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A COMPARATIVE STUDY ON SENSORY PROPERTIES OF NUTRIBARS DURING STORAGE

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Abstract

As nutribars are well known helpful nourishments with long timeframe of realistic usability the quality is most important during storage. For this study the nutribars were prepared and packed in polyethylene and laminated aluminium pouches under vacuum. After packaging, the products were stored under ambient conditions for a period of six months and evaluated for various quality parameters during storage. The organoleptic qualities of the products were assessed initially and at monthly intervals for a period of six months.The mean score for overall acceptability of nutribars decreased during storage. The nutribars had mean score above 7.0 in laminated aluminium pouches and in polyethylene pouches at the end of storage. Nutribars packed in laminated aluminium pouches retained its original qualities than polyethylene packed samples up to fourth month of storage. Later much difference in mean scores for the overall acceptability were not noticed with respect to packages. Based on organoleptic qualities, the nutribars prepared with corn flakes in jaggery honey mix (T_3) was the most acceptable combination followed by T_{12} prepared with wheat flakes and T_{16} prepared with rice flakes and corn flakes in glucose syrup.

Key words:nutribars,laminated aluminium pouches,polyethelene pouches

I. INTRODUCTION

Nutribars were introduced in the last decade as a wholesome alternative of comfit when consumers show more interest in health and diets (Bower and Whitten, 2000). The association between cereal bars and wholesomeness foodstuffs is well-documented tendencies in industrial food (Boustani and Mitchell, 1990).They contain good sensory and nutritional characteristics due to their crispiness and essential nutrients. Nutribars are a popular and convenient food with long shelf life and therefore, would be an ideal food format to deliver nutrients. Nutribars have better nutritive value than most of the convenient foods. They can also be used as a carrier of prebiotic functional ingredients. These kinds of items will give impressive degree to the food processing industry to diversify the processing operation. The snacking industry is blasting in this scenario as more buyers are searching for helpful food that is prepared to-eat in a solitary serve in a hurry ways of life. As nutribars are popular convenient foods with long shelf life, selection of proper packaging materials is most essential to ensure maximum product quality during storage.

II. METHODOLOGY

For this study, six varieties of nutribars were prepared with various types of cereal flakes, dehydrated fruits, nuts, jaggery honey mix, glucose syrup and other functional ingredients purchased from local market. The nutribars are T_3 (corn flakes in jaggery honey mix), T_6 (rice flakes and corn flakes in jaggery honey mix), T_8 (wheat flakes and corn flakes in jaggery honey mix), T_{12} (wheat flakes in glucose syrup), T_{16} (rice flakes and corn flakes in glucose syrup) and T_{20} (oat flakes and corn flakes in glucose syrup). They were prepared, packed in polyethylene and laminated aluminium pouches under vacuum and stored for a period of six months under ambient conditions(figure 1).

Figure 1. Nutribars packed in polyethylene and laminated aluminium pouches under vacuum

A series of organoleptic trials were carried out using simple triangle test at laboratory level to select a panel of ten judges between the age group of 18 to 35 years as suggested by Jellinek (1985). A score card containing six quality attributes such as appearance, colour, flavour, texture, taste and overall acceptability was prepared by a nine point hedonic scale for organoleptic evaluation of nutribars initially and at monthly intervals .The mean score for different quality attributes were statistically interpreted using Kendall's coefficient of concordance.

III. RESULT AND DISCUSSION

A. Appearance

The mean score for appearance of nutribars packed in polyethylene and laminated aluminium pouches during storage is presented in Table 1.

The initial score for appearance of nutribars varied from 8.3 (2.20) to 9.0 (4.70). A gradual decrease in the mean score for appearance was noticed in nutribars packed in polyethylene pouches during six months of storage. Compared to polyethylene packed nutribars better mean score for appearance during storage was noticed in nutribars packed in laminated aluminium pouches under vacuum. In nutribars packed in laminated aluminium pouches after first month of storage, the mean score for appearance was steady in T_3 (8.8), T_6 (8.8), T_{12} (8.3), T_{16} (8.8) and T_{20} (8.2) till fifth month of storage.

At the end of sixth month of storage, among nutribars packed in polyethylene pouches the highest mean score was noticed in T_3 (corn flakes in jaggery honey mix) and the lowest in T_8. In case of vacuum packed nutribars the highest mean score for appearance was recorded in T_3 and T_{16} and the lowest in T_8.

The nutribars packed in laminated aluminium pouches had retained its good appearance up to fifth month of storage. The nutribars packed in polyethylene pouches showed comparatively higher moisture gain from initial months resulting in a soggy appearance even at earlier months of storage itself.

B. Colour

The nutribars packed in polyethylene pouches showed a gradual decrease in the mean score for colour with advancement in periods of storage. Similarly nutribars packed in laminated pouches under vacuum also showed a decrease in the mean score for colour during six months of storage (Table 2). Better mean scores for colour than the samples packed in polyethylene pouches packed samples was noticed in vacuum packed nutribars. On sixth month of storage the mean score for colour varied from 7.6 (2.95) to 8.1 (3.50).

The desirable characteristics of cereal bars include a light brown colour and moist appearance (Dutcoski *et al*., 2006). The colour of nutribars became darker and darker with advancement in the period of storage. Major changes in colour of the nutribars were observed only after third month of storage. The colour change in nutribars stored in laminated aluminium pouches under vacuum was comparatively low.

C. Flavour

As revealed in Table 3, The mean score for flavour of nutribars packed in polyethylene and laminated aluminium pouches decreased gradually during six months of storage. Comparatively better mean score for flavour was noticed in nutribars packed in laminated aluminium pouches.

In nutribars packed in polyethylene pouches the highest mean scores at the end of six months of storage was noticed in T_3 (7.4, 3.25) and lowest in T_8 and T_{12} (7.0, 2.97). In nutribars packed in laminated aluminium pouches the mean score for flavour at the end of six months of storage was between 7.4 (T_8) and 7.8 (T_{16}).

D. Texture

The mean score for texture (Table 4) of nutribars initially varied 8.5 (4.28) to 8.8 (4.55). The nutribars packed in polyethylene pouches as well as in laminated aluminium pouches a gradual decrease in the mean score for texture was noticed with advancement in days of storage. After sixth month of storage, the highest score mean of 7.5 (3.7) was observed in T_{12} (wheat flakes in jaggery honey mix) and the least score was noticed in T_6 (6.9, 2.10) in case of nutribars packed in polyethylene pouches. Compared to polyethylene packed nutribars better mean scores for texture was noticed in vacuum packed nutribars.

E. Taste

A gradual decrease in the mean score for taste was noticed in nutribars irrespective of packages during six months of storage (Table 5). Compared to polyethylene packed nutribars better mean score for taste during storage was noticed in nutribars packed in laminated aluminium pouches under vacuum.

At the end of sixth month of storage, among nutribars packed in polyethylene pouches the highest mean score was noticed in T_3 (corn flakes in jaggery honey mix) and the lowest in T_6 (rice flakes and corn flakes in jaggery honey mix). In case of vacuum packed nutribars the highest mean score for taste was recorded in T_3 (corn flakes in jaggery honey mix) and the

lowest in T_8 (wheat flakes and corn flakes in jaggery honey mix).Tarar (2009) observed a general deteriorating trend in texture and taste of products packed in OPP/PP upon storage.

F. Overall acceptability

As in Table 6, the mean score for overall acceptability of nutribars packed in polyethylene and laminated aluminium pouches decreased gradually during six months of storage. Comparatively better mean score for overall acceptability was noticed in nutribars packed in laminated aluminium pouches under vacuum.

The nutribars had mean score above 7.0 in laminated aluminium pouches and in polyethylene pouches at the end of storage. Up to fourth month of storage, nutribars packed in laminated aluminium pouches retained its original qualities than polyethylene packed samples. Later much difference in mean scores for overall acceptability was not noticed with respect to packages. Contrary to the present finding Padhmashree *et al*. (2013) reported that the bars packed in PFP, MP and MP vacuum remained stable and acceptable during the entire storage period of 12 months.

IV. CONCLUSION

The mean scores for different organoleptic qualities of nutribars packed in polyethylene pouches were lower than the nutribars packed in laminated aluminium pouches throughout the storage period. All the sensory parameters namely, appearance, colour, flavour, texture, taste and overall acceptability of the nutribars showed a decline during storage. The nutribars stored in laminated aluminium pouches had mean score above 7.5 for overall acceptability even after sixth month of storage. Based on Kendall's (W) value, the agreement among judges in the sensory evaluation of nutribars was found to be statistically significant.

The nutribars prepared with corn flakes in jaggery and honey mix (T_3) followed by wheat flakes in glucose syrup (T_{12}) were the most acceptable nutribars in both the packages.

Table 1. Mean score for appearance of nutribars during storage

Nutribar base	Treatments	Initial	Storage period											
			Polyethylene pouch						Laminated aluminium pouch (vacuum)					
			1MAS	2MAS	3MAS	4MAS	5MAS	6MAS	1MAS	2MAS	3MAS	4MAS	5MAS	6MAS
JHM	**T_3** – CF	9.0 (4.70)	8.9 (4.70)	8.8 (2.15)	8.7 (4.45)	8.6 (4.40)	8.6 (4.45)	8.5 (4.45)	9.0 (4.73)	8.8 (4.45)	8.8 (4.45)	8.8 (4.45)	8.8 (4.60)	8.7 (4.30)
	T_6 – RF & CF	9.0 (4.70)	8.9 (4.70)	8.8 (4.64)	8.8 (4.75)	8.7 (4.65)	8.6 (3.80)	8.4 (4.45)	8.9 (4.45)	8.8 (4.55)	8.8 (4.75)	8.8 (4.50)	8.8 (4.50)	8.6 (3.90)
	T_8 – WF & CF	8.3 (2.20)	8.3 (2.30)	8.3 (3.41)	8.3 (3.30)	8.2 (2.40)	8.1 (2.10)	7.8 (2.05)	8.3 (2.45)	8.3 (2.55)	8.3 (2.40)	8.2 (2.25)	8.2 (2.30)	8.0 (2.15)
GS	**T_{12}** – WF	8.4 (2.85)	8.4 (1.90)	8.3 (3.23)	8.3 (3.23)	8.2 (2.35)	8.1 (2.35)	7.9 (2.85)	8.4 (2.14)	8.3 (2.35)	8.3 (2.35)	8.3 (2.30)	8.3 (2.70)	8.2 (2.35)
	T_{16} RF & CF	9.0 (4.70)	8.9 (4.60)	8.8 (4.73)	8.8 (4.50)	8.7 (4.45)	8.6 (4.45)	8.3 (4.40)	8.9 (4.70)	8.8 (4.59)	8.8 (4.50)	8.8 (4.60)	8.8 (4.70)	8.7 (4.70)
	T_{20} – CF & OF	8.5 (2.85)	8.4 (2.75)	8.3 (3.05)	8.3 (2.65)	8.2 (2.25)	8.1 (2.15)	8.0 (2.10)	8.4 (2.73)	8.3 (2.59)	8.3 (2.50)	8.3 (2.40)	8.3 (2.75)	8.1 (2.80)
	Kendall's (w) value	**0.715****	**0.636****	**0.513****	**0.483****	**0.418****	**0.316****	**0.364****	**0.585****	**0.490****	**0.562****	**0.465****	**0.360****	**0.438****

Figures in the parenthesis indicate mean rank scores
** - Significant at 1% level CF- Corn flakes RF- Rice flakes WF- Wheat flakes OF- Oat flakes
JHM- Jaggery honey mix GS – Glucose syrup

Table. 2. Mean score for colour of nutribars during storage

Nutribar base	Treatments	Initial	Storage period											
			Polyethylene pouch						Laminated aluminium pouch (vacuum)					
			1MAS	2MAS	3MAS	4MAS	5MAS	6MAS	1MAS	2MAS	3MAS	4MAS	5MAS	6MAS
JHM	T_3 – CF	8.9 (5.60)	8.5 (4.15)	8.2 (3.80)	8.1 (3.50)	8.0 (3.35)	7.9 (3.23)	7.9 (3.23)	8.7 (4.25)	8.5 (4.15)	8.4 (4.05)	8.3 (3.95)	8.2 (3.80)	8.1 (3.50)
	T_6 – RF & CF	8.2 (3.80)	8.1 (3.50)	8.0 (3.35)	8.0 (3.35)	7.9 (3.23)	7.8 (3.05)	7.7 (3.60)	8.1 (3.50)	8.0 (3.35)	8.0 (3.35)	8.0 (3.35)	7.9 (3.23)	7.9 (3.25)
	T_8 – WF & CF	8.0 (3.35)	8.0 (3.35)	8.0 (3.35)	7.9 (3.23)	7.8 (3.05)	7.6 (2.90)	7.4 (2.55)	8.0 (3.35)	8.0 (3.35)	8.0 (3.35)	7.9 (3.23)	7.9 (3.23)	7.6 (2.95)
GS	T_{12} – WF	8.8 (5.30)	8.2 (3.23)	8.0 (3.35)	7.9 (3.23)	7.8 (3.05)	7.7 (2.90)	7.6 (2.90)	8.5 (4.15)	8.4 (4.05)	8.4 (4.05)	8.3 (3.95)	8.2 (3.80)	8.1 (3.50)
	T_{16} RF & CF	8.2 (2.70)	8.2 (3.80)	8.2 (3.80)	8.1 (3.50)	8.1 (3.50)	8.0 (3.35)	7.9 (3.23)	8.2 (3.80)	8.1 (3.50)	8.0 (3.35)	7.9 (3.23)	7.8 (3.05)	7.7 (4.05)
	T_{20} – CF & OF	8.1 (3.50)	8.1 (3.50)	8.0 (3.35)	7.8 (3.05)	7.7 (2.95)	7.7 (2.95)	7.5 (2.70)	8.1 (3.50)	8.0 (3.35)	8.0 (3.35)	8.0 (3.35)	7.9 (3.23)	7.9 (3.23)
	Kendall's (w) value	**0.820****	**0.128****	**0.118****	**0.110****	**0.126****	**0.095****	**0.136****	**0.128****	**0.295****	**0.211****	**0.101****	**0.138****	**0.080****

Figures in the parenthesis indicate mean rank scores
** - Significant at 1% level CF- Corn flakes RF- Rice flakes WF- Wheat flakes OF- Oat flakes
JHM- Jaggery honey mix GS – Glucose syrup

Table 3. Mean score for flavour of nutribars during storage

Nutribar base	Treatments	Initial	Storage period											
			Polyethylene pouch						Laminated aluminium pouch (vacuum)					
			1MAS	2MAS	3MAS	4MAS	5MAS	6MAS	1MAS	2MAS	3MAS	4MAS	5MAS	6MAS
JHM	**T_3** – CF	8.8 (5.40)	8.2 (4.98)	7.8 (3.95)	7.7 (3.85)	7.7 (5.0)	7.4 (3.25)	7.4 (3.25)	8.5 (5.23)	8.3 (5.05)	8.1 (4.65)	8.0 (3.55)	7.8 (3.95)	7.7 (3.85)
	T_6 – RF & CF	8.3 (4.23)	7.7 (3.86)	7.6 (3.73)	7.4 (3.25)	7.3 (3.20)	7.2 (3.15)	7.1 (3.05)	8.4 (3.23)	8.2 (4.98)	8.0 (4.10)	7.9 (4.25)	7.8 (3.95)	7.3 (3.75)
	T_8 – WF & CF	8.1 (4.65)	7.8 (3.95)	7.6 (3.04)	7.3 (3.20)	7.2 (3.15)	7.1 (3.05)	7.0 (2.97)	8.3 (3.23)	8.1 (4.65)	8.0 (3.45)	7.7 (3.85)	7.6 (3.55)	7.4 (2.95)
GS	**T_{12}** – WF	8.5 (5.23)	7.8 (3.95)	7.5 (3.35)	7.4 (3.25)	7.3 (3.20)	7.1 (3.05)	7.0 (2.97)	8.2 (4.98)	7.9 (4.23)	7.9 (4.23)	7.8 (3.95)	7.6 (3.55)	7.6 (3.55)
	T_{16} RF & CF	8.6 (5.32)	7.8 (3.95)	7.7 (3.85)	7.7 (3.85)	7.5 (3.35)	7.3 (3.20)	7.3 (3.25)	8.1 (4.64)	8.0 (3.27)	8.0 (3.50)	7.9 (4.25)	7.8 (3.70)	7.8 (3.75)
	T_{20} – CF & OF	8.5 (5.23)	7.7 (3.85)	7.5 (3.32)	7.5 (3.35)	7.3 (3.20)	7.1 (3.05)	6.9 (2.86)	8.1 (4.65)	7.9 (4.23)	7.9 (4.23)	7.7 (3.85)	7.6 (3.55)	7.5 (3.35)
	Kendall's (w) value	**0.780****	**0.130****	**0.118****	**0.194****	**0.252****	**0.180****	**0.231****	**0.089****	**0.109****	**0.072****	**0.041****	**0.056****	**0.033****

Figures in the parenthesis indicate mean rank scores
** - Significant at 1% level CF- Corn flakes RF- Rice flakes WF- Wheat flakes OF- Oat flakes
JHM- Jaggery honey mix GS – Glucose syrup

Table. 4. Mean score for texture of nutribars during storage

Nutribar base	Treatments	Initial	Storage period											
			Polyethylene pouch						Laminated aluminium pouch (vacuum)					
			1MAS	2MAS	3MAS	4MAS	5MAS	6MAS	1MAS	2MAS	3MAS	4MAS	5MAS	6MAS
JHM	T_3 – CF	8.8 (4.55)	8.5 (4.28)	7.9 (3.45)	7.8 (3.36)	7.7 (3.28)	7.6 (3.14)	7.3 (4.20)	8.5 (4.28)	8.3 (3.85)	8.0 (3.65)	8.0 (3.65)	7.8 (3.36)	7.7 (3.28)
	T_6 – RF & CF	8.5 (4.28)	8.0 (3.60)	7.8 (3.36)	7.5 (2.85)	7.4 (2.80)	7.3 (2.85)	6.9 (2.10)	8.2 (3.73)	8.0 (3.60)	7.9 (3.45)	7.9 (3.60)	7.6 (3.14)	7.5 (2.85)
	T_8 – WF & CF	8.7 (4.50)	8.5 (4.28)	8.3 (3.85)	7.5 (2.95)	7.3 (2.70)	7.3 (2.82)	7.1 (2.60)	8.7 (4.50)	8.6 (3.35)	8.5 (4.28)	8.4 (4.15)	7.7 (3.28)	7.7 (3.28)
GS	T_{12} – WF	8.8 (4.55)	8.4 (4.15)	7.7 (3.28)	7.6 (3.14)	7.5 (2.95)	7.4 (2.90)	7.5 (3.70)	8.6 (4.35)	8.5 (4.28)	8.3 (3.85)	8.2 (3.70)	8.0 (3.60)	7.9 (3.45)
	T_{16} RF & CF	8.8 (4.55)	8.0 (3.60)	7.8 (3.36)	7.7 (3.28)	7.5 (2.95)	7.4 (3.40)	7.4 (3.50)	8.2 (3.73)	8.0 (3.60)	8.0 (3.65)	7.9 (3.45)	7.9 (3.45)	7.8 (3.36)
	T_{20} – CF & OF	8.7 (4.50)	7.9 (3.45)	7.9 (3.45)	7.8 (3.36)	7.7 (3.28)	7.6 (3.15)	7.2 (2.77)	8.5 (4.28)	8.3 (3.85)	8.2 (3.73)	8.0 (3.6)	7.6 (3.14)	7.5 (3.05)
	Kendall's (w) value	**0.970****	**0.077****	**0.044****	**0.218****	**0.153****	**0.108****	**0.152****	**0.036****	**0.068****	**0.240****	**0.154****	**0.079****	**0.141****

Figures in the parenthesis indicate mean rank scores
** - Significant at 1% level CF- Corn flakes RF- Rice flakes WF- Wheat flakes OF- Oat flakes
JHM- Jaggery honey mix GS – Glucose syrup

Table. 5. Mean score for taste of nutribars during storage

Nutribar base	Treatments	Initial	Storage period											
			Polyethylene pouch						Laminated aluminium pouch (vacuum)					
			1MAS	2MAS	3MAS	4MAS	5MAS	6MAS	1MAS	2MAS	3MAS	4MAS	5MAS	6MAS
JHM	T_3 – CF	8.9 (5.35)	8.5 (4.55)	8.0 (3.45)	7.7 (3.25)	7.3 (2.95)	6.9 (3.18)	6.6 (2.70)	8.8 (5.29)	8.5 (4.55)	8.1 (3.50)	7.7 (3.25)	7.3 (2.95)	7.0 (3.75)
	T_6 – RF & CF	8.9 (5.35)	8.4 (4.25)	7.8 (3.34)	7.6 (3.16)	7.0 (2.70)	6.5 (2.95)	6.1 (2.60)	8.6 (4.73)	8.2 (3.54)	7.9 (3.40)	7.8 (3.34)	7.2 (2.84)	6.5 (3.35)
	T_8 – WF & CF	8.6 (4.50)	8.2 (3.55)	7.6 (3.18)	7.5 (3.15)	7.3 (2.95)	6.8 (2.50)	6.4 (2.20)	8.5 (4.55)	8.3 (3.95)	8.0 (3.45)	7.5 (3.15)	7.0 (3.75)	6.7 (3.44)
GS	T_{12} – WF	8.0 (3.45)	7.8 (3.34)	7.6 (3.18)	7.3 (2.95)	7.1 (2.75)	6.7 (3.45)	6.5 (2.35)	8.0 (3.45)	7.9 (3.40)	7.8 (3.34)	7.4 (3.05)	7.2 (2.84)	6.8 (2.50)
	T_{16} RF & CF	8.8 (5.29)	8.4 (4.25)	7.7 (3.25)	7.7 (3.05)	7.2 (2.84)	6.6 (2.70)	6.6 (2.70)	8.6 (4.73)	8.5 (4.55)	8.3 (3.95)	7.9 (3.40)	7.5 (3.15)	6.9 (3.65)
	T_{20} – CF & OF	8.9 (5.35)	8.3 (3.95)	7.9 (3.40)	7.4 (3.05)	6.9 (3.30)	6.4 (3.18)	6.2 (2.10)	8.5 (4.55)	8.0 (3.45)	7.6 (3.18)	7.2 (2.84)	6.7 (3.44)	6.6 (2.70)
	Kendall's (w) value	**0.946****	**0.107****	**0.239****	**0.483****	**0.334****	**0.216****	**0.130****	**0.158****	**0.090****	**0.562****	**0.070****	**0.018****	**0.046****

Figures in the parenthesis indicate mean rank scores
** - Significant at 1% level CF- Corn flakes RF- Rice flakes WF- Wheat flakes OF- Oat flakes
JHM- Jaggery honey mix GS – Glucose syrup

Table. 6. Mean score for overall acceptability of nutribars during storage

Nutribar base	Treatments	Initial	Storage period											
			Polyethylene pouch						Laminated aluminium pouch (vacuum)					
			1MAS	2MAS	3MAS	4MAS	5MAS	6MAS	1MAS	2MAS	3MAS	4MAS	5MAS	6MAS
JHM	**T_3** – CF	8.9 (4.55)	8.3 (3.96)	8.0 (3.80)	7.8 (3.65)	7.7 (3.30)	7.6 (3.25)	7.5 (3.05)	8.7 (4.36)	8.4 (4.21)	8.1 (3.90)	8.0 (3.80)	7.9 (3.75)	7.9 (3.75)
	T_6 – RF & CF	8.6 (4.30)	8.2 (3.92)	8.0 (3.80)	7.9 (3.75)	7.7 (3.30)	7.5 (3.05)	7.4 (2.95)	8.4 (4.21)	8.3 (3.93)	8.0 (3.80)	7.8 (3.65)	7.7 (3.30)	7.7 (3.30)
	T_8 – WF & CF	8.8 (4.45)	7.9 (3.95)	7.7 (3.30)	7.6 (3.05)	7.5 (3.05)	7.3 (2.55)	7.2 (2.30)	8.5 (4.25)	8.3 (3.93)	8.1 (3.90)	8.0 (3.80)	7.9 (3.75)	7.7 (3.30)
GS	**T_{12}** – WF	8.8 (4.45)	8.3 (3.95)	8.0 (3.80)	7.8 (3.65)	7.6 (3.25)	7.5 (3.05)	7.4 (2.65)	8.4 (4.21)	8.4 (4.21)	8.2 (3.92)	8.0 (3.80)	7.9 (3.65)	7.8 (3.65)
	T_{16} RF & CF	8.2 (3.85)	8.0 (3.80)	7.9 (3.75)	7.8 (3.65)	7.7 (3.30)	7.5 (3.05)	7.4 (2.95)	8.2 (3.95)	8.2 (3.92)	8.1 (3.90)	8.0 (3.80)	7.8 (3.65)	7.8 (3.65)
	T_{20} – CF & OF	8.5 (4.25)	8.0 (3.80)	7.8 (3.65)	7.7 (3.30)	7.6 (3.25)	7.4 (2.65)	7.4 (2.65)	8.2 (3.95)	8.1 (3.90)	8.0 (3.80)	7.8 (3.65)	7.8 (3.65)	7.6 (3.25)
	Kendall's (w) value	**0.397****	**0.055****	**0.123****	**0.257****	**0.215****	**0.084****	**0.105****	**0.113****	**0.218****	**0.407****	**0.278****	**0.153****	**0.116****

Figures in the parenthesis indicate mean rank scores

** - Significant at 1% level CF- Corn flakes RF- Rice flakes WF- Wheat flakes OF- Oat flakes

JHM- Jaggery honey mix GS – Glucose syrup

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