

Spread of *Clostridium botulinum* in the soils of Georgia

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Objective

The main focus of this study was to study the spread of botulism in Georgia and the biological characteristics of the strains of *Clostridium botulinum* isolated from territories in the country.

Introduction

Accumulation of *C. botulinum* in soil occurs through excretion of bacterial spores from the intestines of humans, animals, birds and fish. In Georgia, during the winter season, the population consumes homemade vegetable preserves, which are made of locally produced (as well as imported) vegetables. Historical surveys confirmed that the presence of *C. botulinum* in the soil is widespread. Some researchers consider *C. botulinum* a characteristic component of soil flora.

Methods

Soil samples were collected from areas, where from 2001-2002 cases of botulism caused by homemade vegetable preserves (produced from vegetables cultivated in those areas) were registered. Soil samples were collected from Kakheti, Shida Kartli, Kvemo Kartli, Samtkhe-Javakheti, and Samegrelo regions. Standard bacteriology and PCR were used to confirm the presence of *C. botulinum* from soil samples. Separation of strains and their examination was conducted in accordance with the scheme provided by the CDC Atlanta Reference Laboratory (USA), which was later tested by NCDC. Toxigenicity and toxin production of strains were tested using a biotest on white mice.

Results

In total, 258 soil samples were tested, from which, 40 (15.5%) cultures of *C. botulinum* type B were obtained. Toxigenicity and toxin production were confirmed through biotests. These results confirm the presence of *C. botulinum* in agricultural lands, which causes contamination of vegetables cultivated on those lands, which are used for the preparation of homemade preserves, causing botulism in humans.

Conclusions

For the purpose of finding solutions to botulism, it is essential to verify the ecology of the pathogen through establishing the prevalence of bacteria in different soil types. It was shown that some areas of Georgia, where vegetable growing is greatly developed, and which, are the main sources of crops, are highly contaminated with *C. botulinum*. In Georgia, land used for agriculture is contaminated with *C. botulinum*. *C. botulinum* type B was isolated from 40 cultures obtained from 258 soil samples, which represents contamination in 15.5% of sampled areas. These results suggest that vegetables and melons may be highly contaminated as well. All cases of *C. botulinum* in humans that were researched were connected to homemade canned vegetables.

Keywords

C. botulinum; Soil; Spores; Strains

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