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Evaluation of bacterial and fungal load in fresh, frozen and dried food mushrooms

D. Magli,[1] F. Venturella,[2] M.L. Gargano,[1] C. Sciarratta,[3] A. Zummo,[3] G. Venturella[1]

[1]Department of Agricultural and Forest Sciences, University of Palermo; [2]Department of Biological, Chemical and Pharmaceutical Sciences and Technologies, University of Palermo; [3]Provincial Health Unit 6, Palermo, Italy

The analysis carried out by Doores and colleagues[1] and Venturini and colleagues[2] on the total bacterial load tested in wild and cultivated fresh mushrooms highlight values ranging between 3.7 and 9.3 log ufc/g. Due to the absence of pathogens, the microbiological quality of mushrooms analysed by the above-mentioned authors has been considered good. On the basis of data reported in literature we have also extended the observations with frozen and dried mushrooms in order to evaluate the mesophilous bacterial and fungal load. In particular the presence/absence of *Escherichia coli* (Migula,1895) Castellani & Chalmers, 1919, *Salmonella* spp. and *Listeria monocytogenes* (Murray *et al.,* 1926) Pirie 1940 was analysed. The aim of this paper is also to evaluate the quality and safety of mushrooms daily consumption by consumers. Thirty samples of mushrooms (10 cultivated fresh mushrooms identified with letter A 1-10; 10 dried mushrooms identified with letter B 1-10 and, 10 frozen mushrooms identified with letter C 1-10) were taken from large-scale distribution markets, mini-markets and small markets owned by migrants. The frozen mushrooms were contained in packages of *Agaricus bisporus* (J.E. Lange) Imbach 1946 and packages of *Boletus edulis* Bull. Besides mixed packages of *A. bisporus*, *Pholiota nameko* (T. Itô) S. Ito & S. Imai, *Boletus luteus* L., *Pleurotus ostreatus* (Jacq.) P. Kumm. and, *Lentinula edoses* (Berk.) Pegler were analysed. Other analyzed frozen mushrooms were a mixture of *A. bisporus*, *Agrocybe aegerita* (V. Brig.) Singer, *P. ostreatus* and, *P. cornucopiae* (Paulet) Rolland and a mixed package of *A. bisporus* and *P. ostreatus*. The fresh mushrooms (*A. bisporus* and *Pleurotus ostreatus*) were purchaed from the grocery store. Dried mushrooms (*L. edodes*) were purchased from shops owned by Chinese migrants. The microbiological analysis were carried out in the laboratory of the Center of Mycological Control belonging to the Sanitary Agency of the province of Palermo (southern Italy). The total bacterial load was analysed in 25 g of mushrooms (1:10 diluition) according to the rule ISO 4833:2004.[3] Moulds and yeasts were analysed according to the report ISTISAN 96/35.[4] *Salmonella* sp. was checked through the criteria of analysis ruled by UNI EN ISO 6579:2008.[5] The methodology of ISO 16649-2:2001[6] was used to test the *Escherichia coli* positive beta-glucorinidase. *Listeria monocitogenes* was tested accordino to the rule ISO 11290-1:2005.[6] The total count in Petri dishes was made using the formula reported in ISO 7218:2007.[7] The cultura media were provided by the concern Lickson srl (Vicari, province of Palermo). The nomenclature follows the List of Prokaryotic Names with Standing in Nomenclature (LPSN). *L. monocitogenes* and *Salmonella* spp. were not found in the analysed mushrooms. On the contrary a sample of fresh mushrooms from a supermarket of the town of Palermo was polluted by *E. coli*. The count of *E. coli* positive beta-glucorinidase correspond to 1.7 10^4 cfu/g. The value of total bacterial count in all the mushrooms analysed varies from a minimum of 3.8 10^2 cfu/g found in dried mushrooms (*L. edodes*) to a maximum 2.6 10^8 ufc/g in a fresh sample of mixed mushrooms (*A. bisporus* and *P. ostreatus*) in the supermarket. As regards moulds and yeasts the value varies from zero in dried mushrooms (*L. edodes*, *B. edulis*) to 4.4 10^4 ufc/g in fresh mushrooms (*A. bisporus*). The results obtained showed that an analyzed sample of mushroom had a high pollutant load of *E. coli*. As known this bacterium is responsible of intestinal infections that can result in serious extra-intestinal infections. Besides *E. coli* is involved in drug resistance and thus have a significant impact on human health. Since the packaging of fresh mushrooms polluted by *E. coli* was purchased from a supermarket belonging to the mass distribution highlights the need and importance of sanitary controls for the protection of the consumers. The recent warning from the EFSA (European Food Safety Authority) that Italy is the second country in the EU as largest food borne diseases (especially salmonellosis) reinforces the need to respect to meet the parameters set out in Regulation 2073/2005 but also the checking of the proper handling of mushrooms during cultivation and packaging, including compliance with good hygienic practices by insiders.

Correspondence: Giuseppe Venturella, Department of Biological, Chemical and Pharmaceutical Sciences and Technologies, University of Palermo, viale delle Scienze 16, 90128 Palermo, Italy.
E-mail: giuseppe.venturella@unipa.it

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