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## Consumer Acceptance of Standardized Mixed/Composite Foods for Optimal Accuracy in Nutrient Estimation

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**Abstract:** This study was conducted to develop standardized mixed composite foods for assessing consumer acceptance and for achieving optimal accuracy in nutrient estimation of Pakistani meals. Since, it was a pilot study only two composite foods Dal maash (*Phaseolus Radiata*) and Tori Bujia (*Luffa Segyptice*) were selected. Nine recipes were selected from a recipe pool. Three different recipes for each composite food were prepared and evaluated by the Preference Evaluators (PE) for consumer acceptability. The composite food with the Highest Preference Score (HPS) was selected and subjected to the process of standardization. Both the mixed/composite foods were prepared and assessed on nine point Hedonic scale for consumer acceptability by sensory evaluation. Standardized recipes of both Dal maash and Tori Bujia scored highest points with mean values ranging from 8.0-8.8 for three attributes of sensory evaluation taste, texture and color with LSD = 0.30. The Nutritional assessment of the two standardized composite foods was calculated using Pakistani Food Tables (2001) and values were compared with the values of food items (cooked or raw) given the national food tables. The study concluded that nutritional composition of standardized composite food (Tori Bujia) differed remarkably from those presented as raw edible food part reflected in the Pakistani Food Composition Tables as the recipes are either not included in these food tables or have limitation for not being standardized.

**Key words:** Formula/recipe standardization, sensory evaluation, Pakistani meals, composite food

### INTRODUCTION

A Pakistani diet is based on mixed/composite foods. All traditional Pakistani foods involve combining two or more food items from different food groups in varying proportions. e.g., Aloo Ghost which is a savory item, includes onions and tomatoes belonging to the vegetable group, oil (fat group); meat (ghost) belonging to the meat and its substitutes group and potatoes (aloo) which is placed in the cereals and starchy vegetables group.

Previously, composite food was referred to as a mixture of one or more products of animal origin and other edible material intended for human consumption and may and may not be cooked or processed e.g., cookie dough, cake mixes etc. The Euro FIR refers to mixed food as ethnic or modified ethnic food associated with the traditional dietary practices of immigrants in the light of their cultural background and religious beliefs that are different from the host country. (Hamid and Sarwar, 2004). Today, composite food describes the design of those mixed foods that involve processing and cooking of two or more food items selected from different food groups in varying proportions, processed and cooked under different temperatures and durations to give the finished product a particular character.

Misinterpreting composite mixed foods as a single food item is one of the common mistake Dietitians and

Nutritionist make in Pakistan and perhaps all over the world.

The term food, usually refers to a single food item belonging to a particular food group and may misrepresent a mixed/composite food, while diet usually indicates the pattern of food consumption and meal is the combination of various food courses served at a particular time. The term dish either refers to a specific type of food (not specific for composite/mixed food) or is used to describe the serving utensil or bowl rather than the food itself.

The purpose of the present study was to standardize mixed/composite Pakistani foods for consumer acceptance by sensory evaluation so as to bring precision in the nutrient estimation of Pakistani recipes as they are not available in the food composition tables as earlier reported by Vyas *et al.* (2003) which in turn is required in many epidemiological studies where the nutrient intake has to be assessed.

Due to limitations of time and resources the study was limited to a single day's menu and only 2 composite foods namely dal maash (*Phaseolus Radiata*) and Tori Bujia (*Luffa Segyptice*) were standardized.

### MATERIALS AND METHODS

The experimental study of formula standardization of two composite/mixed foods was carried out at the food

laboratory of the College of Home Economics Lahore, Pakistan. A lunch menu selected from The National Food Based Dietary Guidelines, 2006, was slightly modified in accordance with the seasonal availability of vegetables.

**Test procedure:** Initially the recipes were selected from a recipe pool of internet and cookbooks and subjected to preference test. Vaclavik and Christian (2005). Five Preference Evaluators (PE) were randomly selected from postgraduate students of food and nutrition. Preference was measured by comparing three different recipes with each other i.e., which one of the recipe was preferred. The three recipes were prepared and coded A, B, C. The PE was asked to circle the preferred recipe. The recipe which rated the Highest Preference Score (HPS) was selected as the basic recipe and was subjected to the process of regularity for acceptability.

**Selection of Food Acceptability Assessors (FAA):** The assessors were recruited after determining their health conditions, availability and willingness to take part in the study as a sensorial panel. The FAA were instructed to evaluate the prepared dish (Test 1) and assess them in global terms (taste, texture and color). Changes in the recipe were made in accordance with the suggestions of the FAA and the modified dish was presented as Test 2. The same procedure of sensory evaluation and modification was followed as Test 3 for the most acceptable recipe.

**Consumer acceptability:** Sensory evaluation for taste, color and texture was conducted based on the following hedonic scale: 9 = excellent, most acceptable; 7-8 = very good, acceptable; 5-6 = fair, limited acceptability; 1-4 = non acceptable. The scale was adapted from Gorny *et al.*, 2000.

**Statistical analysis:** The results obtained with the hedonic scale for sensory evaluation, were treated for multiple comparison by analysis of variance (one-way ANOVA) with Least Significant Difference (LSD) between means determined at 5% level (Gorny *et al.*, 2000).

**Nutritional evaluation:** The nutritional composition of the serving and portion size was evaluated by the use of Nutritional Composition Tables for Pakistan, 2001.

## RESULTS

Test 1 depicts the original recipe for dal maash with a mean range 7.0-7.6 for all three attributes while Tori Bhujia shows a mean range of 6.2-7.4. The recipes were modified in accordance with the suggestions of the FAA in Test. 2. [oil was reduced for both the recipes i.e. from ¼ cup-3 tbsp. for Dal Maash and ½ - ¼ cup for Tori Bhujia; tumeric was cut down to ¼ tsp. from ½ tsp. for Dal Maash; while the weight of the onions was reduced

Table 1: Sensory evaluation of experiments for recipe standardization

	Test 1		Test 2		Test 3	
	Mean	SD	Mean	SD	Mean	SD
<b>Dal Maash</b>						
Taste	7.6 <sup>b</sup>	0.5	7.6 <sup>b</sup>	0.5	8.6 <sup>a</sup>	0.5
Texture	7.0 <sup>b</sup>	0.7	7.4 <sup>b</sup>	0.8	8.4 <sup>a</sup>	0.5
Color	7.4 <sup>b</sup>	0.5	8.2 <sup>a</sup>	0.4	8.6 <sup>a</sup>	0.5
<b>Tori Bhujia</b>						
Taste	6.2 <sup>b</sup>	0.8	6.6 <sup>b</sup>	0.5	8.0 <sup>a</sup>	0.0
Texture	7.4 <sup>b</sup>	0.8	7.6 <sup>b</sup>	0.5	8.8 <sup>a</sup>	0.4

LSD = 0.30; Mean values in the same row with the same letter show non significant difference; Different letter show significant difference are non significantly different

from 160 grams (2 medium) to 120 g (120 g) for Tori Bhujia]. The suggestions of the FAA for Test 2 were incorporated in the recipe prepared as Test 3. [oil was reduced to 1 tbsp. and tumeric was reduced to 1/8 tsp. for dal maash; and for tori bhujia oil was further reduced to 1 tbsp]. The application of Least Significant Difference (LSD) for Dal Maash revealed that the recipe prepared as Test 3 was most acceptable as compared to Test 1 and Test 2 for all three attributes of taste, texture and color. Similar results were obtained for Tori Bhujia. (Table 1 depicts letter b for all attributes of Test 1 and letter a for all attributes of Test 3).

The above table clearly indicates the difference in the nutritive composition of edible portion/100 g of Dal Maash (*Phaseolus Radiatus*) and Tori Bhujia (*Luffa Segyptica*) as depicted in the Food Composition Tables of Pakistan 2001 and the standardized recipe of cooked Dal Maash and Tori Bhujia.

## DISCUSSION

This is a base-line study which was carried out in an attempt to address the question of formula standardization of complex food dishes of Pakistani diet for optimal accuracy in nutrient estimation. Standardization of recipes is important as the nutritional composition of many composite foods which make up a Pakistani diet are not available in the food composition tables (Vyas *et al.*, 2003). This study helps to address the importance of recipe standardization for composite foods in order to achieve optimal accuracy in determining the nutrient estimation by using food composition tables. Such nutrient estimation is imperative in many epidemiological studies where, the nutrient intake has to be assessed.

Table 2 clearly illustrates that the Nutritional composition of cooked Dal Maash (*phaseolus radiatus*) as depicted in the Food Composition Tables of Pakistan 2001, was 18.8k calories less than the composite Dal Maash. The difference could be due to the element that the cooked Dal Maash in the Food Composition Tables of Pakistan 2001 probably referred to the boiled Dal and not the composite Dal Maash. This assumption is supported by

Table 2: Nutrient variation in individual food and composite food.

Nut. Comp.	Individual food	Composite food
Weight	100 g edible portion	100 g cooked portion
<b>Dal Maash</b>		
CHO (gms)	22.5	26.5
Protein (gms)	10.6	9.6
Fat (gms)	01.0	3.6
Energy (kcal)	158.0	176.8
<b>Tori Bhutia</b>		
CHO (gms)	04.0	15.2
Protein (gms)	01.0	3.2
Fat (gms)	00.2	6.4
Energy (kcal)	18.0	131.2

Food Composition Tables of Pakistan (2001)

the fact that the composite Dal Maash contains 3.6 g fat/100 g dal as compared to 1.0 gram fat in Dal Maash as individual food.

Similar results were seen when the composite Tori Bhujia (*Luffa Segyptice*) was assessed for its nutritional value. One hundred grams of composite Tori Bhujia provided 131 kcal, 15.2 g CHO; 3.2 g protein and 6.4 g of fat. The Food Composition Tables of Pakistan 2001, enlists only the nutritional composition of edible (raw) portion, where, 100 g of raw vegetable yields 18 kcal, 4 g CHO; 1 g protein and 0.2 g fat. Compared with the composite Tori Bhujia cooked in the traditional way yields 15.2 g carbohydrate, 3.2 g protein, 6.4 g fat with 131k calories. The difference in the nutritional composition can be attributed to the addition of onions (48 g), tomatoes (60 g) and cooking oil (1 teaspoon) which has attributes to the higher nutritive value of the composite Tori Bhujia.

**Conclusion:** The study has shown that sensory evaluation is a useful tool to achieve consumer acceptability for recipe standardization of composite foods.

This study further highlighted the fact that there is a difference between the nutritional composition of the edible portion of foods enlisted in The Food Composition Table of Pakistan (2001) and mixed composite foods of Pakistan standardized on scientific basis and translated with consumer acceptance.

These standardized recipes of traditional Pakistani composite foods are most helpful were there is a need to draw out recommended servings for dietary recommendations.

However, this baseline study laid the foundation for further research for developing standardized recipes of highly complex composite food of Pakistani Asian diet like haleem, Palao, biryanis etc.

**Recommendations:** Standardized recipes of different composite foods should be developed along with the nutritional composition and serving size so as to facilitate its incorporation in the Dietary Guidelines.

Consumer Acceptability Panel should belong to different socio-economic groups with different cultural backgrounds so that the data is representative nationally. The consumption data should be validated by chemical analysis.

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