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# Quality of khoa sold in Washim district

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## ABSTRACT

**The present investigation was carried out in Department of Animal Husbandry and Dairying, Dr. PDKV, Akola during year 2009-2011. The objectives of present investigation were to study the chemical, sensory quality and to find out the adulteration of starch of khoa sold in Washim district. The market khoa samples were collected from three sources *i.e.* Washim khoa produced and marketed in Washim city, Karanja (Dist. Washim) and Risod (Dist. Washim). It was found that Washim, Karanja and Risod khoa samples content on an average moisture 27.20, 30.10 and 30.08 per cent, fat 27.70, 22.50 and 23.29 per cent protein 18.89, 18.67 and 17.26 per cent, lactose 21.74, 19.20 and 21.10 per cent, ash 3.91, 4.06 and 3.47 per cent, total solids 72.80, 69.89 and 69.92 per cent, solids-not-fat 44.90, 47.56 and 46.63 per cent, titratable acidity 0.597, 0.692 and 0.690 per cent and free fat acids 0.629, 0.736 and 0.774 per cent, respectively. It indicated that the khoa produced and marketed as Washim had better chemical quality than the Karanja and Risod khoa. It was also observed that khoa produced and marketed in Washim has good sensory quality than the Karanja and Risod khoa. Adulteration of starch was found in Karanja and Risod khoa.**

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**Key Words :** Khoa, Risod market, Washim market, Karanja market, Chemical composition, Sensory evaluation, Adulteration

## INTRODUCTION

Khoa is a concentrated milk product. It is very rich in total solids and hence highly nutritious food in the diet of human beings. According to Indian Standard Institute, khoa shall not contain moisture less than 28 per cent and fat not less than 26 per cent on dry matter basis. Khoa is a major intermediate base product for a variety of sweets. Naturally, there is a considerable demand for this product in big cities but unfortunately, the manner in which this product is prepared, packed and transported is very unhygienic.

The demand for milk and milk products of Washim district is high and day by day, it is increasing rapidly. In the district, some wholesalers, Halwai, hoteliers etc. prepared khoa by purchasing milk from milk men of surrounding villages or areas. While others purchase ready made khoa from khoa producers of surrounding villages or areas of Washim district.

By considering the nutritional significance and economical importance of khoa, it becomes essential to find out and check sensory and organoleptic qualities of khoa. The results obtained during the investigation depend upon the represented samples of khoa of a particular time or period, time to time, batch to batch and lot to lot variation is found. Hence, results can be changed lot to lot and condition to condition *i.e.* availability of khoa.

## METHODOLOGY

The research work was undertaken in the Department of Animal Husbandry and Dairying, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2010-11. The procedure adopted for experimentation in the present study are given below.

**Evaluation of market samples:**

*Collection of samples:*

In Washim district, three markets namely Washim, Risod and Karanja were selected. From each source, 30 samples were analyzed during three forthright, so ten samples of each source were analyzed for each fortnight. These total 90 khoa samples were selected by stratified random sampling method. The samples were collected with care to avoid contamination.

*Sensory evaluation:*

Khoa samples from Washim district was subjected

to organoleptic evaluation. The panel of five judges were provided with the evaluation cards in each trial separately for flavour, body and texture, colour and appearance. The 100 point numeric score as described by Pal and Gupta (1985) was provided for evaluating the sensory qualities.

**Chemical analysis:**

Moisture content of khoa samples were determined as per procedure prescribed in ISI Hand book of food analysis SP: 18 (part XI): 1981. Fat content of khoa, samples were determined by Soxhelt extraction method as prescribed in A.O.A.C. (1990). Protein content of samples was determined by procedure recommended in B.I.S. Handbook of food analysis: dairy products IS:1166 (1973). Lactose content of khoa samples was determined as per procedure prescribed in ISI Hand book of food analysis SP: 18 (part XI): 1981. Ash content of khoa samples was determined as per procedure prescribed by IS –1165 (1967). Total solids content in the sample was determined by subtracting the moisture content in the sample. Solid not fat of khoa samples were determined by subtraction of fat from total solids. Titratable acidity of khoa samples was determined as per procedure given by Rudreshappa and De (1971).

**Detection of adulteration :**

Market khoa samples were tested for adulteration of starch. Starch was detected according to the method given in IS 1479 Part I (1960).

**Statistical analysis:**

Data for chemical composition and organoleptic evaluation was statically analyzed under Factorial Completely Randomized Block Design (FCRD) as per procedure given by Amble (1975).

## OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as well as relevant discussion have been presented under following heads :

**Chemical composition of khoa:**

Market samples of khoa were analysis for moisture, fat, protein, lactose, ash, total solids, solids-not-fat, acidity and free fatty acids. The average chemical composition of khoa sold in Washim district is presented in Table 1.

**Moisture :**

It is revealed from Table 1 that the maximum average moisture content was recorded by Karanja khoa and minimum in Washim khoa. Washim khoa was significantly superior over Karanja and Risod khoa in respect of moisture content. So, Washim khoa conformed with ISI specifications (ISI, 1968) in respect of moisture (28.00 per cent max.) while Karanja and Risod khoa contained high moisture percentage as compared to ISI specification.

**Fat:**

It was observed from Table 1 that the maximum fat content was recoded by Washim khoa followed by Risod and Karanja khoa. The fat content of Washim khoa was significantly superior over Karanja and Risod khoa. However, the Karanja and Risod khoa which contained less fat per cent than Washim khoa were confirmed to ISI specification (ISI-1968) in respect of fat (20.00 per cent min.).

**Protein:**

It was observed that the mean values of protein content of khoa samples from Washim, Karanja and Risod market showed 18.89 per cent, 18.67 per cent and 17.26 per cent, respectively. The average maximum protein content of market khoa was recorded by Washim khoa fallowed by Karanja and Risod khoa. These differences were found to be significant for protein content. Washim khoa was at par with Karanja khoa while significantly superior over Risod khoa in respect of protein content.

**Lactose :**

It was noticed from Table 1 that, lactose content of khoa samples produced in Washim, Karanja and Risod

**Table 1 : Average chemical composition percentage of Khoa sold in Washim district**

| Source of khoa | Means values based on 03 fortnight and 10 samples of each fortnight (%) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Moisture | Fat | Protein | Lactose | Ash | Total solids | Solids not-fat | Titratable acidity | Free fatty acids |
| *Washim* | 27.20 | 27.70 | 18.89 | 21.74 | 3.91 | 72.80 | 44.90 | 0.597 | 0.629 |
| Karanja | 30.10 | 22.50 | 18.67 | 19.20 | 4.06 | 69.89 | 47.56 | 0.692 | 0.736 |
| Risod | 30.08 | 23.29 | 17.26 | 21.10 | 3.47 | 69.92 | 46.63 | 0.690 | 0.774 |
| 'F' Test | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. |
| SE (M) ± | 0.52 | 0.56 | 0.32 | 0.38 | 0.13 | 0.51 | 0.67 | 0.011 | 0.013 |
| C.D. (P=0.05) | 1.43 | 1.55 | 0.88 | 1.05 | 0.37 | 1.43 | 1.85 | 0.030 | 0.035 |

showed significant difference while period of samples did not differ significantly. The maximum percentage of lactose was contributed by Washim khoa and lowest by Karanja khoa. Washim khoa was at par with Risod khoa and significantly superior over Karanja khoa in respect of lactose content.

**Ash :**

It is revealed from Table 1 that the average ash content of khoa sold in Washim district ranged from 3.47 to 4.06 per cent. The maximum percentage of ash was recorded by Karanja khoa while minimum ash content obtained in Risod khoa. Washim khoa and Karanja khoa were at par in respect of average values of ash content.

**Total solids** :

It was noticed that Washim khoa recorded maximum percentage of total solids followed by Risod and Karanja khoa. So, Washim khoa was significantly superior over Karanja and Risod khoa in respect of total solids.

**Solids-not-fat :**

It was observed from Table 1 that the average solids-not-fat content of khoa sold in Washim district ranged from 40.90 to 47.56 per cent. Karanja khoa recorded maximum SNF content whereas Washim khoa recorded minimum for this attribute. These differences found to be significant for solids-not-fat. Washim khoa was at par with Risod khoa in respect of solids-not-fat content.

**Titratable acidity (per cent lactic acid):**

It is revealed from Table 1 that the average titeratable acidity levels in Washim district market khoa ranged from 0.597 to 0.692 per cent LA. The highest titratable acidity was contributed by Karanjia khoa while lowest by Washim khoa. The higher acidity in khoa indicates that the khoa was not fresh which sold three to four days after preparation. As concern to titratable acidity, Washim khoa was significantly superior over Karanja khoa and Risod khoa.

**Free fatty acids (per cent oleic acid):**

The average values of free fatty acids content of Washim, Karanja and Risod khoa in respect of per cent oleic acids were 0.629 per cent, 0.736 per cent and 0.774 per cent oleic acid, respectively. Out of three sources of khoa from Washim district, Risod khoa recorded maximum free fatty acid level followed by Karanja and Washim khoa. The higher free fatty acid level indicated that khoa was not fresh which was sold three to four days after preparation.

These results was found to be in close agreement with the results reported by Bhosale and Chavan (1972), Ghodekar *et al.* (1974), Zariwala *et al.* (1974), Jaikhani and De (1979), De (1980), Ghodekar and Patel (1980), Aneja (1997) and Katole (2002). The findings of the present investigation are comparable to the findings of these research workers.

**Organoleptic quality of khoa:**

Market samples of khoa were organoleptically evaluated for colour, appearance, flavour , body and texture and over all acceptability The average score obtained for khoa sold in Washim district is presented in Table 2.

**Flavour :**

It is observed from Table 2, that the average flavour scores of khoa sold in Washim district ranged from 36.33 to 39.88. However, maximum average flavour score was contributed by Washim khoa where as lowest contributed by Risod khoa. Washim khoa was significantly superior over Karanja and Risod khoa for average flavour scores. Out of three sources of khoa which was sold in Washim city, Karanja and Risod received adverse comments for flavour which was most inferior with slightly acidic flavour, due to long storage period and also slight burnt flavour.

**Body and texture :**

It was noticed from Table 2 that the average body and texture scores of Washim district khoa ranged from 29.17 to 32.18. It was noticed that minimum and maximum

**Table 2 : Average sensory / organoleptic scores of khoa sold in Washim district**

| Source of khoa | Mean values of scores obtained for five replications (Score/Marks) | | | |
|---|---|---|---|---|
| | Colour and appearance(20) | Flavour(45) | Body and texture(35) | Overall acceptability(100) |
| Washim khoa | 18.20 | 39.88 | 32.18 | 90.26 |
| Karanja khoa | 16.91 | 36.61 | 29.85 | 83.37 |
| Risod khoa | 16.72 | 36.33 | 29.17 | 82.22 |
| 'F' test | Sig. | Sig. | Sig. | Sig. |
| S.E. (m)± | 0.09 | 0.21 | 0.17 | 0.27 |
| C.D. (P=0.05) | 0.26 | 0.60 | 0.48 | 0.75 |

average body and texture was exhibited in Risod khoa and Washim khoa, respectively. Interaction between khoa sources and fortnight was found to be significant differences. Form the above results it seen that there was variation in average score of body and texture of khoa samples collected from Washim, Karanja and Risod in first, second and third fortnight.

**Colour and appearance :**

The average scores obtained for colour and appearance of Washim district khoa (from three sources) differed significantly. Washim khoa was found to be significantly superior over Karanja khoa and Risod khoa in respect of average colour and appearance score. The samples from Risod and Karanja khoa showed slightly brown and black specks of burnt spots, slightly moldy and there appeared visible foreign matter like news paper pieces which caused to reduce the scores for this sensory attribute.

**Overall acceptability:**

It is observed from Table 2 that the average overall acceptability of Washim district khoa ranged from 82.22 to 90.26. The differences of score obtained for khoa sources were found to be significant whereas Washim khoa was found to be significantly superior over Karanja and Risod khoa in respect of overall acceptability.

**Adulteration:**

Market khoa obtained from Washim market was tested for starch. The iodine test was negative for Washim khoa which was prepared in Washim city while, this test was positive for Karanja and Risod khoa which was sold in Washim city for 24 samples and 22 samples, respectively from out of 30 samples each. Also 12 samples (out of 30 samples) from Washim khoa felt hard granular texture while chewing from this, it was clear that other than starch the unknown foreign substance might have been added. Little attempts have so far been made to investigate nature of adulteration in khoa, its ill effect on health of consumers. Hence, further research should be done to detect the adulteration with substances other than starch and further improvements in this fecundancy are needed to improve consumer's acceptability.

**Conclusion:**

The khoa produced and marketed in Washim city had better chemical quality than the Karanja and Risod khoa which were fair and far below or fat above as per the standards of Indian Standards Institute (ISI, 1968). The sensory quality of khoa produced in Washim city was good having 90.26 overall score and showed slightly salty and nutty flavour, pasty texture and absence of visible foreign matter. Adulteration of starch was found in Karanja and Risod khoa. However, Washim khoa gave negative test for starch while some samples showed the unknown foreign substances which might have been added other than starch.

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