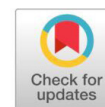


Assessment of Supplementation with Nutrient Dense Millet Bar to Underweight Adolescent Girls of Nagarkurnool District of Telangana State



Afifa Jahan^{1*}, R. Arunjyothi², Jessi Suneetha W³, B. Anila Kumari⁴, T. Prabhakar Reddy⁵, A. Shankar⁵, M. Rajasheker⁵, K. RamaKrishna⁵, B. Rajasheker⁵ and Shah Faraaz Ahmed⁶

¹Department of Food and Nutrition, KrishiVigyan Kendra-Palem, PJTSAU Nagarkurnool District, 509215, India

²Home Science K.V.K PVNRTVU, Mamnoon, Warangal district, India

³Home Science K.V.K Wyrā , Khammam district, PJTSAU, India

⁴PGRC, Rajendranagar, PJTSAU, India

⁵KrishiVigyan Kendra-Palem, Nagarkurnool District, 509215, India

⁶Aligarh Muslim University (AMU), Mursheedabad, West Bengal, India

Abstract

Millets are small coarse grains with high nutritive value. Snacks play a major role in diet of Indian population. Hence the study was targeted to underweight adolescent girls from 13 to 16 years of age. The millet bar of 50gms was given for 90 days along with the normal diet to 20 adolescent girls. The weight and height were monitored with 30 days interval gap till 90 days. The study concluded that there was a significant increase in BMI at 1% level of significance. The weight was increased and t calculated value is greater than t tab value. Hence supplementation of millet bar is highly significant.

Keywords: *Millets, Millet bar, snacks, underweight, BMI (Body Mass Index)*

Introduction

A heterogeneous group of small-seeded cereal crops known for their small coarse grains is called millets [14]. Millets had a vital role in strengthening food security [8] due to their ability to withstand extreme climatic conditions, pH, the salinity of the soil, in a short cultivation period [12]. Energy bars were originally designed for athletes and those with heavy training as real food sources. Snacks with good sensory and nutritional characteristics are food bar [4] due to their high content of proteins, carbohydrates, vitamins and minerals [10]. Ready-to-eat (RTE)

breakfast cereals and their product play an important role due to specific function and physiological benefits to the human being and are considered as source of nutrients economically. According to [9] Sports snacks prepared from composite mixture of various ingredients assure a mutual complementation of nutrients to supply adequate energy and increase muscular endurance of sportspersons.

Nutri bars were created as source of energy for athletes concerned with energy depletion due to long training sessions. As there is malnutrition in India Nutri bar can be used to offer a fast energy as its convenient food source that requires no preparation, a long shelf life and no refrigeration [5] which can be easily used in rural areas along with their normal diets [3]. Cereal bars are easy to consume with nutritional quality. These bars improve or substitute snacks between meals, to complement meals, or simply gain energy in a healthy way. The consumption of cereal bars has increased mainly among young consumers [3]. The

*Corresponding Author: Afifa Jahan

E-mail Address: afifajahan26@gmail.com

DOI: <https://doi.org/10.58321/AATCCReview.2022.10.01.70>

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millet bar is low cost, nutri-dense and convenient snack for all age groups [6]. Sports nutri bar is antioxidant rich, ready to consume, easy to carry snack would be an ideal supplement for athletes- pre event and post event snack as well [13].

Millet bar/Protein bars are usually used by athletes or exercise enthusiasts for muscle building. Body requirement for protein is higher and must be supplemented with protein bars. Oats, peanuts, soybean flour, amaranth, protein isolates and concentrates, etc., are generally used ingredients in making protein bars [2]. Formulating snack bars using regional low cost raw materials will be sensational from nutritional as well as in sensory perspective, as these can be considered as an option in menu of the particular region [1]. Incorporation of millets as major functional ingredient in snack food, helps to improve the nutritional attributes of the snacks and to overcome nutritional deficiencies at large [11]. The protein bars are nutritionally beneficial and appealing specially production of pearl millet-based convenience foods [7]

Objective

Supplementation of nutrient dense millet bar along with normal diet of underweight adolescent girls to increase their body weight.

Methodology

This study was conducted from 2020 to 2022 on twenty (20) underweight adolescent girls as a part of on farm trail (OFT) at Krishi Vigyan Kendra-Palem Nagarkurnool district of Telangana state. First year 2020-2021, ten (10) girls three months the adolescent girls were monitored with height and weight consuming their normal diet. Every month height and weight were noted. After three months they were given a millet bar of 50gms at mid-morning for 90 days along with their normal diet. Their height weight was monitored every month. Similarly other ten girls (10) were selected next year 2021-2022 and monitored with height and weight consuming their normal diet. Every month height and weight were noted. After three months they were given a millet bar of 50gms at mid morning for 90 days along with their normal diet. Their height weight was monitored every month.

Preparation of Millet bar

Table no I. ingredients of millet bar

S.No.	Ingredients	Weight in g
1	Groundnuts	25.0
2	Sesame seeds	4.0
3	Flax seeds	4.0
4	Soya granules	7.0
5	Dates	15.0
6	Cocoa powder	1.5
7	Skimmed milk powder	4.0
8	Jaggery	75.0
9	Foxtail and proso flakes or any other flakes based on convenience	50.0

Table II. Procedure to make millet bar

S.No	Procedure
1	Weighing the ingredients
2	Roasting the selected ingredients
3	Pounding in small pieces
4	Adding milk and coco powder
5	Preparation of jaggery syrup until firm ball
6	Adding liquid glucose
7	Mixing all ingredients
8	Spread into sheet and cut into preferred shapes or pour into shapes.
9	Let it set for 4 hours
10	Pack or serve as required

Results and Discussion

The nutri dense millet bar was prepared weighing 50gms each. The nutritive value of the millet bar is described in table III. The Proximate analysis, Shelf-life studies and Consumer acceptability studies were done as described by [15]

The underweight 13-16 years adolescent girls were selected from three different villages of Nagarkurnool of Telangana state. The weight before supplementation of Nutri dense millet bar was noted as T1 and the weight after supplementation of millet bar for 90 days was noted and shown as T2 in the table IV. The average T1 weight is 30.7 and the T2 is 33.23. The table V Shows the weight in kilogram (KG) gain from day 1 to day 90 in kgs. The table VII shows the height in centimeters (CM) gain from day 1 to day 90 in kgs.

Table III. Nutritional composition of millet bar

Moisture(%)	Ash(%)	Protein(%)	Fat(%)	Fiber(%)	Carbohydrates (%)	Energy (Kcal/100g)
3.46 ^b ±0.17	1.78 ^b ±0.06	12.34 ^b ±0.21	8.85 ^b ±0.65	0.31 ^a ±0.01	73.55 ^a ±0.92	423.3 ^b ±3.00

Table No IV. Showing the difference of weight gain before (T1) and after intervention (T2)

S.NO	AGE	HEIGHT (CM)	T1 WEIGHT (KG)	T2 WEIGHT (KG)
1	13	142.0	26.0	30.0
2	14	145.0	28.0	32.0
3	15	144.0	30.0	32.0
4	13	148.0	32.0	34.1
5	13	150.0	28.0	30.0
6	13	150.0	28.0	30.0
7	13	143.0	28.0	31.2
8	13	145.0	30.0	32.5
9	13	144.0	30.0	32.2
10	14	147.5	32.0	34.0
11	16	155.0	35.0	37.2
12	16	150.0	28.0	31.0
13	16	152.0	32.0	34.5
14	16	152.0	31.6	33.3
15	14	148.0	33.0	36.3
16	14	149.5	32.0	34.9
17	15	154.0	34.0	36.2
18	15	153.5	31.0	32.9
19	15	151.0	32.0	34.3
20	14	151.5	33.5	36.0
Average		148.75	30.70	33.23

Similarly table no IX shows the BMI (KG/m²) from day 1 to day 90.

Table No V. Showing the difference of weight gain during intervention

S. NO	AGE	DAY 1 (Weight in KG)	DAY 30 (Weight in KG)	DAY 60 (Weight in KG)	DAY 90 (Weight in KG)
1	13	26.0	27.2	29.0	30.0
2	14	28.0	29.1	31.2	32.0
3	15	30.0	30.8	31.5	32.0
4	13	32.0	33.0	33.6	34.1
5	13	28.0	28.8	29.4	30.0
6	13	28.0	28.6	29.3	30.0
7	13	28.1	29.0	30.1	31.2
8	13	30.0	30.8	31.8	32.5

9	13	30.0	30.7	31.6	32.2
10	14	32.0	32.9	33.3	34.0
11	16	35.0	35.7	36.6	37.2
12	16	28.2	29.2	30.0	31.0
13	16	32.0	32.9	33.6	34.5
14	16	31.6	32.2	32.9	33.3
15	14	33.1	34.1	35.0	36.3
16	14	32.0	33.3	34.0	34.9
17	15	34.0	34.6	35.4	36.2
18	15	31.0	31.7	32.3	32.9
19	15	32.1	33.0	33.7	34.3
20	14	33.5	34.3	35.2	36.0
Average		31.35 33333	31.595	32.475	33.23

Table VI. Paired t-test for means of weight

t-Test: Paired Two Sample for Means of weight		
Weight	T1 Weight	T2 Weight
Mean	30.705	33.23
Variance	5.887868421	4.931684
Observations	20	20
Pearson Correlation	0.96242979	
Hypothesized Mean Difference	0	
df	19	
t Stat	-16.88525385	
P(T<=t) one-tail	3.37136E-13	
t Critical one-tail	1.729132812	
P(T<=t) two-tail	6.74272E-13	
t Critical two-tail	2.093024054	

Table VI shows that t-calculated value is more than t-tabulated value. Hence the weight gain is highly significant at 1% level of significance.

Table No VII. Showing the difference of height gain during intervention

S. NO	AGE	DAY 1 HEIGHT (CM)	DAY 30 HEIGHT (CM)	DAY 60 HEIGHT (CM)	DAY 90 HEIGHT (CM)
1	13	142.0	142.0	142.3	143.0

Continued..

2	14	145.0	145.0	145.4	146.0
3	15	144.0	144.0	144.0	144.0
4	13	148.0	148.0	149.0	149.0
5	13	150.0	150.0	150.0	150.0
6	13	150.0	150.0	150.0	150.0
7	13	143.0	143.0	143.0	143.0
8	13	145.0	145.0	145.0	145.0
9	13	144.0	144.0	144.0	144.0
10	14	147.5	147.5	147.5	147.5
11	16	155.0	155.0	155.0	155.0
12	16	150.0	150.0	150.0	150.0
13	16	152.0	152.0	152.0	152.0
14	16	152.0	152.0	152.0	152.0
15	14	148.0	148.0	148.2	148.2
16	14	149.5	149.5	149.5	149.5
17	15	154.0	154.0	154.0	154.0
18	15	153.5	153.5	153.5	153.5
19	15	151.0	151.0	151.0	151.0
20	14	151.5	151.5	151.5	151.5
Average		148.7	148.7	148.8	148.9

Table VIII. Paired t-test for means of height

t-Test: Paired Two Sample for Means for height		
Height	Day 1	Day 90
Mean	148.75	148.91
Variance	14.88158	13.81463
Observations	20	20
Pearson Correlation	0.996052	
Hypothesized Mean Difference	0	
df	19	
t Stat	-1.96166	
P(T<=t) one-tail	0.032311	
t Critical one-tail	1.729133	
P(T<=t) two-tail	0.064622	
t Critical two-tail	2.093024	

Table VIII shows that t-calculated value is more than t-tabulated value; hence the height gain is significant at 5% level of significance.

Table IX. Showing the difference of BMI during intervention

S.NO	AGE	DAY 1 BMI	DAY 30 BMI	DAY 60 BMI	DAY 90 BMI
1	13	12.9	13.5	14.4	14.9

2	14	13.3	13.8	14.8	15.0
3	15	14.5	14.9	15.2	15.4
4	13	14.6	15.1	15.3	15.6
5	13	12.4	12.8	13.1	13.3
6	13	12.4	12.7	13.0	13.3
7	13	13.7	14.2	14.7	15.3
8	13	14.3	14.6	15.1	15.5
9	13	14.5	14.8	15.2	15.7
10	14	14.7	15.1	15.3	15.6
11	16	14.6	14.9	15.2	15.5
12	16	12.5	13.0	13.3	13.8
13	16	13.9	14.2	14.5	14.9
14	16	13.7	13.9	14.2	14.4
15	14	15.1	15.6	16.0	16.6
16	14	14.3	14.9	15.2	15.6
17	15	14.3	14.6	14.9	15.3
18	15	13.2	13.5	13.7	14.0
19	15	14.1	14.5	14.8	15.0
20	14	14.6	14.9	15.3	15.7
Average		13.88	14.275	14.66	15.02

Table X. Paired t-test for means of BMI

t-Test: Paired Two Sample for Means		
BMI	DAY 1	DAY 90
Mean	13.88	15.02
Variance	0.693263158	0.739579
Observations	20	20
Pearson Correlation	0.920845591	
Hypothesized Mean Difference	0	
df	19	
t Stat	-15.09270247	
P(T<=t) one-tail	2.46923E-12	
t Critical one-tail	2.539483191	
P(T<=t) two-tail	4.93845E-12	
t Critical two-tail	2.860934606	

Table X shows that t-calculated value is more than t-tabulated value. Hence the weight gain is highly significant at 1% level of significance.

Conclusion

In the present study 20 under weight adolescent girls were given supplementation of 50gms of millet bar daily till 90 days. Their weight and height was monitored for every 30 days interval. There was significant increase in weight at 1% level of significance and height was significant 5% level of

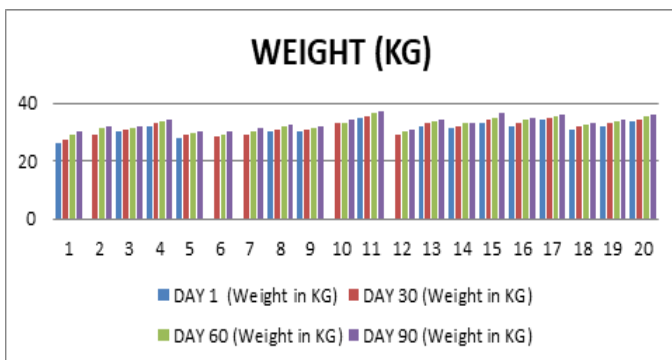


Image 1 showing the graphical representation of weight gain from day 1 to day 90 in kgs

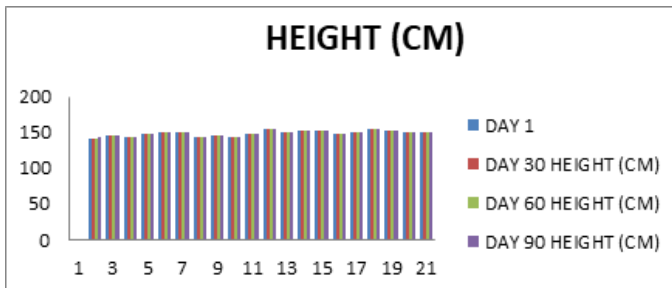


Image 2 showing the graphical representation of height from day 1 to day 90 in CM

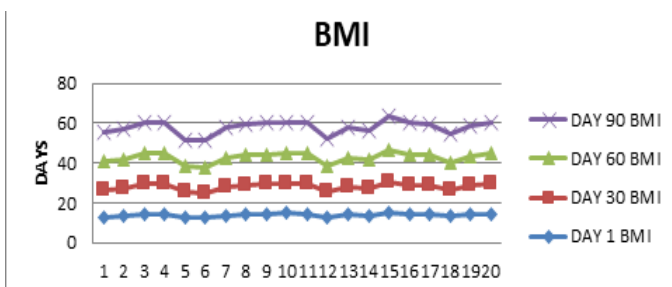


Image 3 showing the graphical representation of from day 1 to day 90 in KG/m²

significance and BMI was high significant at 1% level of significance. The 90 days supplementation has shown improvement in weight but still there need to increase weight to reach normal BMI. Hence parents were given diet counseling and training to make millet bars at their home.

Acknowledgement

The authors are thankful to The Indian council of Agricultural research (ICAR) for providing funds along with Director ATARI Zone X for constant support during the study.

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