



The effect of the infection *Clostridium difficile* on the rehabilitation

Edina Tanovic^{1*}, Haris Tanovic², Aldijana Kadic¹, Dževad Vrabac¹, Senad Selimović³, Dragan Kostić⁴

¹Clinic for Physical Medicine and Rehabilitation, Clinical Center University of Sarajevo, Bosnia and Herzegovina. ²Clinic for Abdominal Surgery, Clinical Center University of Sarajevo, Bosnia and Herzegovina. ³JZU BRC Aquaterm, Olovo, Bosnia and Herzegovina. ⁴Clinical Center University of Banja Luka, Bosnia and Herzegovina.

ABSTRACT

Introduction: *Clostridium difficile* is the cause of the post antibiotic colitis. This anaerobe, sporogenous, gram-positive bacteria is most often recognized as the cause of the nosocomial diarrhea. The aim of this work is to show the impact of the infection *Clostridium difficile* on the result of rehabilitation of the patients that have been treated in the rehabilitation facility.

Methods: 448 patients treated at the Clinic for physical medicine and rehabilitation of the Clinical Center University of Sarajevo were included in the study. Gender, age, Barthel index, length of hospitalization, and values of the albumin in the serum were documented. Kolmogorov-Smirnov test, Mann-Whitney U test and One Sample Wilcoxon Signed Rank test were used for data analysis.

Results: There were 57% female and 43% of male patients. The average age was 67.5 years for women and 52 years for men. Barthel index at admission was 4.0 and at discharge raised to 8.0 ($p=0.047$). The length of the hospitalization for patients without infection was shorter (28.8 days) compared to patients with infection (43 days) ($p=0.015$). Values of the albumin in the blood at patients with confirmed *Clostridium difficile* infection were significantly lower than referent values ($p = 0.016$).

Conclusion: Patients with *Clostridium difficile* infection had longer period of the rehabilitation and the results were less favorable.

Keywords: *Clostridium difficile*, Barthel index, rehabilitation

INTRODUCTION

Clostridium difficile is the cause of the post antibiotic colitis. This anaerobe, sporogenous, gram-positive bacteria is most often recognized as the cause of the nosocomial diarrhea (1-4).

Diarrhea caused by the *Clostridium difficile* can either occur individually or in smaller epidemics and can be transmitted from person to another person (5,6). It occurs up to 8% of the hospitalized patients and can be responsible for 20-30% cases of diarrhea. Risk factors are advanced age, serious illnesses, lengthy period of hospitalization, residence at nursing homes or chronic patients (7-9). Lately, it has been proven also that risk factors include application of blockage of proton pump and application of non-steroid anti-rheumatic (10). Dominant pre-

*Corresponding author: Edina Tanovic, Clinic for Physical medicine and rehabilitation, Clinical Center University of Sarajevo, Bosnia & Herzegovina, E-mail: tanovicedina@hotmail.com

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disposed factor of the host is the antibiotic induced gastro intestinal disorder. The course of the disease varies from asymptomatic to necrosis colitis (11-13). Rarely there are limited impacts of the tissue as well as sepsis of the acute abdomen. With previous application of the cephalosporin there can be occurrences of not fully formed stool (not liquid) and leukocytes in the stool (14,15).

Asymptomatic patients with *Clostridium difficile* in their stool are more common than symptomatic patients, in ratio 3:1. After diarrhea caused by *Clostridium difficile*, reactive arthritis is described (16-18). Risk factors are: advanced age, serious illnesses, lengthy period of hospitalization, residence at nursing homes or chronic patients. Typical clinical symptoms are diarrhea, increased body temperature (fever), pain in the stomach area and leucocytosis (19,20). The cases of ileus are increasingly described, as well as cases of perforation of colon, toxic megacolon with development of the shock, to very com-

plicated colitis that can lead to death (21,22).

The aim of this work is to show the impact of the infection *Clostridium difficile* on the result of rehabilitation of the patients that have been treated in the rehabilitation facility.

METHODS

Total of 448 patients were hospitalized at the Clinic for physical medicine and rehabilitation of the Clinical Center University of Sarajevo, in the period of May 2011 to May 2012. As the source of the information, we have used the existing medical documentation. We have done ELISA –RIDASCREEN *Clostridium difficile* to determine the existence of the toxin in the stool. We analyzed the following: gender, age, results of the rehabilitation with Barthel index, length of the hospitalization, as well as values of the albumin in the blood.

Statistical analysis

Kolmogorov-Smirnov test, Mann-Whitney U test and One Sample Wilcoxon Signed Rank test were used for data analysis. $P < 0.05$ was considered statistically significant.

RESULTS

Infection with *C. difficile* occurred 7 (2%) out of total 448 patients. Of those, 4 (53%) were female and

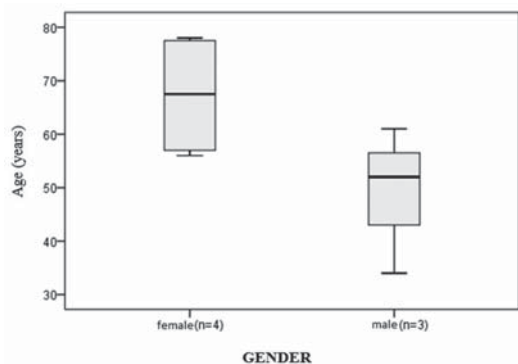


FIGURE 1. Age distribution in patients with *C. difficile* infection

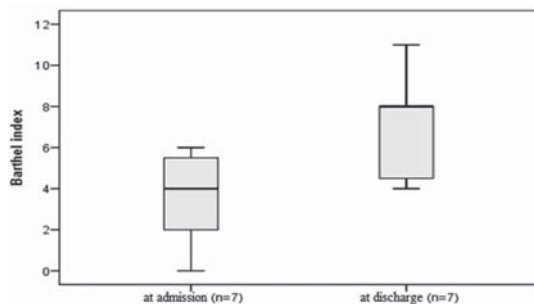


FIGURE 2. Barthel index at admission and discharge ($Z = 2.120$; $P = 0.047$).

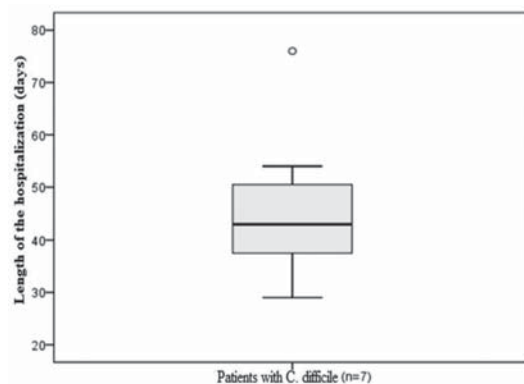


FIGURE 3. Length of hospitalization for patients with *Clostridium difficile* infection compared to patients without infection with mean length of hospitalization of 28.8 days ($Z = 2.282$; $P = 0.015$).

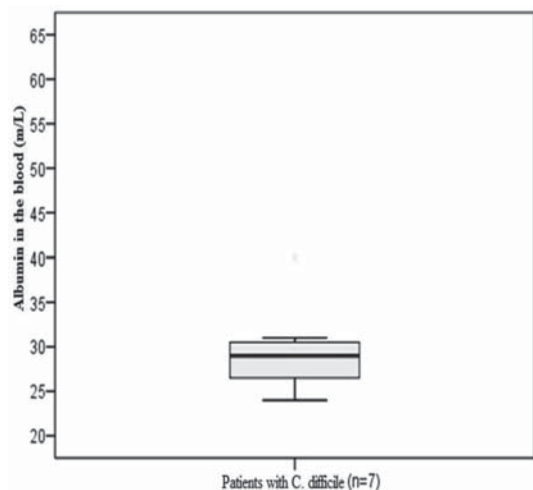


FIGURE 4. Albumin in the blood at patients with *C. difficile* (Mean=29.0 g/L; IQR=26.0 to 31.0) compared to referent values (53.0-64.0 g/L) ($Z=-2.281$; $P=0.016$).

3 (47%) were men. The mean age for females was 67.5 years and for males 52.0 years (Figure 1). The Barthel index values were significantly different at admission and discharge (Figure 2). Also, the length of hospitalization was significantly different for patients with and patients without *C. difficile* infection (Figure 3).

DISCUSSION

In our study we analyzed 448 patients. With 11 patients, there was a suspicion of the infection *C. difficile* and at 7 patients, the infection was confirmed. All the patients were accepted for the rehabilitation as transfers from the Clinic for Neurology. The frequency of the infection with *Clostridium difficile* in our study was 2%. The research of the Orsini et al. published in 2010 on included 747 patients with 22 having infection, with frequency of 2.9%. Female patients were slightly more represented in the study (57%) which does not correspond with other research which demonstrates that male genders are more represented.

When we analyze age of the patients, we see different results. In literature we found different values depending on the institution where the research was conducted. The average patients were represented at the advanced age but the illness can sporadically oc-

cur at younger patients as well. The majority of cases of infection developed with 30 days of admission (27).

The results of the rehabilitation were estimated using Barthel index. All of the suspected patients were isolated and the process of the rehabilitation at the proven cases was conducted in special conditions. In our work we noticed significant statistical difference in the values of Barthel index at the admission ($M=4.0$) and discharge ($M=8.0$), $p=0.047$. However, results of the rehabilitation with patients with *C. difficile* are less effective compared to patients without infection. Similar results were obtained by Orsini et al. The hospitalization for patients without infection with *C. difficile* is shorter ($M=28.8$) compared to patients with infection ($M=43.0$). Similar results were verified by Orsini et al. which note the length of the hospitalization at 55.3 days.

The values of the albumin in the blood for patients with infection *C. difficile* are significantly lower than the referent values; there is a high significance $p=0.016$. Several research studies show the same or similar results with differently pronounced values of the significance. We have not verified horizontal transmission of the infection. Measurements for the control of the infection are important for reducing the transmission of the *C. difficile* from health workers to patients, as well as between the patients.

Reduced used of the clindamycin in the hospitals, has reduced the incident of the illness. Relapse can occur in 15-20% of the patients.

Higher occurrence of the illness caused by *Clostridium difficile* can be interpreted with the selection of the new type NAP1/027 which excretes much higher levels of the toxins A and B compared to until now prevailing types of the *Clostridium difficile*. It is assumed that the gene mutation occurred which regulates the secretion of the toxins. It is still unclear how much effect on the selection of this type of *Clostridium difficile* had the prescribing as well as use of anti-microbic medicine.

Importance of the CD following is also indicated by Olson et al. who examined the mortality connected with the infection of the *C. difficile*. Their results on 908 cases of CDAD show that 6 patients (0.06%) died from the active pseudomembranous colitis (PMC) as the primary disease.

Results of the study done by Morris et al. show that the mortality of the patients with colonotomy, toxic megacolon and perforated colon was high (up to 50%). In the United Kingdom hospitals it is noted the increase of death cases that had infection *C.difficile* during their primary disease. The information also indicates two to three times higher death rate during year 2004 compared to year 1999 (20). Prevention remains a priority, high standards of hygiene and careful attention to the judicious prescription of antibiotics and crucial regard (28). Patients admitted to acute rehabilitation may have an elevated rate of intestinal colonization with *C. difficile* without clinical symptoms. Inadvertent transfer of the organism within the rehabilitation setting may occur because asymptomatic colonization is not recognized (29). Effective management requires a coordinated effort among all members of the healthcare team to facilitate early identification of patients at risk for CD, early recognition of disease onset and confirmatory testing, prompt initiation of the most appropriate management approach and ongoing monitoring throughout the continuum care (19,23,30).

CONCLUSION

Patients that had infection with *Clostridium difficile* had longer period of the rehabilitation and the results were less favorable.

COMPETING INTERESTS

Authors declare no conflict of interest.

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