.984$). No relation between clinical pharmacist's presence and medication administration route was found.

Table 1: The distribution of routes of medication administration, depression, and anxiety for participants

Variable	Distribution *N* (%)
Routes of medication administration	
Oral	1 (0.6)
Parenteral	16 (10.26)
Parenteral and oral	91 (58.3)
Parenteral and others	2 (1.3)
Oral and others	1 (0.6)
Parenteral and oral and others	44 (28.2)
Do not have any medications	1 (0.6)
Depression	
Normal	134 (85.9)
Mild	16 (10.3)
Moderate	3 (1.9)
Severe	3 (1.9)
Anxiety	
Normal	123 (78.8)
Mild	16 (10.3)
Moderate	15 (9.6)
Severe	2 (1.3)

DISCUSSION

We found out that there was a direct correlation between the number of medications and anxiety/depression. That is to say, if the number of medicines of patient increases then his/her anxiety and depression also increases as a result. Moreover, we found the frequency of medication administration played an effective role in the level of anxiety and depression. The lowest level of anxiety was observed when the medications were taken orally along with either topical or inhaled route. However, the lowest amount of depression happened when the medicine was taken orally. Note that among all patients, those without any prescribed medication reported anxiety and depression the most. We can explain this finding with fewer nursing support in this regard. In many published studies, the positive role of nursing on alleviating the anxiety level has been stressed.[10,11] Moser *et al*. found that care techniques, improving knowledge and communication, and support were major anxiety management strategies that were used by nurses in critically ill patients.[10] Evidenced by the presented data, anxiety was more prevalent compared to the depression and often times these two were seen together. This comorbidity confirmed the findings of an earlier study conducted by

Table 2: The detailed description of measured correlations

Variable	Correlation coefficient[1]		*P* value[2]	
	Anxiety	Depression	Anxiety	Depression
Lab data				
Urea	0.044	−0.044	0.608	0.613
K	0.061	−0.085	0.493	0.340
Na	0.025	−0.037	0.774	0.675
Cr	0.040	0.036	0.639	0.674
Hg	−0.001	0.001	0.990	0.994
WBC	0.006	0.091	0.948	0.283
ESR	−0.239	−0.021	0.154	0.901
CRP	0.098	0.362	0.627	0.063
Age	0.181	0.124	0.025	0.128
Number of medication	0.451	0.324	0.0001	0.0001
Frequency of medication	0.221	0.220	0.006	0.006
Anxiety		0.681		0.0001
Depression	0.681		0.0001	

[1]Based on spearman rank test, [2]$P<0.01$ were considered as statistically significant. WBC: White blood cell, ESR: Erythrocyte sedimentation rate, CRP: C-reactive protein

Table 3: The severity of anxiety and depression, route of administration and demographic characteristics of patients in placebo and intervention groups of the clinical trial part

Characteristics	*N* (%)		*P* value[1]
	Placebo group	Intervention group	
Age (mean±SD)	47.04±19.47	47.66±19.89	
Gender			0.83
Male	36 (69.23)	35 (67.31)	
Female	16 (30.77)	17 (36.69)	
Hospital anxiety scale			0.163
Normal	43 (82.69)	50 (96.15)	
Mild	4 (7.69)	1 (1.92)	
Moderate	4 (7.69)	1 (1.92)	
Severe	1 (1.92)	0	
Hospital depression scale			0.361
Normal	49 (94.23)	51 (98.08)	
Mild	1 (1.92)	1 (1.92)	
Moderate	2 (3.85)	0	
Severe	0	0	
Route of medications			0.342
Parenteral	4 (7.69)	9 (17.31)	
Oral	0	1 (1.92)	
Parenteral & oral	36 (69.23)	32 (61.54)	
Parenteral & oral & other	12 (23.08)	10 (19.23)	

[1]Based on Chi-square test, $P<0.05$ were considered to be statistically significant. SD: Standard deviation

Kessler *et al*.[2] In a quantitative review, DiMatteo *et al*. found out that non-compliance to medication therapy was 3 times more prevalent in depressed patients in comparison with non-depressed patients.[3] Hosaka *et al*. found out that patients with major depression stayed in hospital longer than those without it. Furthermore, this increasing length of hospital stay could cause increase in cost and reduction in the quality of life of patients and their families.[4] Due to the results of the two mentioned studies and also our findings, if physicians prescribe medications in a proper manner, the level of depression in hospitalized patients may decrease and it may be followed by enhancement of compliance and reduction of length of hospitalization. Different factors affected hospital anxiety and depression. In this study, we tried to eliminate them. Day of hospitalization is one important factor. Kathol and Wenzel found out that in the 1st day of hospitalization, anxiety and depression levels were maximum but gradually reduced since then. In this study, 128 adult patients were included and routine follow-up depression and anxiety questionnaires until discharge were performed to diagnose anxiety and depression.[8] Therefore, we evaluated hospital anxiety and depression during the 3rd or 4th days of admission. The severity of illness is another effective factor which we considered. The more the severity the more depression would be. Moffic and Paykel conducted a study in 150 medical in-patients and the Beck depression inventory questionnaire was used. They tried to establish a relation between depression and other factors, and they realized that severity of illness, previous depression, and stressful condition could increase depression level.[7] Therefore, we excluded patients with any psychiatric disorders and severe illnesses. HIV patients[14] and those suffering from cancer[9] or COPD[24] can also be at risk of more anxiety and depression. Gammon showed isolation could increase the rate of depression,[12] so we only included the patients who were not kept in isolated rooms.

In the trial part of this study, no relation between the presence of a clinical pharmacist and the rate of depression and anxiety was observed. We could explain this finding by the fact that the responsibility of clinical pharmacists was not only to decrease the number of medications or the frequency of medications but also they might increase the aforementioned factors at their discretion.[25] Many studies discussed the roles of clinical pharmacist. Krupicka *et al*. studied the influence of a clinical pharmacist in a pediatric ICU to examine the type and quantity of interventions recommended by him/her. Moreover, they realized that the most common interventions were dosage changes (28%), drug information (26%), and miscellaneous information (22%).[19] LaPointe and Jollis considered the role of a clinical pharmacist during a long period of time (September 1995-February 2000) in cardiology wards. They recorded all interventions by clinical pharmacists and reported that out of 14,983 such interventions 4768 (equivalent to 24 medication error per 100 admissions) were related to medication errors. The most common errors were associated to wrong drug (36.0%) and wrong dose (35.3%). The authors concluded that clinical pharmacist had an important role in error correction.[20] Kane *et al*. reviewed the literature on the impact of pharmacists as an integral part of multidisciplinary ICU teams. They mentioned pharmacist interventions as correcting/clarifying orders, providing drug information, suggesting alternative therapies, identifying drug interactions, and therapeutic drug monitoring. They also mentioned that in the case of critically ill patients, pharmacist involvement would be associated with optimal fluid management and substantial reductions in the rates of adverse drug events, medication administration errors, and ventilator-associated pneumonia. They concluded that pharmacists have a significant contribution to improve both the clinical and economic outcomes of the treatments and that more recognition for their valuable role in the healthcare community was required.[17] Chisholm-Burns *et al*. examined both the health and economic impacts of clinical pharmacy among renal transplant recipients. As a part of this study, clinical pharmacists were required to review and optimize medication therapy, provide instructions on how to take medication, and help with enrollment into medication assistance programs. By comparing the outcome of the intervention group to control

group (did not receive clinical pharmacy services), the authors observed a significant difference on measures of adherence, health, economics, and quality of life.[21]

This study had some limitations. This study was conducted in one ward and during the relatively short duration. The sample size was small. Larger studies in different wards of hospital with longer duration are needed to confirm our findings. It was concluded drugs associated factors such as route of administration, frequency and number of medication had a significant effect on anxiety and depression of hospitalized patients.

ACKNOWLEDGMENT

The present article was financially supported by Kerman University of Medical Sciences grants No: 92/518.

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Source of Support: Nil. **Conflict of Interest:** None declared.