

Studies on the Physico-Chemical Properties of Milk Powder packed in Sudan

Nagat A. Elrofaei¹,
Amna Yousif Mohamed¹,
Nebras A. Mohammed¹,
Nosiba S. Abdalla¹ and
Ahmed Ali Mustafa^{2*}

Abstract

Physico-chemical characteristics of milk powder packed in Sudan were investigated and compared with international quality standards. The proximate compositions (moisture, protein, fat, ash and lactose) observed was moisture content in milk powder the best of Nido control (3.2-6.4%) (2.25%) respectively of the locally pocked milk powders are almost differ, also local milk powders (1, 2, 3, 5, 6, 7 and 8) showed higher acidity ranged between 1.40-1.49%, simultaneously with a PH range of 6.6 - 6.7, this is a useful nutrition human body. Despite the variation in acidity and PH between milk powder samples, their levels remained within the acceptable standard levels. Results also showed that most milk powders packed in Sudan had partial solubility in water, in comparison with the instantly soluble standards. Organoleptically they considered of fair quality.

Keywords: Milk powder; International quality; Partial solubility; Properties of milk; Packed in Sudan

- 1 Department of Biotechnology, Faculty of Science and Technology, Omdurman Islamic University, P.O. Box-382, Omdurman, Sudan
- 2 Department of Botany, Faculty of Science and Technology, Omdurman Islamic University, P.O. Box-382, Omdurman, Sudan

***Corresponding author:**

Ahmed Ali Mustafa

✉ ahmad.ali11526@gmail.com

Department of Botany, Faculty of Science and Technology, Omdurman Islamic University, P.O. Box-382, Omdurman, Sudan.

Tel: 00249911511696

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Introduction

The quality of whole milk powder is affected by the quality of raw milk used in its manufacture, and the self-life can be extended from six months at room temperature to more than months if the powder is packed under vacuum or with nitrogen which lead to decrease oxygen levels [1]. Milk powder is a product of lower water activity and better keeping qualities and it is produced in large scale in modern plants. The powder produced can be stored for long periods of time without significant deterioration of taste or nutritive value. Its manufacture involves of the gentle removal of water at the lowest possible cost under strict hygienic conditions while remaining all the desirable natural properties of milk such as colour, flavour, solubility and nutritional value. During the manufacture of milk powder, the water is removed by evaporation under reduced pressure and low temperature followed by spraying in a fine mist of air to remove further moisture [2,3]. There are many type of packaging materials for milk products, the container meat net only protects the food from contamination and spoilage. But it must also be convenient attractive and informative as well. Packaging plays an important role in protecting and preserving the quality of food manufacturing and distribution process, and the shelf-life of any food is limited due to the occurrence of many deteriorate processes and reaction within the food materials. These include physical, chemical and interactions between food and the ambient environment aeries

the packaging material [4]. The milk powder contains lactose (38%), protein (26%), fat (26%) and ash (6%) in the same proportions as fluid milk [5].

According to the standards (Codex Ston, 1999 [6], EAS, 2006 [7] SDS, 2008 [8] and SVGNS, 2004 [9]). Whole milk powder should contain 26% fat (minimum), 34% protein (minimum), 5% moisture (maximum) 0.18% acidity (maximum), 34% lactose (minimum), 7.3% ash (maximum) and 6.6-6.8 PH on dry-matter basis. The consumption of whole milk powder increased in the last few years due to shortage of fresh milk. This situation encouraged some investors to import powdered milk in large size bags (25kg) and repack into small size bags in order to be distributed in the retail market. This study was aimed at evaluating the chemical quality of whole milk powders repacked in Sudan and sold in the

Table 1 Nutrient composition of milk powder.

Sample No	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Lactose (%)
1	3.5	26.03	26	3.4	27.9
2	3.2	24.24	27.21	3.1	26.5
3	3.8	23.37	26	3.4	26.53
4	5.6	25.43	27.03	3.7	28.45
5	6.4	23.9	26.02	3.5	26.96
6	3.6	26.3	27.11	3.6	28.49
7	4.5	25.74	26	5.3	27.76
8	5.3	25.06	26.01	5.5	28.63
9	2.25	27	28.03	5.7	37.15

9=Nido Brand (Control)

Table 2 Physical quality of milk powder.

Sample No.	PH	Titrateable acidity (%)	Solubility
1	6.6	1.4	Partially soluble
2	6.6	1.43	Partially soluble
3	6.7	1.49	Instantly soluble
4	6.8	1.34	Instantly soluble
5	6.6	1.41	Partially soluble
6	6.7	1.42	Partially soluble
7	6.6	1.4	Partially soluble
8	6.7	1.41	Instantly soluble
9	6.8	1.34	Instantly soluble

9=Nido Brand (Control)

local marked in order to grade their chemical quality in relation to the worldwide standard.

Material and Methods

Sample collection

Eight repacked whole milk powder samples (200gm) in aluminium foil bags from different commercial brands were purchased from the supermarket in Khartoum state, Sudan. The samples were transported to the central laboratory, Faculty of Agriculture, University of Khartoum Shambat, Sudan, for analysis. The samples were aseptically opened and immediately subjected to chemical analysis. The milk powder of Nido brand was imported from nether lands and used as control.

Composition analysis

Moisture, ash and acidity tested were determined according to the standard methods of AOAC 2003 [10]. Protein content was determined according AOAC, 1990 [11]. Fat content was determined by Gerbera according AOAC 2000 [12]. Lactose was determined by the Thomas method (Richard 1959) [13]. Solubility was determined by according to standard 1990 [11].

Results and Discussion

Physicochemical characteristics

Moisture, protein, fat, ash and lactose contents: Proximate composition of the milk powder is represented in **Table 1**. The moisture contents of the local commercial milk powders (8

brands) ranged between 3.2-6.4% compared to 2.25% for the control Nido sample (**Table 1**). Variation in moisture content of sample was observed. Physicochemical stability of milk powder during storage and distribution varies with the water content. Additionally, technological functionalities like dissolution or wet ability can also be affected by the water content [14]. The findings of this study indicated that the moisture content of all samples is higher than the reports of Sabah Elkhier and Yagoub [15] and Fernandez Oliveira et al. [16]. The protein contents ranged between 23.37-26.30%, fat contents ranged between 26.0-27.21%, ash contents between 3.1-5.3% all these findings are comply with the standards [6,9]. Lactose contents between 26.50-28.63% and are lower than the standards mentioned above. The imported milk powder (Nido) gave higher lactose content than locally milk powder and this result is disagree with those reported by Sabah Elkhier and Yagoub [15].

PH acidity and solubility

Table 2 Represents the physical properties of the milk powders. Results revealed that sample No.4 had the lowest acidity (1.34%) and the highest PH (6.80) almost similar to control (Nido). The other local milk powders (1, 2, 3, 5, 6, 7 and 8) showed higher acidity ranged between 1.40-1.49%, simultaneously with a pH range of 6.6-6.7. These results are in agreement with those reported by Sabah El-Khier and Yagoub [15]. The solubility of milk powders depends upon a number of factors such as the amount of dissolved minerals hardness in the water used, speed, duration stirring and temperature and other factors [17].

Conclusion

In this study from the results of proximate analysis observed was moisture content in milk powder the best of Nido control (3.2-6.4%) (2.25%) respectively, also local milk powders (1, 2, 3, 5, 6, 7 and 8) showed higher acidity ranged between 1.40-1.49%, simultaneously with a pH range of 6.6-6.7. This is a useful nutrition human body. Atenolol and Losartan potassium were

procured from Unichem Laboratories Ltd. (Sikkim). Commercial pharmaceutical preparation Nusar ATN tablets, manufactured by Emcure Pharma. Ltd., containing 50 mg of ATN and 50 mg of LOS was collected from local market. Acetonitrile, methanol and water used were of analytical grade (Qualigens Fine Chemicals, Mumbai, India). A 0.45 µm nylon filter (Pall life Sciences, Mumbai, India) was used. All other chemicals and reagents used were analytical grade unless otherwise indicated.

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