INCORPORATION OF SUPERFOODS IN SNACK RECIPES (TRAIL MIX, DATE BALLS, NUTRI BAR) AND ITS SENSORY EVALUATION

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Abstract:

Introduction:

Snacking is very common in all age groups. In this era, where individuals have started being health conscious, healthy snacks can now be made more nutritious and at home in an easier way.

Aim: To incorporate 3 different superfoods in different amounts in snack recipes (Trail Mix, Date Balls and Nutri Bar) and develop an acceptable product.

Methodology:

The products were innovated as a research project which was a part of the curriculum in Post-Graduation in Clinical Nutrition and Dietetics, Department of food Nutrition and Dietetics, SVT College of Home Science (Autonomous), SNDT Women's University. Sensory Evaluation was done by 8 trained panel members on attributes such as Colour, Consistency, Taste and Overall Acceptability on a 9 point Hedonic rating scale.

Results:

In Recipe 1 (trail Mix), it was seen that acceptability and mean scores were increased in terms of Colour, texture, taste and overall acceptability as the concentration of the superfood (goji berry) increased. However, significant changes were noticed only in sample 3 (amount- 15 gms) (p<0.05).

In Recipe 2 (Date Balls), it was seen that the in terms of colour and texture, mean scores gradually decreased as the concentration of superfood (Cinnamon Powder) increased. Whereas, in terms of taste, acceptability and mean scores increased as the concentration of superfood (cinnamon powder) increased, however results were not significant.

In Recipe 3 (Nutri bar), it was seen that mean scores for colour had no significant changes. In terms of texture, no significant changes were found but the mean scores increased as the concentration of superfood (Almonds) increased. In Taste, significant changes were found in sample 2 (amount-10 gms) ($p<0.05$), but the mean scores increased as the concentration of superfood increased, although the results remain non-significant. For overall acceptability, mean scores of sample 4 i.e. with highest concentration of superfood were highest of all in all attributes, however significant changes were noticed for sample 3 (amount- 15gms) ($p<0.05$) when compared with all.

Conclusion:

Superfoods are rich in antioxidants and are great immune source to the body. Hence they should be consumed in a snack on a daily basis, even if in little amount, they'll be beneficial in long term consumption. Goji Berries, Cinnamon and Almonds are outstanding in their own ways and provide many health benefits and can be easily incorporated in snacks.

Keywords: Superfood, Healthy snacking, Goji Berries, Antioxidants

Introduction:

A snack portion of food, smaller than a regular meal, generally eaten between meals. (1) There are four characteristics of healthy snacking: adequacy, balance, calorie control, moderation and variety (2). Eating a healthy snack allows you to add to your intake of essential nutrients, keeps a control on appetite, increases energy and allows better concentration. (3) Superfoods are foods mostly plant-based but also some fish and dairy thought to be nutritionally dense and thus good for one's health (4). The body cannot possibly get every nutrient it needs from a single food. As a result, a person needs to consume a variety of nutrient-rich foods throughout the day. The advantage of eating superfoods versus other foods (and even other fruits and vegetables) is that, since they often have more nutrients per gram of volume (aka nutrient density), you get more nutrients per bite than you would eating any other healthy food (5).While Superfood, also called as Functional Foods are ignored by everyone, they can be incorporated in snacks as they are to be consumed in smaller amounts.One may find it confusing to pick the right superfoods especially when supermarket shelves are loaded with a number of food items - all claiming to possess one or more super qualities. Some power-packed foods are been used such as Goji berries, Cinnamon and Almonds in snack recipes. (6). Goji berries, also known as Lycium barbarum fruit, are used in nutritional supplements that provide the most potent

health benefits. (7) Cinnamon is a spice obtained from the inner bark of several tree species from the genus Cinnamomum and is loaded with powerful antioxidants, such as polyphenols which has anti-inflammatory, anti-diabetic effect (8). Almonds are off-white in colour, covered by a thin brownish skin, and encased in a hard shell (9). Studies stated that regular consumption of Almonds reduces risk of heart disease, increases vitamin E levels and reduces blood sugar levels (10).

Methodology:

Scores were analysed using SPSS (20.0) software. Descriptive and advanced statistics were performed by applying the independent group t test where $p < 0.05$ was considered to be statistically significant.

Results:

Table 1: Sensory evaluation score and significance levels for color, consistency, taste and overall acceptability attributes of Trail Mix samples.

Sr. No	COLOUR			CONSISTENCY			TASTE			OVERALL		
	Mean ± SD	t-value	p-value	Mean ± SD	t-value	p-value	Mean ± SD	t-value	p-value	Mean ± SD	t-value	p-value
S1	6.500 ± 1.574	-3.987	**0.005***	6.875 ± 1.309	0.893	0.402	7.042 ± 1.786	0.592	0.573	7.000 ± 1.623	0.000	1.000
S2	7.292 ± 1.240			6.750 ± 1.389			6.875 ± 1.563			7.000 ± 1.357		
S2	7.292 ± 1.240	-2.198	0.064	6.750 ± 1.389	-0.228	0.826	6.875 ± 1.563	-2.494	**0.041***	7.000 ± 1.357	-2.728	**0.029***
S3	7.583 ± 1.095			6.792 ± 1.167			7.542 ± 0.942			7.542 ± 0.975		
S3	7.583 ± 1.095	0.624	0.553	6.792 ± 1.167	-1.357	0.217	7.542 ± 0.942	-0.284	0.785	7.542 ± 0.975	-0.509	0.629
S4	7.417 ± 0.939			7.000 ± 1.259			7.583 ± 1.065			7.625 ± 1.015		
S1	6.500 ± 1.574	-4.478	**0.003***	6.875 ± 1.308	0.386	0.711	7.042 ± 1.786	-1.210	0.265	7.000 ± 1.623	-1.976	0.089
S3	7.583 ± 1.095			6.792 ± 1.167			7.542 ± 0.942			7.542 ± 0.975		
S1	6.500 ± 1.574	-2.226	0.061	6.875 ± 1.308	-0.375	0.718	7.042 ± 1.786	-1.021	0.341	7.000 ± 1.623	-1.541	0.167
S4	7.417 ± 0.939			7.000 ± 1.259			7.583 ± 1.065			7.625 ± 1.015		
S2	7.292 ± 1.240	-0.532	0.612	6.750 ± 1.389	-0.851	0.423	6.875 ± 1.563	-2.038	0.081	7.000 ± 1.357	-2.143	0.069
S4	7.417 ± 0.939			7.000 ± 1.259			7.583 ± 1.065			7.625 ± 1.015		

Note: Concentration of super food i.e. Goji Berry in Trail Mix samples S1, S2, S3 & S4 was 0 gram, 10 gram, 15 gram & 20 gram respectively.

Colour

In comparison with standard **Trail Mix** i.e. S1, the mean colour score increased by 0.729, 1.083 & 0.917 for S2, S3 & S4 respectively. The increase in score of S2 (t=-3.987, p<0.01) and S3 (t=-4.478, p<0.01) were **Highly Significant**, whereas **Non-significant (p-values greater than 0.05)** for S4. Additionally, mean scores of S3 increased by 0.29 & S4 increased by 0.12 when compared with S2, and lastly mean score of S4 reduced by 0.17 when compared with S3. However, these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Goji Berry in S1, S2, S3 & S4 were 0 gram, 10 gram,15 gram & 20 gram respectively. The least mean

score was reported for S1 i.e.with 0 gram concentration of Goji Berry and the best mean score for S3 i.e. with 15 gram concentration of Goji Berry. Hence, it can be concluded that scores gradually increased till 15 gram concentration of gojy berry and dropped as the concentration is further increased.

Consistency

In comparison with standard **Trail Mix** i.e. S1, the mean consistency score for S2 & S3 slightly decreased by 0.125 & 0.08 respectively, whereas that of S4 slightly increased by 0.125. Additionally, mean scores of S3 slightly increased by 0.04 & S4 increased by 0.25 when compared with S2, and lastly mean score of S4 increased by 0.21 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Goji Berry in S1, S2, S3 & S4 were 0 gram, 10 gram,15 gram & 20 gram respectively. The least mean score was reported for S2 i.e. with 10 gram concentration of Goji Berry and the best mean score for S4 i.e. with 20 gram concentration of Goji Berry. Hence, it can be probably concluded that scores gradually increased as the concentration increases.

Taste

In comparison with standard **Trail Mix** i.e. S1, the mean taste score for S2 slightly decreased by 0.17, whereas that of S3 & S4 increased by 0.5 & 0.54 respectively. However these changes were **Non-significant (p-values greater than 0.05)**. For S3, mean score increased by 0.67 when compared to S2 and this change was **Significant** (t=-2.494, $p < 0.05$). Additionally, mean scores of S4 increased by 0.71 when compared with S2, and lastly mean score of S4 slightly increased by 0.04 when compared with S3. However, these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Goji Berry in S1, S2, S3 & S4 were 0 gram, 10 gram,15 gram & 20 gram respectively. The least mean score was reported for S2 i.e. with 10 gram concentration of Goji Berry and the best mean score for S4 i.e. with 20 gram concentration of Goji Berry. Hence, it can be probably concluded that scores gradually increased as the concentration increases.

Overall Acceptability

In comparison with standard **Trail Mix** i.e. S1, the mean Overall Acceptability score for S2 was reported same, whereas that of S3 & S4 increased by 0.54 & 0.62 respectively. However these changes were **Non-significant (p-values greater than 0.05)**. For S3, mean score increased by 0.54 when compared to S2 and this change was **Significant** (t=-2.728, $p < 0.05$). Additionally, mean scores of S4 increased by 0.62 when compared with S2. And lastly mean score of S4 slightly increased by 0.08 when compared with S3. However, these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Gojy Berry in S1, S2, S3 & S4 were 0 gram, 10 gram,15 gram & 20 gram respectively. The least mean score was reported for S1 i.e with 0 gram concentration of Gojy Berry and the best mean score for S4 i.e with 20 gram concentration of Gojy Berry. Hence, it can be concluded that scores gradually increased as the concentration increases.

Table 2: Sensory evaluation score and significance levels for colour, consistency, taste and overall acceptability attributes of Date Balls samples.

Sr. No	Colour Mean ± SD	t-value	p-value	Consistency Mean ± SD	t-value	p-value	Taste Mean ± SD	t-value	p-value	Overall Mean ± SD	t-value	p-value
S1	7.541 ± 1.082	-1.158	0.285	7.417 ± 0.988	0.798	0.451	7.083 ± 1.205	1.000	0.351	7.417 ± 0.338	0.664	0.528
S2	7.667 ± 1.154			7.333 ± 1.195			6.875 ± 1.154			7.292 ± 0.336		
S2	7.667 ± 1.154	1.433	0.195	7.333 ± 1.195	0.683	0.516	6.875 ± 1.154	-1.082	0.316	7.292 ± 0.336	2.198	0.064
S3	7.375 ± 1.315			7.250 ± 1.109			7.042 ± 1.105			7.000 ± 0.388		
S3	7.375 ± 1.315	0.424	0.685	7.250 ± 1.109	1.000	0.351	7.042 ± 1.105	-0.55	0.598	7.000 ± 0.388	-0.837	0.430
S4	7.292 ± 1.374			7.125 ± 1.368			7.167 ± 1.247			7.167 ± 0.423		
S1	7.542 ± 1.083	1.080	0.316	7.417 ± 0.988	1.323	0.277	7.083 ± 1.205	0.137	0.895	7.417 ± 0.338	1.616	0.150
S3	7.375 ± 1.315			7.250 ± 1.109			7.042 ± 1.105			7.000 ± 1.098		
S1	7.542 ± 1.083	1.158	0.285	7.417 ± 0.988	1.433	0.195	7.083 ± 1.205	-0.26	0.802	7.417 ± 0.955	1.158	0.285
S4	7.292 ± 1.374			7.125 ± 1.368			7.167 ± 1.247			7.167 ± 1.195		
S2	7.667 ± 1.155	1.567	0.161	7.333 ± 1.195	1.256	0.250	6.875 ± 1.154	-1.43	0.195	7.292 ± 0.950	0.893	0.402
S4	7.292 ± 1.374			7.125 ± 1.368			7.167 ± 1.247			7.167 ± 1.195		

Note: Concentration of super food i.e. Cinnamon Powder in Date Ball samples S1, S2, S3 & S4 was 0 teaspoon, 1 teaspoon, 2 teaspoon & 3 teaspoon respectively.

Colour

In comparison with standard **Date Ball** i.e. S1, the mean **colour** score for S2 slightly increased by 0.13, whereas that of S3 & S4 decreased by 0.17 & 0.25 respectively. Additionally, mean scores of S3 & S4 decreased by 0.295 & 0.38 respectively, when compared with S2. And lastly mean score of S4 slightly decreased by 0.08 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Cinnamon Powder in S1, S2, S3 & S4 was 0 teaspoon, 1 teaspoon, 2 teaspoon & 3 teaspoon respectively. The least mean score was reported for S1 i.e. with 0 tsp concentration of Cinnamon Powder and the best mean score for S2 i.e. with 1 tsp concentration of Cinnamon Powder. Hence, it can be probably concluded that scores dropped as concentration of Cinnamon Powder is increased beyond 1 tsp.

Consistency

In comparison with standard **Date Ball** i.e. S1, the mean **consistency** score for S2, S3 & S4 decreased by 0.09, 0.17 & 0.295 respectively. Additionally, mean scores of S3 & S4 slightly decreased by 0.08 & 0.20 respectively, when compared with S2. And lastly mean score of S4 slightly decreased by 0.125 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Cinnamon Powder in S1, S2, S3 & S4 was 0 teaspoon, 1 teaspoon, 2 teaspoon & 3 teaspoon respectively. The least mean score was reported for S4 i.e. with 3 tsp concentration of Cinnamon Powder and the best mean score for S1 i.e. with 0 tsp concentration of Cinnamon Powder. Hence, it can be concluded that scores decreases gradually as concentration of Cinnamon Powder increases.

Taste

In comparison with standard **Date Ball** i.e. S1, the mean **taste** score for S2 & S3 decreased by 0.21 & 0.06 respectively, whereas that of S4 increased by 0.29. Additionally, mean scores of S3 & S4 increased by 0.17 & 0.29 respectively, when compared with S2. And lastly mean score of S4 increased by 0.125 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Cinnamon Powder in S1, S2, S3 & S4 was 0 teaspoon, 1 teaspoon, 2 teaspoon & 3 teaspoon respectively. The least mean score was reported for S2 i.e. with 1 tsp concentration of Cinnamon Powder and the best mean score for S4 i.e. with 3 tsp concentration of Cinnamon Powder. Hence, it can be probably concluded that scores gradually increased as the concentration of Cinnamon Powder increases.

Overall acceptability

In comparison with standard **Date Ball** i.e. S1, the mean **Overall acceptability** score for S2, S3 & S4 decreased by 0.125, 0.42 & 0.25 respectively. Additionally, mean scores of S3 & S4 decreased by 0.29 & 0.11 respectively, when compared with S2. And lastly mean score of S4 slightly increased by 0.71 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Cinnamon Powder in S1, S2, S3 & S4 was 0 teaspoon, 1 teaspoon, 2 teaspoon & 3 teaspoon respectively. The least mean score was reported for S2 i.e. with 1 tsp concentration of Cinnamon Powder and the best mean score for S4 i.e. with 3 tsp concentration of Cinnamon Powder. Hence, it can be probably concluded that scores gradually decreased as the concentration of Cinnamon Powder increases.

Table 3: Sensory Evaluation scores and significance levels for color, texture, taste and overall acceptability attributes of Nutri Bar samples.

	Colour			Consistency			Taste			Overall		
Sr. No.	Mean ± SD	t-value	p-value	Mean ± SD	t-value	p-value	Mean ± SD	t-value	p-value	Mean ± SD	t-value	p-value
S1	8.000 ± 0.777	-1.000	0.351	7.458 ± 0.689	-1.313	0.231	7.000 ± 1.297	-2.447	**0.044***	7.167 ± 1.054	-1.930	0.095
S2	8.083 ± 0.729			7.750 ± 0.611			7.625 ± 0.825			7.583 ± 0.751		
S2	8.083 ± 0.729	1.000	0.351	7.750 ± 0.611	-1.158	0.285	7.625 ± 0.825	-0.271	0.794	7.583 ± 0.751	-2.198	0.064
S3	8.000 ± 0.891			7.875 ± 0.834			7.708 ± 1.174			7.875 ± 0.834		
S3	8.000 ± 0.891	-2.049	0.080	7.875 ± 0.834	-1.488	0.180	7.708 ± 1.174	-0.168	0.871	7.875 ± 0.834	-0.893	0.402
S4	8.125 ± 0.834			8.083 ± 0.955			7.750 ± 1.109			8.000 ± 0.992		
S1	8.000 ± 0.777	0.000	1.000	7.458 ± 0.689	-1.852	0.106	7.000 ± 1.297	-2.693	**0.031***	7.167 ± 1.054	-2.773	**0.028***
S3	8.000 ± 0.891			7.875 ± 0.834			7.708 ± 1.174			7.875 ± 0.834		
S1	8.000 ± 0.777	-1.158	0.258	7.458 ± 0.689	-2.143	0.069	7.000 ± 1.297	-2.393	**0.048***	7.167 ± 1.054	-2.303	0.055
S4	8.125 ± 0.834			8.083 ± 0.955			7.750 ± 1.109			8.000 ± 0.992		
S2	8.083 ± 0.729	-0.552	0.598	7.750 ± 0.611	-2.160	0.068	7.625 ± 0.825	-0.574	0.584	7.583 ± 0.751	-2.118	0.072
S4	8.125 ± 0.834			8.083 ± 0.955			7.750 ± 1.109			8.000 ± 0.992		

Note: Concentration of super food i.e. Almond in Nutri bar smaples S1, S2, S3 & S4 was 0 gram, 10 gram, 15 gram & 20 gram respectively.

Colour

In comparison with standard **Nutri Bar** i.e. S1, the mean **Colour** score for S2 & S4 increased by 0.08 & 0.125 respectively, whereas that of S4 was reported same. Additionally, mean scores of S3 decreased by 0.08 & S4 increased by 0.04, when compared with S2. And lastly mean score of S4 increased by 0.125 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Almond S1, S2, S3 & S4 was 0 gram, 10 gram, 15 gram & 20 gram respectively. The least mean score was reported for S1 & S3 i.e. with 0 gm and 15gm concentration of Almond and the best mean score for S4 i.e. with 20 gm concentration of Almond. Hence, it can be probably concluded that scores were almost similar as the slight changes in scores were Non-Significant.

Consistency

In comparison with standard **Nutri Bar** i.e. S1, the mean **Consistency** score for S2, S3 & S4 increased by 0.29, 0.42 & 0.625 respectively. Additionally, mean scores of S3 & S4 increased by 0.125 & 0.33 respectively, when compared with S2. And lastly mean score of S4 increased by 0.21 when compared with S3. However, all these differences observed were **Non-significant (p-values greater than 0.05**). Concentration of super food i.e. Almond S1, S2, S3 & S4 was 0 gram, 10 gram, 15 gram & 20 gram respectively. The least mean score was reported for S1 i.e. with 0 gm concentration of Almond and the best mean score for S4 i.e. with 20 gm concentration of Almond. Hence, it can be probably concluded that scores gradually increased as the concentration of Almond increases.

Taste

In comparison with standard **Nutri Bar** i.e. S1, the mean **Taste** score for S2, S3 & S4 increased by 0.62, 0.71 & 0.75 respectively. This increase in score of S2 (t= -2.447, p<0.05), S3 (t= -2.693, p<0.05) and S4 (t= -2.393, p=<0.05) were reported **Significant (p-values less than 0.05)**. Additionally, mean scores of S3 & S4 increased by 0.08 & 0.125 respectively, when compared with S2. And lastly mean score of S4 increased by 0.04 when compared with S3. However, these differences observed were **Non-significant (p-values greater than 0.05**). Concentration of super food i.e. Almond S1, S2, S3 & S4 was 0 gram, 10 gram, 15 gram & 20 gram respectively. The least mean score was reported for S1 i.e. with 0 gm concentration of Almond and the best mean score for S4 i.e. with 20 gm concentration of Almond. Hence, it can be concluded that mean scores gradually increased as the concentration of Almond increases.

Overall acceptability

In comparison with standard **Nutri Bar** i.e. S1, the mean **Overall acceptability** score for S2, S3 & S4 increased by 0.42, 0.71 & 0.83 respectively. Out of which only increase in score of S3 was reported **Significant (t=-2.773, p<0.05)**, rest all other changes were reported **Non-significant (p-values**

greater than 0.05).. Additionally, mean scores of S3 & S4 increased by 0.29 & 0.42 respectively, when compared with S2. And lastly mean score of S4 increased by 0.125 when compared with S3. However, these differences observed were **Non-significant (p-values greater than 0.05)**. Concentration of super food i.e. Almond S1, S2, S3 & S4 was 0 gram, 10 gram, 15 gram & 20 gram respectively. The least mean score was reported for S1 i.e. with 0 gm concentration of Almond and the best mean score for S4 i.e. with 20 gm concentration of Almond. Hence, it can be concluded that mean scores gradually increased as the concentration of Almond increases.
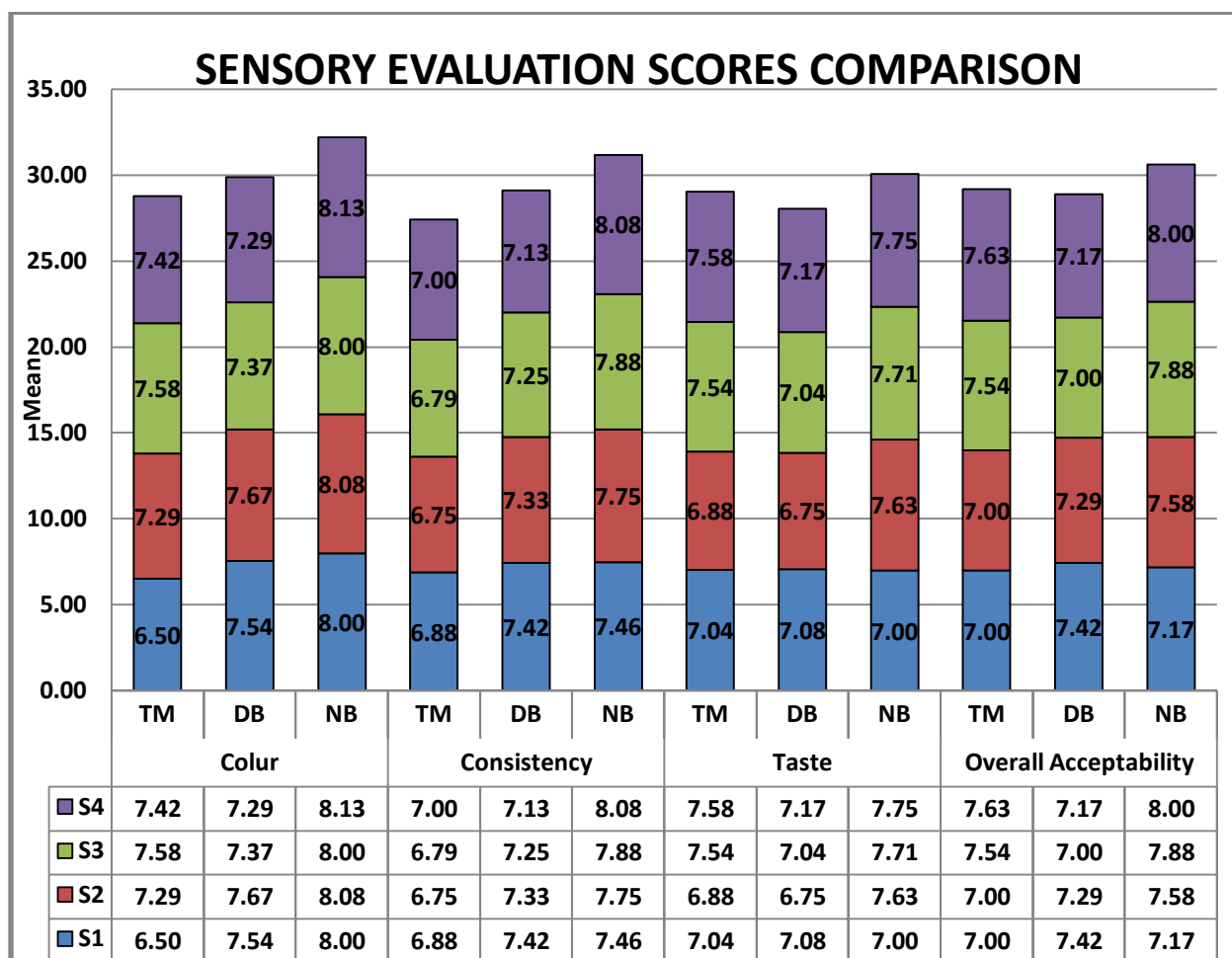
Discussion:

SENSORY EVALUATION SCORES COMPARISON

	Colur			Consistency			Taste			Overall Acceptability		
	TM	DB	NB	TM	DB	NB	TM	DB	NB	TM	DB	NB
S4	7.42	7.29	8.13	7.00	7.13	8.08	7.58	7.17	7.75	7.63	7.17	8.00
S3	7.58	7.37	8.00	6.79	7.25	7.88	7.54	7.04	7.71	7.54	7.00	7.88
S2	7.29	7.67	8.08	6.75	7.33	7.75	6.88	6.75	7.63	7.00	7.29	7.58
S1	6.50	7.54	8.00	6.88	7.42	7.46	7.04	7.08	7.00	7.00	7.42	7.17

** TM- Trail Mix, DB – Date Balls, NB- Nutri Bar

Figure 1: Graphical Representation describes the mean scores of all the samples within and between the products.

Within the Products:

As per above graphical representation, **trail mix** product showed the best mean scores for the sample having highest concentration of super food (i.e. Goji Berry) in Consistency, taste and overall acceptability, where as the best mean score for colour was achieved by sample having second highest concentration.

An article issued by University of Michigan suggested that daily consumption of 5-15 grams of Goji Berries are known to raise blood levels of Zeaxanthin, a rich antioxidant known to **neutralize the free radicals that destroy eye cells**.(11)

Amagase Het al stated that daily consumption of Goji berries increases subjective feeling of general well-being and improves neurologic /psychologic performance and gastrointestinal functions (12).

In **Date Ball** product, standard sample (i.e. without super food) was predominant by achieving highest mean scores in Overall acceptability & Consistency and achieving second highest mean scores in Colour & taste.

Self Nutrition Data, 2015 stated each date provides 1.6 grams of dietary fiber (13). Men should aim to get 38 grams of fiber every day, while women need at least 25 grams (14). Eating a small handful of dates (six or seven whole dates) gives you 11.2 grams of dietary fiber, putting you well on your way to your recommended daily intake.

Getting enough dietary fiber is associated with better cardiovascular health, lower levels of "bad" LDL cholesterol, improved gastrointestinal regularity, better control of blood sugar, and maintenance of a healthy weight (14).

In **Nutri Bar** product, sample with highest concentration of super food (i.e. Almonds) achieved highest mean scores in all the sensory attributes viz. Colour, consistency, taste & overall acceptability. The American Dietetic Association notes that meal replacements, including protein bars, are effective for weight loss when part of a well-rounded diet (15). Nutrition bars have the advantage of convenience. They are small and can be consumed quickly by active people or professionals. Meal replacement and snack varieties provide an easy option for dieters who lack the time or resources for extensive meal planning.

Between the Products:

As per the above graphical representation, the best mean score for colour, consistency, taste and overall acceptability attributes was achieved by Nutri Bar among all the products, followed by Date Balls in attributes of colour & consistency and by Trail Mix in attributes of taste & overall acceptability. After incorporation of super food (i.e. Goji berry, Cinnamon powder and Almonds in Trail Mix, Date Balls & Nutri Bar respectively), the mean score increased mostly for all the products in almost all sensory attributes, when compared to standard sample.

Conclusion:

After superfoods incorporation in all the recipes, it was seen that Goji berry as a superfood was accepted up to 15grams as per taste and overall acceptability. However, In terms of Color till 15grams and in texture 20 grams was accepted. In date balls, color was accepted for 1 tsp of Cinnamon Powder, for texture with no cinnamon powder, whereas for taste and overall acceptability 3 tsp of cinnamon powder was accepted. The best sample for each attribute after the incorporation of superfood almonds was with highest incorporation i.e.-20 grams.

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