Original Article

Standardizing the Essence of Pakistani Gastronomy: Traditional Cereal and Vegetable-Based Dishes in Focus

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Abstract: Background: Traditional Pakistani dishes have the ability to captivate the taste buds of their consumers through their unique and intricate blend of spices. Despite their popularity, the recipes of these dishes are not standardized which often leads to difficulties in the estimation of their macronutrient content. This study aimed to identify and standardize commonly consumed cereal and vegetable-based Pakistani dishes. **Methods:** The study was mixed-methods exploratory research that was carried out in two phases. The first phase dealt with the identification of traditional dishes through the conduction of focus groups (n=27) across Lahore, whereas the second phase involved the quantification of ingredients, recipe standardization and consumer acceptability for the identified dishes (n=33). **Results:** Statistical analysis showed that the three trials for all the prepared dishes showed no significant difference (p-value > 0.05) for the sensory attributes. The findings from sensory evaluation by both trained and untrained panelists also revealed high overall acceptability for the standardized recipes. **Conclusion:** This study can aid local as well as foreign dietitians, nutritionists and health-care professionals to develop culturally sensitive meal plans and dietary interventions while dealing with the local and immigrant Pakistani communities. It can also serve as a valuable resource for epidemiological studies focused on understanding the relationship between diet, health, and disease within the Pakistani population.

Keywords: Traditional Pakistani dishes, one-pot dishes, cereal-based dishes, vegetable-based dishes, quantification of ingredients, standardization of recipes.

1. Introduction

Food is not only a source of nutrients, but also has the power to overcome cultural and geographical barriers, as it serves to express cultural identity, preserve cultural heritage, promote cross-cultural understanding and facilitate social cohesion. The relationship between food and culture is diverse and complicated because the methods of preparation and consumption of food are central to the cultural identities of individuals (Wijaya, 2019). The food industry has experienced significant modernization, globalization, and commercialization, leading to shifts in consumer preferences away from local cuisines. This trend emphasizes on the urgent need to document and standardize traditional recipes in order to preserve them (Joan, 2014).

The culinary cuisine of the country is a perfect blend of aromatic spices and unique preparation techniques that give their dishes a plethora of complex flavors (Khan and Haq, 2014). Traditional Pakistani dishes are typically one-pot dishes that involve the cooking of two or more food items from different food groups in varying proportions (Khan, 2017). This study focuses on identifying and standardizing recipes for commonly consumed cereal and vegetable-based Pakistani dishes. Mixed Sabzi Pulao (mixed vegetables rice), Channa Pulao (chickpeas and rice), Daal Chawwal (lentils and rice) and Mattar Pulao (peas and rice) are a combination of rice (cereal group) with starchy vegetables (vegetables group) or legumes/lentils (meat group), whereas dishes such as Aloo Gosht (potato and mutton gravy), Aloo Qeema (potato and mutton mince), Bhindi Gosht (okra and mutton curry), Shaljam Gosh (turnip and mutton curry), Kaddu Gosht (bottle gourd and mutton gravy) and Karelay Gosht (bitter gourd and mutton gravy) are a combination of the vegetable group paired with the meat group (Soomro, et al., 2016).

Modernization of preparation methods and lack of documentation of recipes for traditional dishes has resulted in the loss of their authentic taste and flavor over the decades (Awogbenja et al., 2021). The cultural and ethnic diversity across provinces of Pakistan has resulted in variations among traditional recipes. With the country's culinary culture and cuisine continually evolving, there is an urgent need to standardize the recipes for traditional dishes in attempts to safeguard the cultural identity and heritage of the (Khan and Haq, 2014).

Standardizing recipes for traditional dishes will ensure consistency in the ingredients and cooking techniques used to prepare them while maintaining the same unique flavor and taste each time they are prepared, regardless of who is making them or where they are being prepared (Al-Faris and Abdullah, 2018). This study aims to identify and catalogue standardized recipes for commonly consumed cereal and vegetable-based Pakistani dishes. The data from this study will guide local and foreign dietitians, nutritionists, and healthcare professionals in developing culturally sensitive meal plans for local and immigrant Pakistani communities. Moreover, patients with chronic health conditions can also benefit from it as they can customize their diets with a diverse range of culturally sensitive, healthy, and nutrient-balanced food choices.

2. Materials and Methods

Mixed-methods research design was used to address the objectives of the study as it incorporates both qualitative and quantitative aspects in a single study (Almalki, 2016). The study was carried out in two phases; first phase dealt with the identification of commonly consumed cereal and vegetable-based Pakistani dishes along with their recipes while the second phase quantified the recipe ingredients and standardized the recipes for these dishes.

2.1 Phase I

2.1.1 Sample Size

The study was conducted in Lahore, which is recognized as a prominent culinary hub in the country. The sample size calculation for the study was done by using statistics from the UN population projection, through which the population of Lahore was estimated to be around 13,542,000 individuals in 2022 (United Nations Population Fund, 2022).

Total number of households was calculated using the following formula:

Total Number of Households = Total Population of Lahore/Average Household Size

Sample size for the study was calculated using the following formula:

$$\textbf{Sample Size (n)} = \frac{NZ2\ (1-p)}{e2N + Z2\ (1-P)}$$

Assumption of a 10% non-response rate was made during calculation of sample size. The number of households in each union council was calculated using the following formula:

Number of Households = Total number of sample size/ Selected number of UC

A simple random sampling technique was utilized for the selection of the primary and basic sampling units (Bhardwaj, 2019). Three union councils from each administrative zone formed the primary sampling unit. Later on, 16 households were randomly selected from each union council through the Lady Health Worker's which formed the basic sampling unit for the study. In this way, a total of 423 households were selected for participation in the focus group discussions, which was deemed an appropriate size to gather information about the commonly consumed cereal and vegetable-based Pakistani dishes.

A total of 27 focus groups were conducted in a time span of three months, from 23rd September, 2022 to 16th November, 2022. Each focus group started at the designated time with a brief description of the research objectives. Strict measures were taken to protect the confidentiality of each participant (Guest et al., 2017). All questions were phrased in a simple and easy-to-understand way. Each participant was given a chance to present their opinions and viewpoints without judgment from the researcher or other participants. At the end of each discussion, participants were thanked for their cooperation and provided the contact number of the researcher if they were interested in finding out the end results of the research.

The data collected was analyzed through both constant comparison analysis and classical content analysis (Kumari et al., 2021). Themes and sub-themes were obtained through constant comparison analysis, which helped in the determination of recipes for commonly

consumed cereal and vegetable-based traditional dishes. Classical content analysis was used to determine the frequencies and relative frequencies of the commonly consumed cereal and vegetable-based traditional dishes. The analysis of frequencies, percentages and relative percentages was done through SPSS 22. The following formulas were used during this step:

Frequency = Number of times a traditional dish is mentioned by each participant

$$\text{Relative Frequency} = \frac{\text{Frequency of Each Traditional Dish}}{\text{Total Number of Participants}}$$

$$\%\ \text{Relative Frequency} = \frac{\text{Frequency of Each Traditional Dish} \times 100}{\text{Total Number of Participants}}$$

2.2 Phase II

2.2.1 Quantification of Recipes

The recipes obtained through the focus groups were averaged and noted down in both kitchen measures such as spoons and cups and standard measures such as grams and kilograms to prevent errors during the process of recipe standardization.

2.2.2 Standardization of Recipes

Standardization of recipes for cereal and vegetable-based traditional dishes was carried out at the Food Science Laboratory in Kinnaird College for Women, Lahore. A total of 99 experiments were carried out from 14th December, 2022 to 28th February 2023, spanning a time period of three months. Each recipe was prepared three times to complete the process of recipe standardization (Bassey et al., 2020).

2.2.3 Consumer Acceptability of Dishes

A controlled environment was created in the Sensory Evaluation Laboratory at Kinnaird College for Women, Lahore to determine consumer acceptability of the standardized traditional dishes. 9-point hedonic scale was used 1 was regarded as extremely undesirable and 9 was regarded as extremely desirable. Similar protocols have been previously followed for the consumer acceptability testing of traditional meat-based products in Spain (Ruiz-Capillas et al., 2021).

2.2.4 Data Analysis Methods

Data of the specific sensory descriptors used for cereal and vegetable-based dishes was entered into SPSS for the descriptive rating scales. These values were then averaged and used to determine the means and standard deviations for the dishes. Lastly, one-way ANOVA helped in the determination of non-significant differences through the generation of the significance values. For the hedonic scale, data for the sensory variables was entered into SPSS, from which the mean hedonic scores and percentage consumer acceptability for the cereal and vegetable-based traditional dishes were determined. The study analyzed data from World Values Survey (WVS) Pakistan 2018 using 1750 cases of population aged 18 – 85 years of which 931 were males and 819 were females. The complete details of WVS Pakistan 2018 including detailed methods, sampling design, and datasets can be found elsewhere (Haerpfer et al., 2022). The data is publicly available to be used by researchers so no ethical approval was required.

3. Results

Focus groups provided an avenue to not only identify the commonly consumed cereal and vegetable-based Pakistani dishes but also to dwell on their intake patterns, factors influencing intake and basic recipes. Constant comparison analysis method was used to draw out initial and focused codes from the transcripts of these discussions, which were later categorized into major themes and sub-themes.

Table 1: Themes & Subthemes from Focus Group Discussions (n=27)

Research Questions	Identified Themes and Subthemes
Research Question #1: What are the traditional Pakistani dishes that are usually cooked at your home?	***Theme # 1: Composition of Identified Dishes*** Pakistani culinary culture mirrors the unique flavors and tastes of a multitude of different cultures. "Composition of Identified Dishes" was further translated into the sub-themes of "Starchy Vegetable Dishes", "Non-Starchy Vegetable Dishes" and "Rice Dishes".
	Theme # 2: Variations in Traditional Dishes Preparation of traditional dishes is influenced by a wide range of different factors. "Variations in Traditional Dishes" was further translated into the subthemes of "Seasonal Variations", "Guests Variations", "Health Conditions Variations", "Festivity Variations", "After Marriage Variations" and "Weekend/Weekdays Variations".
Research Question #2: What are the factors that influence meal preparations at your household?	***Theme # 1: Family Composition*** Home environment influences the food habits of individuals. "Family Composition" was further translated into the sub-themes of "Family Hierarchy" and "Likes & Dislikes of Family".
	Theme # 2: Convenience Convenience plays a significant role in shaping the food preferences of individuals as people often choose food options that are quick and easy to prepare. "Convenience" was further translated into the sub-themes of "Time Availability" and "Employment Status of the Participants".
	Theme # 3: Eating Preferences Consumption of traditional dishes heavily relies on the eating preferences of individuals and their family members. "Eating Preferences" was further translated into the sub-themes of "Preference for Vegetables" and "Preference for Meat".
	Theme # 4: Environmental Variables Pakistan is currently facing an economic crisis of inflation, gas load shedding and lack of food accessibility that has severely impacted the preparation and consumption of traditional dishes. "Environmental Variables" was further translated into the sub-themes of "Economic Status of the Family", "Gas Load shedding" and "Food Accessibility".
Research Question # 3: What are the basic recipes and cooking methods used in your household to cook combination dishes?	***Themes # 1: Basic Recipes*** Typically, Pakistani meals comprise of a main dish that is accompanied by a side of either roti or rice. "Basic Recipes" was translated into the subthemes of "Rice-Based Dishes" and "Vegetable-Based Dishes".
	Theme # 2: Cooking Methods Traditional cooking methods allow increased infusion of aroma, taste and flavor into the prepared dishes. "Cooking Methods" was further translated into the sub-themes of "Bhunnayi (stir frying)" and "Pressure Cooking".
	Theme # 3: One Pot-Dishes Pakistani traditional foods are notable due to their unique combinations of spices and base ingredients, which tantalize the taste buds of the consumers "One-Pot Dishes" was further translated into the subthemes of "Variety", "Uniqueness" and "Complete Meals".

Identification of the commonly consumed cereal and vegetable based traditional dishes (Table 2) was done through focus groups. Frequency of consumption, relative frequency and percentage frequency for all the identified dishes were obtained through classical content analysis. Only dishes with a percentage frequency above 60% were selected for quantification and standardization. Among the 62 traditional dishes that were identified, Chicken Biryani

(chicken and rice) was the most frequently consumed dish among the participants, with a frequency of 95%. This was followed closely by Tarke Wale Chawwal (tempered rice) (93%), Bhindi (Okra) (85%), Mattar Pulao (83%), Aloo Anday (egg and potato curry) (83%) and Ghiyya (bottle gourd) (82%). Makhanay (fox nuts) was identified as the least consumed dish among the participants with a frequency of 10%.

Table 2: Frequency of Commonly Consumed Cereal and Vegetable Based Dishes

S/r	Commonly Consumed Traditional Dishes	Frequency of Dishes (n=423)	Relative Frequency of Dishes	Frequently Consumed Dishes (%)
1	Aloo Anday (egg and potato curry)	350	0.83	83%*
2	Aloo Baingan (potato and eggplant curry)	324	0.77	77%*
3	Aloo Bhujia (potato curry)	341	0.81	81%*
4	Aloo Gajjar (potato and carrot curry)	337	0.8	80%*
5	Aloo Gobhi (potato and cauliflower curry)	274	0.65	65%*
6	Aloo Gosht (potato and meat curry)	341	0.81	81%*
7	Aloo Kachnar (potato and bauhinia variegate curry)	164	0.39	39%
8	Aloo Kulfa (potato and purslane curry)	164	0.39	39%
9	Aloo Mattar (potato and pea curry)	333	0.79	79%*
10	Aloo Meethi (potato and fenugreek curry)	312	0.74	74%*
11	Aloo Mooli (potato and radish curry)	143	0.34	34%
12	Aloo Moongray (potato and radish pods curry)	270	0.64	64%*
13	Aloo Palaak (potato and spinach curry)	177	0.42	42%
14	Aloo Qeema (potato and minced meat)	316	0.75	75%*
15	Aloo Shimla Mirch (potato and capsicum curry)	135	0.32	32%
16	Arbi Baingan (taro and eggplant curry)	261	0.62	62%*
17	Arbi Bhujia (taro curry)	236	0.56	56%
18	Arbi Gosht (taro and meat curry)	223	0.53	53%
19	Baingan Bharta (eggplant curry)	269	0.64	64%*
20	Beef Biryani (beef and rice)	189	0.45	45%
21	Beef Pulao (beef and rice cooked in beef broth)	177	0.42	42%
22	Bhindi (okra)	358	0.85	85%*
23	Bhindi Gosht (okra and meat curry)	307	0.73	73%*
24	Channa Pulao (chickpeas and rice)	324	0.77	77%*
25	Chicken Biryani (chicken and rice)	400	0.95	95%*
26	Chicken Pulao (chicken and rice cooked in chicken broth)	328	0.78	78%*
27	Fish Biryani (fish and rice)	67	0.16	16%
28	Ghiyya (bottle gourd)	345	0.82	82%*
29	Ghiyya Gosht (bottle gourd and mutton curry)	312	0.74	74%*
30	Gobhi (cauliflower)	312	0.74	74%*
31	Kachnar Gosht (meat and bauhinia variegate curry)	189	0.45	45%
32	Karelay (bitter gourd)	324	0.77	77%*

33	Karelay Gosht (bitter gourd and meat curry)	299	0.71	71%*
34	Karelay Qeema (bitter gourd and minced meat)	240	0.57	57%
35	Kichdi (lentils and rice cooked together)	244	0.58	58%
36	Kulfa Gosht (meat and purslane curry)	131	0.31	31%
37	Kulfa Qeema (purslane and minced meat)	105	0.25	25%
38	Lauki Shaljam (bottle gourd and turnip curry)	67	0.16	16%
39	Makhanay (fox nuts)	42	0.1	10%
40	Makhanay Gosht (fox nuts and meat curry)	51	0.12	12%
41	Mattar Pulao (peas and rice)	349	0.83	83%*
42	Mattar Qeema (peas and minced meat)	248	0.59	59%
43	Meethi Gosht (fenugreek and meat curry)	240	0.57	57%
44	Mixed Sabzi (mixed vegetables comprising of potatoes, carrots, peas, cauliflower and fenugreek)	337	0.8	80%*
45	Mixed Sabzi Pulao (potatoes, carrots and peas in rice)	320	0.76	76%*
46	Mooli (radish)	206	0.49	49%
47	Moongray (radish pods)	126	0.3	30%
48	Mongray Aloo Mattar (radish pods, potato and pea curry)	202	0.48	48%
49	Moongray Gosht (radish pods and mutton curry)	248	0.59	59%
50	Mutton Biryani (mutton and rice)	160	0.38	38%
51	Mutton Pulao (mutton and rice cooked in mutton broth)	189	0.45	45%
52	Palaak Paneer (spinach and cottage cheese curry)	88	0.21	21%
53	Palak Gosht (spinach and meat curry)	282	0.67	67%*
54	Saag Gosht (mustard leaves and meat curry)	274	0.65	65%*
55	Saag Makhni (mustard leaves and butter)	299	0.71	71%*
56	Shaljam Gosht (turnip and meat curry)	253	0.6	60%*
57	Shimla Mirch Qeema (capsicum and minced meat)	236	0.56	56%
58	Tarke Wale Chawwal (tempered rice)	392	0.93	93%*
59	Tinday (apple gourd)	307	0.73	73%*
60	Tinday Gosht (apple gourd and meat curry)	286	0.68	68%*
61	Tori (ridge gourd)	295	0.70	70%*
62	Tori Gosht (ridge gourd and meat curry)	227	0.54	54%

**represents the identified dishes that have been selected for recipe standardization*

Standardization of recipes for commonly consumed cereal and vegetable-based traditional dishes was carried out at the Food Laboratory in Kinnaird College for Women, Lahore. All prepared dishes were evaluated by a sensory panel comprising trained panelists from Kinnaird

College for Women, Lahore. Sensory evaluation was done using a descriptive rating scale, focusing on the five major attributes of appearance, aroma, taste, texture and flavor along with the overall acceptability of each traditional dish. The significance values for all sensory attributes of the selected dishes (Table 3) were higher than the p-value, which indicated that there was no significant difference between the three trials.

Table 3: Significance Values for Standardization of Traditional Dishes

Traditional Pakistani Dishes	Significance Values for Standardization of Cereal and Vegetable Dishes					
	Aroma	**Appearance**	**Flavor**	**Taste**	**Texture**	**Overall Acceptability**
Aloo Anday	.968	1.000	.775	.939	.968	.821
Aloo Baingan	.939	.963	.848	.783	.939	.916
Aloo Bhujia	.751	1.000	.912	.926	.968	.905
Aloo Gajjar	.944	.880	1.000	.939	.850	1.000
Aloo Gobhi	.950	.894	.642	.902	.968	1.000
Aloo Gosht	.751	.977	1.000	.958	.882	1.000
Aloo Mattar	.780	.976	.809	.792	.739	.943
Aloo Meethi	.868	.972	1.000	.690	.729	.928
Aloo Moongray	1.000	.869	1.000	.961	.773	.881
Aloo Qeema	.858	.724	1.000	.969	.875	.912
Arbi Baingan	.936	.971	.767	1.000	.977	.936
Baingan Bharta	.951	.874	.702	1.000	.723	.776
Bhindi	.840	.850	.785	.976	.773	1.000
Bhindi Gosht	.926	.733	.685	.734	.682	.764
Channa Pulao	1.000	.755	1.000	1.000	.764	.862
Chicken Biryani	1.000	.795	1.000	1.000	.898	.948
Chicken Pulao	1.000	.939	.880	1.000	.834	1.000
Ghiyya	.766	.997	.809	.970	.745	.876
Ghiyya Gosht	.923	.961	.801	.785	.743	.767
Gobhi	.754	.785	.785	.902	.775	.710
Karelay	.957	.925	.929	.742	.979	.802
Karelay Gosht	1.000	.960	.951	.834	1.000	.915
Mattar Pulao	1.000	.908	1.000	1.000	.747	.969
Mixed Sabzi	1.000	.849	.929	.880	.719	.848
Mixed Sabzi Pulao	.961	.854	.931	1.000	.988	.886
Palaak Gosht	.945	.974	.848	.735	.920	.936
Saag Gosht	.916	.748	.831	.888	.889	.922
Saag Makhni	.960	.987	.924	.932	.888	.930
Shaljam Gosht	.783	.935	.924	.790	.790	.936
Tarke Wale Chawwal	.890	.983	.933	.982	.969	1.000
Tinday	.721	.708	1.000	.806	.726	.911
Tinday Gosht	.785	.725	1.000	.750	.853	.883
Tori	.793	.979	.936	.952	.751	.916

Consumer acceptability testing was conducted for the commonly consumed cereal and vegetable based traditional dishes in the Food Laboratory at Kinnaird College for Women, Lahore. The hedonic scale focused on the five major sensory attributes of aroma, appearance, flavor, taste and texture along with overall acceptability. The results of consumer acceptability for all the sensory attributes of traditional dishes have also been provided respectively. Table 4 presents the data for frequency of hedonic responses, mean scores of hedonic responses, total mean hedonic scores and percentage consumer acceptability for the commonly consumed cereal and vegetable based Pakistani dishes. All the dishes had a hedonic score above 5 which indicated high consumer acceptability. Saag Makhni (mustard leaves and butter) had the highest mean hedonic score (8.05) and Shaljam Gosht had the lowest mean hedonic score (7.29) in terms of overall acceptability.

Table 4: Overall Consumer Acceptability for Traditional Pakistani Dishes

Traditional Pakistani Dishes	N	Mean Consumer Score of Hedonic Responses										Total Mean Hedonic Score	% Consumer Acceptability
		5	6	7	8	9	5	6	7	8	9		
Aloo Anday	35	01	07	09	10	08	0.14	1.20	1.80	2.28	2.05	7.50	83.20%
Aloo Baingan	36	01	08	07	10	10	0.14	1.34	1.36	2.23	2.50	7.56	84.00%
Aloo Bhujia	33	-	05	07	08	13	-	0.90	1.48	1.93	3.54	7.87	87.54%
Aloo Gajjar	31	01	04	06	10	10	0.16	0.77	1.35	2.58	2.90	7.77	86.37%
Aloo Gobhi	33	-	07	07	10	09	-	1.27	1.48	2.42	2.45	7.63	84.85%
Aloo Gosht	38	-	09	09	09	11	-	1.42	1.65	1.90	2.60	7.57	84.20%
Aloo Mattar	33	01	03	09	11	09	0.15	0.90	1.90	2.67	2.45	8.00	89.89%
Aloo Meethi	36	01	05	09	10	11	0.13	0.83	1.75	2.22	2.75	7.70	85.50%
Aloo Moongray	31	01	03	08	09	10	0.16	0.58	1.80	2.32	2.90	7.77	86.37%
Aloo Qeema	35	01	05	09	08	12	0.14	0.85	1.80	2.32	2.90	7.77	86.37%
Arbi Baingan	31	02	03	07	09	10	0.32	0.58	1.58	2.32	2.90	7.70	85.66%
Baingan Bharta	34	02	04	08	10	10	0.30	0.70	1.64	2.35	2.64	7.64	85.00%
Bhindi	35	02	06	09	08	10	0.28	1.02	1.80	1.82	2.57	7.50	83.50%
Bhindi Gosht	33	01	06	08	08	10	0.15	1.09	1.69	1.93	2.72	7.60	84.50%
Channa Pulao	30	-	02	10	09	09	-	0.40	2.34	2.40	2.70	7.83	87.00%
Chicken Biryani	37	-	04	9	12	12	-	0.64	1.70	2.60	2.91	7.86	87.38%
Chicken Pulao	34	01	05	07	08	13	0.14	0.88	1.44	1.88	3.44	7.80	86.60%
Ghiyya	34	01	03	09	11	10	0.14	0.52	1.85	2.58	2.64	7.76	86.27%
Ghiyya Gosht	32	01	03	07	11	10	0.15	0.56	1.53	2.75	2.80	7.80	86.80%
Gobhi	31	02	04	08	09	08	0.32	0.77	1.80	2.32	2.32	7.54	83.87%
Karelay	30	01	03	07	09	10	0.16	0.60	1.63	2.40	3.00	7.80	86.67%
Karelay Gosht	36	01	04	09	10	12	0.13	0.67	1.75	2.22	3.00	7.77	86.37%
Mattar Pulao	30	-	04	07	09	10	-	0.80	1.63	2.40	3.00	7.83	87.03%
Mixed Sabzi	33	03	03	09	10	08	0.45	0.54	1.90	2.42	2.18	7.50	83.50%
Sabzi Pulao	31	-	03	08	10	10	-	0.58	1.80	2.58	2.90	7.87	87.45%
Palaak Gosht	33	-	05	10	11	07	-	0.90	2.12	2.66	1.90	7.60	84.50%
Saag Gosht	33	-	04	07	10	12	-	0.72	1.48	2.42	3.27	7.90	87.87%
Saag Makhni	34	-	03	06	11	14	-	0.52	1.23	2.58	3.70	8.05	89.55%
Shaljam Gosht	34	04	04	11	08	07	0.58	0.70	2.26	1.88	1.85	7.29	81.04%
Tarka Chawwal	30	01	04	06	10	09	0.16	0.80	1.40	2.67	2.70	7.73	85.93%
Tinday	31	01	04	09	09	08	0.16	0.77	2.03	2.32	2.32	7.60	84.50%
Tinday Gosht	31	01	03	08	09	10	0.16	0.58	1.80	2.32	2.90	7.77	86.37%
Tori	36	02	05	09	09	11	0.27	0.83	1.75	2.00	2.75	7.60	84.50%

4. Discussion

The study utilized focus group discussions as a tool for qualitative data collection, which helped in the establishment of uniform and consistent preparation methods for the commonly consumed cereal and vegetable-based traditional dishes. Furthermore, the study also high-lighted the variations in preparation and the factors influencing intake of traditional Paki-stani dishes (Table 1). It was observed that various factors, including weekends, guests, fes-tive occasions, seasons, and health conditions, influence the preparation of traditional dishes. Similar variations in the production and consumption of traditional Pakistani dishes have been documented in existing literature. (Baloch et al., 2020).

Convenience and food accessibility were identified as the primary factors influencing the consumption of traditional dishes. Participants tended to prefer cooking meals that re-quired less time, money, and effort on a daily basis. These findings align with previous studies that indicate individuals favor using easily available local ingredients over imported ones when preparing meals. (Khan et al., 2019b). Another major factor that determined the type of traditional dish being prepared was the eating preferences of individuals and their family members. Previous studies also suggest that individuals prefer to cook dishes that are in line with their family members taste choices (Khan et al., 2019b). A trend was observed that men and children are now becoming more involved in the decision-making process, as opposed to the notion that women are directly responsible for deciding what to cook on a daily basis (Sarfaraz et al., 2015).

The study identified the commonly consumed cereal and vegetable-based Pakistani dishes (n=62) along with their cooking methods through focus group discussions, which is the highest number of dishes to be reported in existing literature (Table 2). Traditional dishes varied from rice-based delicacies such as Chicken Biryani and Mattar Pulao to vegetable- based delicacies such as Aloo Gosht, Bhindi, Tori Bhujia (ridged gourd gravy) and Saag Makhni. Similar to the Pakistani cuisine, Lebanese cuisine also skillfully combines various food groups to offer a unique gastronomic experience. Riz Bi Dajaj (chicken rice) and Maqloba (lamb rice) are traditional dishes made with rice, whereas Baba Ganouj (eggplant gravy), Malfouf Mehchi (stuffed cabbage rolls) and Loubia Bi Zet (green beans in oil) are traditional dishes made with vegetables (Hoteit et al., 2022).

Rice is an important staple food in many countries and across multiple cultures, which makes it the most consumed cereal grain globally (Timothy, 2021). Findings from the study showed that rice were combined with a fusion of meat varieties such as beef, chicken, or mutton resulting in a wide range of flavorful dishes such Chicken Biryani, Chicken Pulao (rice in chicken broth), Beef Biryani (beef gravy and rice), Beef Pulao (rice cooked in beef broth), Mutton Biryani (mutton gravy and rice) and Mutton Pulao (rice cooked in mutton broth). Similarly, the participants also revealed that rice are commonly combined with vegetables, lentils and legumes to produce a diverse array of flavorful dishes. The combi-nation of rice with lentils, legumes and vegetables is seen across various Arabic cuisines such as Mujaddara (lentils rice) is a flavorful delicacy of the United Arab Emirates that cooks lentils and rice together to produce a hearty and satisfying meal (Habib et al., 2015).

Potatoes are the base for a diverse range of local and international culinary preparations. These starchy vegetables are a staple in multiple cuisines across the globe. The Peruvian cuisine draws heavily upon potatoes as a foundational staple, which is why it is renowned globally for its wide variety of potato cultivars and potato-based traditional dishes such as Papa a la Huancaina (Huacayo-style potatoes), Carapulcra (dried potatoes stew), Papa Rellena (stuffed potatoes) and Causa Rellena (meat-stuffed potatoes) (Bannister, 2017). Findings from the present study showed that potatoes are skillfully combined with a vast array of vegetables and meat to yield a myriad of enticing dishes such as Aloo Anday, Aloo Bhujia (potatoes dry mix), Aloo Baingan (potatoes and eggplant gravy), Aloo Gosht, Aloo Gobhi (potato and cauliflower curry), Aloo Meethi (potatoes and fenugreek leaves gravy) and Aloo Qeema (potatoes and minced meat).

Non-starchy vegetables play an integral role in Indian cuisine to produce a flavorful repertoire of traditional dishes such as Undhiyu (eggplant, sweet potatoes, green beans, and fenugreek leaves curry), Purial (stir-fried or sauteed vegetables and greens), Kathal Curry (raw jackfruit curry), Tindora Sabzi (ivy gourd curry), Lauki Kofta (bottle gourd balls) and Meethi Mattar Malayi (fenugreek and peas curry) (Hoque and Toufique, 2019). Findings from the study revealed that non-starchy vegetables are an essential component of the daily diets of citizens. These local dishes either cook vegetables separately, such as Arbi Baingan (taro root and eggplant curry), Gobhi (cauliflower), Kaddu (pumpkin), Karelay (bitter gourd), Tinday (apple gourd) and Tori (ridged gourd) or combine them into one-pot delica-cies such as Aloo Moongray (potatoes and raddish pods curry), Shaljam (turnip), Bhindi Aloo (okra and potatoes), Arbi Baingan and Mixed Sabzi (mixed vegetables like potatoes, carrots, peas and cauliflowers). These vegetables are also combined with a wide variety of flavorful meats. Bhindi Gosht (okra and meat) is a flavorful combination of okra and meat that is prepared in a similar manner to its Arab counterpart, Bamia Bil Lahme (okra stew), which is also cooked with fresh okra and tender pieces of meat (Hoteit et al., 2022).

The standardization of recipes for the commonly consumed cereal and vegetable-based traditional Pakistani dishes was carried out to achieve consistency in the measurement of ingredients and cooking techniques, thereby maintaining the authentic flavors of these culinary treasures (Hussain et al., 2022). One-way ANOVA was utilized to determine the presence of significant difference between the three trials during the process of recipe standardization. Statistical analysis revealed that the three trials for all the prepared dishes showed no significant difference for the sensory attributes (Table 3). These findings are in line with prior studies conducted in other countries that standardized the recipes for traditional dishes. Traditional Saudi dishes such as Fatayer (meat pies stuffed with spinach and cheese), Falafel (deep fried ball fritter made from beans and chickpeas), Harees (porridge made from coarsely-ground wheat and meat), Hummus (dip made from mashed chickpeas), Mohala (sweetened bread), Mutabaq (pan fried bread), Qorsan (thin layered bread topped with tomato puree), and Harees were subjected to standardization in a previous study, which produced comparable results (p-value > 0.05) (Al-Faris and Abdullah, 2018). Boiled rice, fried rice and Jollof rice (one-pot dish of long grain rice with tomatoes, meat and other vegetables) made locally with different varieties of indigenous rice were also standardized using similar protocols in Nigeria (Nwokorie and Ayogo, 2020). The study opened the way for standardizing the recipes for one-pot traditional dishes, which is crucial to achieving optimal accuracy in nutrient estimation.

The study utilized hedonic rating scale to determine the consumer acceptability of traditional dishes, as it allowed the researcher to obtain clear insight into the hedonic aspects of traditional dishes by the inclusion of a large pool of diverse panelists belonging to different socioeconomic and cultural backgrounds (Ruiz-Capillas et al., 2021). Previously, hedonic scale has been successfully used to determine the consumer acceptance of Tori Bhujia and Daal Maash (black gram lentils curry) in a local study, hence establishing its effectiveness as a reliable tool for sensory evaluation of traditional dishes (Khan, 2017). All the prepared traditional Pakistani dishes had a hedonic score above 5 which indicated high consumer acceptability (Table 4). Furthermore, the consumer acceptability scores for the cereal- based dishes were slightly higher than the scores for vegetable-based traditional dishes. An observation was also made that the incorporation of meat into traditional cereal and vegetable- based dishes was associated with a higher percentage of consumer acceptability.

5. Conclusions

Pakistani cuisine is acclaimed globally for its perfect blend of aromatic spices and unique preparation techniques that provide their dishes with distinct organoleptic characteristics. Traditional Pakistani dishes predominantly exhibit a composite nature, in which multiple ingredients from diverse food groups are skillfully blended to produce complete and satisfying meals; however, since these dishes depend upon more than one food group to provide energy and nutrients, this can lead to significant changes in their nutrient compositions. The study played a vital role in unifying the ingredients and cooking styles that are used to prepare traditional Pakistani dishes, which in turn allows accurate and reliable assessment of their macronutrient content. Thus, it can be concluded that it is possible to identify and standardize the recipes for commonly consumed cereal and vegetable-based dishes. The baseline data obtained from the study can serve as a reference for conducting similar studies in the future that identify and standardize the recipes of other traditional Pakistani dishes. Furthermore, the study empowers the local and immigrant Pakistani communities and even foreigners with the necessary information to customize their diets, while promoting dietary variety and enabling a personalized approach to nutrition. The study provides an opportunity to policy-makers and health-care providers to develop healthy eating guidelines regarding acceptable portion sizes and nutrient in- take of traditional Pakistani dishes for the citizens living in Pakistan and overseas. The study also serves as a valuable resource for epidemiologic studies focused on understanding the relationship between diet, health, and disease within the Pakistani population.

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