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Analysis of Nutritional Value and Study of Physicochemical Parameters of Low Fat and High Fat of Yogurt Samples Available in Local Market

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ABSTRACT

Aim of the present study is to evaluate nutritional value and comparative study of various physico chemical parameters of low & high fat yogurt (curd) samples. Yogurts are well known from ancient time for its health benefit. Yogurt samples were analyzed for ash, Na, K, Ca, titratable acidity, casein protein, fat, lactose, total solid, carbohydrate etc.

We found that the pH of yogurt between 4.08-4.35. We detected conductivity was 1228.33 and 1395.66 us/cm.; lactic acid per 100g in the first week was 0.9526g and 1.19625g, and significant change in second week 1.28346 and 2.70716, viscosity was in the range of 1190mpas and 8280mpas. The percentage of Ash in the range of 0.1895 and 0.903, the amount of sodium & potassium was in the range of 68 - 73mg and 106.88 - 140.64 mg and calcium 124.2 - 126.5mg per 100g of yogurt. Also, the amount of fat content was found to be 2.785g and 5.45g, casein protein 3.5632g and 5.9504g in 100g of yogurt. Samples were prepared according to AOAC methods.

Keywords : High fat Yogurt, Low fat yoghurt, Physicochemical analysis, Nutritional value.

I. INTRODUCTION

Yogurt is a popular dairy product. It is a food produced by bacterial fermentation of milk. The bacteria used to make yogurt are known as "yogurt cultures". Fermentation of lactose by these bacteria produces lactic acid, which acts on milk protein to give yogurt its texture and characteristic tart flavour. The use of different fruits and additives in fruit yogurt production has improved its nutritional and sensory properties [1]. Peaches, cherries, apricots, and blueberries are frequently used in yogurt production [2].

People are more directed toward the issue of diet and health. Increasing concern over the epidemics of obesity, coronary heart disease, hypertension, and cardiovascular diseases has oriented consumers for searching for food products that are lower in fat content [3]. The starter cultures used to make yogurt are *Lactobacillus bulgaricus* and *Streptococcus thermophiles* [4]. Many people consuming yoghurt due to its tremendous health benefits and improvement of gastrointestinal functions to reduce risk of disease [5].

Yogurt consumption has increased around the world because of its nutritional value and therapeutic effects [6]. Yoghurt is more nutritious than other fermented milk product because having a high level of milk solid and nutrients developed during the fermented process. Different forms of yoghurt are now available in the market like stirred, set, frozen and liquid yoghurt [7].

The result obtained by Joseph A.O. Olugbuyiro et al. showed that there is no direct relationship observed between pH values and titratable acidity i.e. in terms of lactic acid [8]. While the other research paper shows that the titratable acidity contents and pH values of the samples changed slowly throughout the storage period [9]. According to Kolawole Falade et al., pH of soy and bambara yoghurts decreased during the storage period for both storage temperatures. This decrease in pH was accompanied by simultaneous increase in titratable acidity [10].

A. Yogurt production

For yogurt production, milk, skim milk powder (2%, w/v), sugar (3%, w/v), and starch (1%, w/v) were mixed in a boiler. This mixture was heated at 90 °C for 10 min and left to cool to 45 °C. Milk was inoculated with yogurt culture at 44°C. The milk was incubated at 44°C until it reached pH 4.7. Type of milk used for manufacturing of yoghurt are significantly affected the sensory attributes of syneresis, compactness, goat odor and flavor, rate of flow, color, shininess, bitter flavor, denseness, melting rate, and spread ability, while fat level affected only color, denseness, and melting rate [11].

II. MATERIAL AND METHODS

Different samples were selected from local market. We choose both high and low fat sample of different manufacturers and given them symbolic name as sample MLF, MHF, SFF and RFF. In which sample MLF was low fat sample and other three samples were full fat.

A. Physico-chemical analysis

All four samples were used for the testing of various physical and chemical properties of the yoghurt. Various physical and chemical parameters were tested such as pH and sample, conductivity, titratable acidity, viscosity, % of moisture contents, % of ash, sodium, potassium, fat contents, lactose, total solid fat, casein and carbohydrate determination.

B. Analytical Methods.

Different analytical methods have been used for testing different chemical and physical parameters of the yoghurt samples. Most of the method used for the analysis of various parameters were used from Manual of Methods of Analysis of Foods [12].

Measurement of pH & conductivity pH is a measure of the hydrogen ion concentration of a solution. pH generally represents acidic nature of the material. Ordinary pH meter is used for the measurement of pH of the sample. Conductance is representing the total number of ions in the sample, they are conducts the electric current. Different dilute concentration of yoghurt is prepared and used for the measurement of pH and conductivity. 5 gram of yoghurt was mixed with 50 ml of distilled water. This 10 % yoghurt solution was used for measurement.

Total acidity is measured by simple acid base titration between diluted yoghurt sample and previously standardized sodium hydroxide solution. 10 gm of yoghurt of all four samples was mixed with 50 ml of distilled water and used for measurement of acidity.

Moisture and ash contents in the yoghurt samples were determined by taking 10 gm of each sample in previously heat, cooled and weighed crucibles and heated at in an oven according to AOAC method [13]. For measurement of ash value which is very important parameters and deals with various mineral oxides are formed after complete burning of sample initially in electric burner and then completely burn in a furnace at controlled temperature. Both methods are performed according to AOAC.

Determination of sodium and potassium is done with flame photometer. Ash sample was used for both sodium and potassium measurement. Standard series of sodium and potassium was prepared by using NaCl and KCl salt to made a stock solution [14]. Fat contents in the all four yoghurt samples with Rose-Gotallib method [13]. Yoghurt sample is mixed with ammonia solution and then extracted with diethyl ether couple of times and two layers are allowed to separate and settle. Then slowly remove ether layer in a wide porcelain dish which is previously heated and weighed. Then after complete evaporation of ether amount of fat is measured.

Lactose is a sugar formed in milk and milk product. it is included to smaller from the sugar; glucose and galactose. lactose makes up 2-8% of milk. Lactose is determined by using Fehling's solution A & B for the titration [15].

Amount of calcium is determined by AAS (Atomic Absorption Spectrophotometer) method. Four samples of yoghurt were prepared by making ash and ash is dissolved with a distilled water and diluted in volumetric flask as a sample solution. Standard Calcium solution was prepared from AAS grade (Analytical grade) stock solution of calcium. After measurement of absorbance concentration, calibration curve was obtained as absorbance vs concentration. With a calibration curve equation amount of calcium in each sample was calculated.

Casein was determined by simple precipitation method. Precipitate of casein obtained by addition of acetic acid with constant stirring in warm yoghurt sample. After proper precipitation casein was filtered dried and weighed as casein.

Carbohydrate are the most important source of energy for the body. The digestive system change, carbohydrates into glucose (blood sugar) the body use this sugar for energy for the cells, tissues and organs. Carbohydrate was determined by using anthrone reagent and measured color developed was measured as a OD with colorimeter.

III. RESULT AND DISCUSSION

Different physical and chemical methods were tested for four different types of yoghurt (full fat and low fat) samples. Some of the most common parameters were tested such as, pH, conductivity, % acidity in terms of lactic acid, % moisture, % ash, fat, casein, lactose, carbohydrates and various elements such as sodium, potassium and calcium in the samples. All results are summarised in Table 1.

pH were tested by using pH meter and it was found that sample MHF got lowest pH 4.08 (more acidic) while sample RFF found highest pH vaue 4.35 (less acidic). The conductivity of the all yoghurt samples were in the range of 1228.33 us/cm to 1395.66 uS/cm. All samples having nearly very close value of conductivity. low fat sample 'MLF' were highest i.e. 1395.66 us/cm and sample 'SFF' (full fat) was the lowest 1228.33 uS/cm.

Titratable acidity was measured in terms of lactic acid. Lactic acidity was measured two times with fresh yogurt and near expiry date sample. It was found that acidity of all samples were drastically changes as the yoghurt samples keep for longer time in the refrigerator. Fresh yoghurt sample acidity was in the range of 0.95 to 1.19 g/ 100 gm of sample. While old samples were found in the range of 1.28 to 1.70 g / 100 gm of sample (Figure 1).

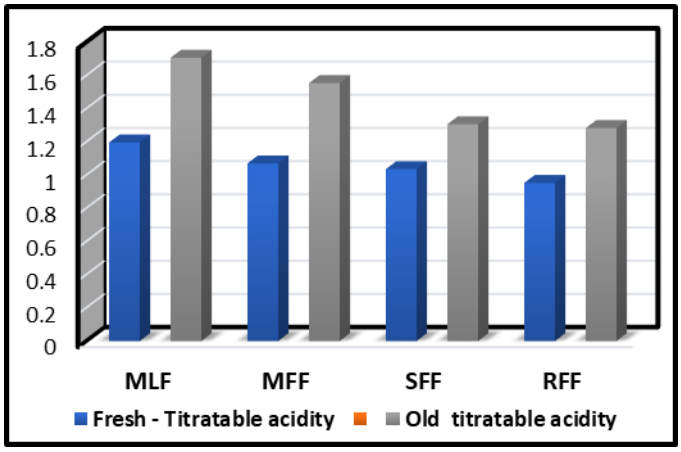

Figure 1. Analysis of Titratable acidity of yoghurt samples

Amount of ash measured in all samples was found in the range of 0.2 to 0.9 %. 'RFF' sample was highest i.e. 0.9 %. The amount of Lactose was found in the range of 0.256 – 0.336 g/100 gm of yoghurt sample. We found that sample 'MHF' was lowest amount of lactose i.e. 0.256 and sample 'SFF' possess highest i.e. 0.336 g/100 gm of sample (Table 1).

Total fat and Non solid fat (SNF) these are very important parameters of milk related products. So yoghurt is also had some variations in fat and SNF contents of four different samples. Sample 'B' was having highest amount of fat 5.45 g/100gm while 'MLF' was having 2.78 g/100 gm of sample. SNF value also ranges from 8.8 (MLF)– 19.7 % (RFF) (Figure 2).

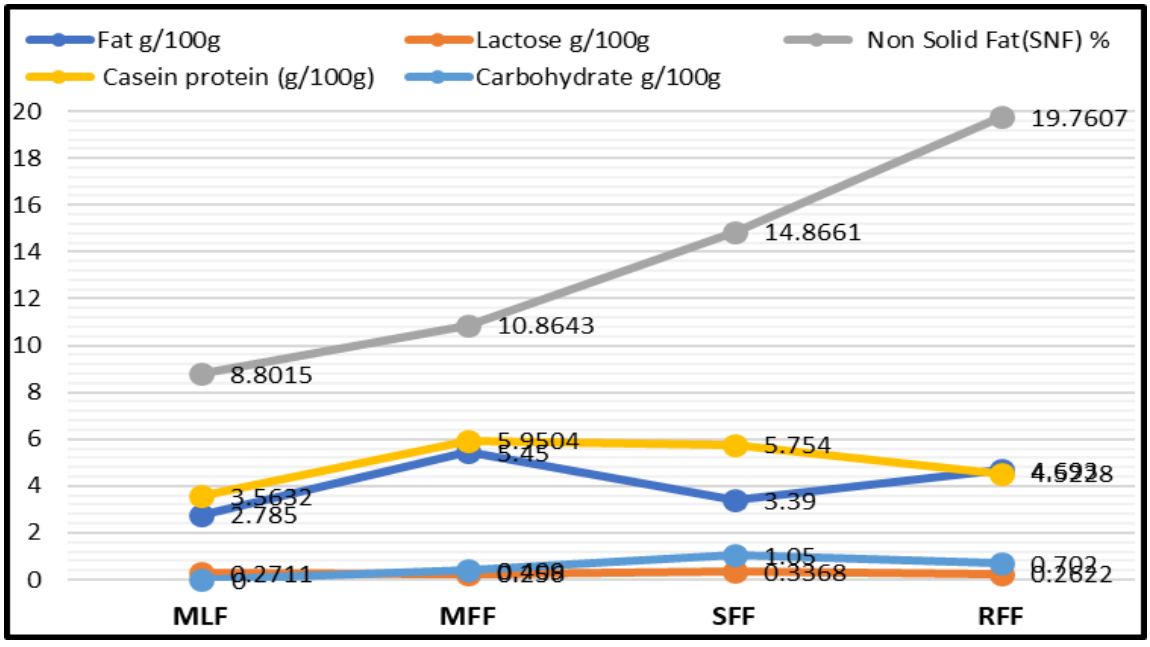

Figure 2. Relation between various parameters (Fat, Lactose, SNF, Casein, Carbohydrate).

Table 1. Result of four y

oghurt samples with different parameters.

Sample / Parameters	MLF	MHF	SFF	RFF
pH	4.265	4.17	4.08	4.35
Conductivity (µS/cm)	1395.66	1276.3	1228.33	1283.33
First titratable acidity (lactic acid w/w%)	1.19625	1.07	1.0353	0.9526
Second titratable acidity (lactic acid w/w%)	1.70716	1.55388	1.30616	1.28364
Viscosity (mpas)	1190	3270	3280	4100
Moisture (%)	90.820	89.494	84.1427	81.58
Ash(%)	0.8747	0.775	0.1895	0.903
Na determination (mg)	86	70	86	73
K determination (mg)	118.57	106.88	131.558	140.64
Fat determination (g/100g)	2.785	5.45	3.39	4.693
Lactose determination (%)	0.2711	0.256	0.3368	0.2622
Determination of Ca(mg/100g)	126	124.2	125.8	126.5
Determination Total solid (%)	9.08	11.41	15.2	20.23
Determination Total solidnon fat (%)	8.8015	10.8643	14.8661	19.7607
Determination Casein protein (g/100g)	3.5632	5.9504	5.754	4.5228
Carbohydrate determination (g/100g)	1.15348 q	0.409	1.05	0.702

The lactose contents in all four samples were measured and it was found in the range of 0.256 – 0.336 (g/100 g of sample). MHF sample found to be lowest and SFF found to be highest amount of lactose in the yoghurt. Casein was found in the range of 3.56 to 5.95 (g/100 g sample). Sample MLF having lowest amount and MFF having the highest amount of casein. (Figure. 3)

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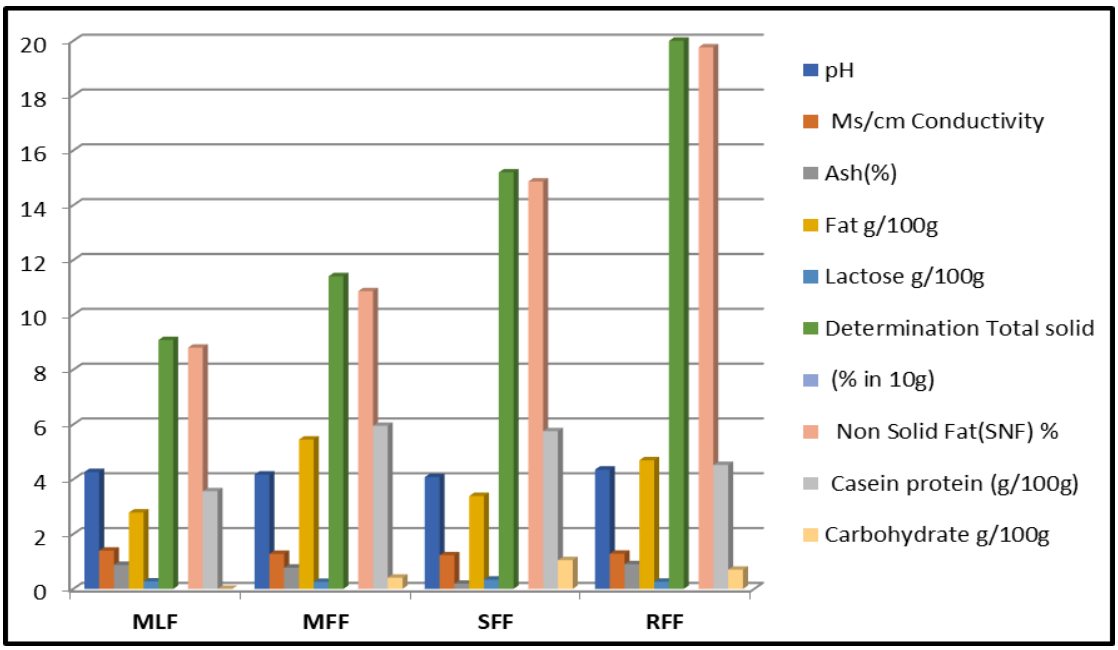

Figure 3. Comparison of various parameters of Yoghurt samples.

A. Mineral contents.

We also studied various minerals which are very healthy and nutritious for human being. We have measured amount of Calcium, Sodium and Potassium in all four samples of yoghurt (Table 1). Calcium is very important for bone strength and it is available in plenty in yoghurt also potassium is very useful for metabolic activities in the body. The comparison between minerals and yoghurt sample. It shows sample SFF & RFF was having good amount of Calcium, potassium while sodium was nearly close to each other (Figure 4).

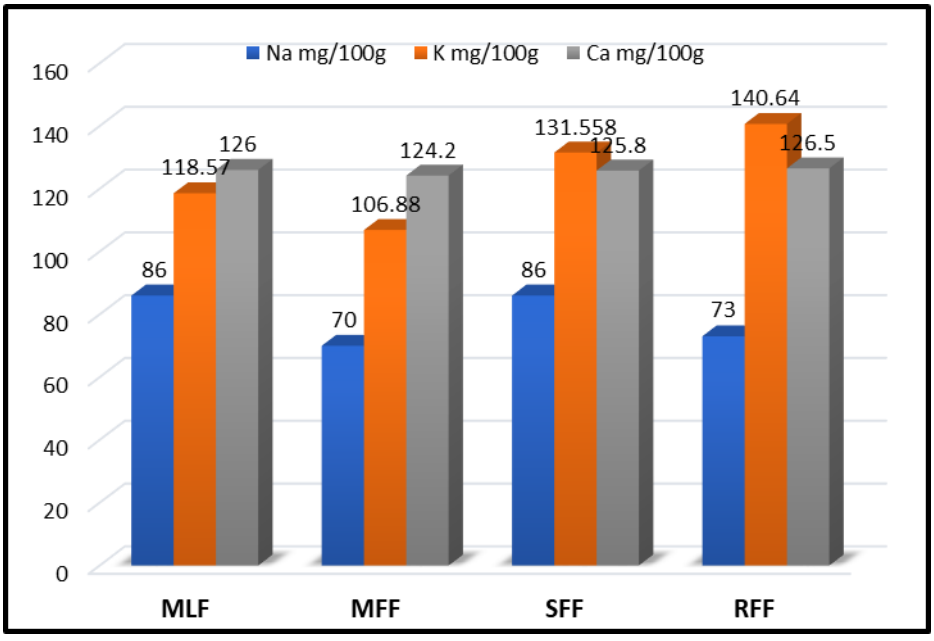

Figure 4. Comparison of sodium, potassium & calcium in yoghurt sample.

From the above all results shows that sample RFF contents more amount of important parameters values such as ash contents represents more amount of minerals in the sample also the specific amount of calcium and potassium is also good amount as compared to all other three sample. The amount of total solids and SNF (nonsolid fats) value is also at higher range. Other parameters are also at moderate range in the RFF.

One important observation we found during our study was, the titratable acidity which was calculated in terms of lactic acid found variable amount during the storage of the yoghurt sample for longer duration of time. It also shows that acidity is increased after 10 days because of more amount of lactic acid was formed during storage of the sample. The further study would extending to find out different changes of nutritional values in the yoghurt during storage of sample for variable time duration.

Calibration curve equation and R^2 value for analysis of sodium and potassium are shown in figure 5 and figure 6 respectively.

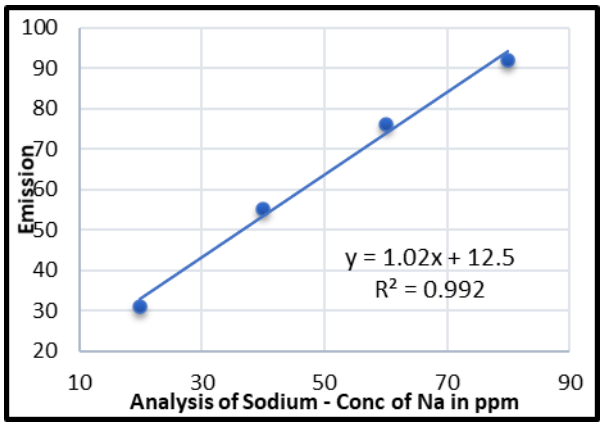

Figure 5. Calibration curve of Sodium

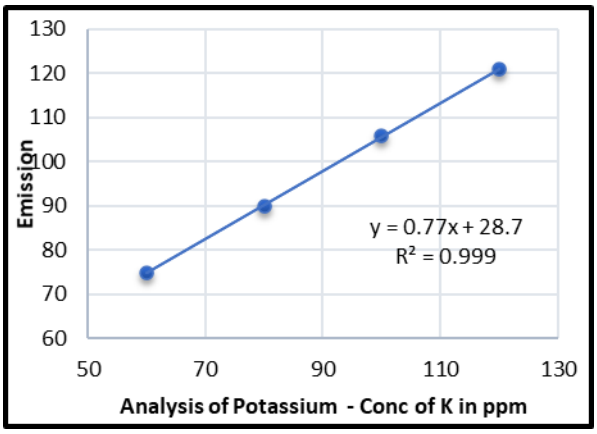

Figure 6. Calibration curve of potassium

IV. CONCLUSION

Based on the result obtained in our study shows that, titratable acidity of all samples were significantly increased after storage of sample. Low fat sample (MLF) was found highest acidity. MLF sample possess lowest fat and RFF was significantly high. Calcium was almost similar in all samples. MFF was high in sodium and RFF was highest amount in potassium.

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VI. REFERENCES

[1]. Cakmakcı S, Cetin B, Turgut T, Gurses M, Erdoğan A, (2012). Probiotic properties, sensory qualities, and storage stability of probiotic banana yogurts. Turk J Vet Anim Sci 36: 231–237.

[2]. Arslan S, Ozel S (2012). Some properties of stirred yoghurt made with processed grape seed powder, carrot juice or a mixture of grape seed

powder and carrot juice. Milchwissenschaft 67: 281–285.

[3]. Alonso, A., C. Zozaya, Z. Vazquez, J. Alfredo Martinez, and M. A. Martinez-Gonzalez. (2009). The effect of low-fat versus whole-fat dairy product intake on blood pressure and weight in young normotensive adults. J. Hum. Nutr. Diet. 22:336–342.

[4]. Adolfsson, O., S.N. Meydani and R.M. Russel, (2004). Yogurt and gut function. Am. J. Clin. Nutr., 80: 245- 256.

[5]. Heyman, M., (2000). Effect of lactic acid bacteria on diarrheal diseases. J. Am. Coll. Nutr., 19: 137S- 146S.

[6]. McKinley MC (2005). The nutrition and health benefits of yoghurt. Int J Dairy Technol 58: 1–12.

[7]. Chougrani Fadela, Cheriguene, Abderrahim and 2Bensoltane Ahmed, (2009), Sensorial and Physico-Chemical Characteristics of Yoghurt Manufactured with Ewe's and Skim Milk, World Journal of Dairy & Food Sciences 4 (2): 136-140.

[8]. Joseph A.O. Olugbuyiro and Joy E. Oseh, (2011), Physico-chemical and Sensory Evaluation of Market Yoghurt in Nigeria, Pakistan Journal of Nutrition 10 (10): 914-918, 2011

[9]. Seher ARSLAN*, Selma BAYRAKÇI (2016), Physicochemical, functional, and sensory properties of yogurts containing persimmon, Turkish Journal of Agriculture and Forestry, 40: 68-74.

[10]. Kolawole. O. Falade & Opeolu. M. Ogundele & Adenike O. Ogunshe & Olanrewaju E. Fayemi & Fidelis C. K. Ocloo, (2014). Physico-chemical, sensory and microbiological characteristics of plain yoghurt from bambara groundnut (Vigna subterranea) and soybeans (Glycine max), Journal of Food Sci Technol (September 2015) 52(9):5858–5865.

[11]. Samson Atamian, Ammar Olabi, Omar Kebbe Baghdadi & Imad Toufeili, (2014), The characterization of the physicochemical and sensory properties of full-fat, reduced-fat and low-fat bovine, caprine, and ovine Greek yogurt (Labneh), Food Science & Nutrition; 2(2): 164– 173.

[12]. Manual Of Methods Of Analysis Of Foods, Milk And Milk Products , Lab. Manual 1 (2015) , Food Safety And Standards Authority Of India Ministry Of Health And Family Welfare Government Of India New Delhi.

[13]. AOAC 17th Edn, (2000), Official Method 905.02 Fat analysis.

[14]. Practical Handout Analytical Chemistry, (2018), Analysis of Sodium in soft drink sample, Higher College of Technology, Muscat, Oman.

[15]. dIgbabul B., Shember J., Amove J. (2014). Physicochemical, microbiological and sensory evaluation of yoghurt sold in Makurdi metropolis. Afr. J. Food Sci. Technol. 5(6):129-135.

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