Evaluation of Bacillus cereus contamination in packed Mazafati dates

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Abstract
Bacillus species are spore-forming positive gram. These bacilli are found everywhere and they remain in environment for several years due to their ability in producing spores. Among many species of genus bacillus, most of them will not cause disease, but a few species are important factors in human diseases. Bacillus cereus causes food poisoning and sometimes eye infections and other localized infections. One hundred 500gr packages of Mazafati dates were randomly sampled from the distribution centers and tested. For the enumeration of B. cereus MYP (Mannitol-egg yolk-polymyxin) agar was used. The linear culture was performed in plates. After the evaluation of the results, none of the samples showed B. cereus contamination indicating the antibacterial effects of date, although, this may need further research.

Key word: Date, Bacillus cereus, microbial contamination

1 Introduction
The immunity of nutrition is related to dangers imposed on foods when the consumer eats them. Since the immunity dangers can occur in every stage of nutrition chain, hygienically, it is necessary to have adequate precautions throughout nutrition chain (ISO 22000, 2005) [2]. Therefore, the nutrition immunity should be guaranteed by all interested parties of the chain. The internal organizations of nutrition chain may include manufacturers of domesticated animals food, initial producers, nutrition producers, transporters, storekeepers’ secondary retailer contractors and caterers along with relevant organizations such as producers of equipments, packages, cleansers, additives and so on. Service providers are also a part of this category (ISO 22000, 2005) [2]. Given the growing number of lifestyles, dietary changes in recent decades and lack of education in this regard, nutrition immunity risks are considered to be one of the main problems of societies. World Health Organization believes that diseases caused by consumption of contaminated food are considered as one of the main problems of our era (ISO 22000, 2005) [2].
Bacillus cereus is an aerobic organism which produces spores. It exists in the dust and foods contaminated by dust (N. Dahr Rokni, 1994) [6]. The food poisoning may cause both vomiting and diarrhea which is attributed to its toxin (B. Jawetz and et al, 2005) [5]. Two kinds of secreted enterotoxins have been extracted from Bacillus cereus. One of them is heat resistant and bears 126 °C more than 90 minutes causing vomiting after an incubation period of up to 5 hours. The other one is sensitive to heat and causes watery diarrhea in consumers after an incubation period of 8 to 16 hours. These enterotoxins are secreted on foods after proliferation of microorganisms (N. Dahr Rokni, 1994) [6].

Palm tree is a plant of palmaceae family. Its scientific name is phoenix datylifera L. that is monocotyledonons plant. There are 200 genus and 400 types of its kind (Ashraf Jahani, 2002) [4]. The differences in types exist in their stem, leave, pistil of flower and fruit. Date is cultivated for its edible sweet fruit. Although its place of origin is unknown because of long cultivation, it probably originated from lands around Iraq. It grows 70–75 feet (21–23 m) in height, growing singly or forming a clump with several stems from a single root system (Ashraf Jahani, 2002) [4]. The leaves are 4–6 meters (13–20 ft) long, with spines on the petiole, and pinnate, with about 150 leaflets; the leaflets are 30 cm (12 in) long and 2 cm (0.79 in) wide. The full span of the crown ranges from 6–10 m (20–33 ft). Dates contain 20–70 calories each, depending on size and variety. The date is a single, stretched, pointed, cylindrical fruit with terminal stigmatic. Mazafati date is ripe fruit of palm tree and is dark, violet, fleshy, nectarous and delicious. Desirable kind of Mazafati date grows in Bam (Ashraf Jahani, 2002) [4]. Date palms can take 4 to 8 years after planting before they will bear fruit, and produce viable yields for commercial harvest between 7 to 10 years. Mature date palms can produce 80–120 kilograms (176–264 lb) of dates per harvest season, although they do not all ripen at the same time so several harvests are required (Ashraf Jahani, 2002) [4].

In order to get fruit of marketable quality, the bunches of dates must be thinned and bagged or covered before ripening so that the remaining fruits grow larger and are protected from weather and pests such as birds. Date is a good exported plant having annual export rate of a million ton in Iran. Removal of date microbial contamination is necessary in order to maintain export market and provide opportunity to compete with products of other countries (Ashraf Jahani, 2002) [4].

This study was conducted in order to examine contamination rate of packaged Mazafati date by Bacillus cereus.

2 Materials and Methods

One hundred 500-gram packages of Mazafati dates were randomly sampled from distribution centers in the city of Tehran (Iran). The samples were transported to the Standard Research Institute located in Karaj city. Then, Bacillus cereus test was conducted on the samples. Initial suspension and decimal dilutions were prepared to carry out microbiological testing (ISO 6887-1, 1999) [3]. Ringer solution was used for the preparation of the initial suspension. 500 ml of distilled water was added per one Ringer tablet and maintained at 25 °C temperature after sterilization (ISO 6887-1, 1999) [3]. Solid MYP medium was used for linear culture. MYP medium obtained from Merck Company was produced in powder form. 10g of the sample (Homogenized dates) was weighed inside sterilized filter bags and Ringer solution was added 9 times more than its weight. 1ml of initial suspension was added to tubes containing 9 ml of sterilized Ringer diluents solution by a sterile pipette in order to obtain further decimal dilutions. The prepared dilution was mixed using a mechanical stirrer. Accordingly, $10^{-2}$ dilution was obtained (ISO 7932, 2004) [1].

0.1 ml of initial suspension was then transferred to each of the two plates containing MYP medium and this procedure was repeated for the next decimal dilutions by a sterile pipette. The inoculated liquid was distributed on the surface of medium by spreader so that there is no contact with plate wall. Different sterilization was used for each plating spreader. Plates were incubated for 15 min at laboratory temperature.
to absorb liquid culture in medium. These plates were reversely incubated at 30 °C. After the incubation period, plates were examined in terms of contamination by Bacillus cereus (ISO 7932, 2004) [1].

3 Results and Discussion

The contamination of Mazafati dates to Bacillus cereus was examined in this study. There was no contamination in 100 samples of the study which is indicative of date antibacterial characteristic. Several related studies have also been conducted confirming antibacterial effects of date. The results of a study in Yasouj University of Medical sciences indicated that consumption of date as a nutrient is very effective in the prevention of bacteria that causes tooth decay, i.e., it can stop the bacterial growth (Seyyedi, and et al, 2006) [7]. There are also reports about useful effects of date extract in preventing the growth of some microorganisms such as Streptococcus (Abuharfeil and et al, 1999) [9]. There was a study about antiviral effect of palm kernel oil against lytic phage of Pseudomonas aeruginosa that indicated this extract can have significant inhibition against this phage (Sabah and et al, 2007) [10]. There are also other studies including Sadinkin et al. about effects of Phoenix dactylifera extract against 6 mutant strains of Streptococcus (Sadakin and et al, 2008) [11]. Also, in Sallal and Hammed study the effects of various concentrations of date prevented the growth of Streptococcus pyogenes (Hammed and et al, 2002) [12]. In the studies that were conducted on Anatoli and Eastoni, the extract of kernel and its prevention effect against the growth of 9 strains of Staphylococcus aureus, therefore, we may conclude that these extracts have relatively good inhibitory effect against the growth of 9 strains of Staphylococcus aureus (Shariati and et al, 2010) [8]. Given the studies on antibacterial feature of date and the results of this study along with lack of growth of Bacillus cereus in cultured samples, it is indicated that date has useful antibacterial effects that can be considered as a substitute for less effective or even ineffective current medication to treat or prevent infectious diseases. However, more research is required to obtain solid results.

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References


