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Assessment of Microbial quality of some yoghurt Types Sold in Khartoum state

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Abstract

This study was carried out to assess the microbial quality of different types of yoghurts samples (set and stirred) collected from different producers (A, B, C and D). Thirty specimens from set yoghurt (B, C, D) and twenty specimens from stirred yoghurt (A, C) were collected. The pH values were measured during storage periods for the whole fifty samples, values were determined between 5 – 6. Enumeration of the total viable organisms was performed by using total viable counts. Identified microorganisms were *Streptococcus* sp. and *Lactococcus* sp. which isolated from all samples at (100)%, while *Staphylococcus aureus*, *E. coli* and coliforms were not isolated (0%), and yeast was isolated from samples (A stirred yoghurt as 100%, B set yoghurt as (70%), C set and stirred yoghurt as (0%), and D set yoghurt as (50%) from whole samples. This study concluded that yoghurts produced at Khartoum state were good in microbial quality and suitable for human consumption, while Batch A unsuitable for consumption because *Bacillus* sp was isolated, A, B and D undesirable due to yeast isolation.

Keywords: Prevalence .Infertility .fecundity. Risk factors

Introduction

Yoghurt has been a part of the human diet for several millennia and goes by many names throughout the world. The word "yoghurt" is believed to have come from the Turkish word "yoğurmak," which means to thicken, coagulate, or curdle. While references to the health-promoting properties of yogurt date back to 6000 BC in Indian Ayurvedic scripts, it was not until the 20(th) century that Stamen Grigorov, a Bulgarian medical student, attributed the benefits to lactic acid bacteria (Mauro and Rachel, 2019). The origin name of the yoghurt could be traced to the Middle East and the term. Yoghurt is derived from the Turkish word called "Jugurt". It is called by various in different parts of the world viz., fers Labneh (Middle east), Zabady (Sudan, Egypt), Matzooa (USA) and Dahi in India (Tamime and Robinson, 1999). Yoghurt is a fermented dairy product obtained from the lactic acid fermentation of milk. It is one of the most popular fermented milk products in the world and produced commercially at home (Willey *et al.*, 2008**),** yoghurt is generally made from a standardized mixture containing whole milk, partially defatted milk, condensed skim milk cream and non fat dry milk. Alternatively milk may be partly concentrated by removal of 15- 20% water in a vacuum pan or by heating. While the microorganisms fermenting milk confers on it certain health benefits inadequate pasteurized milk may contain microorganism of special importance to man (Boor and Murphy, 2002) and (Ojokoh, 2006) , any sort of milk may be used to make yoghurt, but modern production dominated by cow milk. In addition to the major constituent, milk contains a large amount of lactose sugar, phosphate, peptone and nitrogen base enzyme (Clarence *et al*, 1963). It is the fermentation of the milk sugar (Lactose) into lactic acid that gives yoghurt its gel-like texture and characteristics (Davis, 1974), milk is often regarded as being nature's most complete food. It earns this reputation by providing many of the nutrients which are essential for the growth of the human body. It is an excellent source of protein, vitamins, minerals particularly calcium and also some anti-bacterial substances such as lysozyme, ladoferin (Transferring) and lactoperoxidases. yoghurt has practically the same nutritional value as the basic milk product (Ruud and Bert, 2004), the same author added that fermented milk products such as yoghurt contain bacteria of the lactobacilli group; these bacteria occur naturally in the digestive tract and have a cleansing and healing effect, therefore, the introduction of fermented products like yoghurt into the diet can help prevent certain pathogenic bacteria, otherwise some people suffer from a condition known as (lactose intolerance), this means that they are unable to digest the milk sugar (lactose), during fermentation, lactic acid producing bacteria breakdown lactose

and eliminate the cause of irritation, well known thus yoghurt is good for people suffering from protein allergy' or lactose intolerance (Witton, 2004).

Health benefits of yoghurt refer to its probiotic cultures ; Lactobacilli which are currently among the best known examples of "functional food" (Oyeleke, 2009), yoghurt is contains less lactose and more lactase, rich in calcium which contributes to colon health and decreases the risk of colon cancer and it aids healing, after intestinal infection like diarrhea which injures the lining of the intestines especially the cells that produce' lactase results to temporal lactose mal absorption problem, and can decrease yeast infection (Gray, 2007), it is improves the bioavailability of other nutrients increase the absorption of calcium, and vitamins B, yoghurt can lower cholesterol and boosts immunity (Maltock, 2007), and improve fresh breath and a healthy mouth (Okpalugo *et al.*, 2008).

The level of bacteria, coliform, yeast and mold counts indicated that excessive contamination occurs during manufacture and packaging of the product. Every small and large-scale yoghurt producer is suggested to maintain adequate hygienic condition to make the good quality and healthy yoghurt which will reduce the microorganisms load. Overall the hygienic quality of those yoghurt samples was lower and must be improved considerably (Abdul Matin *et al.*, 2018).

The quality of yoghurt, or any food product, can be defined against a wide range of criteria, including for example, the chemical, physical, microbiological and nutritional characteristics, food or dairy manufacturers aimed to ensure that the safety and quality of their products will satisfy the highest expectations of the consumers (Tamime and Robinson, 1999). Coliforms are routinely used as indicator to the quality of the milk and milk products as some members of coliform are responsible for the development of objectionable taints in milk and its products rendering them of inferior quality or even un marketable (Yabaya and Idris, 2012) *Staphylococcus aureus* in food article is an index of its contamination from personnel sharing in production and handling (Abdelhmeed and Elmalt, 2009). Presence of yeast and moulds in milk and dairy product are undesirable even when found in few number as they resulting in objectionable changes that render the products of inferior quality (Abdelhmeed, 2011). The presence of microbial contamination in yoghurt could be traced to its source, the "milk". Although yoghurt may be fermented but some microorganisms that could survive the fermentation and pasteurization process could still strive and alter the quality of the product when this happens, the food becomes unfit for human consumption (Jilon, 2001).

The main sources of microbial contaminants in yoghurt is raw milk as it leaves the udder of healthy cows normally contains very low number of microorganism and generally less than 1000 total bacteria per ml (Kurweil and Busse 1973). In healthy cows, the teat colonized by a variety of microorganism, cow with mastitis has the potential to shed large numbers of microorganism into the milk supply, mastitis microorganisms found to most often influence the total bulk milk count are *Streptococcus spp,* most notably *Streptococcus agatatiae* and *Streptococcus aberis* (Bramley and Mckinnon ,1990). Organisms associated with bedding materials that contaminate the surface of teats and udders include *Streptococci, Staphylococci,* spore formers bacteria, coliforms and other gram negative bacteria both thermoduric such as '*Streptococci* and *Lactobacillus'*and psychotrophic bacteria are commonly found on teat surfaces (Bramley and Mckinnon, 1990), indicating that contamination from the exterior of the udder can influence labortary Pasteurization count (LPC) and Preliminary Incubation Count of Milk (Pankey, 1989).

Materials and Method

Fifty samples of the yoghurt were collected from different four producers (A,B, C and D), thirty of set yoghurt samples from (B,C and D) and twenty stirred yoghurt samples from (A and C), all samples were kept under refrigeration condition, pH were measured by using pH strips, and analyzed for total bacterial count, coliform count, *S. aureus* , yeast and moulds detection. Solid media "Nutrient Agar (NA), Plate count Agar (PCA), Mannitol Salt Agar (MSA), Eosin Methylene Blue (EMB), Sabouraud Dextrose Agar (SDA), Urease media and Oxidation Fermentation (OF) Semi solid media were cultured with tested yoghurt from serial dilution by using sterile loop on the media

surfaces. Broth media "Glucose Broth media, Glucose Phosphate Peptone Water (VP-MR) media and Peptone Water were cultured by inserting of sterile loop containing tested organism. Cultural characteristics, Gram's stains, motility test according to Kirk *et al.*, (1975), primary and secondary tests for bacterial identification was done according to (Cowan 1981). Results were recorded and statistical analysis was applied.

Results

The pH of all collected samples were found to be 6 except D set yoghurt was pH at 5. Isolated colonies identified as *Streptococcus sp*, *Bacillus spp*, *Lactobacillus spp* and yeast *Streptococcus spp* and *Lactobacillus* spp have been isolated and identified from all the samples (100%), but *the Bacillus spp*. was isolated from stirred yoghurt (Batch A). *Staphylococcus aureus* and *Escherichia coli* or coliforms were not isolated (0%), Yeast were isolated from 22 (44%) of yoghurt samples, without detection of mould, Table (1), (2), (3) and figure (1).

Table (1): pH and total viable bacterial count enumerated from A, B, C and D collected yoghurt:

Yoghurt	pH values	Bacterial Count
A Stirred yoghurt	6	(8 x 10^6 - 230 90x 10^6) CFU/ml
B set yoghurt	6	(15 x 10^6 – 225 x 10^6) CFU/ml
C set yoghurt	6	(15 x 10^6 – 225 x 10^6) CFU/ml
C stirred yoghurt	6	(10x 10^6 - 350x 10^6) CFU/ml
D set yoghurt	5	(30 x 10^6 - 300x 10^6) CFU/ml

Table (2): Percentages of microorganisms isolated from A, B, C and D collected yoghurt:

Microorganisms	A stirred	B set	c set	C stirred	D set
Staphylococcus aureus	0%	0%	0%	0%	0%
Escherichia coli	0%	0%	0%	0%	0%
Coliforms	0%	0%	0%	0%	0%
Moulds	0%	0%	0%	0%	0%
Bacillus sp	100%	0%	0%	0%	0%
Yeast	100%	70%	0%	0%	50%
Streptococcus sp	100%	100%	100%	100%	100%
Lactobacillus sp	100%	100%	100%	100%	100%

Table (3): Analytical Method for percentages of microorganisms isolated from A, B, C and D collected yoghurt:

Groups	*Count*	*Sum*	*Average*	*Variance*
A Stirred yoghurt	8	4	0.5	0.285714
B set yoghurt	8	2.7	0.3375	0.225536
C set yoghurt	8	2	0.25	0.214286
C stirred yoghurt	8	2	0.25	0.214286
D set yoghurt	8	2.5	0.3125	0.209821

Discussion

In this study it's not surprising that *lactobacillus and streptococcus* were isolated from virtually all the sample examined because they are the organisms used as starter cultures for the production of yoghurt. *S. aureus E. coli* and coliform groups are not isolated 0% and *Bacillus* sp. isolated from batch A as (100)%, the sources of this microorganisms is exterior from as previously mentioned by (Bramley and Mckinnon, 1990) and *S. aureus* from the personnel sharing in production and handling (Abdelhmeed and Elmalt, 2009). The high total bacterial count could be due to improper pasteurization or poor handling of raw milk material (Birollo *et al*., 2000), yeast was isolated from batch B (70%) and batch D (50)%, the presence of yeast in dairy product are undesirable even when found in few number as they resulting in objectionable changes that render the products of interior quality as previously mentioned by (Abdel hmeed, 2011). Presence of yeasts or molds in yogurt is also indicative for poor sanitary practices in manufacturing or packaging (Abdul Matin *et al.,* 2018).

Conclusion and Recommendations

The study conclude that yoghurt produced from different producer in Khartoum state is not contaminated by microorganisms which can cause public health proplems, and its produced under good hygiene conditions. A stirred contain 100% *bacillus sp*. A stirred and B set contain yeast at; 100% and 70% respectively we recommend that yeast sp must be controlled much more to minimize objectionable changes that render the products of interior quality.

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