

AN OUTBREAK OF SHIGELLA DYSENTERIAE IN SWEDEN, MAY–JUNE 2009, WITH SUGAR SNAPS AS THE SUSPECTED SOURCE

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We report an outbreak of *Shigella dysenteriae* type 2 infections during May–June 2009 in Sweden, involving 47 suspected cases of whom 35 were laboratory-confirmed. The epidemiological investigation based on interviews with the patients pointed at sugar snaps from Kenya as the source. *Shigella* was not detected in samples of sugar snaps. However, *Escherichia coli* was confirmed in three of four samples indicating contamination by faecal material. During April to May 2009 outbreaks with *Shigella* connected to sugar snaps from Kenya were reported from Norway and Denmark. In the three countries trace back of the indicated sugar snaps revealed a complex system with several involved import companies and distributors. In Sweden one wholesale company was identified and connections were seen to the Danish trace back. These three outbreaks question whether the existing international certification and quality standards that are in place to prevent products from contamination by faecal pathogens are strict enough.

Introduction

Shigellosis is a notifiable disease in Sweden. Annually approximately 500 cases are notified to the Swedish Institute for Infectious Disease Control (Smittskyddsinstitutet, SMI) and about 20% are domestic cases. The majority of the *Shigella* strains are sent to SMI for verification and further typing. Most of the cases are caused by *Shigella sonnei*. Cases with *Shigella dysenteriae* are rare in Sweden. In average five cases are reported each year, including domestic cases and cases infected abroad.

On 10 June 2009 the laboratory at SMI detected six domestic cases of *Shigella dysenteriae* from four different counties and informed the department of epidemiology. Minutes later the county medical officer of another Swedish county (not one of the four mentioned above) telephoned SMI and reported that 25 persons who had visited a restaurant on 31 May were ill with gastrointestinal symptoms. This first information also revealed that a number of them (at the time it was unclear how many) were diagnosed with *S. dysenteriae*. The restaurant was visited by 320 guests that day as it was a holiday (Mother's Day in Sweden).

Six cases of *S. dysenteriae* in a short period of time, although geographically spread, clearly indicated an outbreak. The coinciding report from another county pointed to the possibility of a large outbreak. An outbreak team including investigators from the involved county medical offices, the SMI and the National Food Administration (Livsmedelsverket, SLV) was formed. As this was a national outbreak, the outbreak investigation was coordinated from the SMI.

Routine typing of the isolates from the six domestic cases revealed *S. dysenteriae* type 2. This is a rare type of *S. dysenteriae* with only four cases reported last year and all of them acquired abroad.

All five counties with cases were contacted. In one of the counties a birthday party with 60 guests took place on 30 May. Five persons were ill and one of them was diagnosed with *S. dysenteriae*.

In cooperation with the National Food Administration an investigation was started to try to identify any common food product consumed by known cases.

Methods

Epidemiological investigation

In the county where 25 persons got ill after visit to a restaurant, a list of food items that had been delivered to the restaurant was produced. The persons affected were asked about food items they had consumed at the dinner according to the delivery list. Due to summer vacations and shortage of staff it was unfortunately not possible to perform a cohort study for the restaurant.

In the county where a case of *S. dysenteriae* was linked to a birthday party, the person responsible for purchasing food for the party was asked to list the products served and where they were bought. People who became ill after the party were asked what they had consumed.

In the remaining three counties the infected persons were either interviewed according to a general questionnaire for gastrointestinal diseases or asked by phone what they had consumed. The interviews were performed at the county medical offices and the results were gathered at the SMI for analysis and discussion with the National Food Administration.

Microbiological investigation

PFGE was performed on 12 clinical isolates with *S. dysenteriae* type 2 at SMI using the enzyme XbaI.

After sugar snaps had been suspected as the possible source of infection, four samples of sugar snaps were sent to the section for water and environmental microbiology at the SMI for analysis of *Shigella*. Three samples had been collected from supermarkets in two counties and one from a private person in a third county. The sample from this private person was of the same batch as a sample

from one of the supermarkets. Coliforms and *Escherichia coli* were also analysed as indicators for possible faecal contamination.

Sugar snaps were treated as environmental samples where extraction was performed by washing an appropriate amount of sugar snaps in PBS+Tween80. Extracts were then used for analysis of coliforms and *E. coli* by using Colilert-18 as well as an enrichment procedure for the analysis of *S. dysenteriae* where enriched broth was used both for plating on DC-agar and PCR.

Results

A case was defined as having a domestic laboratory-confirmed *S. dysenteriae*. The case definition was not more specific than that since the infection is so rare and there were no cases to exclude at the time. Of the 47 persons reported to have been affected by the outbreak, 35 were laboratory-confirmed, including three secondary cases (Figure, excluding the three secondary cases). One of the cases with *S. dysenteriae* type 2 was identified in a sixth county more than two weeks after the earliest reported date of onset (Figure). This case was included in the outbreak as it fit the above case definition and had also consumed sugar snaps.

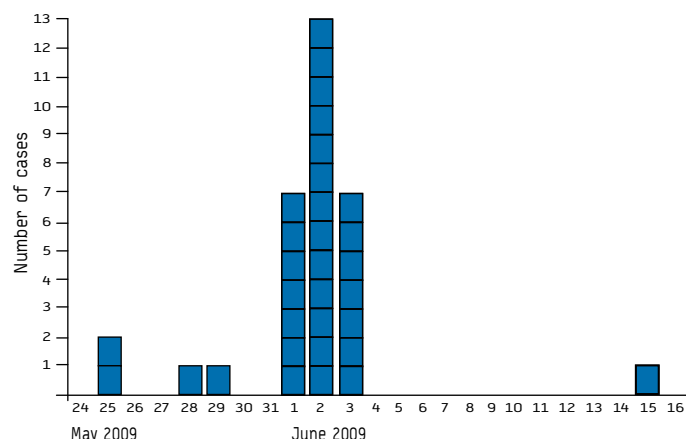
The cases were reported from six counties, all but one situated in the southern or middle part of Sweden. The cases were between 1 and 82 years old and 50% were women. 20 confirmed cases were reported from the restaurant, seven from the birthday party and eight from the remaining four counties. The cases from the birthday party were single cases in five different families. In all, seven persons were infected after the party since the parents of a child who was ill became secondary cases.

Date of onset for all cases in the outbreak was between May 24 and June 15 with the majority of cases reporting onset of symptoms on June 1 to 3 (Figure). One single case with date of onset on June 15 had kept sugar snaps in the refrigerator and consumed them continuously. This person still had sugar snaps left during the time of investigation and they were sent to SMI for analysis.

Shigella was not detected in any of the four samples of sugar snaps sent to SMI. However, *E. coli* was confirmed in three samples.

FIGURE

Confirmed cases of *Shigella dysenteriae* type 2 in an outbreak in Sweden in May-June 2009, by date of onset of symptoms (n=32)



11 of the 12 isolates analysed by PFGE were identical. These isolates were collected from five counties.

The investigation pointed at sugar snaps from Kenya as the source of infection since the majority of the cases from the restaurant, the birthday party and the other counties had consumed sugar snaps. As a result, the local health authority in one municipality decided to impose sales restrictions on sugar snaps, something that was not done in any other municipality. In Sweden this can be decided on local level and does not require decision by the National Food Administration.

At the time of the outbreak sugar snaps from Kenya as well as from other African countries were sold all over Sweden. At least four large wholesale companies and an unknown number of smaller companies import sugar snaps to Sweden. Information from the restaurant and the cases indicated however that the implicated sugar snaps had been distributed by the same wholesaler. Interestingly enough this company is in liaison with the wholesaler that distributed the sugar snaps suspected to have caused the outbreak of *S. sonnei* earlier this year in Denmark.

No more domestic cases with *S. dysenteriae* were reported after the case with the latest date of onset, 15 June.

Discussion

It was difficult to find samples consumed by cases representative of the suspected food batch. One package from the time of the outbreak was found in one of the case's home. *Shigella* was not isolated from this sample or from samples of sugar snaps from the other two counties. However, it is known that isolating *Shigella* from food specimens can be difficult. *E. coli*, on the other hand, was confirmed in three of the samples and since both bacterial species represent intestinal microorganisms the finding of *E. coli* could still be a good indication that the analysed sugar snaps were contaminated by faecal material.

No cohort or case control study was performed in this outbreak as these studies are time consuming and the outbreak coincided with vacations. Personnel at the county medical offices in the involved counties interviewed the persons who were ill and sugar snaps were the only common denominator. Our conclusion is therefore that the most probable source of infection in this outbreak was sugar snaps.

During April to May 2009 outbreaks with *Shigella* connected to sugar snaps from Kenya were reported from two other northern countries; Norway and Denmark [1,2]. Strains of *S. sonnei* were isolated from patients and in Norway a sample of sugar peas was tested positive for *S. sonnei* by PCR. It was probably not a coincidence that *Shigella* outbreaks were connected to sugar snaps from Kenya in three Scandinavian countries within such a short time period.

The investigation performed by the Swedish National Food Administration showed that the trade routes from Kenya are many and diversified. The wholesale companies in Sweden usually have more than one local supplier in Kenya and each supplier in turn packs products from up to 200 local farmers. Trace-back to the farm of origin thus becomes very difficult. The wholesale companies require that each local producer is certified according to GlobalGap which is the golden international quality standard for produce. The question then arises whether this programme is strict enough to

prevent products from being contaminated by faecal pathogens or whether these regulations have not been followed adequately. According to available information, the period of growth this year in Kenya was dry and that normal production volumes could not be reached. Maybe the dry conditions led local producers to use contaminated water for irrigation.

The number of cases included in this outbreak is probably an underestimation of the actual number of persons affected as is the case in food-borne outbreaks in general. The county medical officer in the county with the restaurant outbreak was convinced that a number of people who had visited the restaurant and fallen ill afterwards did not seek healthcare and were not sampled. We may suppose that this was probably the case also in other counties.

Outbreaks with *Shigella* sp. are uncommon in Sweden but in 2008 there was a large outbreak in Stockholm with 140 cases infected with a very rare type of *S. sonnei* (mannitol negative). This was the largest outbreak of shigellosis in Sweden during the last 30 years. The cases had visited the same lunch restaurant. A cohort study pointed at grated carrots of Swedish origin as the suspected vehicle in the outbreak but this was not laboratory-confirmed [3].

The recent *Shigella* outbreaks in Denmark, Norway and Sweden, most likely associated with imported sugar peas from Africa, revealed a complex import system for sugar peas involving various wholesalers and distributors and numerous growers. The dimension of the system raises concern whether the existing international certification and quality standards that prevent products from being contaminated by faecal pathogens are strict enough.

As sugar peas are sold as a ready-to-eat product, consumers should be aware of the risk of possible contamination by faecal bacteria that can cause gastroenteritis. It is advisable to wash the vegetables or even better heat them up quickly. During the outbreak information on correct handling of vegetables to avoid infection was published on SMI and SLV websites. However, it will be discussed whether this kind of information should be disseminated more widely to prevent similar outbreaks in the future.

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