Analysis of Food Toxin Trends in the Federation of Bosnia and Herzegovina Over Five Years Period

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ABSTRACT

Introduction: Alimentary toxoinfections represent a significant public health problem. Globalization of the market and food production, significant impoverishment of a large part of the population, and traditional approach with food preparation and consumption, cause a significant increase in the rates of population infections around the world. The epidemiological surveillance of the illness occurrence plays a significant role in monitoring and controlling the population’s burden of diseases caused by unhygienically prepared and stored food. Aim: The aim of the article is to determine the rates and trends of food related diseases in the Federation of Bosnia and Herzegovina. Results: The results of the analysis have shown that the rate of illness in the Federation of Bosnia and Herzegovina is declining but is still significantly higher than in developed western countries. Particularly great burden is on the population of the Zenica-Doboj Canton (ZDC), which can be due to the traditional relation to the preparation and storage of food, as well as to the relatively poorer economic situation in ZDC. Conclusion: We can conclude that the strengthening of the monitoring system, laboratory capacities, the availability of monitoring guides will enable responsible FBiH/ Bosnia and Herzegovina institutions to better control and implement safer food practice. Key words: food poisoning, salmonella, epidem-ics.

1. INTRODUCTION

After consuming hygienically defective food or water, digestive tract diseases may occur, which manifest themselves in the form of acute gastroenterocytosis, which are caused by bacteria and viruses or bacterial toxins. According to the mechanism of action, we can classify them as: Alimentary infections, which occur after the intake of a sufficient number of live microorganisms that multiply in the digestive tract and thus cause invasive infection; Toxoinfections that occur after the introduction of hygienically incorrect food containing living microorganisms into the digestive tract, which those in the digestive tract are multiplied and produce toxins that damage individual organs; Food poisoning resulting from the ingestion of specific toxins produced by bacteria in contaminated food.

The clinical picture of these illnesses depends on the type and the infectious dose of the pathogen. The infectious pathogen or toxin dose depends on the immunological status of the host and the pathogen’s natural pathogen potential (1). An infectious dose is reduced if the pathogen enters the digestive tract by liquid food because it passes very quickly through the gastric barrier or is introduced with food that neutralizes stomach acid (milk or cheese). Bacteria that cause toxoinfections first colonize the mucus surface of the digestive tract and then begin production of exotoxins in the intestine. The toxins produced have their toxic effects induced on local cells or tissues, and in some cases, they penetrate the bloodstream and cause systemic disease. Examples of such toxins are cholera toxins produced by Vibrio cholerae, enterotoxin by E.coli and Clostridium perfrigens. In some cases, toxins kill polymorphonuclear leukocytes, which helps develop and spread bacteria by developing a gas gangrene as with Clostridium species. Bacteria produce two types of toxins. Exotoxins are secreted into the environment or they are released by the lysis of bacteria such as Botulinum toxins or Sigel toxins. Endotoxins are part of the cellular structure of bacteria and are released only when bacteria are destroyed. Some
Table 1. Toxiinfectio alimentaris (infectious food poisoning unknown cause), number of diseased and morbidity per 100,000 inhabitants, in the period 2010 -2014 in the Federation of Bosnia and Herzegovina.

| Canton            | 2010 N | Mb | 2011 N | Mb | 2012 N | Mb | 2013 N | Mb | 2014 N | Mb |
|-------------------|--------|----|--------|----|--------|----|--------|----|--------|----|
| Una-Sana          | 23     | 7.99| 21     | 7.30| 24     | 8.34| 7      | 2.43| 7      | 2.44|
| Posavina          | 3      | 7.59| 0      | 0   | 0      | 0   | 0      | 0   | 0      | 0   |
| Tuzla             | 60     | 12.02| 63     | 12.62| 31     | 6.21| 16     | 3.21| 41     | 8.21|
| Zenica-Doboje     | 486    | 121.46| 382    | 95.53| 368    | 92.12| 231    | 57.94| 233    | 58.57|
| Bosnia-Podrinje   | 0      | 0   | 0      | 0   | 0      | 0   | 0      | 0   | 0      | 0   |
| Middle Bosnia     | 9      | 3.54| 26     | 10.24| 5      | 1.97| 10     | 3.95| 11     | 4.36|
| Herzegovina-Neretva | 21   | 9.32| 14     | 6.22| 15     | 6.68| 15     | 6.68| 5      | 2.23|
| West Herzegovina  | 1      | 1.23| 1      | 1.23| 3      | 3.68| 1      | 1.23| 0      | 0   |
| Sarajevo          | 69     | 15.80| 178    | 40.57| 199    | 45.15| 165    | 37.27| 126    | 28.32|
| Canton 10         | 0      | 0   | 0      | 0   | 0      | 0   | 0      | 0   | 0      | 0   |
| FBiH              | 672    | 28.75| 685    | 29.30| 645    | 27.58| 445    | 19.04| 423    | 18.10|

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2. GOAL
Identify the number of reported food toxicoinfections and salmonellosis in the Federation of Bosnia and Herzegovina and by cantons from 2010 to 2014;
Calculate rates of illness per 100,000 inhabitants and determine the trend of disease progression.

3. MATERIAL AND METHODS
This is a descriptive, analytical, epidemiological, retrospective study, which analyzes the collected data from the FBiH Public Health Institute for reported cases of food toxicoinfections and salmonellosis, grouped by cantons for the period from 2010 to 2014. Also presented are reported epidemics of food toxicoinfections and salmonellosis for the aforementioned period.

Statistical analysis
The material was processed by calculations for descriptive analysis. The rates of illness per 100,000 inhabitants were calculated, and the results were presented in tables suitable for comparison and on charts showing the relationships and trends of the cases.

4. RESULTS
A list of registered cases of food poisoning (Toxiinfectio alimentaris) in the period from 2010 to 2014, in the Federation of Bosnia and Herzegovina. In the period, 2010-2014, a total of 2870 cases of contagious food poisoning have been reported to the Public Health Institute, the cause of which is unknown (Toxiinfectio alimentaris). The highest morbidity was registered in 2011 (29.3/10000) and the lowest in 2014 (18.1/10000) (Figure 1).

Table 2 shows that the highest number of patients with the highest morbidity per 100,000 inhabitants was registered during the observed years at the ZDC with the highest number in 2010 and amounted to 121.4.

The majority of patients are registered in the Sarajevo Canton, the number of patients ranging from 89-246 of the population with the morbidity of 20,01% to 56,07%.

By presenting the results in Table 3, we notice that there is no difference in morbidity compared to the sex of the respondent.

A total of 11 epidemics of contagious food poisoning were reported. Epidemics were reported in Una-Sana, Zenica-Doboj and Sarajevo Cantons. The largest number was reported in 2010 (6 epidemics).

Table 5 shows that the largest number of reported epidemics caused by food poisoning were recorded in 2010, a total of 6 epidemics.

5. DISCUSSION
Alimentary toxicoinfections represent a major public health problem, which imposes the establishment of acceptable standards in the chain of production, control, distribution and use of food products. These are the result of hygieni-
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cally incorrect preparation, storage and consumption of food products. Hygienic defective paths can be due to the tradition, ignorance or lack of certain technologies, i.e. the socioeconomic inability to comply with acceptable standards in relation to food products.

As a result, epidemiological surveillance of the occurrence of these diseases is very important both as a condition indicator and as an alarm to take certain activities to eliminate unwanted factors and take preventive action. For the purpose of epidemiological surveillance of the situation in FBiH, the Act on the Protection against Infectious Diseases stipulates that every case of a food-borne illness must be recorded (reported) in the control chain at health facilities. Salmonellosis is reported as a particular clinical entity. Analyzing data from the FBiH Public Health Institute we found that in the period 2010-2014 was reported a total of 2870 cases of contagious food poisoning, the cause of which is unknown (Toxiinfectio alimentaris). The highest morbidity was registered in 2011 (29.3/10000), and the lowest in 2014 (18.1/10000) (Figure 1). A total of 11 epidemics of contagious food poisoning were reported. Epidemics were reported in Una-Sana, Zenica-Doboj and Sarajevo Canton. The largest number was reported in 2010 (6 epidemics). The analysis of laboratory-isolated pathogens reveals that among the isolated pathogens, salmonella is most common. Although the number of reported laboratory infectious pathogenic agents cannot be directly compared with the number of reported cases of illness (cloning, repeated trials), laboratory results confirm that the low incidence of some etiologic entities is not the consequence of low reporting rates (6).

Analyzing the data from Table 1, we can see that the rate of illness is highest in Zenica-Doboj and Sarajevo Cantons and that the rate in Zenica-Doboj Canton significantly decreases from 2010 to 2014. While in the developed western society there has been a noticeable increase in the rate of illness, whether the FBiH has experienced a trend of falling rates due to the global food market or the economic repression of neoliberal capitalist planning (7,8). This downward trend can be explained by the establishment of stronger mechanisms for controlling production, transport and consumption of food by setting standards of European Union in this area. Although there is a trend of decline in food infections in FBiH, the rate of illness is still higher than in the Western European countries.

6. CONCLUSION

- There has been a noticeable decrease in the rate of illnesses in the food caused infections in the FBiH, and
especially in ZDC;

- In FBiH data are analyzed weekly and are presented through monthly/annual Bulletin (web and regular e-mail, Cantonal institutes of public health);
- Data analysis points to routine monitoring weaknesses: complex reporting, weaknesses in reporting, difficulty in obtaining accurate data, weakness of laboratory diagnostics;
- Weaknesses in coordinating activities across different sectors.

**Recommendation:** Strengthening the monitoring system, laboratory capacities, and the availability of surveillance guides will enable FBiH/BiH to be an equal member of the international network for the control of food infections.

- Conflict of interest: None
- Author Contribution: All authors participated in each step of article.
- Salih Tandir revised it critically and gave final approval of the version to be submitted.

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