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Development and Sensory Evaluation of Sunflower Meal Fortified Cookies

Yamunadevi Puraikalan[1], N. Sabitha[2]

[1]Ph. D Scholar. Department of Nutrition and Dietetics, Vellalar College for Women, Erode-638 012, India

[2]Associate Professor and Head, Department of Nutrition and Dietetics, Vellalar College for Women, Erode-638 012, India

Abstract: ***The present study was to formulate the cookies incorporated with sunflower meal as influenced by different levels of sunflower meal powder. Sunflower meal incorporated cookies were prepared by using sunflower meal powder in different levels to the cookies flour, whereas cookies prepared out of without adding sunflower meal powder were kept as control. Among the different treatments 20 per cent incorporation of sunflower meal recorded highest scores for overall acceptability and hedonic 9 point scale.***

Keywords: Sunflower meal, Antioxidants

1. Introduction

The foundation of health is vitality and that is something that no medical checkup can reveal. Health is not a virtue signifying absence of disease. It is something positive, implying an abundance of vitality, vigour and youthfulness. Physical stamina, mental alertness and clarity and spiritual poise are the blessings of good health [1] . A better knowledge of nutrition, have increased life expectancy with consequent increase in degenerative arterial disease and coronary heart disease. “We are living too short and dying too long”- Dr. Aiyron Wentz.

Nutrition scientists are realizing that all should pay more attention to their daily intake of complex plant foods like seeds, nuts and whole grains. A move towards whole foods, like sunflower seeds, will add nutrients to the diet in a flash. Mother Nature has created a nutritional power pack that is hard to beat in sunflower seeds. Healthy unsaturated fats, protein and fiber, plus important nutrients like vitamin E, selenium, copper, zinc, folate, iron and phytochemicals come wrapped up in this small and perhaps unsuspected package – a sunflower seed. Just one ounce of these seeds every day can improve the nutritional quality of the diet [2].

The sunflower is an annual plant native to the Americas in the family Asteraceae. Per 100 g the seed is made-up to enclose protein 20.78 g, total lipid (fat) 51.46 g, ash 3.02 g, carbohydrate 20 g and fiber 8.6 g with total energy of 2445 kj [3]. It has also been investigated that some elements can decrease the risk of some types of cancer, e.g., selenium. USDA (2008) provided the composition for mineral contents in sunflower seeds as per 100 g seeds containing calcium 78 mg, iron 5.25 mg, magnesium 325 mg, phosphorus 660 mg, potassium 645 mg, sodium 9 mg, zinc 5 mg, copper mg, manganese 1.95 mg and selenium 53.0 mcg. This oxidative damage in human body is involved in the onset of large number of diseases such as auto-immune diseases, inflammation, cardiovascular-neuro-logical diseases, cancer and aging [4].

An adequate intake of natural antioxidants could protect the onset of oxidative damage in cells [5]. Sunflower meal is primarily used as ruminant feed but its nutritional and functional properties make it potentially useful in human food. Polyphenol oxidase, present in sunflower, oxidises chlorogenic acid which constitutes more than 70 per cent of the total phenolic compounds in sunflower seed [6]. The chlorogenic acid, in oxidized form, combines covalently with sulphur and nitrogen groups of sunflower proteins at high pH or non- covalently through hydrogen bonding at low pH. The new complex thus formed between chlorogenic acid and protein imparts a dark green to brown colour to sunflower meal and protein isolates[7]. The colour depends on the extent of oxidation of chlorogenic acid which in turn depends on the amount of chlorogenic acid and poly phenol oxidase present in seeds[8] .

Sunflower meal is one of the major protein meals used for livestock feeding and particularly for ruminant diets. It is generally a valuable and safe product, whose protein, fibre and oil contents are highly variable and driven by variations of the oil extraction process. Its protein content ranges from 23 % for some non-dehulled, mechanically-extracted meals, to more than 40 % for highly decorticated, solvent-extracted meals. However, usual ranges for protein are 29 to 33% for non-dehulled meals and 35 to 39% for dehulled and partially dehulled meals. The fibre content is directly linked to the presence of hulls: crude fibre range is 27 to 31% for non-dehulled meals and 20 to 26% for dehulled and partially sunflower meals. The lignin content is important, in the 9 to 12% range, even in dehulled meals. Solvent-extracted sunflower meals contain about 2 to 3% of residual oil, but mechanically-extracted meals may contain up 30 % oil depending on the amount of pressing. [9].

One particularly interesting trait of sunflower meal is the absence of intrinsic anti nutritional factors: unlike other oil meals, including those of soybean, rapeseed or cotton, it does not require heating or special attention before being fed. Its amino acid profile is richer in sulfur amino acids, and particularly methionine than other protein sources [10]. Sunflower meal is also a valuable source of calcium, phosphorus and B vitamins [11].

2. Materials And Methods

Sunflower meal was cleaned and grounded into powdered form, grounded sunflower meal powder were incorporated into the cookies flour. The treatments for preparation of sunflower meal fortified cookies were as follows.

Treatment details

T1 – Cookies flour (Control)
T2 – Cookies flour + 10% sunflower meal powder
T3 - Cookies flour + 20% sunflower meal powder
T4 - Cookies flour + 30% sunflower meal powder.

The sunflower meal fortified cookies were prepared by mixing the cookies flour with specified amount of sunflower meal powder as mentioned treatments. All the ingredients such as butter, granulated sugar, water, whole egg, maida, baking powder, vanilla essence and salt were used. Butter and granulated sugar were mixed together in a planetary mixture for creaming of 15 to 20 minutes, and then water and whole egg were added. Weigh and sieve the maida flour, baking powder, vanilla essence, salt and sunflower seed powder were added together in desired quantities and baked to a temperature of 180°C for 15 to 20 minutes.

Organoleptic evaluation of sunflower meal cookies were carried out by a panel 15 semi-trained judges including staffs and post graduate students of Mother Teresa Women's University, Kodaikanal. The sensory attributes of cookies in terms of external sensory characteristics like volume, surface colour, surface cracking pattern, evenness of the bake and the form of symmetry and internal characteristics such as crumb colour, flavor, taste, texture and over all acceptability were determined. Hedonic 9 point scale was also used. The mean score given by fifteen judges were used for statistical analysis.

3. Results And Discussion

The data pertaining to the organoleptic evaluation of sunflower meal incorporated cookies was influenced by different treatments were presented in Table 1. The overall acceptability and 9 point hedonic scale score was higher for the 20 % level of incorporation of sunflower meal cookies. Evenness of bake, form of symmetry and aroma was significant at $p< 0.05$ among the control cookies and 20 % level of proportion.

4. Conclusion

Sunflower meal cookies and other ready to eat products can also be introduced in school feeding programmes to provide more nutritious meals. Early dietary intervention is absolutely essential to have proper weight gain, healthy bones and teeth for which the right choice of food plays a vital role. The incorporation of sunflower meal in the preparation of cookie will indirectly improve the protein and vitamin- E intake of its consumers. The product has excellent market potential since it contain low carbohydrate, high protein, and sufficient amount of fiber, vitamin and mineral content.

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Table 1: Organoleptic evaluation of sunflower meal incorporated cookies.

Variables	Sample/ Group	Mean±S.D	t-value			Significance		
			Control Vs 10%	Control Vs 20%	Control Vs 30%	Control Vs 10%	Control Vs 20%	Control Vs 30%
Volume	Control 10% 20% 30%	8.00±0.926 9.13±1060 8.80±1.373 7.13±2.264	3.119	1.871	1.373	0.004 P<0.01	0.072 NS	0.181 NS
Surface colour	Control 10% 20% 30%	7.67±1.759 9.20±0.676 8.001.512 7.27±1.534	3.151	0.557	0.664	0.004 P<0.01	0.582 NS	0.512 NS
Surface cracking pattern	Control 10% 20% 30%	8.07±1.100 8.80±0.941 8.40±1.121 6.53±2.588	1.962	0.822	2.112	0.060 NS	0.418 NS	0.044 P<0.05
Evenness of bake	Control 10% 20% 30%	7.13±1.457 7.93±1.534 8.20±1.373 5.87±1.356	1.464	2.063	2.465	0.154 NS	0.048 P<0.05	0.020 P<0.05
Form of symmetry	Control 10% 20% 30%	7.60±0.828 8.67±1.447 8.33±1.175 6.47±1.356	2.477	1.979	2.763	0.020 P<0.05	0.058 P<0.05	0.010 P<0.01
Colour	Control 10% 20% 30%	7.60±1.183 8.80±1.207 7.53±1.807 7.13±1.598	2.750	0.120	0.909	0.010 P<0.01	0.906 NS	0.371 NS
Aroma	Control 10% 20% 30%	7.27±1.223 9.33±0.816 8.27±1.534 8.13±1.125	5.444	1.974	2.020	0.000 P<0.001	0.058 P<0.05	0.053 P<0.05
Taste	Control 10% 20% 30%	6.87±2.232 8.40±0.737 8.20±1.424 6.60±1.121	2.527	1.950	0.414	0.017 P<0.01	0.061 NS	0.682 NS
Texture	Control 10% 20% 30%	7.33±1.676 8.33±1.447 7.93±1.624 6.73±1.907	1.749	0.996	0.915	0.091 NS	0.328 NS	0.368 NS
Overall acceptability	Control 10% 20% 30%	7.60±1.056 8.80±1.207 8.87±1.125 7.13±1.356	2.898	3.179	1.052	0.007 P<0.01	0.004 P<0.01	0.302 NS
Hedonic 9 point scale	Control 10% 20% 30%	6.20±0.775 7.73±0.961 8.27±0.799 5.93±1.751	4.811	7.193	0.539	0.000 P<0.001	0.000 P<0.001	0.594 NS