Contamination levels that compromise the hygienic condition in the handling of food

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INTRODUCTION

Microbial contamination of food is a major public health problem, as it affects millions of people worldwide [1], and it constitutes an important source of food borne diseases to humans [2]. Of all the groups of microorganisms that can cause food contamination, the group of bacteria stands out for its diversity and pathogenicity [3]. Bacteria belong to the natural flora of the human being, and can be easily transmitted by this to the food, especially when there are no good hygiene practices [4].

The contamination with *Staphylococcus aureus* (*S. aureus*) occurs by the handler after the food has been cooked [4]. The prevalence of this bacterium causes gastroenteritis, vomiting, diarrhea and abdominal pain [5]. The presence of this microorganism (> 0 CFU) in the hands of the handler is synonymous of food contamination, thus indicating poor hygiene on the part of the handler.

Coliforms are divided into total and fecal coliforms. The first ferment lactose at 37°C. As for the seconds, to which belongs *Escherichia coli* (*E. coli*), they ferment lactose with production of acid and gas at 44°C. These serve primarily to measure the level of fecal contamination. *E. coli* is the main indicator of fecal contamination [6]. The presence of total and fecal coliforms and E. coli (> 0 UFC) is synonymous with contamination, thus indicating poor hygiene on the part of the handler.

The total germs are evaluated regularly, allowing to control, quantitatively, the organisms present on the utensils used [6]. The evaluation of the growth of total germs provides an indication of the general sanitation state of the utensils and the final result is expressed in CFU / piece (colony forming units per piece).

In general one can classify the hygienic condition of the utensils on:

- Satisfactory - if the total number of germs is ≤ 100CFU/piece and the detection of coliforms is negative;
- Unsatisfactory - if the number of germs is > 100CFU/piece and/or if the search for total coliform is positive;
- Bad - if research on fecal coliform and/or E. coli is positive.

According to the Decree - Law nº 132/2000, of 13 July, concerning the official control of foodstuffs, competent laboratories follow a system of quality standards that are in accordance with standard rules and using validated methods of analysis, thus ensuring the quality of the test [7].

In this work, the results of samples from the hands of food handlers and the manipulation utensils, harvested at different catering establishments in the district of Bragança were analyzed. Through the detection of the bacteria referred previously it was possible to determine the hygienic state of the catering establishments.

MATERIALS AND METHODS

Study type: A transversal and retrospective study, which took place between November 2009 and November 2010 in PHLB.

Studied sample: 842 samples of different catering establishments (restaurants, cafeterias and canteens of homes and schools), from the hands of food manipulators and the handling utensils (421 samples each).

Samples processing: Research and quantification of microorganisms in accordance with the standards followed by the PHLB, and performed by the their technicians; the results obtained were treated by the computer program Microsoft Excel 2007 to Windows7.

DISCUSSION/CONCLUSION

Of the 421 samples taken from the hands of the food manipulators, 39%, meaning 164 samples, were contaminated with *S. aureus* and/or coliforms and/or *E. coli*. This means that in 4 of 10 catering services food is, most likely, to be contaminated by the hands of its manipulators.

From the detected contamination, 57% were of total coliforms. It is important to notice the presence of S. aureus in 10% of samples, since this microorganism causes various diseases of the gastrointestinal tract, the infected person must be accompanied by a physician, in order to eliminate the presence of the microorganism. As there are many asymptomatic carriers, medical monitoring is essential to assess the location of the presence of this microorganism and the measures to be taken in case of persistence.

From the establishments where there were two samples collected at different times, where at least one of them was contaminated, there was a positive evolution in which 56% of the samples went through contaminated to without contamination. Nevertheless, the percentage of samples which remained contaminated is considerably high (39%). The positive evolution may be due to the implementation and enforcement of hygiene practices on the part of handlers [7] [8].

The percentage of samples from the handling utensils showing a satisfactory hygienic level is 66%. 60% of the contaminations found were total germs. This may be indicative of poor hygiene, not only by the handler, but also the work environment in general. It is worth noting the presence of E. coli in 3% of samples. This microorganism indicates fecal contamination and, of all the fecal microorganisms, this is the most pathogenic.

Establishments where there was collection of two samples in handling utensils, on different dates, in which at least one of them showed an unsatisfactory or a bad result, there was a positive evolution in 37% of those samples, from either unsatisfactory or bad to a satisfactory result, or from bad to unsatisfactory. However, the percentage of samples that had a negative evolution, from satisfactory to unsatisfactory or poor, or unsatisfactory to bad, is quite significant (38%). It was also noted the high percentage of establishments remained unsatisfactory or poor (25%).

The positive evolution may had been due to the implementation and enforcement of hygiene practices [7] [8]. The application of a questionnaire on hygiene practices implemented in the catering establishments could clarify the relationship between the results and those practices.

It can be concluded that for the handlers hands much of the contamination was of total coliforms, while for the handling utensils the most common microorganisms present were total germs.

It seems that the positive evolution of the hygienic level was greater for the hands of the food handlers than for the handling utensils. This difference can be understood in the future, through the knowledge of hygiene practices applied to the hands of manipulators and handling utensils.

On the influence of hygiene practices in hygienic condition of food handling in the district of Bragança, this could be clarified in future studies by applying a questionnaire aimed know the practices implemented in catering establishments.

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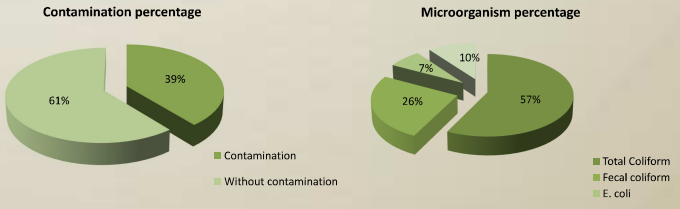
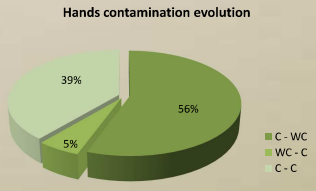
RESULTS

Hands evaluation



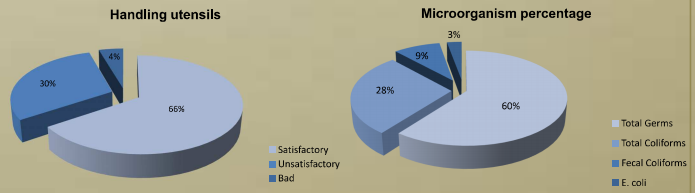
Grafic 1: Percentage of contamination of sample from the hands of food handlers.

Grafic 2: Percentage of each microorganism contamination in the hands of food handlers.



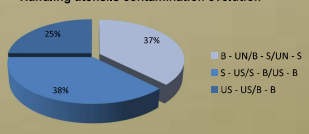
Grafic 3: Percentage of the evolution of contamination in the hands of the food handlers. C-WC: evolution from contamination to without contamination; WC-C: evolution from without contamination to contamination; C-C: with no evolution, the contamination remains.

Handling utensils evaluation



Grafic 4: Hhygienic condition Rate of the handling utensils.

Grafic 5: Percentage of each microorganism contamination in the handling utensils.



Grafic 6: Percentage of the evolution of contamination in the handling utensils. B-UN: evolution from bad to unsatisfactory; B-S: evolution from bad to satisfactory; UN-S: evolution from unsatisfactory to satisfactory; S-US: evolution from satisfactory to unsatisfactory; S-B: evolution from satisfactory to bad; US-B: evolution from unsatisfactory to bad; US-US: with no evolution, the unsatisfactory evaluation remains; B-B: with no evolution, the bad evaluation remains.