

## Preparation and nutritional evaluation of oat fiber based yogurt

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**Abstract:** The study was conducted to determine the effect of different concentrations of oat fiber in yogurt and its physiochemical quality during storage. In this research, different concentration of oat fibers, like 0.1gm, 0.2gm and 0.5gm were used for the preparation of yogurt. Analysis was carried out for each sample to evaluate its different parameters after storage at 0, 5, 10 and 15 days at 4°C. The results showed that oat fibers slightly enhanced the quality of yogurt as compared to control sample of yogurt. It was observed that the protein, lactose, ash, fat, acidity and solid mass slightly increased whereas the moisture depleted during storage. Different concentrations of oat fibers have different effects on the quality of yogurt.

**Keywords:** Yogurt, oat fiber, nutritional evaluation.

**Received:** January 12, 2012 **Accepted:** April 22, 2012

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### INTRODUCTION

Yogurt is coagulated milk produced by lactic acid fermentation through the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* from milk and milk product<sup>1</sup>.

In the yogurt production milk heat treatment is considered to be a critical factor for texture formation<sup>2</sup>. Different starter cultures i.e., bacterial species being used to provide more functional properties with different flavored<sup>3-5</sup>. Flavor and texture are the most pronounced factors that influenced the quality of yogurt<sup>4-9</sup>.

Dietary fiber is the indigestible portion of plant foods that process food through the digestive system, absorbing water and easing defecation sometimes called roughage. Some plants contain significant amounts of soluble and insoluble fiber. For example plums have a thick skin covering a juicy pulp<sup>6</sup>. The oat grain is a hardly cereal which resembles wheat and can withstand poor soil condition.

Constituents in dietary fiber may interact with food components during processing leading to changes in the nutrients. The effect of fiber addition to dairy products has deals with stabilizer and emulsifier for texture improvement<sup>7</sup>.

### MATERIALS AND METHODS

Olpers milk, gelatin and sugar as raw material were purchased from a local market, Lahore. "*Lactobacillus acidophilus*" and "*Lactobacillus bulgaricus*" were used as starter culture for the production of yogurt samples. Milk was homogenized in a homonizer to improve the texture. After addition of gelatin (0.5%), milk was pasteurized at temperature of 90°C for a period of 30 minutes. The freshly made yogurt was incubated at 38°C to 42°C for 3 to 4 hour for proper setting.

Yogurt was cooled at 4°C in a refrigerator to check any further fermentation and was subjected to sensory and physiochemical evaluations.

#### Physiochemical analysis

The physiochemical analysis was carried out during 15 days of storage period.

#### Moisture

Moisture contents of yogurt were determined by oven dry method<sup>8</sup> and calculation was carried out by using following formula: Moisture % = wt. of fresh sample - wt. of sample after drying x 100/weight of sample.

#### Ash

Ash contents were determined by following formula: Ash % = wt of crucible and Ash - wt of crucible x 100/wt of sample **Protein**

Protein and nitrogen contents of yogurt samples were determined by Kjeldahl method according to the BS 1741-5.2<sup>10</sup>

#### Fat

Fat was determined (on wet weight basis) by Soxhlet's method by using this formula, % Fat = g of fat in dry sample/g fat of in wet sample\*100<sup>11</sup>.

#### Lactose

The lactose in yogurt sample was determined by the gravimetric method described by AOAC official methods<sup>12</sup>.

#### Total solid

Total solids were determined by following formula, % Total solids (wt/wt) = wt. of dry sample/wt. of wet sample\*100<sup>13</sup>.

### RESULTS AND DISCUSSION

This study was carried out on the preparation and nutritional evaluation of fiber based yogurt. Yogurt were made by using three different concentrations of oat fibers as 0.1gm, 0.2gm and 0.5gm. Incubation was carried out at 37°C and the yogurt were stored at 4°C for 15 days. Yogurt was analyzed on 0, 5, 10, and 15 days after preparation.

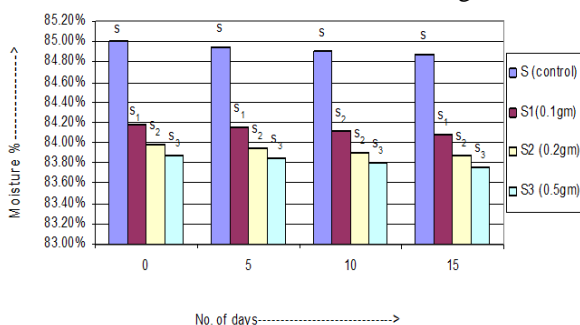
In this study, physiochemical analysis like moisture contents, ash contents, fat contents, protein contents, total solid mass, acidity and amounts of lactose were analysed.

**Moisture contents**

During this work, it was found that the moisture contents of all yogurt treatments were decreased as in control sample (S). The data in the figure 1 showed that the moisture content of all the samples decreased with the addition of oat fibers throughout the storage period for 0 to 15 days.

The bar chart showed a gradual decrease in moisture percentage (%) in yogurt samples with the addition of oat fibers for during 15 days of storage. Moisture content, a physiochemical parameter is an expression of the amount of water available for biochemical reaction and bacterial growth. The importance of moisture contents in dairy foods has been widely studied<sup>14</sup>.

Hamdan, et al., (1971) and Bills, et al., (1972) stated that the moisture contents decreased from 86.90 % to 84.95 % during refrigerated storage. These results were resembles to our findings.

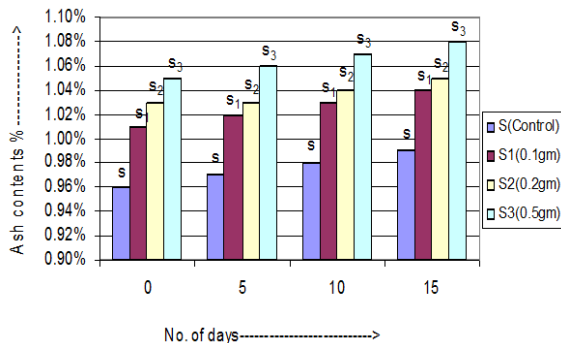


**Figure 1:** Estimation of moisture contents in yogurt within 15 days.

**Ash contents**

The effect of fiber based yogurt for the analysis of ash contents was obtained which are given in the Figure 2. The ash content increased with the addition of oat fibers, it was also noted that ash contents also increased with the passage of time in 15 days. The data in the Figure.2 showed the addition of oat fiber effect on ash contents % in yogurt samples for during 15 days of storage.

The “ash contents” is a measure of the total amount of minerals present within a yogurt. It is important to the mineral contents of yogurt during processing because this effect physiochemical properties of yogurt<sup>15</sup>.



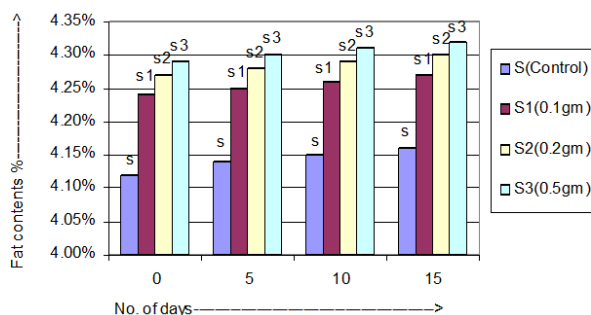
**Figure 2:** Ash contents % in yogurt within 15 days.

**Fat contents**

There was a minute increase in the fat contents of yogurt during storage. Increased in fat contents in yogurt is due to acidic pH. A slight increased in fat percentage between different samples having different concentrations was observed which did not affect the yogurt quality.

It was concluded that fat content increased with the addition of oat fibers gradually within 15 days of storage. The bar chart (Figure 3) showed the effect of oat fibers on fat contents in yogurt prepared with 3 different % of oat fibers samples .There was slight increase in fat values of all yogurt samples.

Ahmad (1999) reported that the fat contents of yogurt have the maximum range of 4.5 %. In another experiment Mutlu, et al., (2005) reported that the fat contents of bio yogurt ranged from 3.1 % to 4.5 % during storage period.



**Figure 3:** Fat contents (%) in yogurt within 15 days of storage.

**Proteins contents**

Oats are rich in protein and these oat fibers increased protein contents in yogurt in high ratio. The protein contents of yogurt samples were found to increase on fermentation. The protein value in fiber based yogurt is higher as compared to control sample which was found to enhance the quality of yogurt.

The Figure 4 shows the effect of oat fibers on protein contents in yogurt. Hussain, *et al.* (2009) reported that the average protein content of probiotic yogurt was 5.4 % and that of natural yogurt was 5.3 %. It was concluded that protein content increased with the addition of oat fibers in yogurt within 15 days of storage.

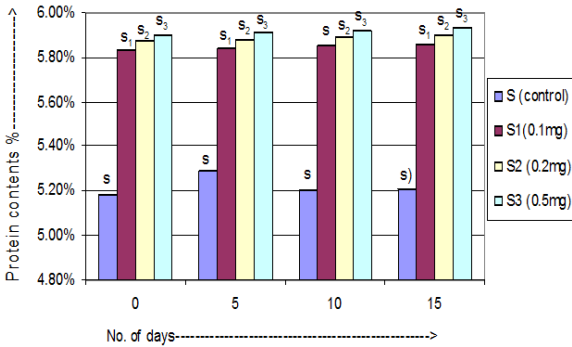


Figure 4: Protein contents (%) in yogurt within 15 days of storage.

**Total solid mass**

The total solid mass in all yogurt samples were increased with the passage of time. The increased in solid mass was due to decrease of moisture. The total solid mass in control sample was from 14.60% to 14.75%. Muhammad, *et al.*, (2005), estimated the highest range of total solids in yogurt as 17.1 %. As shown in the Figure 5, solid contents of all the samples increased with the passage of time at 4 °C within 15 day and this increased in solid mass is due to the loss of moisture in yogurt.

**Lactose contents**

The results obtained are given in the Figure 6, which is showing that the lactose contents of different yogurt samples were increased during storage period within 15 days. The increased in lactose contents might be due to fermentation done by bacteria.

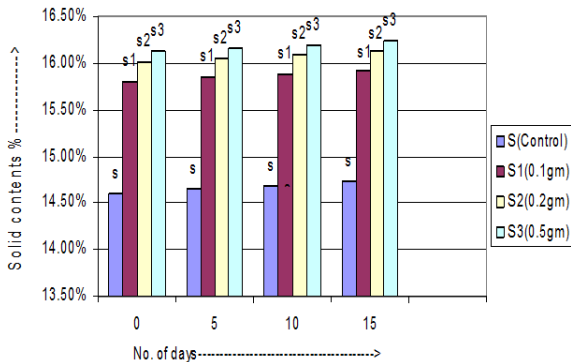


Figure 5: Total solid mass (%) in yogurt within 15 days.

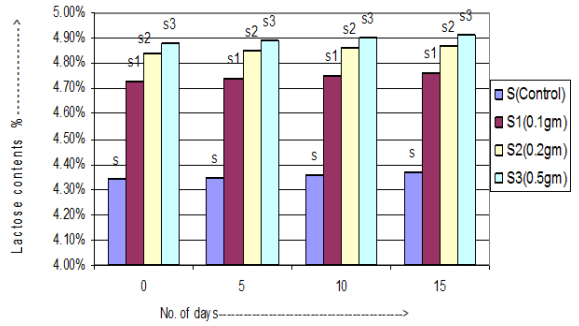


Figure 6: Lactose contents (%) in yogurt within 15 days.

**Acidity in yogurt**

The results obtained from this study are in the Figure 7 which shows that the acidity of yogurt tends to increased continuously with the passage of time. It was found that the acidity determines the quality and tast of yogurt. In this study, the acidity tends to increased in all sample during storage. The oat fiber yogurt sample had a higher acidity. The increased in acidity of yogurt was mainly due to the oat fibers during which lactose is broken down to lactic acid.

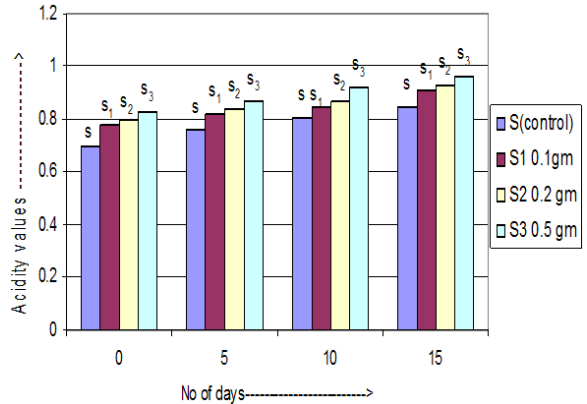


Figure 7: Acidity values in yogurt within 15 days.

**CONCLUSION**

Oat fiber was used to Insoluble dietary fortify sweetened plain yogurt. Fiber addition caused acceleration in the acidification rate of the experimental group yogurts, and most of the fortified yogurts also showed increases in their apparent viscosity. Oat fibers caused a significant increased in viscosity of yogurt.

In general, fiber addition led to lower overall flavor and texture of yogurt. It was concluded that Nutritional Value of the Yogurt was increased by the addition of Oat.

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