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# Production of low Fat Synbiotic Yogurt Containing Lactobacillus Plantarum and Inulin

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ABSTRACT

Nowadays, production of functional foods using additives to improve technological properties and enhance the nutritional values is considered. Inulin is one of the fructan that's prebiotic effect and used in functional foods production. The aim of this study was to produce low-fat synbiotic yogurt with desirable quality by using Lactobacillus plantarum and Inulin. For this purpose, the long chain inulin with concentrations of 1 and 1.5% were used for production of low fat synbiotic yogurt (1.5% fat) containing Lactobacillus plantarum. The sensory evalution, pH, acidity, dry matter, count of probiotic bacteria, syneresis and viscosity levels in all samples were preformed, on the days 1,7,14 and 21. Results indicated that the milk supplementation with inulin leads to increase growth and survival of Lactobacillus plantarum. During cold storage, pH, dry matter, count of live probiotic bacteria, and sensory properties were reduced significantly (p<0.05) but acidity, viscosity and percentage of syneresis were increased (p<0.05). In all samples till the 21th day of storage, the number of live probiotic bacteria was higher than the standard 106 CFU/gr ¬(p<0.05).



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## INTRODUCTION

Today, food is not only viewed as a means of providing energy but it is also regarded as a means of preventing, curing the diseases and improving the health of consumers, these food are classified under the functional food category [24]. Synbiotics consist of both probiotic microorganisms and prebiotic compounds. These products, in fact, contain useful bacteria (probiotics) and indigestible carbohydrates (prebiotics) for stimulating beneficial bacteria growth [18]. Synbiotics have antimicrobial, anticancer, anti-allergic and immune–stimulating properties. They improve absorption of minerals, prevent incidence of diarreah, and optimize assimilation of nutrients [6]. For maximum survival of probiotic bacteria and their favored therapeutic effects, as carriers of probiotic bacteria in food are considered. So, a special attention to the dairy products containing probiotic bacteria such as fermented milk, ice-cream, various types of cheese, infant formula, milk powder,Frozen dairy desserts, whey based drinks, sour cream and concentrated milk. The dairy products have been considered as transfer carriers of probiotic bacteria in human digestive tract [32].

Among the fermented milk products, yogurt is the most important carrier of probiotic bacteria and the agent for transmission of that to consumer [40]. Among the benefits of yogurt is the transformation of the milk lactose to lactic acid by fermentation, the lactic acid is used as a preservative for food products, It also creates a mild sour taste, changes in physical properties to facilitate clot casein digestion and increasing the availability of calcium and other minerals are involved [16]. These beneficial effects are related to the beta-galactosidase enzyme available in the dairy fermenting products which by postponing the time of food passing the intestine, positively affects the function of the intestine and intestine micro flora and reduces the symptoms of lactose intolerance indicated [38].

Considering the fact that the bacteria used in yogurt fermentation against with acid and bile has a lower resistance, thus adding the probiotic bacteria to the yogurt starter culture, significant positive features to give the final product [22].

The minimum level of $10^6$-$10^7$ cfu/gr of live probiotic bacteria in one product is critical for achieving their healthy advantages during its storage [31]. *Lactobacillus plantarum* is a member of industrial Lactic acid bacteria. It is found in different products including milk, meat and fish and many vegetables and in general it is known safe (GRAS). Usually it is used as starter for producing fermented food by considering its acidification ability and production of bacteriocins in order to increase safety of food [8].

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*Lactobacillus plantarum* is found in the protein enriched media such as yogurt and it has proteolytic activity [20].

Utilizing this bacterium in curing the irritable bowel syndrome diseases, decreasing the pain and inflation and the abdominal distension has been reported [3].

Since the probiotic bacteria have low survival in food products for long duration , thus adding prebiotics(as stimulators of probiotics growth) to a food , results in an increase in the survival of the probiotic bacteria during shelf life of the product [10, 13] .

Some prebiotics include glocans, fructans and manose , which are more useful among froctans, inulin and fructooligosaccharides [27].

Different studies indicated diet containing Inulin and Fructooligosaccharides stimulates the growth of bifidobacteria and Lactobacillus and it selectively prevents growth of pathogen microorganisms especially Fusobacterium and Clostridium [5]. Inulin has been used in the food industry, as a fat replacer in dairy products (yogurt and cheese), and a reformer of the texture through creating a cream form and improving the oral mouth feel of the product [9].

The purpose of this study has been to produce low fat synbiotic yogurt with desirable quality properties by using *Lactobacillus plantarum* and inulin.

## MATERIALS AND METHODS

*Preparation of Yogurt Starter Culture:*

Yogurt starter is Exp1.0 containing Lactobacillus delbrueckii subsp. bulgaricus and Streptococcus thermophilus prepared from Danish Company (CHR-Hansen). According to the instruction, the starter was activated and ready for inoculation in sterile conditions. In order to activate the starter, the reconstituted skim milk with 10% of Total solids which was heated to 90-95° C for 45 minutes was used [21].

*Preparation of Probiotic Bacterium:*

Lyophilized stock culture including Lactobacillus plantarum was obtained from Persian Type Culture Collection (PTCC), was prepared from Iranian Research Organization for Science and Technology. After breaking the ampoule Lyophilized, 0.3 to 0.4mL of sterile distilled water was added by means of a sterile syringe. And then the whole suspension was added to the sterilized medium MRS-broth at 37° C and incubated for 24 hours. Then the bacteria mass separated from medium MRS-broth using a centrifuge at 5000 rpm for 15-20 min. In next step, the optic absorption of microbial suspension is determined by used of spectrophotometer device (model Mettler-Toledo S20-K) in the wave length 620 nm which was equal to 107-108 cfu/gr probiotic bacteria.

*Producing Low-Fat Synbiotic Yogurt:*

First milk (1.5 % fat) from Tehran Pegah Factory was prepared. It was homogenized at 65°C (The Danish Homogenizer model AVP2000). In next step long-chain Inulin (Tex) was prepared by The Dutch Company (Sensus) with respective percentages was added to that and it was pasteurized at 80° C for 20 minutes. Then the probiotic bacteria and yogurt starter culture were both mixed with the milk. The ratio of probiotic bacteria to yogurt starter was 2:1. The samples were poured in 100 gr Disposable Plastic Containers and kept in incubator at 40° C by reaching to the pH=4.7. Then, the samples were kept in Fridge for 21 days.

The treatments in this study are shown in Table 1.

**Table 1:** The produced samples in this study.

| | | |
|---|---|---|
| 1 | low-fat synbiotic yogurt containing Lactobacillus plantarum whit %1 Inulin | $I_1$ |
| 2 | low-fat synbiotic yogurt containing Lactobacillus plantarum whit %1.5 Inulin | $I_{1.5}$ |
| 3 | low-fat Probiotic yogurt without Inulin (control sample) | C |

*Chemical Analysis:*

Measuring the pH with pH meter (model METROHM, of Switzerland) and acidity and dry matter were according to AOAC method [1].

*Physical Analysis:*

*Syneresis:*

Syneresis was determined by centrifuge method Herolab FR18000 (Germany, Vai Slag). First 25 gr of sample was distributed inside centrifuge pipes and centrifuged at 10° C with 350 G for 30 minutes. Then, the weight of serum released in the upper part of centrifuge pipe was measured. From dividing the released serum to the weight of primary yogurt, the syneresis rate was specified in percentage [12].

*Viscosity:*

Measuring the viscosity was conducted by Brookfield viscometer DV-II+pro at 4° C. The test was done in shear rate=50, rmp=40, 41 & 42 by use of spindle 4 [4].

*Microbial Analysis:*

MRS-bile agar was used for selective enumeration of probiotic bacteria .The plates were incubated anaerobically at 37 0C for 72 h [4].

*Sensory Evaluation:*

Hedonic method was used. Numbers 5,4,3,2 and 1 equal to very good , good , moderate ,bad and very bad degree of acceptability , respectively .The samples were evaluated by 9 trained panelists on days 1, 7, 14 and 21 after production in terms of taste, odor, texture, color and overall acceptance [4].

*Statistical Analysis:*

All experiments were carried out in triplicates. All data were stated as mean ± standard deviation. The data obtained were subjected to one way analysis of variance (ANOVA), followed by the Duncan's multiple range test to determine the significant difference between samples at ($p<0.05$) level using the SPSS 18 software . The charts were drawn by Excel 2010.

## RESULTS AND DISCUSSION

*Chemical Characteristics:*

The Chemical properties of low-fat synbiotic yogurt samples during 21 days storage are shown in Tables 2 - 4.

As it is observed in Table 2, pH of low-fat synbiotic yogurt samples during 21 days of storage at 4° C shows significant reduction ($p<0.05$).

**Table 2:** pH of low-fat synbiotic yogurt samples during 21 days of storage at 4°C(Mean ±SD).

| pH values | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 4.6±0.17 (a) | 4.58±0.18 (a) | 4.41±0.15 (cd) | 4.37±.0.18 (d) |
| $I_{1.5}$ | 4.61±0.18 (a) | 4.46±0.18 (bc) | 4.41±.015 (cd) | 4.37±0.13 (d) |
| C | 4.6±0.16 (a) | 4.5±0.16 (c) | 4.44±0.15 (cd) | 4.32±0.12 (d) |

Similar letters represent non-significant difference ($p>0.05$).

According to the results obtained from Table 2, the trend of the pH changes among the samples is decreases within three weeks significantly ($p<0.05$).

The most cases of decrease in the levels of pH among the sample is observed on the 7th day of storage, that related to the control sample. However, there is no significant difference in the pH values of the samples on the 21th day of storage.

Similar studies showed that the activities of the starter bacteria result a significant decrease in the level of yogurt pH during the 21th days of storage. [39].

In a similar study, some researchers investigated synbiotic yogurt containing Lactobacillus casei and inuin and they reported that the pH levels of yogurt samples decrease during cold storage, which is in accordance with the results of this study [2].

The acidity values of synbiotic low-fat yogurt during 21days of storage at 4°C are shown in Table 3.

**Table 3:** Acidity values of synbiotic yogurt samples during 21 days of storage at 4ºC (Mean ± SD).

| Acidity values (0D) | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 78.16±0.14 (i) | 82.66±0.14 (g) | 85.33±0.18 (f) | 89.66±0.15 (c) |
| $I_{1.5}$ | 77.5±0.1 (i) | 83.33±0.13 (g) | 88.33±0.18 (d) | 90±0.1 (c) |
| C | 79.33±0.15 (i) | 84.33±0.17 (f) | 90±0.14 (c) | 94±0.18 (b) |

Similar letters represent non-significant difference ($p>0.05$).

According to table 3 the rate of acidity values increases within the period of storage the samples. There is no significance difference between samples' acidity on first day of the storage ($p>0.05$). but, the slight differences indicate the maximum level of acidity in the sample $I_{1.5}$ . The minimum level of the acidity values on the 21 th day of the storage was for sample $I_{1.5}$. Additionally, the rate of acidity values was observed milder in inulin containing samples and more severe in the control sample.

Similarly, the studies conducted by some researchers show the significant increase in the acidity of probiotic yogurt during the storage [36].

Some researchers reported that an increase acidification of the yogurt was stated due to the presence of inulin which is in accordance with the obtained from this study [27].

In a study conducted on the effectiveness of increasing inulin to probiotic yogurt within the three weeks of storage, an increase in the level of lactic acid in probiotic yogurt was reported and the increase in the level of the acidity is due to proteolytic activity of some acidophilic bacteria which are tending to increase more acidity and the presence of prebiotics will lead to controlling the process of post-acidification among the probiotics [7].

Some researchers have reported a decrease in the concentration of lactic acid and acetic acid in low fat yogurt containing both starters of Lactobacillus bulgaricus and Streptococcus thermophilus in the presence of inulin [30].

As it is observed in Table 4, the dry matter of synbiotic low-fat yogurt samples during 21 days of storage at 4° C shows significant reduction ($p<0.05$).

**Table 4:** Dry matter of synbiotic low-fat yogurt samples during 21 days of storage at 4°C(Mean ± SD).

| Dry matter values | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 11.36±0.15 (a) | 10.92±0.18 (b) | 9.73±0.14 (de) | 9.77±0 .17 (d) |
| $I_{1.5}$ | 11.69±0.09 (a) | 11.12±0.11 (b) | 10.75±0 .12 (b) | 10.20±0.15 (c) |
| C | 11.27 ±0.14 (a) | 9.99±0.18 (d) | 9.50±0 .17 (e) | 9.21±0.11 (e) |

Similar letters represent non-significant difference ($p>0.05$).

During cold storage, the rate of dry matter has decreased significantly ($p<0.05$).The maximum level of the dry mater is for sample $I_{1.5}$ and the minimum level is related to the control sample on the 21 th day of storage.

*Physical Characteristics:*

As it is observed in Table 5, the rate of syneresis of low-fat synbiotic yogurt samples during 21 days of storage at 4°C significantly increased ($p<0.05$).

**Table 5:** Syneresis of synbiotic low-fat yogurt samples during 21 days of storage at 4°C(Mean ±SD).

| | | | | Syneresis values |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 13.20±0 .17 (c) | 21.9±0.09 (b) | 23.52± 0.18 (a) | 23.8±0.12 (a) |
| $I_{1.5}$ | 19±0 .12 (c) | 22.33± 0.18 (b) | 23.7±0.11 (a) | 23.71±0 .16 (a) |
| C | 19.38±0.15 (c) | 20.71±0.11 (bc) | 22.18±0.13 (b) | 24.04±0.18 (a) |

Similar letters represent non-significant difference ($p>0.05$).

The rate of syneresis during storage significantly increased ($p<0.05$). The maximum level of syneresis on the first day of the storage is related to sample $I_1$ and the minimum level on the 21 th day of the storage is related to sample $I_{1.5}$ . The trend of the syneresis changes is of an upper intensity in the control sample.

In a similar study, the syneresis of probiotic yogurt's containing Lactobacillus casei in the presence of lactulose-inulin decreased during storage [28].

In study conducted by Boeni in relation to adding different concentrations of inulin to synbiotic yogurt which the lowest level of pH , the highest amount of acidity and syneresis was for the sample containing 2%inulin during the 21 days of cold storage [4].

Some researchers that, by adding inulin and fructooligosaccharides to a set yogurt, a significant change is seen in the sample [26].

As it is observed in Table 6, the viscosity of low-fat synbiotic yogurt samples during 21 days of storage at 4°C significantly increased ($p<0.05$).

**Table 6:** Viscosity (cp) of low-fat synbiotic yogurt samples during 21 days of storage at 4°C (Mean ± SD).

| | | | | viscosity values (cp) |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 3.8± 0.12 (c) | 4.51 ± 0. 36 (b) | 3.29±0 .21 (cd) | 4.6±0 .21 (b) |
| $I_{1.5}$ | 3.22±0 .2 (d) | 3.5±0.31 (cd) | 3.21±0.02 (d) | 4.15±0 .1 (bc) |
| C | 4.62±0.22 (b) | 5.23±0.21 (a) | 3.95±0.14 (c) | 4.09±0 .3 (bc) |

Similar letters represent non-significant difference ($p>0.05$).

According to Table 6, the significant change ($p<0.05$) in viscosity of the samples are observed during cold storage. The highest level of viscosity on the 21 th day of the storage was for the sample $I_1$ , although there is no significant difference in the samples $I_{1.5}$ and the control (p>0.05).

According to the reported from some researchers, an increase in the level of inulin viscosity in the probiotic low fat yogurt increases and inulin has been stated as a strengthening that is able to bond the extracellular Polysaccharides and protein and results in the firmness of the tissue [19] ، which is accordance with the results obtained from this research.

Some Authors have been reported that adding inulin increases viscosity and firmness in the low fat and medium fat products like low fat yogurt and salad dressing, which is in accordance with the results obtained from this study [35].

*Microbial Count:*

According to results of Table 7, significant difference is observed between samples during cold storage.

**Table 7:** Probiotic bacterial count (log cfu/ml) in Synbiotic low-fat yogurt samples during 21 days of storage at 4° C (Mean ± SD).

| Synbiotic bacterial count (log cfu/ml) | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 9.54±0.34(a) | 9.83±0.26(g) | 9.44 ±0.38 (h) | 8.65 ±0.45(m) |
| $I_{1.5}$ | 9.77±0.37(d) | 9.91 ±0.18(a) | 9.75±0.36(e) | 8.74±.035 (ol) |
| C | 9.43±0.12(h) | 9.74±0.19(e) | 9.32±0.41(i) | 8.60±.047(m) |

Similar letters represent non-significant difference (p>0.05).

According to the results obtained from Table 7, in the microbial count of the samples during the storage , significant difference are observed (p<0.05). The highest number of probiotic bacteria is observed on the 7th day and is related to sample $I_{1.5}$ . Additionally, the highest number of probiotics on the 21 th day of storage is related to sample $I_{1.5}$ , although there is no significant difference between the sample $I_{1.5}$ and sample $I_1$ (p>0.05).

Some researchers reported that the number of probiotic bacteria decreases during the period of storage, a decrease which varies depending on the type of yogurt and the type of yogurt starter culture [37].

The growth in the number of probiotic bacteria at the presence of inulin is related to producing extracellular enzyme which is able to hydrolysed the high chain froctans [29].

In a similar study, some researchers, by studying the soft cheese containing Lactobacillus plantarum, have reported the positive effect of adding long chain inulin on the increasing of growth and survival of the probiotic bacteria during 45 days of storage time [25].

Some Authors have studied about the effect of adding inulin (1 and 2 %) on the microbial and physiochemical properties of probiotic low fat yogurt produced by Lactobacillus acidophilus. The results showed that adding inulin to the milk has increased the survival of these bacteria during storage. As a result, inulin is able to be used in producing low fat synbiotic yogurt and increase the positive effects of the yogurt [23].

*Sensory Evaluation:*

The results gained from sensory evaluation of synbiotic low-fat yogurt samples during cold storage are observed in Tables 8-12.

According to Table 8 , No significant difference is observed in terms of taste on samples during 21 days of cold storage (p>0.05). The highest score of taste on 21th day is related to sample $I_{1.5}$ , although there is no significant difference between this sample and the sample $I_1$ and the control sample (p<0.05). The trend of the taste changes in the samples $I_1$ and $I_{1.5}$ was milder than the control sample.

According to the Table 9, there is a significant difference in the odor of the samples (p<0.05). The highest score for the odor on the day 21th of cold storage was for samples $I_1$ and $I_{1.5}$ and the lowest score was for the control sample.

The results obtained from evaluating the texture of the synbiotic low fat yogurt samples during storage, has been presented in the Table 10.

There is a significant difference in the texture of the samples during the period of storage (p<0.05). There is no significant change observed in the trend of the changes in the two samples of $I_{1.5}$ and $I_1$ (p<0.05). The highest score for the texture on the 21 th day of cold storage is related to the control sample which has resulted from the more growth among the bacteria in the two inulin containing samples.

Aryana and McGrew(2) have reported that use of the long chain inulin in producing probiotic yogurt creates a better texture in comparison with the probiotic yogurt with short chain inulin and the control yogurt.

According to the Table 11, there is no significant difference among the color of the samples during storage (p> 0.05). But the slight differences indicate an improvement in the color of these two inulin containing samples.

The results obtained from the overall acceptability values of the low fat synbiotic yogurt samples during the 21 days of storage at 4 0C have been reported in the Table 12.

According to the Table 12, there is a significance difference in overall acceptability of the samples during storage ($p<0.05$). The highest score for overall acceptability on the 21 th day of storage is for the sample $I_1$.The lowest score is observed on the sample $I_{1.5}$ , which results from the higher growth of probiotic bacteria and metabolites by them.

The studies show that the sensory properties of probiotic yogurt in comparison with ordinary yogurt decreases during storage unless the stabilizers or prebiotic compounds are used [15].

Some authors have reported that adding prebiotics such as lactulose and inulin into the dairy products causes an increase in the stability and overall acceptability [11].

The effect of adding inulin (0-4)% on the texture of yogurt with different fat levels (2-3.5%) was investigated which the results indicated an improvement in the texture. Using inulin is significantly effective on rheology and quality properties on the 6 th days storage of the yogurt. Moreover, the highest yield, stability, strength and creating the creamy texture in the yogurt with higher amounts of inulin have been reported [14].

Kayanush and Paula [17] have studied the effect of short, medium and long chain inulin along with Lactobacillus casei on the low fat yogurt and the obtained results showed that the yogurt containing long chain inulin has a lower amount of syneresis, cream like taste and a improved texture in comparison with the control yogurt and the short chain inulin containing yogurt.

**Table 8:** Taste of low-fat synbiotic yogurt samples during 21 days of storage at 4° C(Mean ± SD).

| Taste scores | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 4.22 ±0.18(a) | 4 ±0.25 (a) | 3.85 ±0.41 (a) | 3.65±0.76 (ab) |
| $I_{1.5}$ | 4.35 ±0.28(a) | 4.16 ±0.75 (a) | 3.75±0.81(ab) | 3.85±0.19(a) |
| C | 3.94±0.94(a) | 3.58 ±0.43(b) | 3.35 ±0.57(b) | 3.71±0.38(ab) |

Similar letters represent non-significant difference ($p>0.05$).

**Table 9:** Odor of low-fat synbiotic yogurt samples during 21 days¬ of storage at 4°¬C (Mean ± SD).

| Odor scores | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 4.45± 0.51(a) | 3.75 ± 0.28 (a) | 4 ± 0.52(a) | 3.5± 0.75 (ab) |
| $I_{1.5}$ | 4.07±0.38(a) | 3.87± 0.37 (a) | 4.01± 0.64(a) | 3.44 ± 0.29(b) |
| C | 4.07±0.49(a) | 3.97 ± 0.96(a) | 3.68± 0.56(a) | 4.3 ± 0.49(a) |

Similar letters represent non-significant difference ($p>0.05$).

**Table 10**.Texture of low-fat synbiotic yogurt samples during 21 days of storage at 4° C(Mean ±SD).

| Texture Scores | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 4.45 ±0.51(a) | 3.75 ± 0.28(a) | 4 ± 0.52(a) | 3.5 ± 0.75(ab) |
| $I_{1.5}$ | 4.07 ± 0.38(a) | 3.87 ± 0.38(a) | 4.01 ± 0.64(a) | 3.44± 0.29(b) |
| C | 4.07 ± 0.49(a) | 3.97 ± 0.96 (a) | 3.68 ± 0.56(a) | 4.3± 0.49(a) |

Similar letters represent non-significant difference ($p>0.05$).

**Table11.**Color of synbiotic low-fat yogurt samples during 21 days of storage at 4° C (Mean ± SD).

| Color Scores | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 4.78±0 .22(a) | 4.5± 0.95 (a) | 4± 0.46(a) | 4.38± 0.84(a) |
| $I_{1.5}$ | 4.51± 0.84(a) | 4.74± 0.16(a) | 4.7± 0.49(a) | 4.7± .64(a) |
| C | 4.6± 0.35 (a) | 4.67± 0.74(a) | 4.67± 0.38 (a) | 4.24 ± 0.49(a) |

Similar letters represent non-significant difference ($p>0.05$).

**Table 12.**Overall acceptability of synbiotic low-fat yogurt samples during 21 days of storage at 4° C(Mean ±SD).

| Overall acceptability Scores | | | | |
|---|---|---|---|---|
| Samples | First day | 7th day | 14th day | 21th day |
| $I_1$ | 4.35± 0.39(a) | 3.95± 0.85(a) | 3.81± 0.56(ab) | 3.6±0 .95 (b) |
| $I_{1.5}$ | 4.25 ± 0.95 (a) | 3.75± 0.46(ab) | 3.58± 0.41(b) | 3± 0.41(c) |
| C | 3.65± 0.61 (b) | 3.45± 0.55 (bc) | 3.1± 0.91(c) | 3.37± 0.65 (bc) |

Similar letters represent non-significant difference ($p>0.05$).

In general, the sensory evaluation conducted on the effect of using Inulin on organoleptic specifications of dairy products and drinks are indicative of increase in acceptance of consumer and improvement of these specifications that we can mention to improvement of rheological specifications of yogurt, preventing enlargement of ice crystals in ice-cream and frozen products and improvement in mouth feeling of drinks during storage [34].

*Conclusion:*

It is possible to produce synbiotic low fat yogurt by using Lactobacillus plantarum and Inulin. Milk's enrichment with inulin, has had a positive effect on the survival and growth of Lactobacillus plantarum. Inulin is effective in the physiochemical and sensory properties of synbiotic low fat yogurt. At last, samples containing Lactobacillus plantarum with 1% Inulin had the highest score of overall acceptance on 21th day of storage.

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