International Journal of PharmTech Research
CODEN (USA): IJPRIF, ISSN: 0974-4304, ISSN(Online): 2455-9563
Vol.9, No.10, pp 575-592, 2016

Mutual correlation between different microorganisms and bacterial indicators and their effect on bottled water quality in Egyptian market

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Abstract : The main objective of this study is to detect the correlation between presence of microorganisms and bacterial indicators and some physicochemical properties of bottled water samples. During the period from January to June, 2015, monthly samples (n= 54) were collected from markets in Cairo, Egypt which produced by 6 commercial brands (A, B, C, D, E and F).Isolation and identification of classical bacterial indicators, total molds and coliphages as well as sensitivity test for 12 types of antibiotics for *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Bacillus subtillus* were carried out. The physico-chemical characteristics namelypH, total dissolved salts (TDS), electrical conductivity (Ec), nitrate and ammonia concentration, were determined in bottled water samples. In addition, all microorganisms (except coliphage and fungi) were examined for survival in bottled water in the presence of both inoculation (10 – 100 cfu / 100ml) and without inoculation for 6 months of storing at room temperature. Result showed that, all samples were free from bacterial indicators. Also, result revealed that heterotrophic plate counts (HPCat 37ºC and 22ºC) and some physicochemical characteristics were found to be complying with the Egyptian Standard and within International Standard for drinking water. Moreover, results of microbial and physicochemical analysis were safe according to Egyptian Standards for drinking water, after 6 months of storingfor some bottled water samples at room temperature. Also, results showed that positive correlation between HPC and physicochemical characteristics with absence of bacterial indicators. Although bacterial indicators were absent, some bacteria have been isolated and identified including *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Bacillus subtillus.* These bacteria were multi-antibiotic resistant (MAR) when studied against to antibiotic (12 kinds) sensitivity test. *Pseudomonas aeruginosa*, and *Bacillus subtillus* were more survive than other microbes examined including bacterial indicators, yeast and *Staphylococcus aureus* when inoculating with $\log_{10}$about 1 to 2 cfu/100ml for 6 monthsat room temperature in some samples. Positive correlation (*r= 0.856*) were observed in this studybetween time (storing period) and counts of microbes (before and after storing) where recorded. Statistical analysis of results showed no significant correlation between bacterial isolates and absence of bacterial indicators. Moreover, in this investigation, observed correlation of both filamentous fungi and yeasts with free bacterial indicators as well as presence of HPC bacteria were found to be significant (*r= 0.856*). The results showed that the presence of HPC bacteria, negatively correlated with nitrate (r=-0.06), while positively correlated with other physicochemical parameters.
This work concluded that, it is necessary to regularly monitor bottled water to protect public health of consumers.
Key words : Classical bacterial indicators, Bacteria, Total molds, Coliphages, Antibiotic Resistant bacteria, Bottled water, Physico-chemical characteristics, Storing time.

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