

Selected Topics: Toxicology



NEUTROPHIL-LYMPHOCYTE RATIO IN PATIENTS WITH PESTICIDE POISONING

Zerrin Defne Dundar, MD,* Mehmet Ergin, MD,* Ramazan Koylu, MD,† Rasit Ozer, MD,* Basar Cander, MD,* and Yahya Kemal Gunaydin, MD†

*Emergency Medicine Department, Meram Faculty of Medicine, Necmettin Erbakan University, Konya, Turkey and †Emergency Medicine Clinic, Konya Training and Research Hospital, Konya, Turkey

Reprint Address: Zerrin Defne Dundar, MD, Emergency Medicine Department, Meram Faculty of Medicine, Necmettin Erbakan University, Konya, Turkey

Abstract—Background: Pesticides are highly toxic to human beings, and pesticide poisoning is associated with high morbidity and mortality. The identification of powerful prognostic markers is important for the management of patients with pesticide poisoning in emergency settings. **Objective:** To investigate the prognostic value of the neutrophil-lymphocyte ratio and hematological parameters measured in patients with pesticide poisoning within the first 24 h after admission to the emergency department (ED). **Methods:** All patients (≥ 15 years old) admitted to the ED from July 2008 through February 2013 due to pesticide poisoning were enrolled in the study. The written and electronic medical charts of patients were reviewed. Neutrophil-lymphocyte ratio and platelet-lymphocyte ratio were calculated for each patient using absolute neutrophil, lymphocyte, and platelet counts. Mechanical ventilation requirement and mortality were used as the primary end-points. **Results:** A total of 189 patients were included in the study. The mechanically ventilated patients had significantly higher leukocyte and neutrophil counts, and neutrophil-lymphocyte and platelet-lymphocyte ratios ($p < 0.001$, $p < 0.001$, $p < 0.001$, $p = 0.003$, respectively), whereas they had significantly lower lymphocyte counts compared to nonventilated patients ($p = 0.011$). Survivors had significantly higher leukocyte and neutrophil counts, and neutrophil-lymphocyte ratios ($p < 0.001$, $p < 0.001$, $p = 0.002$, respectively), whereas there was no significant difference between groups in terms of lymphocyte counts ($p = 0.463$), compared to nonsurvivors. **Conclusion:** Leukocyte counts, neutrophil counts, and neutrophil-lymphocyte ratios measured within the first 24 h after admission to the

ED are useful and easy-to-use parameters for estimating prognosis in the follow-up of patients with pesticide poisoning. © 2014 Elsevier Inc.

Keywords—pesticide; poisoning; cholinesterase; neutrophil-lymphocyte ratio

INTRODUCTION

Pesticides are highly toxic chemical substances designed to kill living organisms including insects, rodents, and fungi. They are widely used and their sales are not controlled by governments in developing agricultural countries (1,2). The number of intentional and unintentional pesticide poisoning cases has increased in recent years. Annually, approximately 250,000–300,000 deaths occur due to pesticide poisoning worldwide, and 70–80% of pesticide poisonings are suicidal (2). The identification of powerful prognostic markers are important for the management of patients with pesticide poisoning in emergency settings.

Pesticides have many subgroups with different mechanisms of action, for example, organophosphates, organochlorines, pyrethroids, and carbamates. Although their mechanisms of action are different, in almost all acute pesticide poisoning, a general inflammatory response occurs in the body due to oxidative stress (3,4). As a result of this inflammatory response, major laboratory abnormalities, such as leukocytosis and hyperglycemia, can be identified in patients with pesticide poisoning

(5–8). When the differential count of leukocytes is evaluated during the acute inflammatory response to oxidative stress, it is characterized by an increase in neutrophil counts, an increase in monocyte counts, and a decline in lymphocyte counts (9,10). The ratio of neutrophil-lymphocyte also can be used as an additional inflammatory marker. In recent studies, it has been reported that the neutrophil-lymphocyte ratio is a sensitive inflammatory and prognostic marker in various clinical conditions including sepsis, cardiac disorders, stroke, and acute appendicitis (9–13). Due to the similar inflammatory mechanism in the pathophysiology of pesticide poisoning, the counts of leukocytes, neutrophils, and lymphocytes, and the neutrophil-lymphocyte ratio can be used as prognostic markers in predicting the severity of pesticide poisoning.

The aim of this retrospective study is to investigate the prognostic value of the neutrophil-lymphocyte ratio and other hematological parameters measured within the first 24 h after admission to the emergency department (ED) in patients with pesticide poisoning.

MATERIALS AND METHODS

The study was conducted in compliance with the guidelines of the Declaration of Helsinki and was approved by the local ethics committee.

Patients

This retrospective observational study was conducted in the EDs of a university hospital and a training and research hospital. All patients (≥ 15 years old) admitted to both EDs for pesticide poisoning from July 2008 through February 2013 were enrolled in the study.

The diagnosis of acute pesticide poisoning was based on the history of exposure to or contact with a pesticide, the presence of characteristic clinical signs and symptoms of pesticide poisoning, improvement of signs and symptoms with administration of atropine and oximes, and decreased serum cholinesterase activity for organophosphate poisoning. Patients with pregnancy, cancer, hematological disease, or trauma were excluded from the study.

Treatment Protocol

All patients were treated with standard protocols. Initial decontamination procedures were carried out, including removal of all clothing, washing the entire body with soap and water, gastric lavage, and activated charcoal. The patients with cholinergic symptoms such as lacrimation, salivation, diaphoresis, and with decreased serum cholinesterase levels were treated with intravenous atropine and pralidoxime.

Study Protocol

The written and electronic medical charts of patients were reviewed. Demographic data, type of pesticide, route of exposure, physical examination findings, serum cholinesterase levels, and complete blood count (CBC) results (leukocyte, neutrophil, lymphocyte, monocyte, eosinophil, basophil, platelet counts, and hemoglobin) within the first 24 h after admission to the ED, mechanical ventilation requirement, length of stay in hospital, and outcomes were recorded using standard data collection forms. The data collection forms were completed by one investigator at each of the two centers, and the accuracy of the data was verified by a third independent investigator. Neutrophil-lymphocyte ratio and platelet-lymphocyte ratio were calculated using absolute neutrophil, lymphocyte, and platelet counts.

Mechanical ventilation requirement and mortality were used as the primary endpoints. Patients were divided into two subgroups, mechanically ventilated and nonventilated, for analysis. Patients were also divided into two subgroups, survivors and nonsurvivors. The hematological parameters were compared between the groups.

Statistical Analysis

All statistical analyses were performed using SPSS 16.0 software (SPSS Inc, Chicago, IL). Descriptive statistics were computed for all variables. Quantitative variables were expressed as mean \pm standard deviation and categorical variables were expressed as number of cases (percentage).

All data were analyzed for normality. The differences between the groups were compared using the Student's *t*-test for normally distributed quantitative variables and the Mann-Whitney *U* test for nonnormally distributed quantitative variables. The control for multiple comparisons was made by using Bonferroni correction, and *p* value < 0.005 was considered significant. The differences between the groups were determined using the chi-squared test and Fischer's exact test for categorical variables.

Receiver operating characteristic (ROC) analyses were used to determine the power of parameters in predicting mechanical ventilation requirement and mortality. The optimal cut-off values for each parameter were determined by using Youden's index (sensitivity + specificity - 1). Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy rate were calculated for those cut-off values.

RESULTS

In this retrospective study, the charts of 209 patients admitted to EDs due to pesticide poisoning from July

Download English Version:

<https://daneshyari.com/en/article/3246191>

Download Persian Version:

<https://daneshyari.com/article/3246191>

[Daneshyari.com](https://daneshyari.com)