

A study of salmonella carriage among asymptomatic food-handlers in southern Ethiopia

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To cite this article:

Misganaw Birhaneslassie, David Williams. A Study of Salmonella Carriage among Asymptomatic Food-Handlers in Southern Ethiopia. *International Journal of Nutrition and Food Sciences*. Vol. 2, No. 5, 2013, pp. 243-245. doi: 10.11648/j.ijnfs.20130205.15

Abstract: Background: *Salmonella* is the most frequently reported cause of food borne illness in Ethiopia. Objective: The aim of this study was to screen food handlers in the Dilla area of Southern Ethiopia and to assess the scale of carriage of *Salmonella* species and to offer prophylaxis followed by re-testing and advice on personal and food hygiene as appropriate. Method: Stool samples were collected from a total of 107 food handlers from various establishments in the area. Enrichment culture using Selenite broth and sub-culture on to Deoxycholate Citrate agar was used followed by identification to genus level by use of a commercially available biochemical kit and polyvalent antisera. Result: *Salmonella* was isolated from one food handler only and this person could not be traced having left her employment and not having left a forwarding address. Conclusion: As food poisoning is a main issue in Ethiopia further epidemiological research, to monitor those found to be infected is mandatory.

Keywords: Salmonella, Screening, Food handlers, Asymptomatic

1. Introduction

Salmonella is the most frequently reported cause of food borne illness, worldwide. WHO estimated that at least 600,000 deaths occurred each year due to typhoid fever. *Salmonella* infection most commonly occurs in countries with poor standards of hygiene in food preparation and handling and where sanitary disposal of sewage is lacking. It mainly occurs in the tropics and sub tropics in Africa, India, Pakistan South East Asia and South America [1-7].

Food borne salmonellosis often follows consumption of contaminated animal products such as raw meat, poultry and eggs. Not washing fresh fruits and vegetables before eating them, as well as not thoroughly cleaning work surfaces used to prepare raw meat and other foods in the kitchen can also be source of *Salmonella*. Food can also be contaminated by food handlers who do not thoroughly wash their hands with soap after handling raw meat or after using the bathroom [4].

Studies indicated the widespread occurrence and distribution of *Salmonella* in Ethiopia. In recent years the number of out breaks of *Salmonella* in humans has increased considerably in the country. Much more is known now about the extent of food borne illness and how severe it can be, not just in terms of acute illness, but also in terms of long term

consequences. Studies indicated various percentages of *Salmonella* isolates in towns of Ethiopia. Moreover, high percentages of *S. typhi* isolates have been found to be resistant for antimicrobial agents [8,9,10]. In addition, the very young, elderly and immunocompromized individuals are particularly more susceptible to *Salmonella* infections at a lower infective dose than healthy adults. This is more important in developing countries such as Ethiopia where HIV/AIDS is highly prevalent and *Salmonella* is an important opportunistic infection in HIV/AIDS patients [11].

In Ethiopia, minced beef is usually used for the preparation of a popular traditional Ethiopian dish known as locally "KITFO" and most of the time it is consumed raw or medium cooked. The habit of raw meat consumption and the presence of *Salmonella* in minced beef indicate, in addition to the poor hygienic standards in food handling in the country, the presence of great public health hazards of *Salmonella* [6].

Moreover, about 2-5% of those who contract typhoid fever become chronic carriers, as bacteria persist in the biliary tract after symptoms have resolved [7]. Therefore, carrier states of humans are of concern to the food manufacturing and food service institutions because of the

perceived risk of contamination of food by infected food handlers and the risk of food borne disease outbreaks [6].

Strategies for reducing food borne illness require a comprehensive farm-to-table approach, while *Salmonella* contamination from food handlers has been shown to make a significant contribution to human food borne illness in several developing countries [11].

The goal of this project is to carry out a preliminary survey of *Salmonella* from healthy food handlers. The project also helps as a health education tool to elucidate the main pathways by which consumers are exposed to *Salmonella* and helps the Ministry of Health of Ethiopia to achieve its strategic goal of reducing the incidence of food borne illness in the country.

2. Materials and Methods

This survey was undertaken in 2002 with material and professional support from UK health link partners to Southern Ethiopia (www.ethiopiagwentlink.org). This was part of a practical training exercise for laboratory science and sanitation students at Dilla College.

Food handlers who had a direct contact with food and food delivery to people in large establishments were selected as study participants. It was also arranged that health education and sanitary advice to be given by students and instructors from the College.

A number of food handlers were approached by students of Medical Laboratory Technology under supervision of instructors and lecturers from the Dilla campus of the formerly known Debub University. The source of these were namely Dilla College campus 47, Dilla prison 11, Dilla hospital 3, Hotels and Butchery 46, a total of 107 food handlers were screened in the survey. These sources of food handlers from large establishments were a concern because a food handler positive for *Salmonella* could pass it for many people at a time.

Identifiers used were the name, date of birth or age (where known) and the name of the establishment. Overall, adults from age group of 20-40 were involved in the study. Majority of study participants were illiterate and were females.

Stool samples were collected from 107 of these using sterile containers over a two week period. A small piece of each stool sample was inoculated in to Selenite broth and incubated for 16 to 24 hours at 37°C. Each Selenite broth was sub cultured on to Deoxycholate Citrate Agar (DCA) and incubated 37°C for a further 16 to 24 hours. Non-lactose fermenting colonies were tested using oxidase reagent and urea agar slopes. Oxidase and urease negative colonies were further identified using Biomerieux API 10S kits. Isolates identified as presumptive *Salmonella* species were tested with polyvalent O (somatic) and H (flagellar) antisera. Any food handler identified as a *Salmonella* carrier was to be offered a course of Ciprofloxacin and re-tested after finishing the course of antibiotics.

Ethical clearance was obtained from Dilla Health Science

College. Informed consent was obtained from every food handler. Support letter was sent to each facility from Dilla College for cooperation in sample collection and health education.

3. Results

Of the 107 food-handlers tested 1 was identified as being a *Salmonella* carrier (0.93%). The person (female) identified positive was working in a hotel. Unfortunately there was no microbiological analysis performed in the food from the hotel, colleagues from the hotel were negative for the test. On a further visit to this person's workplace to offer advice and a course of antibiotics, instructors from the University were told that she had left her employment and had not left a forwarding address and therefore could not be traced. It is not known whether this person obtained further employment as a food-handler.

4. Discussion

It is believed that this study is the first of its kind to be carried out in Southern Ethiopia. Definitive identification of more *Salmonella* isolates was not possible given the facilities available but it is believed that the methodology used was sufficient for identification to genus level. The percentage positive obtained compares favorably with similar studies in other developing countries. In Lima, Peru [2] 29 out of 1,931 (1.5%) food handlers proved positive for *Salmonella* carriage. Of these 4 (0.2%) were found to be *S. typhi* carriers. In Irbid, Jordan [3], out of 283 food-handlers screened, 17 (6%) were *Salmonella* carriers. In Ghana [12], 258 asymptomatic food vendors were screened and *Salmonella* was isolated from 6 (2.3%). In India [5], among 35 individuals screened 6 (17.14%) were positive for *Salmonella*.

Similar study indicated comparable percentage of positivity for *Salmonella* in Ethiopia. In Bahir Dar, 1.6% food handlers out of 384 were found positive for *S. typhi* [8]. However, in Gondar town, Andargie reported that no *Salmonella* species were isolated in food handlers [9]. Likewise, study undertaken in Hawassa revealed 8.1% (22) *S. typhi* positive food handlers out of 272 from blood sample by Widal test, while there was no *Salmonella* identified by microbiological methods from stool specimen in this study [13]. The methodology applied in this survey was comprehensive in that it used serial of culture, biochemical and serological methods to confirm the *Salmonella* colonies.

5. Conclusion

Routine testing of food handlers in Southern Ethiopia would be difficult and if the carriage rate detected is typical, probably not necessary. Further studies of *Salmonella* carriage in Southern Ethiopia should be possible given the development taking place within the university and the Referral Hospital at Hawassa. The relatively small numbers

of food handlers tested compared with the majority of the other studies referred to indicate that a larger number of individuals should be tested to gain an accurate picture of the true carriage rate.

Acknowledgements

The study was the result of collaboration between partners in the Gwent Healthcare/Southern Ethiopia link which was set up under the auspices of the Tropical Health Education Trust (THET). The project was supported by the link for supply of laboratory materials and also by donations of laboratory materials from Oxoid UK and Biomerieux Ltd.

It was used as a teaching tool to help Medical Laboratory Technology students at the Dilla campus of the university to gain practical experience of microbiological techniques. The students were responsible for carrying out much of the work including specimen collection and were supervised throughout by instructors from the university as well as link partners from the UK.

The authors wish to acknowledge the contributions of Dr Abera Alemneh and Mr Sunirmal Ghosh for organizational help, Mr David Sanders for assistance in preparing training material and Mr Moges Derbe for technical assistance.

Competing Interests

The authors declared that they have no competing interest to disclose in this research.

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