Investigation of Health Effects of Current Levels of Environmental Sanitation and Hygienic Living Conditions of Rural Population in the Municipality of Zenica

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The aim of this article is to investigate and identify all the relevant ways of epidemiology significance for transmitting infectious diseases in the existing unsatisfactory hygienic and sanitary conditions in rural areas of the municipality of Zenica, which are positively correlated with occurrence and spread of infectious intestinal diseases. The study was conducted in seven rural localities of Zenica municipality where the dominant livestock are sheep and cows, and the population is mostly dealing with individual production of cheese and milk. This research aimed to examine and identify the conditions favoring life as the primary issues that affect the increase in the risk of and maintenance of intestinal infectious diseases such as: the level of environmental sanitation in investigated villages, sanitary and hygiene habits of families living in the villages studied, ratio of population to personal hygiene, health safety of water supply, hygienic disposal of fecal waste and waste generated in the breeding of animals. The study included the monitoring and statistical analysis of the epidemiological situation in the values of average prevalence rates of the intestinal infectious diseases in the 1000 inhabitants of each village studied. The study identified five major negative epidemiological indicators that have a major impact on the appearance and maintenance of intestinal infectious diseases. The leading indicator is a negative relationship and personal hygiene attitude in the broader sense, the pending state of water supply, sanitary toilets and unresolved rubbish dump with a negative attitude and stance toward general hygiene. Identified are all the relevant ways of epidemiology importance that are positively correlated with occurrence and spread of infectious intestinal disease. Investigations of the epidemiological situation regarding the occurrence of intestinal infectious disease in the study population showed that intestinal infectious diseases in the investigated area is constantly maintained and that the average prevalence rate is shown suffering intestinal infectious diseases in the 1000 inhabitants significantly higher than the prevalence of these diseases in the urban area where they can be identified in a significant number of negative epidemiological indicators. Key words: health effects of current levels of environmental sanitation, hygienic living, Zenica Canton.

1. INTRODUCTION

In the distant human history it was known that there is a positive correlation between the level of sanitation, hygiene and sanitary living conditions with occurrence of infectious disease among people living in that area. By improving the general hygienic conditions in rural areas, with solving the problem of so called basic hygiene (supply of safe water, population health, hygiene disposition of waste materials including those of human and animal origin, improving housing conditions always resulted in reducing the incidence of intestinal infectious diseases and all diseases that occur in contact with excretions and secretions of infected patients suffering from human and animal diseases transmitted by vectors outside the environment. Many previous studies have shown that the inhabitants of rural villages that are supplied with sufficient quantity of healthy safe water, satisfactory hygiene in the disposition of waste materials, the rate of intestinal diseases disease is low. The studies implemented by the WHO in the South American countries have shown that the number of diarrhea syndromes increases with decreasing levels of sanitation in rural areas. The health effects are mostly noticed in terms of non-compliance with the principles of hygiene and public sanitation without prejudice to the higher level cannot be reduced epidemiological risks for maintenance and transmission of infectious diseases (1,2,3,4).

Epidemiological Service at the municipal level register periodically at intervals not exceeding one year epidemic episodes of infectious diseases that can be linked to persistent unsatisfactory hygienic conditions of life, because they are from the epidemiological point of view the security risk and very suitable for the propagation of the cause of intestinal infectious diseases and main-
taint disease in these areas. These outbreaks are usually passing the alimentary toxico-infections or enteritis (5,6).

Today, there is epidemiological classification of infectious diseases of bacteriological and viral etiology whose propagation in the non-hygienic environment is multiply increased, resulting in increased suffering and intestinal infections. Hygienic living conditions of rural populations are epidemiologically significant. Analysis of rates of intestinal infectious diseases is important and serves to review the epidemiological vulnerability of these diseases among the residents who live in unfavorable sanitary conditions. Epidemiological studies have shown that with an acute bacterial disease epidemic occurring endangered environment and infectious disease of viral etiology (viral enteritis, viral hepatitis A, HFRS, etc.)

2. GOAL

The survey aims to examine and determine the most negative epidemiological indicators associated with low levels of environmental sanitation, inadequate hygiene conditions of living in rural areas and inadequate hygiene habits of the population with negative attitude towards personal and general hygiene and to determine the risk level for health safety of the rural population in connection with the appearance of intestinal infectious diseases. To determine differences in the level of sanitation and hygiene practices in communities in certain villages.

To investigate whether there is a positive correlation between low levels of rural sanitation, unhygienic living conditions of rural population with the incidence of intestinal infectious diseases among the population who live there. To investigate the rate of illness from intestinal infectious diseases and epidemiological threats to population of individual investigated villages.

Based on the obtained results, we will determine the measures to increase the level of hygiene and hygienic villages awareness of the population that lives there, which will result in a favorable epidemiological situation regarding the occurrence and maintenance of intestinal infectious diseases

3. MATERIAL AND METHODS

The study covered the period since 2000 to 2006. The retrospective study included:

- Examination of sanitary and hygienic conditions and all negative epidemiological indicators, which are important for the maintenance and expansion of intestinal infectious diseases at the seven villages in municipality Zenica.

- The research involved developing and testing rates of intestinal infectious diseases by statistical analysis of data from the records of stroke morbidity from infectious diseases for that period in the municipality of Zenica. Methods: A positive correlation between unsatisfactory hygienic living conditions of rural villages with the population studied with the incidence of intestinal infectious disease in this population is tested.

- The tested sample included seven villages located on the mountain area of Zenica municipality in which have 1590 households with 7020 inhabitants, who are mostly engaged in cattle breeding with a dominant breeding of sheep and goats, and where the population mainly deals with individual production of cheese and milk.

- In examining the hygienic sanitary condition survey was used which is appropriate and gives the answer to many questions in the study of hygienic conditions of life, compared to the population of the villages studied personal hygiene, sanitation and hygienic living environment of rural areas. The survey was adapted for testing and processing surveyed data for this type of research. The study rates of intestinal infectious diseases are carried out statistical analysis of data from the records of infectious diseases for that period in the municipality of Zenica.

4. RESULTS

The results of these studies emphasize the favoring conditions of life affecting the increased risk for occurrence and maintaining of intestinal infectious diseases in the studied rural areas.

The results are shown in Tables 1, 2, 3, 4, 5, 6 and 7

Name of the settlement, their position relative to the city, locality, deployment, communication with the city and state of the roads are shown in Table 1

The basic questions in the survey:
- obligation, a way of washing and drying hands,
- frequency and method of washing the body,
- bath at least once a week
- mandatory hand washing after carrying out emergency work after the cattle,
- hand-washing before meals and before beginning of milking cattle and making cheese

Score of responses for the assessment of good hygiene habits and attitude towards personal hygiene must have been 5, meaning that the person has to answer to all questions positively would be classified as one with good hygiene habits. Using these criteria results were obtained by interviewing hygiene habits and attitude towards personal hygiene. The results of this survey show that respondents surveyed in seven villages have poor hygiene habits and attitude towards personal hygiene. Less than half of surveyed 2473 or 35.22% of baseline have developed hygienic habits and a positive attitude towards personal hygiene. The high number 4547 respondents or 64.78% of the total number of respondents, according to investigative criteria score has poor hygienic habits (Table 2).

The basic questions in the survey:
- manner to maintain living hygiene
- removal of fecal material originating from humans
- treatment of fecal waste water
- hygienic state of toilets,
- hygienic state of rubbish dump
- hygienic removal of solid waste

Negative epidemiological indicators act in multiple fragments but each of them individually, negatively affects the epidemiological situation regarding the occurrence of intestinal infectious diseases. Leading negative indicators that relate to the general hygiene in households in the trials were identified and analyzed the percentages of the total impact of sanitary and hygienic condition. Test results showed that the hygienic quality of water in the investigated villages does not receive enough attention. The tests showed that the water is not controlled on the microbial often enough, i.e. does not control the quality of water supply in terms of health control of water. Test results showed that with the construction of rural water facilities does not take into account the compliance of sanitary protection zones in the narrower basin. The
amount of water you have available to residents is not sufficient.

Negative epidemiological indicators act in multiple fragments but each of them individually, negatively affects the epidemiological situation regarding the occurrence of intestinal infectious diseases. Leading the negative indicators that relate to the impact of general hygiene in the households was identified in experiments and analyzed the percentages influence on the overall hygienic sanitary condition. Relationship and attitude towards personal hygiene in the broadest sense is a worrying and negative is projected on the epidemiological situation in the villages with low levels of environmental sanitation. Sanitary and hygienic toilets unresolved

Table 1. General information about the studied villages in the municipality of Zenica

<table>
<thead>
<tr>
<th>Settlement name</th>
<th>No. Of inhabitants</th>
<th>No. Of households</th>
<th>Type of settlement and location Grouped as mountain, plain</th>
<th>Distance to municipality Government</th>
<th>Distance to nearest health facility</th>
<th>Distance to nearest grammar school</th>
<th>Road communication and their state</th>
<th>No. Of new houses under 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>JASTREBAC</td>
<td>450</td>
<td>95</td>
<td>Mountain, plain</td>
<td>30 km</td>
<td>12 km</td>
<td>12 km</td>
<td>poor</td>
<td>3 %</td>
</tr>
<tr>
<td>VUKOTICI</td>
<td>900</td>
<td>160</td>
<td>Mountain, plain</td>
<td>32 km</td>
<td>14 km</td>
<td>14 km</td>
<td>poor</td>
<td>4 %</td>
</tr>
<tr>
<td>KOLICI</td>
<td>210</td>
<td>60</td>
<td>Mountain, plain</td>
<td>26 km</td>
<td>8 km</td>
<td>8 km</td>
<td>poor</td>
<td>3 %</td>
</tr>
<tr>
<td>SERICI</td>
<td>1520</td>
<td>320</td>
<td>Mountain, plain</td>
<td>33 km</td>
<td>15 km</td>
<td>15 km</td>
<td>good</td>
<td>12 %</td>
</tr>
<tr>
<td>ORAHOVICA</td>
<td>2560</td>
<td>595</td>
<td>Mountain, plain</td>
<td>24 km</td>
<td>6 km</td>
<td>6 km</td>
<td>good</td>
<td>21 %</td>
</tr>
<tr>
<td>STARINA</td>
<td>750</td>
<td>180</td>
<td>Mountain, plain</td>
<td>25 km</td>
<td>7 km</td>
<td>7 km</td>
<td>good</td>
<td>7 %</td>
</tr>
<tr>
<td>BISTRICA</td>
<td>630</td>
<td>180</td>
<td>Mountain, plain</td>
<td>27 km</td>
<td>9 km</td>
<td>9 km</td>
<td>good</td>
<td>6 %</td>
</tr>
</tbody>
</table>

Table 2. Testing of personal hygiene and hygienic habits

<table>
<thead>
<tr>
<th>Settlement name</th>
<th>No. Of persons with good hygiene habits</th>
<th>Persons with poor hygiene habits</th>
</tr>
</thead>
<tbody>
<tr>
<td>VUKOTICI</td>
<td>233</td>
<td>667</td>
</tr>
<tr>
<td>KOLICI</td>
<td>30</td>
<td>180</td>
</tr>
<tr>
<td>SERICI</td>
<td>508</td>
<td>1011</td>
</tr>
<tr>
<td>ORAHOVICA</td>
<td>1286</td>
<td>1274</td>
</tr>
<tr>
<td>STARINA</td>
<td>275</td>
<td>475</td>
</tr>
<tr>
<td>JASTREBAC</td>
<td>51</td>
<td>399</td>
</tr>
<tr>
<td>BISTRICA</td>
<td>90</td>
<td>540</td>
</tr>
<tr>
<td>UKUPNO</td>
<td>2473</td>
<td>4547</td>
</tr>
</tbody>
</table>

Table 3. Examination of the general hygienic conditions of life

<table>
<thead>
<tr>
<th>Settlement name</th>
<th>No. Of persons with favorable hygiene conditions</th>
<th>No. Of persons with unfavorable hygiene conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>VUKOTICI</td>
<td>18</td>
<td>142</td>
</tr>
<tr>
<td>KOLICI</td>
<td>13</td>
<td>47</td>
</tr>
<tr>
<td>SERICI</td>
<td>65</td>
<td>255</td>
</tr>
<tr>
<td>ORAHOVICA</td>
<td>265</td>
<td>330</td>
</tr>
<tr>
<td>STARINA</td>
<td>62</td>
<td>118</td>
</tr>
<tr>
<td>JASTREBAC</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>BISTRICA</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>UKUPNO</td>
<td>533 or 33.11%</td>
<td>1057 or 66.89%</td>
</tr>
</tbody>
</table>

4.1. Incidence rates of intestinal infectious diseases in the seven rural settlements examined in municipality Zenica

In all villages, it is necessary to monitor and analyze epidemiological situation regarding infectious diseases, especially the rates of intestinal infectious diseases. The intestinal infectious diseases are one of many infectious diseases of different etiology, whose common feature is fecal oral chain. For these diseases there is a general sensitivity. Reservoir and source of the disease is infected people with typical, atypical and mild cases of the disease, as well as not obvious cases, carriers, convalescents and contacts, which are excreted in urine and feces causes that in the middle non-hygienic environment are easily transmitted and long maintained, and sometimes cannot be controlled under control. Besides the human reservoir the source of these diseases are also animals, particularly where people in the cattle stay close to the cattle.

This research relates to testing and analysis of the average prevalence rate of intestinal infectious diseases among residents of seven rural settlements of Zenica municipality in order to establish a positive correlation between low levels of sanitation environment of rural settlements, a negative attitude towards personal hygiene and unfavorable hygienic living conditions with a high rate of intestinal infectious in population that lives there.

The study involved monitoring and statistical analysis through the analysis of the value of the average prevalence rate of illness from intestinal infectious diseases in the 1000 population of each village studied for a period of 2000 until 2006.

4.2. Changes in developing salmonellosis and gastroenterocolitis

In the area studied seven villages in the period from 2000 until 2006 was registered 40 persons suffering from salmonellosis and 504 affected individuals from gastroenterocolitis. The average prevalence in the study period was for salmonellosis 5.76 per 1000 inhabitants.
habitants, and gastroenterocolitis 71.79. Prevalence rate during the study period was different in relation to population morbidity in examined seven villages (Table 4).

Between the average prevalence rate of illness from salmonella and gastroenterocolitis in the study period among residents of seven villages of rural areas there is a significant statistical difference (p<0.01).

These studies showed that in the overall structure average prevalence rate of infectious diseases in for gastroenterocolitis in period 2000-2006 makes in the structure of these diseases is 50.2% or 504 patients. One of the epidemiological surveillance of gastroenterocolitis problem is that in routine etiology it cannot be found in no more than 15% of cases of disease, and given the large epidemiological problems for quality control of these diseases we should develop better diagnostic.

4.3. Developing of foodborne toxicoinfections

The prevalence of foodborne illness toxicoinfections from 2000-2006 in investigated seven villages per 1000 inhabitants.

Tests have revealed major differences in the rates of illness among the population studied in seven villages. On the basis of epidemiological, clinical and laboratory methods we isolated the causative agent in 24.6% of respondents, not for the rest. The most common pathogens isolated were Clostridiae perfringens and Staphylococcus aureus in the occurrence of 12.5%, and Bacillus cereus. Compared to the average rate of foodborne illness among the population toxicoinfections in seven villages analyzed on trends in disease during 2000-2001 there is a significant statistical difference (p<0.001)

4.4. Development of viral hepatitis type A

The average rate of illness among residents of seven villages studied from viral hepatitis A during 2000-2006 was quite high and amounted to 9.40 per 1000 inhabitants or a total of 66 patients (Table 6). The results of these tests showed that the average prevalence rate of VHA patient population who live in seven different villages exist significant statistical difference p<0.01. There was a significant difference in the number of patients with VHA between the various rural villages.

4.5. Development of bacterial dysentery

These study have shown that compared to the average level of prevalence rates of bacterial dysentery during the period 2000-2006 between the seven villages studied there were significant statistical difference (p<0.01). The average rate of illness among residents of seven villages studied from bacterial dysentery during 2000-2006 was high and amounted to 2.49 per 1000 inhabitants (Table 7).

5. DISCUSSION

High rates of intestinal infectious diseases as a result of scarce environmental sanitation in rural areas and the negative attitude towards personal and general hygiene of the inhabitants of these areas is a characteristic picture of getting sick in many developing countries (7,8,9,10,11). Only by providing healthy safe water, hygienic removal of human and animal excreta, a positive attitude towards personal hygiene in general can reduce or eliminate the occurrence of intestinal infections. These studies indicate that the remote rural municipalities have prevailing health problems supplying safe drinking water, unsanitary disposal of liquid and solid waste, negative attitude toward personal and general hygiene. Leading negative indicators that relate to the impact of general hygiene in the households were identified in experiments and analyzed as percentages influence on the overall hygienic sanitary condition. The leading negative indicator of the state is inadequate water supply.

In the investigated area population is mainly getting water from local water supply, and less than half of the water facilities have protected sources. Since only a small percentage of water facilities provide continuous supply of healthy the problem of safely control comes to the fore, because a high percentage of water facilities do not control the water. Sanitary problematic toilets and the state of toilets and the rubbish dump is also a significant negative epidemiological indicator. In 70% of household toilets were unhygienic, disposal of excreta of people do not meet the health security. The treatment of waste materials arising from the cattle in a rural area (rubbish dump) is a very risky for health. 77% of rubbish dump in the investigated area is hygienically unregulated. Current status is a significant impact on the health security of housing because they are contaminating the free surface and roads in settlements. Removal of solid waste in a large number of households is not solved in hygienic manner. 47% of household rubbish is thrown on the banks of streams. 23% of households throw trash on free surfaces, 9% have sanitary landfill rough, and only 21% of households have sanitary landfill equipped.

The results of this study show that residents of seven villages studied have poor hygiene habits and attitude towards personal hygiene. Only 2473 respondents or 35.22% of total persons surveyed have developed hygienic habits and a positive attitude and the attitude towards personal hygiene. The high number of respondents 4547 or 64.78% of the baseline according to investigative criteria score has a poor hygiene habits (Table 2). Testing environmental sanitation and hygienic liv-
ing conditions in settlements where the number of new houses increased significantly in comparison to other resorts shows that with the newer houses hygienic state still does not satisfy the conditions of health security in full because a significant number of toilets in these houses is unhygienic (24%) but there are indicators that suggest the fact that in raising rural settlements in recent times there is a tendency that the new knowledge and culture of the rural population significantly help in the fight against old and bad habits.

Negative parameters that were determined in these trials have multi fragment influence on the occurrence of risk and the possibility of the spread of infectious intestinal disease and are of great influence on the rate of illness from these diseases. Negative epidemiological indicators act as multi fragments but each of them individually affects the epidemiological situation regarding the occurrence of intestinal infectious diseases.

In all villages it is necessary to monitor and analyze epidemiological situation regarding infectious diseases, especially the rates of the intestinal infectious diseases. Intestinal infectious disease is one of many infectious diseases of different etiology whose common feature is fecal oral chain. For these diseases there is a general sensitivity. Reservoir and source of the disease is infected people with typical atypical and mild cases of the disease as well as not obvious cases, carriers, convalescents and contacts which excreted in urine and feces causes that in the non-hygienic environment are easily transmitted and long maintained and sometimes cannot be brought under control. Besides the human reservoir the source of these diseases are also animals particularly where people lives close to the cattle.

This study examines the epidemiological situation and analyzed statistically by the value of the average prevalence rate of intestinal infectious diseases among residents of seven rural village of Zenica municipality in order to establish a positive correlation between low levels of sanitation environment of rural settlements, a negative attitude towards personal hygiene and sanitation conditions of unfavorable life with a high rate of intestinal infectious disease among population that lives there.

The average prevalence rate of illness is shown by these infectious diseases in the 1000 inhabitants, so it was comparable to rates of illness in all seven investigated villages where 7020 residents live. The tests showed that the average prevalence in the study period among respondents from village to village of salmonellosis was 5.76 per 1000 inhabitants. The average prevalence of gastroenterocolitis 71.79 per 1000 inhabitants. Between the average prevalence rate of salmonellosis and gastroenterocolitis among residents of seven villages there is a significant statistical difference (p<0.01). Test results showed high variability in the average prevalence of gastroenterocolitis in seven villages studied. The average prevalence for the examined period for food toxic infections among residents of seven villages studied showed significant statistical difference (p<0.01) highest average prevalence of this disease in the trials was registered among the inhabitants of the village Kolici 97.62% and the lowest rate among residents of villages from Serici where it was during the study period 36.84%.

6. CONCLUSION

In the studied villages of municipality Zenica existing level of environmental sanitation, hygienic living conditions and the negative attitude of the village population to their personal hygiene and hygienic habits is a security risk to the health of the rural population in connection with the development of intestinal infectious diseases.

There are differences in the level of environmental sanitation hygienic living conditions and hygiene practices of tested inhabitants of the villages between the various villages examined in relation to distance, village age, road communication of rural settlements and socio-economic conditions of the population of these villages and were positively correlated with the prevalence of intestinal infections.

The research results of the average prevalence rate of intestinal infectious diseases in seven villages have shown that these diseases are held in the studied environment in endemic form and is positively correlated with rural sanitation, which represents a constant risk of transmitting pathogens and maintenance of intestinal infectious diseases in the course of individual milk and cheese production, as these foods can be classified into high-risk foods.

Results of these tests will be a guideline and will help in putting the negative epidemiological indicators under control if not eliminate the possibility of these factors need to be partially removed is reduced.

The level of environmental sanitation and hygienic living conditions of rural populations are epidemiologically significant and has so with aim of preventing the risk of occurrence and maintenance of intestinal infectious diseases required is:

Continuous analysis of the rates of the intestinal infectious diseases because it serves to review the epidemiological hazards of infectious intestinal diseases, Hygienic-epidemiological service of primary health care centers should carefully monitor and study to encourage the maintenance of cleanliness and hygienic conditions of the life conditions of rural populations, Solve the problem of communal hygiene in the villages through organized group structure of financing the construction of sewers and water facilities with adequate water protection zones and to have continuous chemical and microbiological control of water, Inspection services to carry out administrative supervision over all activities and to examine and sanction organizations, institutions and individuals who do not respect the legislation on environmental protection.

REFERENCES