

PREVALENCE OF YEAST SPECIES IN PLAIN YOGHURT

By

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ABSTRACT

Thirty random samples of plain yoghurt collected from dairy shops and supermarkets in Cairo and Giza governorates, Egypt were subjected to organoleptic examination & total yeast count. Sensory evaluation revealed that the majority of samples were graded as good. The mean titratable acidity % was 0.89 ± 0.019 , while the mean count of yeast was $2.95 \times 10^8 \pm 1.4 \times 10^8$ cfu/g. *C. albicans* could be detected in 13.03%.

Key words:

Yeast, Acidity and Sensory evaluation.

INTRODUCTION

Spoilage of fermented milks, in general, is likely to be caused by yeasts, or by molds. Acid-tolerant, psychrotrophic, fermentative yeast may be able to grow in yoghurt causing blowing (doming - gas production) because of the production of CO₂. Growth of acid-tolerant mold in yoghurt is restricted by lack of oxygen, and agitation of the product during transportation tends to suppress growth at the surface (**Rhea Fernandes, 2008**). Yeast and Mold are known to be the major cause of yoghurt spoilage due to their lipolytic and/or proteolytic activity that might cause musty and other undesirable off flavor (**Hassan et al., 1994**). Yeast are very common in yoghurt, while mold are less problem than yeast, as 3.5% of the yoghurt lots presented for sale on markets were contaminated with yeast, while one lot was contaminated with mold (**Robinson, 1990 and Pitt and Hocking, 1997**). This study was planned to throw light on the Prevalence of yeast species in Plain Yoghurt.

MATERIAL AND METHODS

Collection of samples:

Thirty samples of Plain yoghurt were randomly collected from dairy shops, supermarkets and

street hawkers in Cairo and Giza governorates. Collected samples were transferred to the laboratory in an insulating ice - box with a minimum of delay to be immediately examined.

Organolyptic examination:

Sensory evaluation was applied according to **Clark et al. (2009)**.

Determination of titratble acidty %: Determination of titratable acidity was performed using the method mentioned by **APHA (2004)**.

Total yeast count:

Preparation of decimal dilutions for the collected samples and Total yeast count were applied according to **(APHA, 2004)**. Identification of isolated yeast according to **(Tibor, 2008)**.

RESULTS

Table (1): Grading of examined yoghurt samples based on their overall acceptability

Score	Grade	No.	%
> 90 %	Excellent	0.0	0.0
80-90 %	Good	17.0	56.67
60 - 80 %	Fair	12.0	40.0
< 59 %	Poor	1.0	3.33

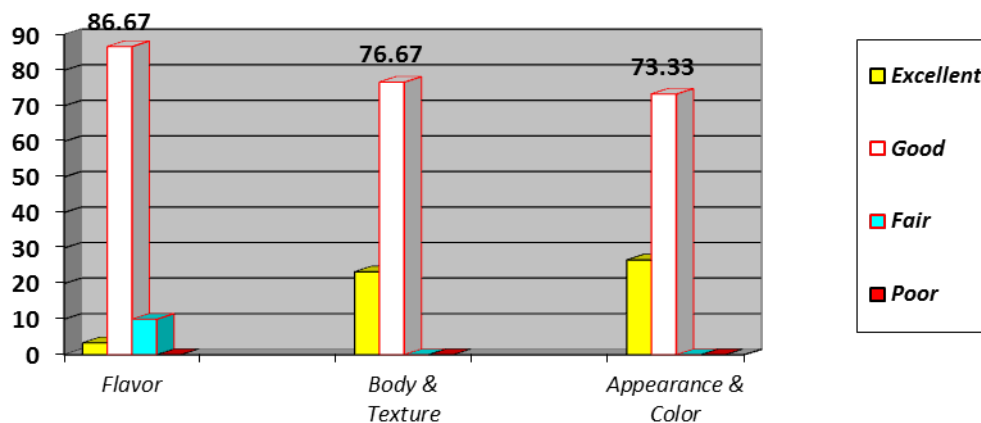


Fig. (1): Grading of examined samples based on their sensory properties

Table (2): Statistical analytical results of acidity percentage and yeas count in the examined samples of yoghurt

Type of samples	Total No. of samples	Min.	Max.	Mean ± S.E.M.
Titratable acidity %	30.0	0.75	1.18	0.89 ± 0.019
Yeast count(cfu/g)	30.0	10 ³	3.1X10 ⁹	2.95X10 ⁸ ±1.4 X10 ⁸

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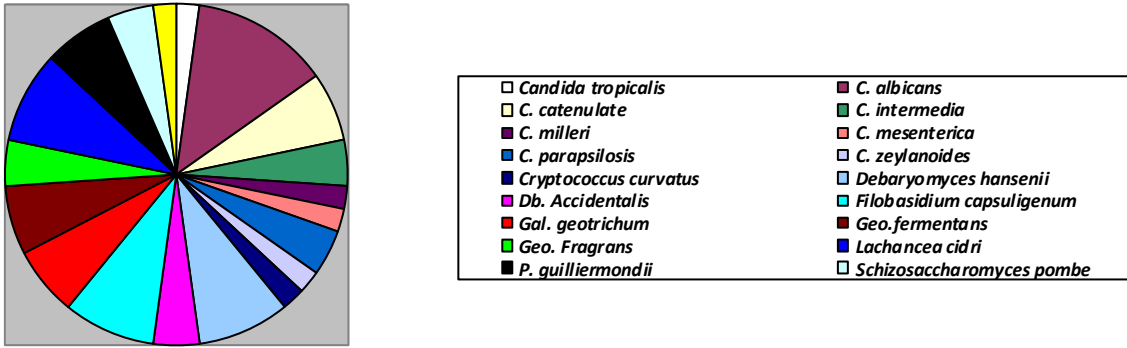


Fig.(2):Incidence of isolated yeast from the examined yoghurt samples

DISCUSSION

1. Organolyptic examination:

1.1. Overall acceptability of the examined samples:

Sensory evaluation is the simplest, most rapid and direct approach for tracing causes of sensory defects in dairy food. Dairy quality judging methods using scorecard are widely spread by the dairy industry to determine sensory quality of dairy products. Score card is best defined as a tabulated list of the factors that contribute to the quality of a product, with a numerical value assigned to each factor, these factors are very helpful in emerge the possible defects that may be found in the product (Clark *et al.*, 2009). Data recorded in (Table 1) revealed that the majority of samples (56.67%) were graded as **good**, while 40 % were graded as fair. The sensory properties of the examined samples showed that 86.67, 76.67 and 73.33% of the examined Plain yoghurt samples had good flavor, body and texture and appearance and color score, respectively, while 10% had fair flavor score Fig. (1). Igbabul *et al.* (2014) obtained nearly similar grades. Higher grades were recorded by Aya (2010) and Karima (2012), while lower scores were obtained by Amanze (2011) and Zehra and Young (2011). Body and texture defects in yoghurt are caused by many different factors; they may be prevented and/or minimized by the following proper and recommended yoghurt manufacturing processes (Clark *et al.*, 2009).

2. Titratable acidity:

Titratable acidity is a measure of freshness and the bacterial activity in milk. However, fresh milk does not contain any appreciable amount of lactic acid therefore an increase in acidity is a rough measure of its freshness and bacterial activity (O'Mahony 1988 and Popescu and

Angel, 2009). Meanwhile lowering the pH of milk to less than 4.6 protect the fermented dairy products against the risk of contamination by pathogens and rendering it hygienically safe (Garbutt, 1997; Al-Kadamany *et al.*, 2001 and Wilton, 2004).

Data recorded in (Table 2) showed that the mean titratable acidity percentage of the examined samples was $0.89 \pm 0.019\%$. The highest frequency distribution of the examined samples (53.33%) lies within the range of 0.85-1. Igbabul *et al.* (2014) and Hossain *et al.* (2015) reported nearly similar results of Plain yoghurt. However, higher findings were obtained by Ekram and Ibtisam (2011) and Joseph and Joy (2011). Meanwhile lower findings were obtained by Karima (2012) and Ahmed *et al.* (2014).. Plain yoghurt is normally considered to be safe regarding food borne diseases because of their low pH, beside some of the lactic acid bacterial starter cultures used in fermentation which produce antimicrobial compounds such as bacteriocins, hydrogen peroxide, formic acid, acetate and diacetyl (Hammes and Tichaczek, 1994), while Yeast is widely distributed in the environment, as they grow at wide range of temperature and acidity, therefore, fermented dairy products are considered as an excellent medium for their growth and multiplication causing undesirable changes in such products (Comi *et al.*, 1982 and Jardano, 1984).

3. Total yeast count:

Yeast plays diverse roles in the quality and safety of cheese (El-Sharoud *et al.*, 2009 and Jacques and Casaregola, 2008). Some yeast show varied ability to metabolize substrates such as lactate and citrate resulting in de-acidification of cheese surface and increase pH, stimulating the growth of mold and bacteria. Moreover, yeast show proteolytic and lipolytic activity; however, this activity differs between species and strains. Typical defects caused by the unwanted yeast were gas production, off-flavors, discolorations and changes in texture (Chamba and Irlinger, 2004). From the other point of view, *Candida albicans* is an opportunistic fungal pathogen that inhabits different locations of human body such as gastrointestinal and genitourinary tracts as commensal in about 70% of humans. However, it can convert from harmless commensal into disease causing pathogen in immune compromised patients (Schulze and Sonnenborn, 2009). The infections caused by *C. albicans* can be divided into two categories: mucosal and systemic. Mucosal infections affect various mucous membranes of the body surfaces such as oropharyngeal mucosa and vaginal mucosa. Systemic infection involves the spread of *C. albicans* to the blood stream and

to the major organs (Sexton *et al.*, 2007). Data depicted in (Table 2) revealed that contaminated yeast could be detected in 24 (80%) of the examined samples, with a mean value of $2.95 \times 10^8 \pm 1.4 \times 10^8$. The highest frequency of the Plain yoghurt (45.83%) lies within the range of 10^6 - 10^8 . Muhammad *et al.* (2008) and Karima (2012) reported nearly similar results of Plain yoghurt. Meanwhile Hadeer (2013) and Ahmed *et al.* (2014) recorded lower findings. The high level of yeast contamination in the examined samples may be attributed to inadequate hygienic measures during production or the use of bad quality raw materials (Varnam and Sutherland, 2009 and Aly *et al.*, 2010). It is evident from the correlation between the titratable acidity % and the count of yeast that there was a proportional relationship.

Isolated yeast species:

Results presented in Fig. (2) revealed that yeast species that contaminated the Plain yoghurt samples: were *Candida tropicalis* (2.17%); *C. albicans* (13.03%); *C. catenulate* (6.52%); *C. intermedia* (4.35%); *C. milleri* (2,17%); *C. mesenterica* (2.17%); *C. parapsilosis* (4.35%); *C. zeylanoides* (2.17%); *Cryptococcus curvatus* (2.17%); *Debaryomyces hansenii* (8.71%); *Db. Accidentalis* (4.35%); *Filobasidium capsuligenum* (8.71%), *Gal. Geotrichum* (6.52%); *Geo. Fermentans* (6.52%); *Geo. Fragrans* (4.35%); *Lachancea cidri* (8.7%); *P. guilliermondii* (6.52%); *Schizosaccharomyces pombe* (4.35%) and *S'copsis vini* (2.17%). Morphogenesis that defined as transition from unicellular yeast form to filamentous form (pseudohyphae or hyphae) is an essential trait in the pathogenisty and virulence of *Candida albicans* (Khan *et al.*, 2010). These morphological changes between the yeast and the various filamentous forms occur in response to alterations in the growth conditions including a growth temperature above 35°C, a pH greater than 6.5, nitrogen and/or carbon starvation, non-fermentable carbon sources, and low oxygen concentrations (Buffo *et al.*, 1984). Occurrence of yeast in yoghurt is not unexpected as yoghurt has various properties that encourage the proliferation of yeast such as high acidity and storage at low temperature., the main defects caused by this spoilage yeast are fruity, bitter or yeasty off flavors, gas production and a softening of texture (Viljoen, 2001).

CONCLUSION

From the obtained results, we can conclude that a large portion of examined yoghurt exposed for sale in Cairo and Giza governorates are of poor safety & quality due to the neglected

sanitary measures adopted during their production, handling and distribution. As yeast existed in most samples (80%) in high numbers in spite of the heat treatment used during their manufacture. Therefore, to safeguard the consumers from being infected as well as to save many products from being spoiled on the market. The following suggestions may be considered: -Public awareness targeting dairy factories and households that produce dairy products should encourage and help them to follow strict hygienic control measures during manufacturing, handling, transportation and storage in order to maintain good quality and safe food. Improvement of product safety and quality could be achieved by applying Good manufacturing practices (**GMP**), Hazard Analysis and Critical Control Point (**HACCP**) system and Food Safety Management System eg. **ISO 22000: 2005** in dairy plants.

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