Microbiological quality assessment of pre-cut melons and the need for food safety practices

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INTRODUCTION

Due to the increasing consciousness of a healthy diet and pursuit of convenience, the market for pre-cut fruits is on the rise, and melons are one of the welcomed fruits for their sensory attributes and nutritional properties. Since the melon is part of the *Cucurbitaceae* family, crop growth occurs on the ground, making the fruit susceptible to contamination through contact with pathogens found in soil or irrigation water [1,2]. Pre-cut fruits should be stored at refrigeration temperatures and for no longer than 10 days, depending on the fruit and only if packaged and stored properly [3,4]. If not handled properly, the safety of pre-cut fruits remains one of the concerning issues that affect public health.

PURPOSE

This work aimed primarily to study the microbiological quality of melons, which were cut, wrapped in plastic cling film by retailers and exposed at room temperature in fruit shops in Porto, Portugal. Secondly, the possible passage of pathogens from the peel to the interior of the melon was evaluated after its slicing. Growth of pathogens over storage time was observed.

METHODOLOGY

I. Microbiological quality of 26 pre-cut melons

Twenty-six single-type melons, *Cucumis melo* L. var. "Piel de Sapo", cut, wrapped in plastic cling film and exposed to room temperature from eleven local fruit shops in Porto, Portugal

Microbiological characterization

Enumeration of:
- Total viable microorganisms
- *Escherichia coli*
- *Listeria monocytogenes* and *Listeria* spp.
- Staphylococci

Detection of:
- *Salmonella* spp.
- *Listeria monocytogenes* and *Listeria* spp.

According to each ISO Standard

II. Artificial contamination of melons

Entire surface of the melon covered with gauze previously dipped in each inoculum, incubated for 20 °C for 24 h

Melon slices analysed at 3 time points:
-Immediatly after slicing
-After 24 h at 20 °C
-After 48 h at 20 °C

Microbiological analysis of the flesh:
-Enumeration of *L. monocytogenes*, *Salmonella* spp. and *E. coli*.
-Methodology according to respective ISO standards.

RESULTS AND DISCUSSION

I. Microbiological quality of 26 pre-cut melons

- No *Salmonella* spp. or *Listeria* spp. were detected in the samples.
- High numbers of total viable microorganisms at 30 °C were observed: eleven samples presented counts between 6 and 8 log CFU/g and seven samples higher than 8 log CFU/g.

  Higher counts were observed on the flesh-cut surfaces than on the peels for 15 samples.

- *Escherichia coli* was present in 4 samples in numbers ranging from 0.5 to 3.9 log CFU/g. Two of these samples have been bought from the same store. The numbers found were higher on the cutting surface than on peels, suggesting the possibility of transfer of *E. coli* from peels to the cutting surface.
- *Staphylococcus* spp. were found in high numbers between 3 to 5 log CFU/g with seven samples exceeding 5 log CFU/g. Most of the species found were coagulase-negative staphylococci, but *S. aureus* was found on six samples in numbers between 1.8 to 3.5 log CFU/g.

II. Artificial contamination of melons

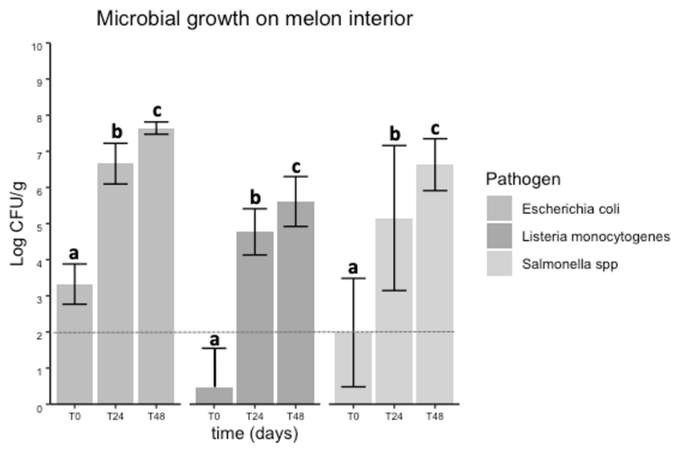

Figure 1. Microbial growth of each bacterial cocktail on the flesh of the melons after 0, 24 and 48 h of cutting. The detection limit of the enumeration technique was 2 log CFU/ g (dotted line). Equivalent lowercase letters mean no significant differences ($p > 0.05$).

- The increase in *Salmonella* spp. and *E. coli* on the melon flesh was similar during storage time.
- Counts of *L. monocytogenes* immediately after cutting (0 h) were below the detection limit of the enumeration technique. However, an almost 4 log CFU/g increase was observed during storage, with counts exceeding 5 log CFU/g.

CONCLUSIONS

- Microbial quality of cut melons sold in Porto was shown to be less than ideal.
- Even though no *Salmonella* or *L. monocytogenes* were detected, *E. coli* and staphylococci were isolated from several samples.
- This study also demonstrates that pathogens are able to be transferred from the peel to the flesh.
- Effective practices to prevent contamination, cross-contamination and bacterial growth on cut fresh melon must be adopted.

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