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Microbial Quality Assessment of Khoa Sold in Parbhani City of Maharashtra, India

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Abstract: ***Khoa is required many desserts. Contaminated khoa may possess health risk when consumed raw or partially processed. Microbial quality assessment of khoa is an important step. Present Study was Planned for microbial quality assessment of khoa sold in Parbhani city of Maharashtra of India. The microbial quality of khoa was evaluated by assessing Total Viable Count (TVC). A total of 100 khoa samples were collected and screened during study. Microbial quality was assessed by estimating TVC. The mean TVC of khoa samples recorded was 2.755±0.139 x 10^6 and the range of TVC was found to be 0.61 x 10^6 to 9.68 x 10^6. Sabaurdor's Dextrose Agar was utilized to isolate yeast and mould. It was found that khoa samples sold in Parbhani city have high microbial load. Fungal contamination was found in 32 samples in the form of yeast and Mould. High microbial load and fungal contaminants of khoa possess public health significance.***

Keywords: Khoa, TVC, Yeast and Mould, Microbial quality, Public health

I. INTRODUCTION

The dairy product khoa is made by boiling milk until thicken and made solid mass. khoa is a perishable dairy product prepared by condensing milk and reducing the water content with continual heating. Indian sweets use khoa for making popular dessert such as gulab jamun, barfi, kalakand, kaju katli etc. The temperature of the milk is raised high enough during the manufacture of khoa leads to destruction of most of the bacteria's and vegetative cells.

When the milk is exposed to open area, moulds will enter in milk, Worker handling and dirty processing utensils are the most likely sources of microbes in khoa. The aim of this study was to assess the microbial count and isolate yeast and mould in khoa which was sold in market of Parbhani city in Maharashtra.

II. MATERIALS AND METHODS

A. Collection of Khoa Samples

Khoa samples were collected from khoa market of Parbhani city by following standard method as per FSSAI (2010). A quantity of 50 gm of khoa sample was collected in sterile polyethylene sachet. These Khoa samples were brought to the laboratory on ice and processed immediately (1).

B. Total Viable Count

For evaluating total viable count (TVC), Standard Pour Plate Technique was followed (2). Dilution of inoculums was standardized for further use. The quantity of inoculums from 10^{-3} and 10^{-4} dilutions used for pour plate technique was 0.1 ml to which molten plate count agar (Hi-media Laboratories, Mumbai) (45-50^{o}C) was poured and mixed thoroughly by rotating plates. Incubation was done at 37^{o}C for 24 hours. TVC was calculated by using standard formula as per method described by AOAC (1997).

The Bacterial colonies were counted with the help of the bacteriological colony counter and CFU was calculated by using the following formula

$$\log_{10} \text{CFU/gm} = \frac{\Sigma C}{[n_1 + (0.1 \times n_2)] \times d}$$

Where,

ΣC = Total number of colonies counted from all plates
n_1 = No. of plates of lower dilution
n_2 = No. of plates of lower dilution
d = Dilution factor

C. Isolation of Yeast and Mould

By using 0.1 ml. inoculums of 10^{-3} and 10^{-4} dilutions of sample on Sabouraud Dextrose Agar (SDA) (Hi-media Laboratories, Mumbai) by spread plate method. Incubation was done at 37°C for 5 days. Colonies were analyzed for *Yeast & Moulds* isolation.

III. RESULT AND DISCUSSION

A. Microbial Quality of Khoa

Total Viable Count (TVC) reflects microbial quality of khoa. The TVC counts increases in storage of khoa at room temperature (3).

Naidu and Rangnathan (1965) reported standard plate count of khoa sold in Karnal market in the range of 1.3×10^4 to 1.5×10^4. The earlier TVC of khoa samples in the range of 1.6×10^5 to 2.7×10^5CFU/gm was reported (5). The bacteriological quality of khoa samples sold in Nagpur city were found to be range of 4.88×10^5 to 1.2×10^7CFU/gm (6).

In the present study all 100 khoa samples collected during the study period were subjected to TVC. The range of TVC was found to be 0.61×10^6 to 9.68×10^6 with a mean of $2.755 \pm 0.139 \times 10^6$. A total of 3 samples (K-52, K-95 and K-96) could not be screened due to heavy growth. The results are shown in Table 1. The results are on similar lines as reported earlier.

High TVC counts observed during present study may be due to higher contamination during transportation, storage & handling of khoa at room temperature in the market [3,5,7,8]

Table 1 : Result of Total Viable Count (TVC) of Khoa Samples.

Sr. No.	Sample code	TVC (CFU/gm)	Sr. No.	Sample code	TVC (CFU/gm)	Sr. No.	Sample code	TVC (CFU/gm)
1	K1	2.47×10^6	35	K35	2.36×10^6	69	K69	2.20×10^6
2	K2	0.90×10^6	36	K36	2.78×10^6	70	K70	4.20×10^6
3	K3	0.61×10^6	37	K37	4.31×10^6	71	K71	2.61×10^6
4	K4	1.31×10^6	38	K38	3.40×10^6	72	K72	2.97×10^6
5	K5	1.31×10^6	39	K39	2.70×10^6	73	K73	2.98×10^6
6	K6	1.98×10^6	40	K40	3.59×10^6	74	K74	3.16×10^6
7	K7	2.12×10^6	41	K41	3.34×10^6	75	K75	2.69×10^6
8	K8	1.81×10^6	42	K42	4.10×10^6	76	K76	3.09×10^6
9	K9	1.35×10^6	43	K43	1.65×10^6	77	K77	3.16×10^6
10	K10	1.86×10^6	44	K44	9.68×10^6	78	K78	2.20×10^6
11	K11	1.60×10^6	45	K45	3.35×10^6	79	K79	2.83×10^6
12	K12	1.82×10^6	46	K46	3.06×10^6	80	K80	3.05×10^6
13	K13	1.95×10^6	47	K47	2.95×10^6	81	K81	3.48×10^6
14	K14	3.11×10^6	48	K48	3.78×10^6	82	K82	1.56×10^6
15	K15	1.60×10^6	49	K49	1.09×10^6	83	K83	2.79×10^6
16	K16	1.10×10^6	50	K50	3.14×10^6	84	K84	2.45×10^6
17	K17	1.36×10^6	51	K51	2.66×10^6	85	K85	2.11×10^6
18	K18	2.85×10^6	52	K52*	-	86	K86	1.47×10^6
19	K19	2.90×10^6	53	K53	2.15×10^6	87	K87	3.08×10^6
20	K20	1.10×10^6	54	K54	3.31×10^6	88	K88	2.94×10^6
21	K21	2.44×10^6	55	K55	3.39×10^6	89	K89	2.79×10^6
22	K22	2.47×10^6	56	K56	1.69×10^6	90	K90	8.54×10^6
23	K23	1.37×10^6	57	K57	3.52×10^6	91	K91	2.90×10^6
24	K24	1.41×10^6	58	K58	3.80×10^6	92	K92	2.45×10^6

25	K25	3.54×10^6	59	K59	3.58×10^6	93	K93	2.00×10^6
26	K26	3.60×10^6	60	K60	3.70×10^6	94	K94	1.37×10^6
27	K27	2.58×10^6	61	K61	2.72×10^6	95	K95*	-
28	K28	2.56×10^6	62	K62	3.92×10^6	96	K96*	-
29	K29	1.92×10^6	63	K63	2.76×10^6	97	K97	2.48×10^6
30	K30	4.11×10^6	64	K64	2.55×10^6	98	K98	2.69×10^6
31	K31	3.62×10^6	65	K65	2.73×10^6	99	K99	3.33×10^6
32	K32	3.47×10^6	66	K66	2.40×10^6	100	K100	3.86×10^6
33	K33	2.35×10^6	67	K67	3.24×10^6		Range	0.61×10^6- 9.68×10^6
34	K34	2.75×10^6	68	K68	3.20×10^6		Mean CFU/gm Mean S. E	2.755×10^6 0.139

* The samples were not screened due to heavy growth.

B. Isolation of Yeast and Moulds

All 100 khoa samples were subjected to screening for *Yeast* and *Moulds* on SDA agar. The results are given in Table 2. A total of 32 *Yeast* and *Mould* isolates were obtained. Heat processing of khoa eliminated microbial load. However, Yeast and moulds growth appear during storage (9).

Table 2. Showing positive 32 samples of *Yeast* and *Moulds* isolated on SDA agar from khoa sample.

Sr. No.	Sample code	*Yeast and Moulds* isolation	Isolate code
1	K2	+ ve	YM-1
2	K3	+ ve	YM-2
3	K4	+ ve	YM-3
4	K5	+ ve	YM-4
5	K6	+ ve	YM-5
6	K7	+ ve	YM-6
7	K8	+ ve	YM-7
8	K9	+ ve	YM-8
9	K10	+ ve	YM-9
10	K12	+ ve	YM-10
11	K13	+ ve	YM-11
12	K14	+ ve	YM-12
13	K15	+ ve	YM-13
14	K65	+ ve	YM-14
15	K66	+ ve	YM-15
16	K67	+ ve	YM-16
17	K68	+ ve	YM-17
18	K69	+ ve	YM-18
19	K70	+ ve	YM-19
20	K71	+ ve	YM-20

21	K72	+ ve	YM-21
22	K73	+ ve	YM-22
23	K74	+ ve	YM-23
24	K75	+ ve	YM-24
25	K76	+ ve	YM-25
26	K89	+ ve	YM-26
27	K90	+ ve	YM-27
28	K91	+ ve	YM-28
29	K94	+ ve	YM-29
30	K96	+ ve	YM-30
31	K97	+ ve	YM-31
32	K98	+ ve	YM-32

+ ve Sample showing growth of *Yeast* and *Moulds*
YM-yeast and Mould, K-Khoa sample

Rajarajan *et al.* (2006) studied appearance of *Yeast* and *Moulds* at different production points i.e. vat section, packaging section and production section. Stored khoa samples had higher *Yeast* and *Moulds* counts while vat section had lower count (10). The presence of *Yeast* and *Moulds* in about 32 khoa samples in present study (Table 2) may also be due to contamination of khoa during storage.

IV. CONCLUSION

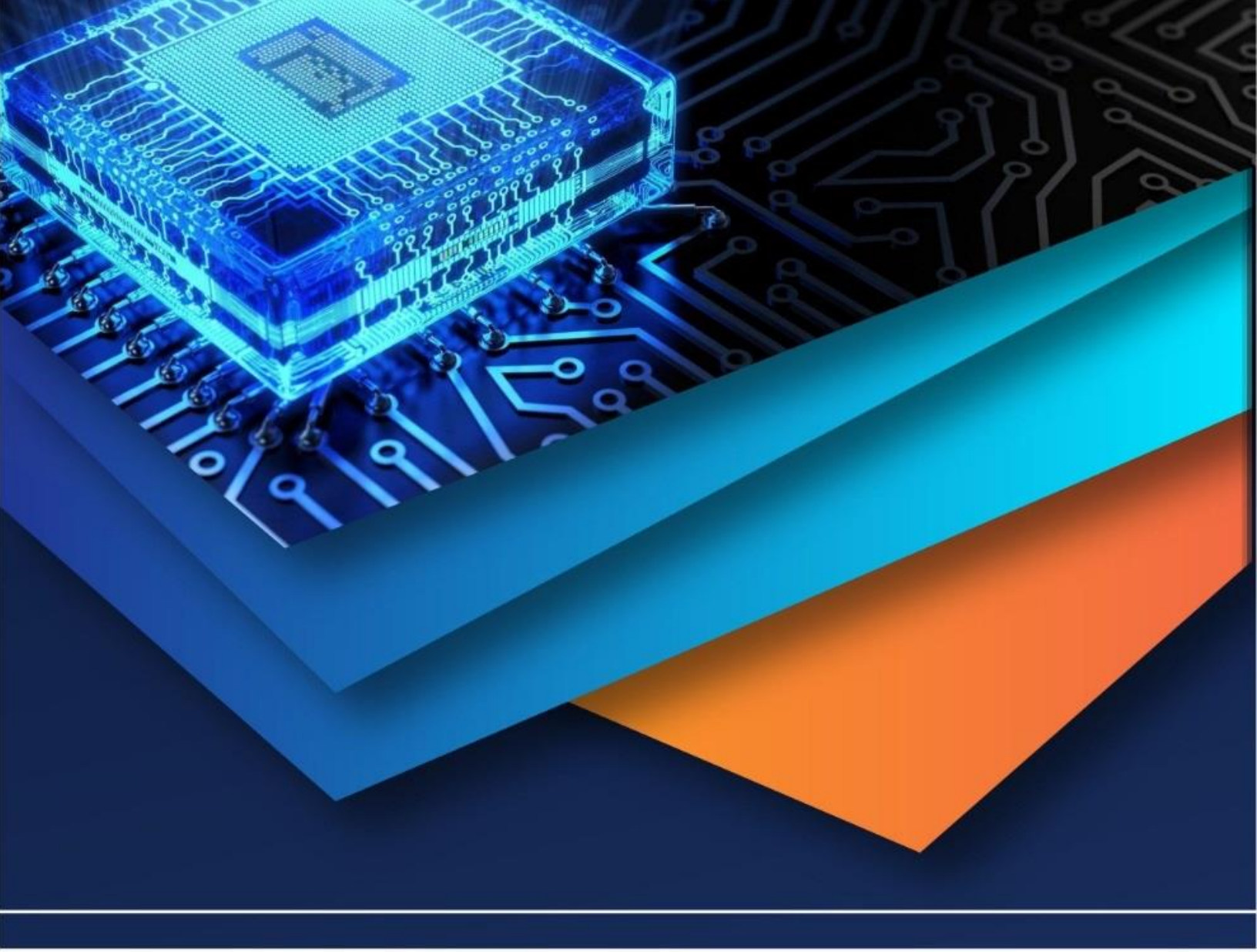
The present study was planned with the objective of evaluating microbial quality of khoa sold in Parbhani city and to isolate *Yeast and Moulds.* A total of 100 khoa samples were collected and screened during study. Microbial quality was assessed by estimating TVC. The mean TVC of khoa samples recorded was $2.755 \pm 0.139 \times 10^6$. Following conclusions can be drawn from study,

1) Khoa samples sold in Parbhani city have high microbial load.
2) *Yeast and Moulds* are common contaminants of khoa of public health significance.
3) Identification of CCP in khoa preparation and technological interventions are required for maintenance of quality of khoa in relation to public health.

Conflicts of interest: The author stated that no conflicts of interest.

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