Int.J.Curr.Microbiol.App.Sci (2023) *12*(05): 169-183

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 12 Number 5 (2023)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2023.1205.024

Physico-Chemical Analysis of Nutribar Incorporated with Legumes

Swati Shukla, Sandeep G. M. Prasad*, Anamika Das, Parimita Khatri and John David

Department of Food Science and Technology, WCDT, SHUATS, Prayagraj, Uttar Pradesh, India

**Corresponding author*

Keywords

Antioxidant, carbohydrate, chickpea, human health, legumes

Article Info

Received:
08 April 2023
Accepted:
04 May 2023
Available Online:
10 May 2023

A B S T R A C T

The goal of the current study project was to prepare nutribars that contained varied amounts of legumes. to assess the sensory qualities of nutribar that contains beans. According to physico-chemical analysis, it was found that the T0 had the greatest average carbohydrate proportion at 67.70%, and T12 had the lowest average carbohydrate percentage at 63.94%. T12 had the highest average protein percentage (20.34%), whereas T0 had the lowest average protein percentage (16.14%). T12 had the greatest average fat percentage (7.68%) while T0 had the lowest average fat percentage (7.25%). The average ash percentage ranged from 1.14% in T0 to 1.95% in T12, with 1.95% being the highest number. The average total solid percentage ranged from 92.23% in T0 to 93.91% in T12, with 93.91% being the highest value. T0 had the greatest average crude fibre percentage at 8.99%, and T12 had the lowest average crude fibre percentage at 8.06%. T0 had the greatest average moisture percentage (7.77%) while T12 had the lowest average moisture percentage (6.09%). The average acidity percentage ranged from 0.10% in T0 to 0.30% in T12, with T12 having the highest value. The average antioxidant percentage ranged from 42.04% in T0 to 56.14% in T11 and T12, with 56.14% being the highest number. T12 had the highest average energy value (406.24 kcal), whereas T2 had the lowest average energy value (400.61 kcal).

Introduction

Nutri-Composite Bars are a good, wholesome snack. Ready-to-eat meals that quell hunger and offer a variety of nutrients (including protein, fat, calories, minerals, and vitamins) (King, 2006; Ryland *et al.*, 2011; Wyatt, 2011) is boosting sales indefinitely. Initially, Nutribar was promoted as a sports energy drink.

Nutri bars are a frequent meal containing a combination of ingredients that work well to enhance nutrition for all age groups, while they are typically recommended for consumption by women (who are pregnant, nursing, or trying to get pregnant). Along with its unique nutritional attributes, Nutri Bar also has certain medicinal properties including demulcent, carminative, laxative, lactogenic, and rubefacient.

The moong bean (*Vigna radiata* L.), a prominent summer-growing, short-season legume, is widely grown across the tropics and subtropics. Some countries, notably Bangladesh, Pakistan, and India,

frequently eat moong beans. It is a little, oblong bean with a lot of fibre (Faridvand *et al.,* 2022). The green moong bean turns yellow after the husk is removed. It helps treat food poisoning caused by a number of things, such as mushrooms and herbal remedies. The moong bean helps people lose weight. There are good concentrations of manganese, potassium, magnesium, folate, copper, zinc, and vitamin B sources. The moong bean is a hearty, starchy, high-protein snack that also contains fibre. It decreases cholesterol and blood pressure. Numerous chronic conditions, such as diabetes, cancer, heart disease, and obesity, are fought off by the moong bean. One cup of cooked moong beans contains the following nutrients (in percentages based on the RDAs for a typical adult female): 97 milligrammes of magnesium (36%), 0.33 milligrammes of vitamin B1 thiamine (36%), 0.6 milligrammes of manganese (33%), and 321 micrograms of folate (100%). 212 calories, 14 grammes of protein, 15 grammes of fibre, 1 gramme of fat, and 4 grammes of sugar are all found in this dish. Along with 55 milligrammes of calcium (5%), 0.13 milligrammes of vitamin B6 (11%), and 0.8 milligrammes of pantothenic acid (vitamin B5), 7 milligrammes of zinc (24%) are also present (Singh *et al.*, 2017).

The annual legume chickpea, commonly referred to as chick pea, is a member of the Fabaceae family and subfamily Faboideae. Among the many names for its numerous variations are gramme, Bengal gramme, garbanzo, garbanzo bean, and Egyptian pea. With a high concentration of protein, dietary fibre, folate, and several dietary minerals including iron and phosphorus per 100 grammes (20% or more of the Daily Value), chickpeas are a nutrient-dense food (El-Adawy, 2002). The low concentrations of magnesium, zinc, and vitamin B6 provide 10–16% of the DV. When compared to reference values established by the World Health Organisation and the United Nations Food and Agriculture Organisation, proteins in cooked and germinated chickpeas are high in essential amino acids such lysine, isoleucine, tryptophan, and total aromatic amino acids. Cooked chickpeas contain 164 calories (690 kJ) per 100 grammes. Cooked chickpeas contain 60% water, 27% carbohydrates, 9% protein, and 3% fat (table). Linoleic acid makes up 43% of the total fat, and unsaturated fatty acids account for 5% of the lipid composition (Jukanti *et al.,* 2012).

A native species of legume from East Asia, the soybean, also referred to as the soya bean, is widely farmed for its edible bean. Most beans have a protein content of 20 to 25%, whereas soybeans have a protein content of about 40%. Protein can be found in soybeans. Typically, soybeans have 18–20% oil. Carbohydrates make up about 30% of it. It offers a significant amount of dietary fibre and has been shown to reduce the incidence of colon cancer and other diseases (Mateos-Aparicio *et al.,* 2008). Jaggery, sometimes referred to as "Gur," is a natural, unadulterated, conventional, complete sugar made by concentrating sugarcane juice that has not been treated with any preservatives. Jaggery, one of the oldest sweeteners known to man, is a mainstay of the peasant diet in many countries (Mandal *et al.*, 2006). Jaggery's colour ranges from pale golden to dark golden to light brown. Circilinol, Circimartin, Isothymusin, Apigenin, and Rosameric Acid are antioxidants due to their ability to scavenge free radicals (Tewari *et al.*, 2021) found in Tulsi leaves (Verma, 2016). Today's population is becoming more health conscious, and as a result, they favour foods that have higher nutritional values. Antioxidants found in sprouted moong beans include flavonoids and caffeine. It reduces heart disease risk factors, bad LDL cholesterol levels, and fibre, potassium, and magnesium content, which may all help to manage blood pressure. The folate in moong beans supports a healthy pregnancy and strengthens the immune system and metabolism of the unborn child.

The soybean is one of the many and inexpensive sources of protein (Singh *et al.,* 2008). Animals and humans alike frequently consume soybeans in many different places of the world. Soybeans are a fantastic source of protein for people with diabetes because they contain no carbs. Soybean seeds contain 17% oil, 63% meal, and 50% protein.

Chickpeas are rich in protein. It regulates weight, enhances digestion, and prevents chronic diseases including diabetes, cancer, and heart conditions (Tewari, 2019). It also reduces blood sugar levels. Circilinol, Circimartin, Isothymusin, Apigenin, and Rosameric Acid are antioxidants found in Tulsi leaves. Nutrition bars, often known as nutribars, have various benefits. In India, Tulsi is the oldest traditional medicinal plant, which has broad beneficial effects on human health for preventing viral fever and cough etc. (Tewari *et al.*, 2020).

They start out being quite useful and small enough to fit in a desk drawer, gym bag, handbag, backpack, or the glove box of a car. Second, most nutribars are heavily fortified with calcium, protein sources comparable to a small chicken breast, vitamins and minerals (just like a bowl of cereal), and fibre.

They are undoubtedly a much better choice than a candy bar, box of cookies, or bag of chips from a vending machine for a quick, on-the-go lunch or snack. Jaggery aids in easing joint pain, blood purification, boosting immunity, preventing anaemia, managing blood pressure, and preventing constipation. Additionally, it functions effectively as a binding agent.

This present research study was carried out to prepare nutribar incorporated with different ratios of legumes. To evaluate the physico-chemical analysis of nutribar incorporated with legumes.

Materials and Methods

The experiment 'Studies on development of nutribar incorporated with legumes' was carried out in research laboratory of Warner college of dairy technology from Sam Higgin bottom University of Agriculture, Technology & Science, Prayagraj.

Selection of ingredients

Sprouted whole moong bean, roasted chick pea, sprouted soya bean, jaggery, ghee, tulsi leaves will be procured from the local market of Prayagraj.

Preparation of raw material

Selection of moong beans, soyabean, and, chick pea, clean the three legumes, then soaking process will be start moong beans for (8 hrs at room temperature), soyabean for (24 hrs at room temperature), chickpea for (8 hrs at room temperature) then drain the excess water of moong beans and soyabean, and surface drying for chick pea, then germinate the moong bean and soyabean for 24 hrs at room temperature, and for chick pea roasting process will be done at 250 degree C (1-2 Min). The whole moong bean, soya bean, chick pea will be roasted separately. Then the tulsi leaves will be dried in a drier for 4 hours and made into a powder.

The sprouted whole moong bean, soya bean, chick pea, tulsi leaves will be mixed properly in a bowl. Then ghee is added in a pan, add crushed jaggery into the pan. After melting the jaggery add all the ingredients which will be mixed in a bowl and roasted, mix it properly till the mixture become thick. After that on the plate apply the ghee and grease it and put the mixture on it and keep it for set in room temperature and cut into a desire piece with the help of moulder.

Total carbohydrate was determined by subtracting the amount of the protein, fat, ash and moisture percentage from hundreds (AOAC, 2000).

Kjeldahl method was used to estimate protein content (AOAC, 2000).

The crude fat content of the samples was estimated by Soxhlet extraction method using SOCS-PLUS apparatus (AOAC, 2000).

Determination of ash content (%) (AOAC, 2000).

Determination of moisture content (%) (AOAC, 2000).

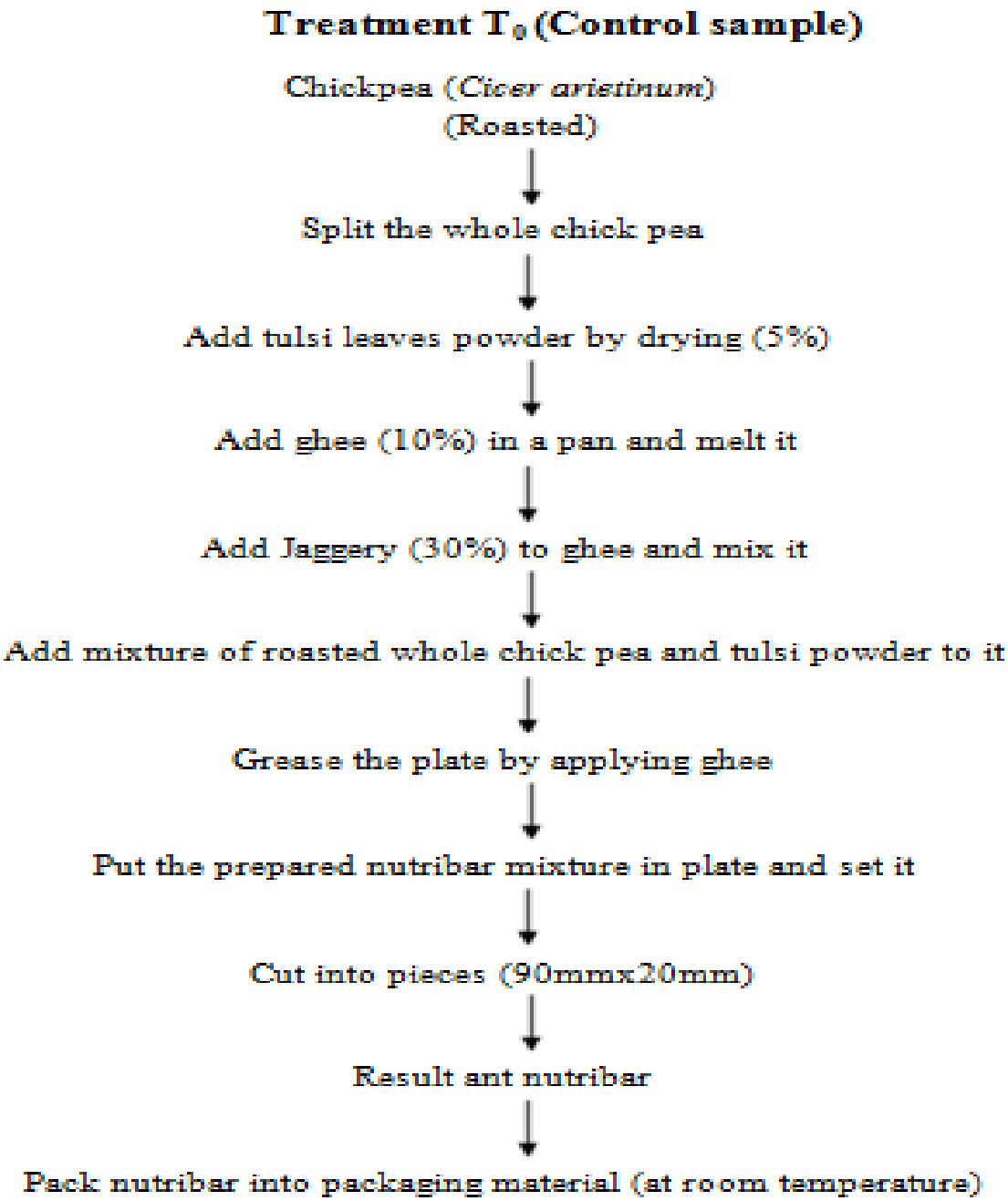
Determination of titratable acidity (%) (AOAC, 2000).

Acidity was measured as a percentage of latic acid (Ranganna, 2009).

Determination of total fibre content (%) (AOAC, 2000).

Determination of antioxidant content (%) (AOAC, 2000).

Flowchart.1 Plan of work



Flowchart.2 Treatment T_1 to T_{12}

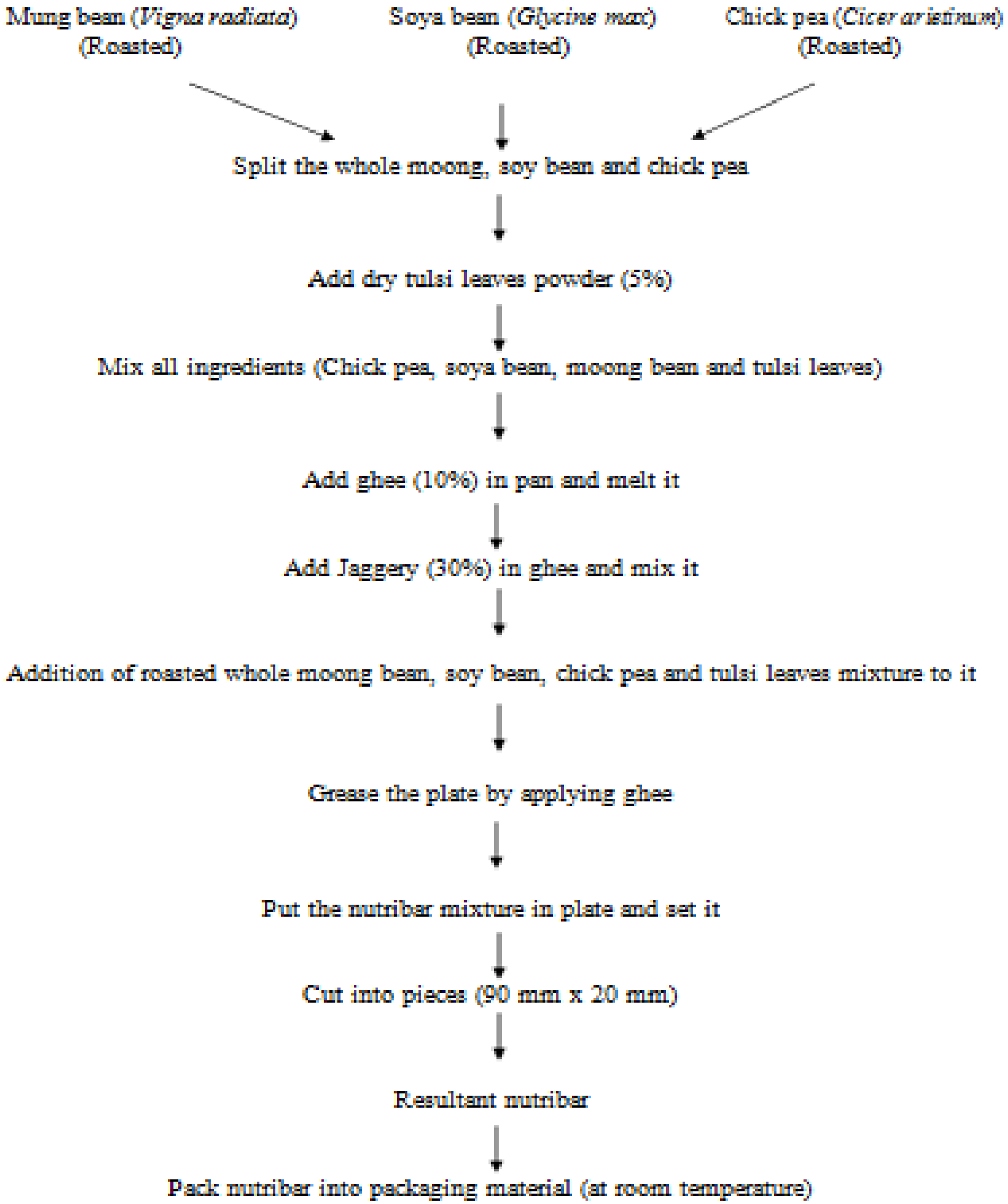


Table.1 Treatment Combination

Treatment	Composition of different Legumes (%)		
	Mungbean	Soyabean	Chickpea
T_1	85	10	**5**
T_2	80	15	**5**
T_3	75	20	**5**
T_4	70	25	**5**
T_5	80	10	**10**
T_6	75	15	**10**
T_7	70	20	**10**
T_8	65	25	**10**
T_9	75	10	**15**
T10	70	15	**15**
T11	65	20	**15**
T12	**60**	**25**	**15**

No. of treatments: 12+1;
No. of replications: 5;
No. of sample: 65

Table.2 Table showing the mean value of physico-chemical analysis of final prepared nutribar

Treatments	Carbohydrate (%)	Protein (%)	Fat (%)	Ash (%)	Total Solid (%)	Moisture (%)	Acidity (%)	Crude fibre (%)	Anti-oxidant (%)	Energy (Cal)
T_0	67.70	16.14	7.25	1.14	92.23	7.77	0.10	8.99	42.04	400.61
T_1	67.65	16.19	7.27	1.16	92.27	7.73	0.12	8.95	44.26	400.79
T_2	67.60	16.26	7.32	1.46	92.64	7.36	0.14	8.91	46.28	401.32
T_3	67.54	16.39	7.35	1.48	92.76	7.24	0.16	8.85	47.69	401.87
T_4	67.50	16.43	7.38	1.50	92.81	7.19	0.18	8.80	49.04	402.14
T_5	65.85	18.36	7.41	1.51	93.13	6.70	0.19	8.78	51.27	404.21
T_6	65.80	18.49	7.45	1.68	93.42	6.53	0.21	8.72	51.27	404.41
T_7	65.70	18.54	7.48	1.71	93.43	6.47	0.23	8.59	52.05	404.68
T_8	65.65	18.59	7.52	1.72	93.48	6.47	0.25	8.52	53.07	404.84
T_9	64.17	20.15	7.57	1.73	93.62	6.38	0.27	8.37	54.40	405.41
T_{10}	64.02	20.22	7.61	1.87	93.72	6.28	0.28	8.30	55.07	405.45
T_{11}	64.02	20.30	7.64	1.89	93.85	6.15	0.29	8.12	56.14	406.04
T_{12}	63.94	20.34	7.68	1.95	93.91	6.09	0.30	8.06	56.14	406.24

The mean value of control (T_0) is 67.70. The above table also showing that treatment combination (T_0) & (T_{12}) contains highest carbohydrate level and lowest carbohydrate level than the other treatments respectively.

Table.3 Table showing ANOVA for carbohydrate content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	23.6753	5.9188	9.812	2.57	**S**
Treatment	12	141.8092	11.8174	19.590	1.96	**S**
Error	48	28.9555	0.6032	-	-	-
TOTAL	64	194.4400	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 16.14. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest protein level and lowest protein level than the other treatments respectively.

Table.4 Table showing ANOVA for protein content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	23.6753	5.9188	9.812	2.57	**S**
Treatment	12	178.5156	14.8763	24.661	1.96	**S**
Error	48	28.9555	0.6032	-	-	-
TOTAL	64	231.1464	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 7.25. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest fat level and lowest fat level than the other treatments respectively.

Table.5 Table showing ANOVA for fat content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	23.6753	5.9188	9.812	2.57	**S**
Treatment	12	1.2005	0.1000	0.166	1.96	**NS**
Error	48	28.9555	0.6032	-	-	-
TOTAL	64	53.8313	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 1.14. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest ash level and lowest ash level than the other treatments respectively.

Table.6 Table showing ANOVA for ash content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	23.6753	5.9188	9.812	2.57	**S**
Treatment	12	3.9330	0.3277	0.543	1.96	**NS**
Error	48	28.9555	0.6032	-	-	-
TOTAL	64	56.5638	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 92.23. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest total solid content level and lowest solid content level than the other treatments respectively.

Table.7 Table showing ANOVA for total solid content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	23.6753	5.9188	9.812	2.57	**S**
Treatment	12	20.0736	1.6728	2.773	1.96	**S**
Error	48	28.9555	0.6032	-	-	-
TOTAL	64	72.7044	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 67.70. The above table also showing that treatment combination (T_0) & (T_{12}) contains highest moisture level and lowest moisture level than the other treatments respectively.

Table.8 Table showing ANOVA for moisture content (%) in final prepared Nutribar

Source	d. f.		S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4		23.6753	5.9188	9.812	2.57	**S**
Treatment	12		20.6954	1.7246	2.859	1.96	**S**
Error	48		28.9555	0.6032	-	-	-
TOTAL	64		73.3262	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 0.100. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest acidity level and lowest acidity level than the other treatments respectively.

Table.9 Table showing ANOVA for acidity content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	0.0862	0.0215	6.275	2.57	**S**
Treatment	12	0.2695	0.0225	6.538	1.96	**S**
Error	48	0.1648	0.0034	-	-	-
TOTAL	64	0.5205	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 8.99. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest crude fibre level and lowest crude fibre level than the other treatments respectively.

Table.10 Table showing ANOVA for crude fibre content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	21.6414	5.4104	9.420	2.57	**S**
Treatment	12	5.9472	0.4956	0.863	1.96	**NS**
Error	48	27.5694	0.5744	-	-	-
TOTAL	64	55.1580	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 42.04. The above table also showing that treatment combination (T_{12}) & (T_0) contains highest anti-oxidant level and lowest anti- oxidant level than the other treatments respectively.

Table.11 Table showing ANOVA for anti- oxidant content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	21.6414	5.4104	9.420	2.57	**S**
Treatment	12	1239.3675	103.2806	179.818	1.96	**S**
Error	48	27.5694	0.5744	-	-	-
TOTAL	64	1288.5783	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments. The mean value of control (T_0) is 400.61. The above table also showing that treatment combination (T_0) & (T_{12}) contains highest energy level and lowest energy level than the other treatments respectively.

Table.12 Table showing ANOVA for energy content (%) in final prepared Nutribar

Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	**Result**
Replication	4	30.7553	7.6888	8.272	2.57	**S**
Treatment	12	252.0024	21.0002	22.593	1.96	**S**
Error	48	44.6155	0.9295	-	-	-
TOTAL	64	327.3732	-			-

The above ANOVA table is showing that the F. Cal. Value is higher than the F. Tab. value at 5 % significant level on their respective d.f. due to replication & treatments. The above table also showing significant difference ($P<0.05$) between different treatments.

Fig.1 Graphical representation of carbohydrate content (%) of final prepared Nutribar

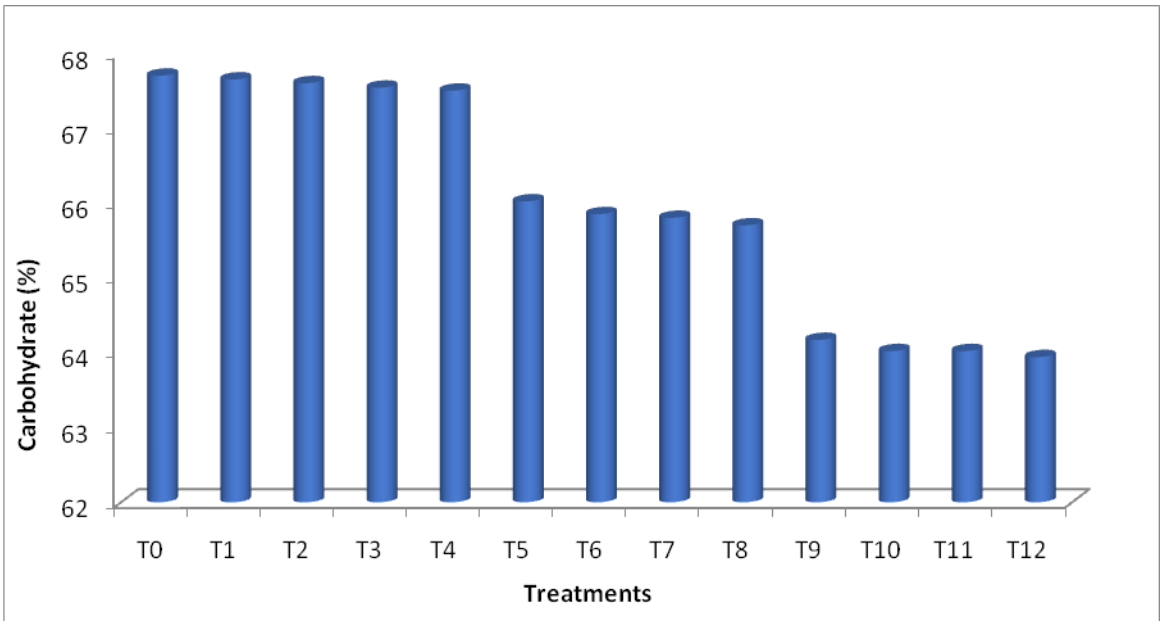


Fig.2 Graphical representation of protein content (%) of final prepared Nutribar

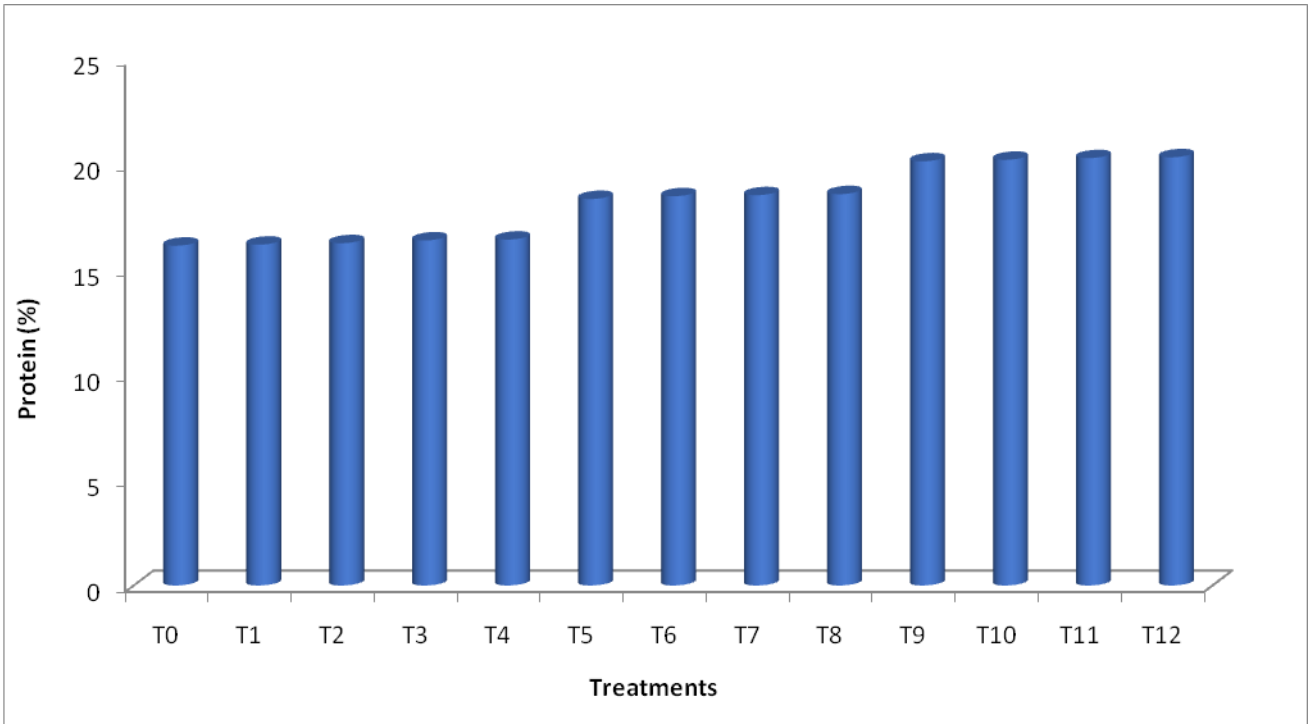


Fig.3 Graphical representation of fat content (%) of final prepared Nutribar

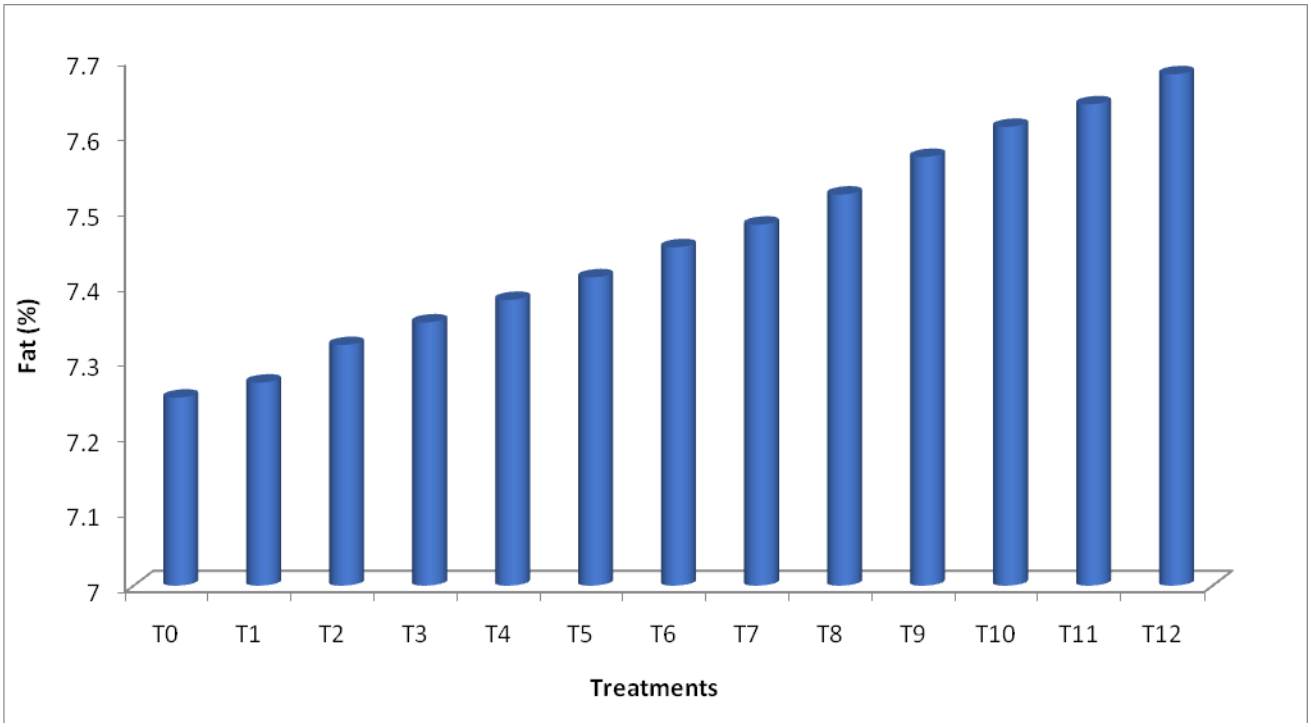


Fig.4 Graphical representation of ash content (%) of final prepared Nutribar

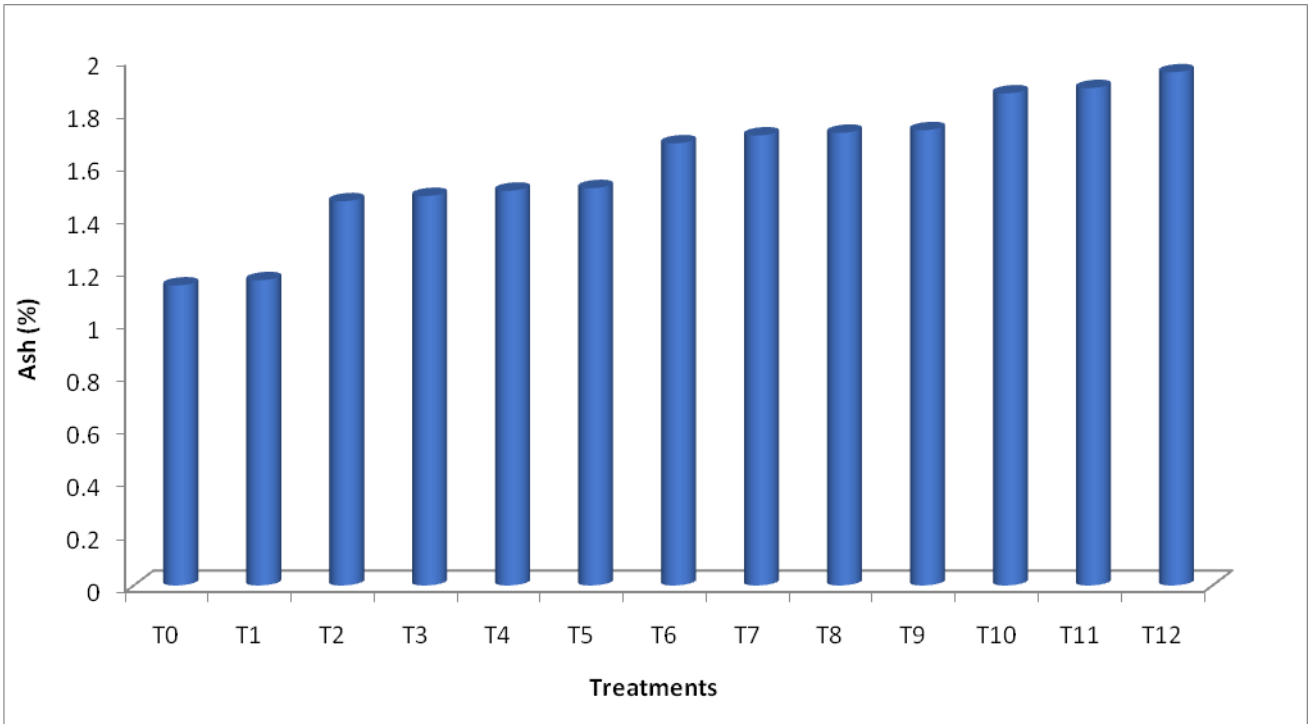


Fig.5 Graphical representation of total solid content (%) of final prepared Nutribar

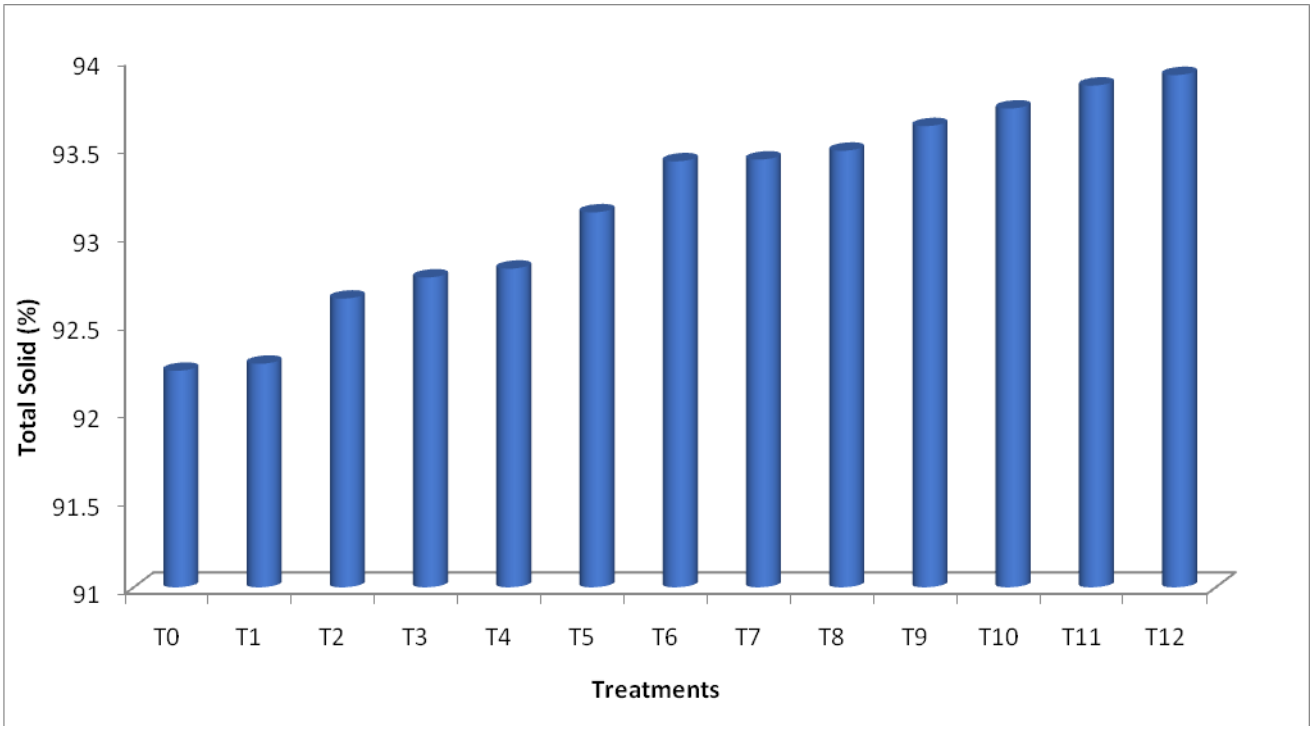


Fig.6 Graphical representation of moisture content (%) of final prepared Nutribar

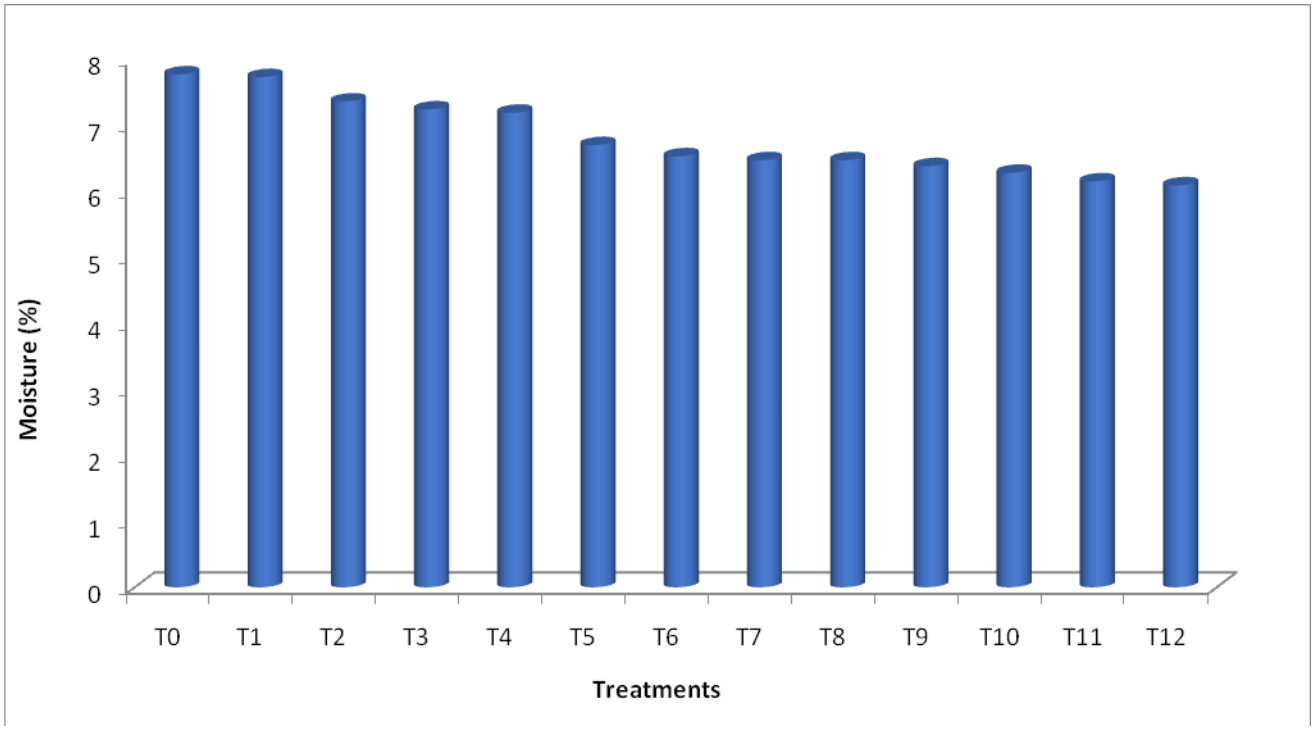


Fig.7 Graphical representation of acidity content (%) of final prepared Nutribar

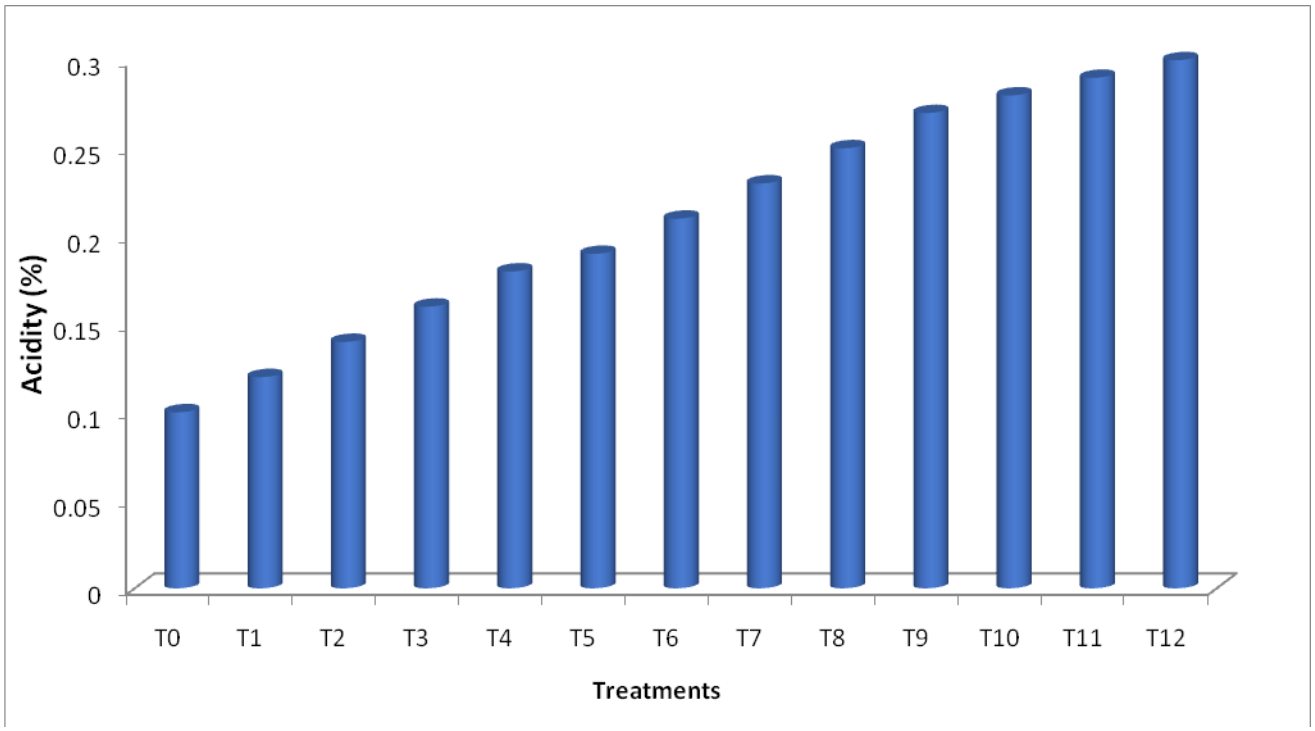


Fig.8 Graphical representation of crude fibre content (%) of final prepared Nutribar

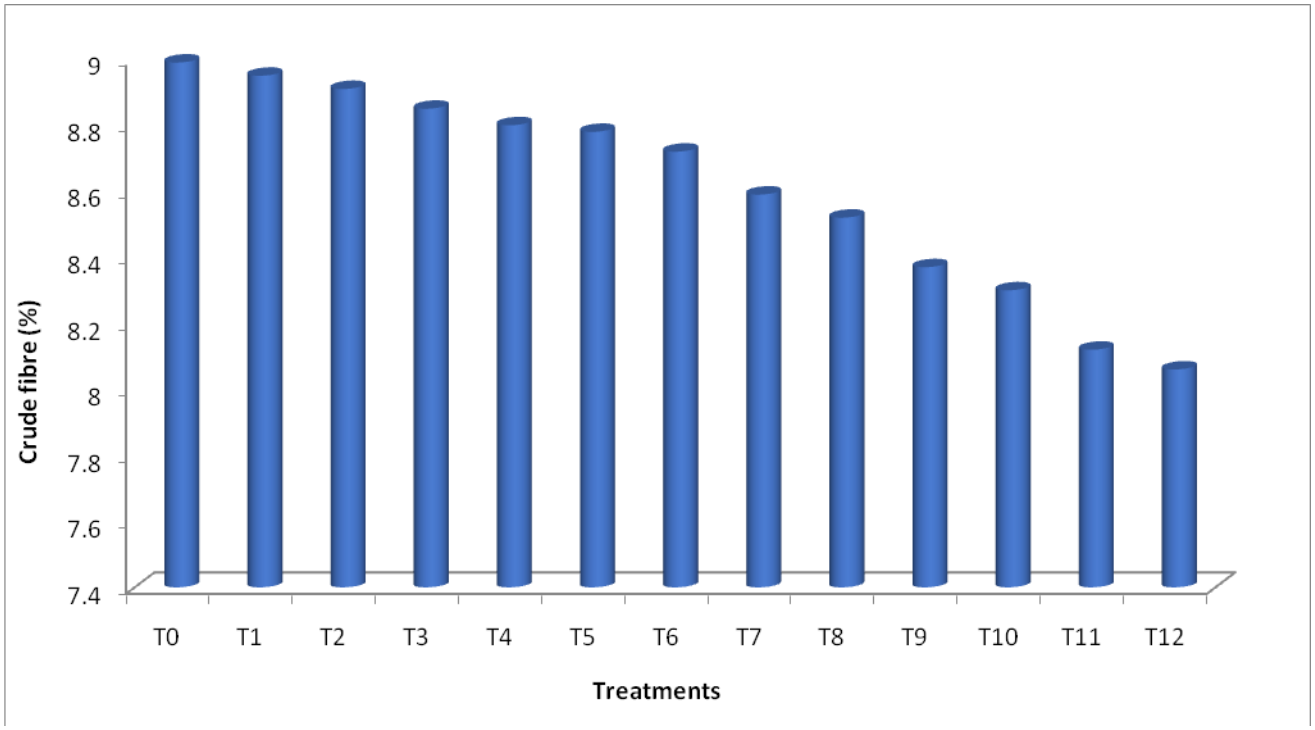


Fig.9 Graphical representation of anti- oxidant content (%) of final prepared Nutribar

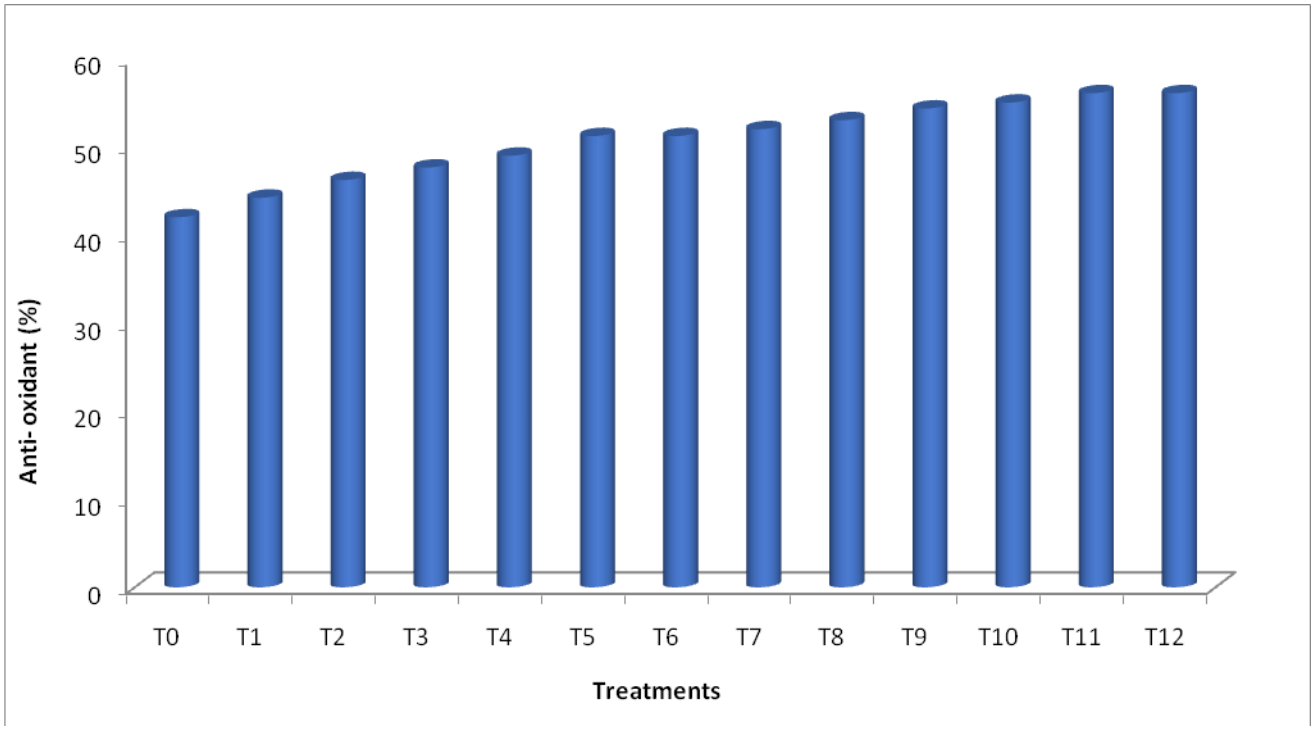
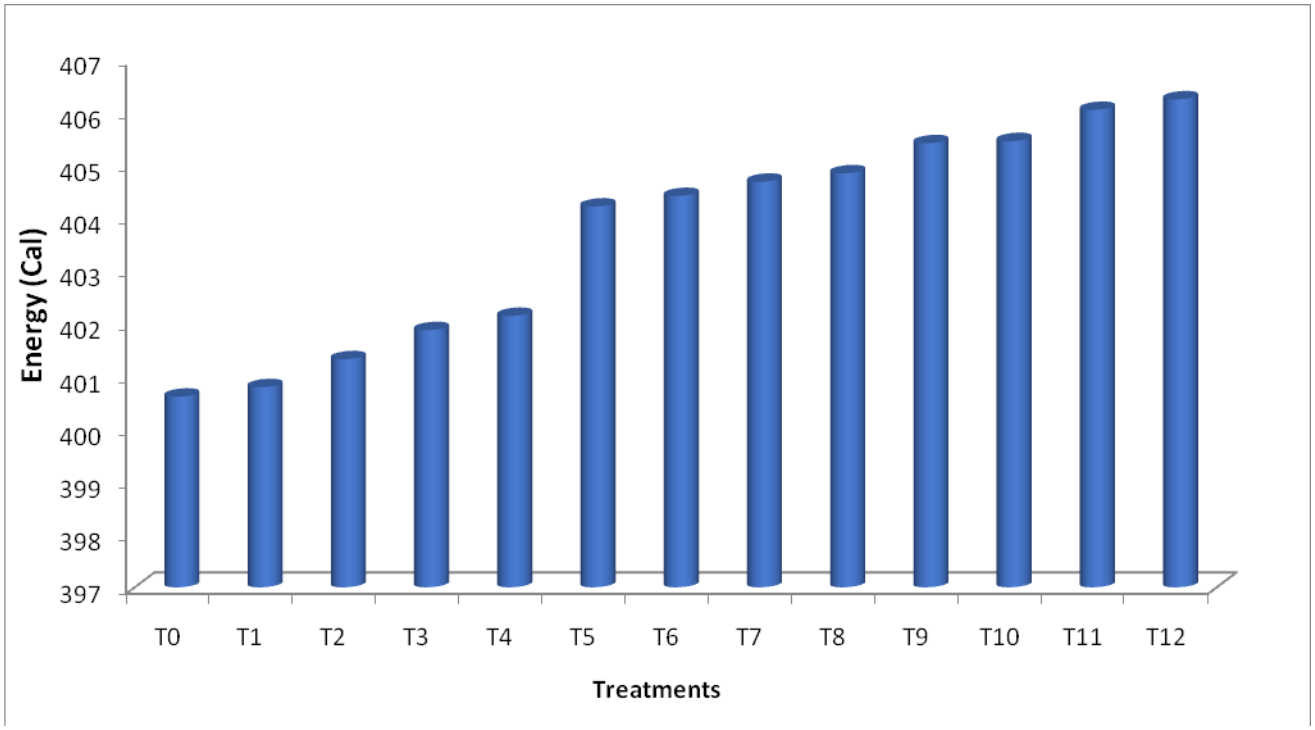


Fig.10 Graphical representation of energy content (%) of final prepared Nutribar



The average carbohydrate percentage was highest in T_0 with value 67.70% and lowest in T_{12} with value 63.94%. The average protein percentage was highest in T_{12} with value 20.34% and lowest in T_0 with value 16.14%. The average fat percentage was highest in T_{12} with value 7.68% and lowest in T_0 with value 7.25%. The average ash percentage was highest in T_{12} with value 1.95% and lowest in T_0 with value 1.14%. The average total solid percentage was highest in T_{12} with value 93.91% and lowest in T_0 with value 92.23%. The average crude fibre percentage was highest in T_0 with value 8.99% and lowest in T_{12} with value 8.06%. The average moisture percentage was highest in T_0 with value 7.77% and lowest in T_{12} with value 6.09%. The average acidity percentage was highest in T_{12} with value 0.30% and lowest in T_0 with value 0.10%. The average antioxidant percentage was highest in T_{11} and T_{12} with value 56.14% and lowest in T_0 with value 42.04%.The average energy value was highest in T_{12} with value 406.24 kcal and lowest in T_2 with value 400.61 kcal.

References

AOAC. (2000). Official Methods of Analysis, 17th Edition. Washington: Association of Official Analytical Chemists.

El-Adawy, T. A. (2002). Nutritional composition and antinutritional factors of chickpeas (*Cicer arietinum* L.) undergoing different cooking methods and germination. *Plant Foods for Human Nutrition*, *57*(1), 83-97. https://doi.org/10.1023/a:1013189620528

Faridvand, S., Rezaei-Chiyaneh, E., Battaglia, M. L., Gitari, H. I., Raza, M. A., & Siddique, K. H. (2022). Application of bio and chemical fertilizers improves yield, and essential oil quantity and quality of Moldavian balm (*Dracocephalum moldavica* L.) intercropped with mung bean (*Vigna radiata* L.). *Food and Energy Security*, *11*(2), e319. http://dx.doi.org/10.1002/fes3.319

Jukanti, A. K., Gaur, P. M., Gowda, C. L. L., & Chibbar, R. N. (2012). Nutritional quality and health benefits of chickpea (*Cicer*

arietinum L.): a review. *British Journal of Nutrition*, *108*(S1), S11-S26. https://doi.org/10.1017/s0007114512000797

King, J. (2006). Nutrition bar update. *Nutraceuticals World*, *9*(1), 32-36.

Mandal, D., Bolander, M. E., Mukhopadhyay, D., Sarkar, G., & Mukherjee, P. (2006). The use of microorganisms for the formation of metal nanoparticles and their application. *Applied microbiology and biotechnology*, *69*(5), 485-492. https://doi.org/10.1007/s00253-005-0179-3

Mateos-Aparicio, I., Cuenca, A. R., Villanueva-Suárez, M. J., & Zapata-Revilla, M. A. (2008). Soybean, a promising health source. *Nutricionhospitalaria*, *23*(4), 305-312.

Ranganna, S. (2009). Manual of analysis of fruit and vegetable products.

Ryland, L. K., Fox, T. E., Liu, X., Loughran, T. P., & Kester, M. (2011). Dysregulation of sphingolipid metabolism in cancer. *Cancer biology & therapy*, *11*(2), 138-149. https://doi.org/10.4161/cbt.11.2.14624

Singh, P., Kumar, R., Sabapathy, S. N., & Bawa, A. S. (2008). Functional and edible uses of soy protein products. *Comprehensive reviews in food science and food safety*, *7*(1), 14-28. https://doi.org/10.1111/j.1541-4337.2007.00025.x

Tewari, S. (2019). Therapeutic diet to control diseases, *AkiNik Publications*, 1-79.

Tewari, S., Agarwal, R.K., Sitaram, S.K. and Nakhale, S. (2021). "The Pharma Therapeutic Fruits: An Overview."*Journal of Pharmaceutical Research International*, 33(38A): 132-142.

Tewari, S., David, J., & David, B. (2020). A critical review on immune-boosting therapeutic diet against Coronavirus (COVID-19). *J Sci Technol*, *5*(5), 43-49.

Verma, S. (2016). Chemical constituents and pharmacological action of *Ocimum sanctum* (Indian holy basil-Tulsi). *The Journal of Phytopharmacology*, *5*(5), 205-207.

Wyatt, L. G. (2011). Nontraditional student engagement: Increasing adult student success and retention. *The Journal of Continuing Higher Education*, *59*(1), 10-20. http://dx.doi.org/10.1080/07377363.2011.544977

How to cite this article:

Swati Shukla, Sandeep G. M. Prasad, Anamika Das, Parimita Khatri and John David. 2023. Physico-Chemical Analysis of Nutribar Incorporated with Legumes. *Int.J.Curr.Microbiol.App.Sci.* 12(05): 169-183. **doi:** https://doi.org/10.20546/ijcmas.2023.1205.024