Research Article

Modified consistency dysphagia diet protocol for Pakistan: Development perspective

Aleena Irum[1], Raffa Mubeen[2], Ghulam Saqulain[3], Sahrish Khalid[4]

ABSTRACT

Background: Increased in life expectancy has led to the increased need for texture-modified foods for dysphagia patients, to maintain their nutrition status. At present clinical practices in Pakistan are marred with no standard diet protocols resulting in misunderstanding in recommended consistencies of both food and fluid, hence compromising patients' safety, necessitating the work of dysphagia diet protocol.

Objectives: To develop a dysphagia diet consistency protocol for Pakistan.

Methods: A descriptive study recruited 16 Speech-Language Pathologists and dieticians from Rawalpindi & Islamabad using convenient sampling from October 2018 to March 2019. The sample included SLPs and dieticians working for at least 1 year with dysphagia patients. To ensure the process of standardization list of food and fluids was generated by the professionals to analyze the various food textures with the help of a viscometer that contributed to labelling and defining the textures. With the help of the International Dysphagia Diet Standardization Initiative Flow Test, Fork Drip Test, Spoon tilt test, Fork Pressure Test, Spoon Pressure Test, and Finger Test, a list of food and fluid items categorized into 8 levels which help the management of dysphagia patients in clinical practice.

Results: The current study developed a dysphagia diet protocol and categorized 29 foods and fluids as per the IDDSI framework. 10 items were placed in level 0 (Thin). 2 items were placed in level 1 (slightly thick). 2 items were placed in 2 (mildly thick) 1 item was placed at level 3. Level 4 included 2 items. Level 5 included 3 items. Level 6 included 4 items and Level 7 included 6 regular daily food items.

Conclusion: The study successfully developed a standardized dysphagia diet consistency protocol consisting of 29 commonly readily available and popular foods consumed by Pakistanis and placed these items under 8 levels of the International Dysphagia Diet Standardization Initiative (IDDSI) recommendations.

Keywords: dysphagia; food consistency; IDDSI; swallowing disorders; texture modification.

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INTRODUCTION

Dysphagia, also known as difficulty swallowing, is defined as an abnormal delay in the passage of food from the oropharynx to the stomach [1]. This delay can happen at any point during the four stages of swallowing—the oral, oropharyngeal, pharyngeal, or esophageal stages—with voluntary control only occurring during the first stage [2]. Roughly 8% of people worldwide suffer with dysphagia, which is frequently accompanied by concomitant diseases like stroke and neurological illnesses. Dysphagia is very common in Pakistan; it affects 17% of people in the 44–49 age group and 22.3% of people in the 55+ age group [4]. Dysphagia is a common observation in intensive care units, where it is recorded at a rate of 47.4% [2]. It is distributed throughout a range of illnesses, including 65% in acute stroke, 50% in Parkinson's disease, 31% in multiple sclerosis, 30 to 100% in motor neuron disease, and 13 to 57% in dementia [5].

Dysphagia sufferers may have difficulty preparing and delivering boluses, as well as experience symptoms like drooling, food or fluid leakage, and food sticking in the mouth. Common problems include difficulty swallowing, difficulty clearing the throat, and coughing during swallowing. Chest infections, malnourishment, dehydration, and even death are possible consequences of dysphagia. Taking dysphagia seriously is essential because of these serious repercussions [6].

The management of dysphagia entails three steps: restitution, which aims to restore disrupted function; compensation, which includes postural adjustments and swallowing techniques; and adaptation, which adjusts food consistency to improve nutrition and swallowing. For example, it might be advised to thicken liquids or choose diets with a softer consistency to address issues like choking when drinking or severe dysphagia [3,6].

The research highlights the important effects of the consistency on food transportation and breathing-swallowing coordination in diets with mixed consistency [7]. Food texture modifications, made possible by a variety of drugs and cutting-edge techniques like 3D printing, are essential for the management of dysphagia [8]. The need for foods with altered textures has increased as the number of elderly people increases. This is because patients with dysphagia need to consume enough calories, nutrients, and amino acids [9]. Optimizing the rheological and physicochemical properties of food is crucial for enhancing the swallowing process. But there are differences in terms and degrees of food and drink modifications throughout the world, which makes standardization difficult [10].

It is crucial to address undernourishment in dysphagia patients, emphasizing the significance of dietary adjustments, such as adjustments to texture and consistency [11,12]. A framework that is widely accepted is offered by the International Dysphagia Diet Standardization Initiative (IDDSI), which rates textures from 0 to 7 for liquids and 3 to 7 for food. The goal of this project is to harmonize terminology between contexts and cultural backgrounds. The IDDSI framework has been proven reliable in clinical settings; positive correlations between IDDSI fluid thickness levels and water-based swallow tests support the framework's applicability in clinical settings [13]. The crucial role that texture modification plays in managing dysphagia, indicating the need for standardized methods that can be applied globally [14].

This study fills in a significant knowledge gap regarding speech and language pathology in Pakistan by emphasizing the underutilization of the IDDSI protocol for the treatment of dysphagia. This problem is made worse by the disparities in dietary preferences among cultures and the lack of qualified speech pathologists. By integrating recommendations between dieticians and speech-language pathologists, the research seeks to improve patient safety by developing a standardized dysphagia diet consistency protocol specific to Pakistan.

METHODOLOGY

This descriptive study recruited n=16 participants from Islamabad and Rawalpindi using convenient sampling. Study was conducted over a period of 6 months from 1st October 2018 to 31st March 2019. Ethical approval was obtained from the Research Ethical Committee of Riphah College of Rehabilitation Sciences, Riphah International University, Islamabad vide Ref # RIPHAH/RCRS/REC/00408 and informed consent of the participants.

Sample included speech & Language Pathologists with at least one year post graduate experience of handling dysphagia patients and Dieticians working with dysphagia clients.

Tools utilized included Viscometer; IDDSI [14] including IDDSI Flow Test, Fork Drip Test, Spoon Tilt test, Finger Test, Fork Pressure Test, Spoon Pressure Test, Finger Test and self-check list for categorizing different food and fluid textures for diet protocol.

Protocol development procedure followed included development of list of food and fluid items through input of n=04 dysphagia trained SLP's, dieticians and literature search by the researcher.

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The fluid and food items of the list derived were then subjected to checking by using viscometer and IDDSI testing, since consistencies of texture and rheological analysis is required to be done by applying force to establish the viscosity of food and fluids. This is done because viscosity is the internal friction of a liquid or its ability to resist flow. This was done by the researcher in the presence of the participants at their workplace. This helped the researcher in labelling and defining the particular textures which were categorized within the levels that have been explained by IDDSI framework. The aim of IDDSI [15, 16] was to introduce terminologies of diet at global level and provide standardized consistencies with the collaboration of Speech and language pathology, dietitian, nutrition, food scientists, physicians, and nurses. These consistencies are divided into 8 levels which help for the management of dysphagia patients in clinical practice. The IDDSI Functional Diet Scale has strong criterion validity and consensual validity. The IDDSI Functional Diet Scale can be easily used with high reliability by clinicians [17]. Final list was then applied on N=16 speech and language pathologist and dieticians to evaluate their knowledge of different consistencies (figure 1)

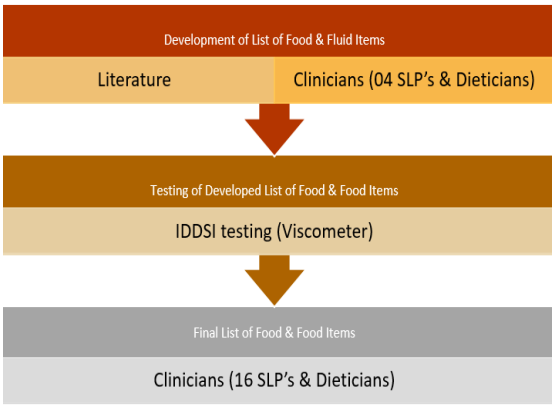

Figure 1: Steps of Protocol Development Process

The IDDSI Flow test is recommended for 0-3 levels, it can be implemented by use 10 ml syringe. For level 4 due to extreme thickness flow cannot be possible from 10 ml syringe in 10 second so spoon test, IDDSI fork test or spoon tilt tests are suggested to determine the consistencies. Protocol of each testing method is considered during testing the items [16]. Method is depicted in figure 2.

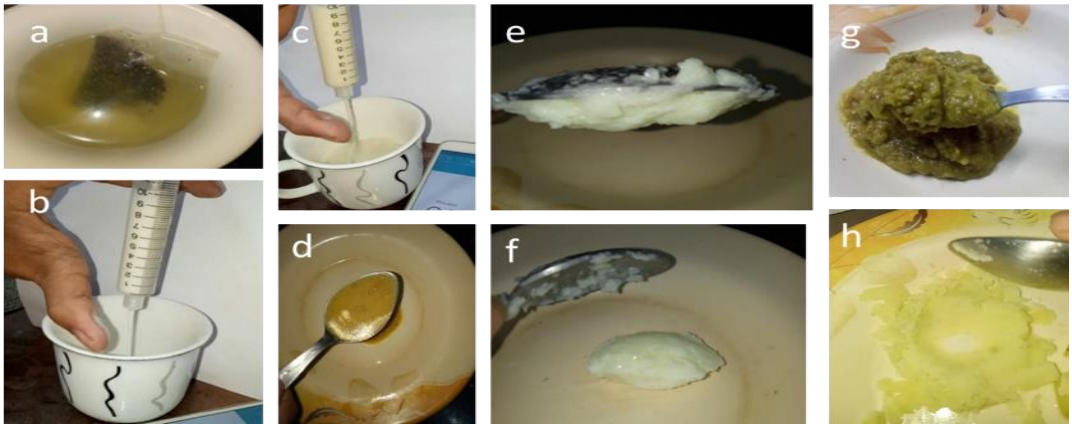

Figure 2: Methods of Protocol Development Process.

Data was analyzed on SPSS- Version 21. Results were presented in frequency and percentage. The comparison about consistency of food, between SLPs and dietician was done by Chi-square test. The $p<0.05$ was considered as significant.

RESULTS

Current study sample included n=16 professionals including 8(50%) SLP's and 8(50%) Dieticians with majority 14 (87.5%) with Master's qualification and 2 (12.5%) with Bachelor's degree. The current study identified and divided 29 food and fluids into eight levels of consistencies and water. Level 0 - Thin was assigned based on IDDSI Flow test results to foods which they revealed fast flow like water and could be drunk from a cup, straw or nipple (age-appropriate skill) (figure 2-a). There were some discrepancies evident in the subjective findings of the dieticians and SLPs of which 7 (43.75%) SLPs and 1(6.25%). All these items are readily available and culturally suitable.

Level 1-Slightly Thick was assigned on basis of IDDSI Flow Test to foods which took little effort to drink because it was thicker than water and can easily pass through a straw, syringe and nipple and thickness was equal to 'anti-regurgitation' infant formulas available in market (figure 2-b).

Level 2-Mildly thick was assigned on the basis of IDDSI flow test to shakes and homemade yogurt, since its thickness was compared to thin liquid and was shapeable and could pour rapidly from a spoon (figure 2-c).

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Level 3-Liquidized Moderately Thick was assigned to Curry on basis of IDDSI flow test, Fork Dip and Spoon tilt tests. Its thickness was such that it could be sucked from a standard straw or could be drunk from a cup by some effort. However, it could not be molded on a plate, eaten with spoon or fork. It could be swallowed without oral processing and had smooth texture with no lumps (figure 2-d).

Level 4-Pureed Extremely thick was assigned on basis of fork pressure test, fork dip test, spoon tilt test and finger test to foods like plain yogurt and custard because it was possible to eat by spoon or fork but could not be drunk through a cup or sucked through a straw. It could be poured but movement was very slow due to gravity and could be molded with no lumps and not sticky. (Figure 2-e,f)

Level 5- Minced & Moist was assigned on basis of fork pressure test, fork drip test, spoon tilt test, and chopstick and finger test. It was possible to eat it with spoon, fork or chopstick, was soft and moist without separation of thin liquid and small lumps could be seen (pediatric, lump size 2mm, whereas adult 4mm). It was possible to scooped and shape it in a plate and lumps could be easily squashed in mouth with tongue (figure 2-g)

Level 6- Soft and Bite sized was assigned to mashed banana, potato; khichari and rice on basis of fork pressure test, spoon pressure test, chopstick test and finger test. It could be age appropriately bite sized and chewing was required, and force of tongue was required for swallowing (figure 2-h)

Level 7-Regular was assigned to readymade nuggets, shami kabab, chapatti, churi, French toast and kheer. It could be hard, crunchy or soft with no size restriction and could be smaller or greater than 8 mm in children and 15 mm in adults. It has dry, chewy crispy crunchy bits with dual consistency or mixed consistency of food and liquid (figure 2-h).

Feedback was taken from SLP's and dieticians to highlight suitable food items for Pakistani population and then matched according to standardized testing methods of IDDSI. Association of knowledge of consistency of food was matched for their profession and educational level to assess whether these parameters have any effect (Annexure 1)

The study results showed significant difference between professionals (SLP's vs dieticians) as regards consistency of some food items including black coffee (p=0.003), yakhni (p=0.026), Dalia (p=0.037) and Rice (p=0.037). While as regards educational qualification there was significant difference in opinion of professionals for lassi (p=0.017), plain yogurt (p=0.043), dalia (p=0.017) and rice (p=0.018). (Annexure 1)

DISCUSSION

Current study developed a dysphagia diet consistency protocol consisting popular foods consumed by Pakistanis and placed these items under 8 levels of the International Dysphagia Diet Standardization Initiative (IDDSI) recommendations. These include Level 0 (water, green tea, black coffee, yakhni, sharbat/ or fruit juice, tea, lemonade, rooh afza, and lassi); Level 1 (squash and Raita); Level 2 (milk shakes and homemade yogurt); Level 3 (Curry); Level 4 (plain yogurt and custard); Level 5 (mashed potato, mashed banana, daal; Level 6 (mashed banana, potato; khichari and rice); Level 7 (readymade nuggets, shami kabab, chapatti, churi, French toast and kheer).

Literature also reveals that there have been efforts to develop semi quantitative or at least qualitative grades of texture - modified food which could fit the requirements of cases with different severity of dysphagia, so that patient could avoid the risks of low viscosity fluids, dry, hard and solid food, and food lacking homogeneity and low consistency since swallowing low - viscosity drinks may cause aspiration etc [18].

Since modification of texture of food and fluid items is essential for the management of dysphagia and in Pakistan commercial thickeners availability is limited. It is also noted that the physiochemical properties of saliva can affect the viscosity of fluids like Gum-containing thickeners compared to synthetic thickeners in which case the consistency was acceptable when it came in in contact with human saliva. Hence it was important to list food and fluid items having a natural consistency and texture under varying circumstances [19]. Feedback was taken from SLP's and dieticians to highlight suitable food items for Pakistani population and then matched according to standardized testing methods of IDDSI. Factually, the textures and consistencies of both solid foods and liquid being used in some countries cannot be implemented globally in other cultures and countries due to diversity in the food and liquid diets of these countries [20].

In current study there were some discrepancies evident in the subjective findings of the dieticians and SLPs of which some participant referred to black coffee as slightly thick while some also referred to yakni as slightly thick. all these items are readily available and culturally suitable. Milk shakes and yougurt are placed under mildly thick and fall in level2. Karhi (yoghurt& gramflour based) is liquidized moderately thick that is in level 3. Level 4 includes plain yougurt and custard. Level 5 includes lentils (Daal), porridge (Dahlia) and minced meat (Keema). Level 6 includes Mashed Patato, Mashed Banana, Khichari and rice whereas Level 7 includes regular daily food items like Ready-made nuggets, Shami

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Kabab, Chapaati, Churi, French toast and Kheer. All ingredients of these fluids and food items can easily available at low price in Pakistan, hence suitable for the population. The difference in the opinion of SLPs and Diaticians might be due to the fact that not all professionals are handling dysphagia patients. Similarly in Australia opinions of 580 professionals were utilized to establish standard diet protocol including 39 labels for thickened fluids and 95 different ones for texture altered foods for use in Australia [21]. In 2016, a study reported 50 labels for consistency modified diet, 26 SLPs and 42 dieticians responded with up to 17 labels for particular foods and hence IDDSI recommendations were adopted [22].

The IDDSI is considered the most accurate method and is the gold standard and has the quality of resolving of difficulties regarding swallowing and to ensure quality of practice [15], in different cultures as utilized in our case. Similarly, a study reported that training was provided to nurses and health care staff with the aim to match the culturally used food items with the standards of IDDSI and to categories the texture in 8 levels. This successfully addressed the needs of individual patients and the results revealed tremendous benefits of IDDSI [23]. Hence IDDSI framework has a significant importance and advantageous for recommendation of consistency modified precision diet for dysphagia cases [20].

In the current study, initially all textures were measured using the viscometer, however, the difference in temperatures affects certain consistencies including custards having a starch base [24], therefore viscometer assessment was reserved only for thin and thick liquids and syrups. When compared with the IDDSI it yielded similar findings as IDDSI for fluids like milk, water, tea, yakhni, and black coffee which is in consistency with available literature [25].

Royal College of speech and language therapist and The British Dietician Associations' collaboration resulted in development of the National Descriptors modifying texture which include two groups including fluids and food. Fluids were further divided into i) thin fluids; ii) naturally occurring thick fluids and; iii) thickened fluids. Texture wise the food is divided in A, B, C, D, E and normal category on basis of consistencies [26]. However it must be kept in mind that enrichment of food to cater to patients' energy needs who is already confounded by illness is also essentially required. According to Carroll a thick puree diet can be utilized for enrichment at one meal to cater to the short term requirements of energy [27]. Current study is the first of its type in Pakistan, however further work is recommended to include more items in the diet protocol.

Due to a handful of professionals working with dysphagia in Pakistan, the number of participants was limited. The protocol covers a range of textures, however the number of options in each division is restricted, hence addition of more items in future studies is recommended.

CONCLUSION

Current study successfully developed a preliminary dysphagia diet consistency protocol consisting of 29 foods items that are common, consumed regularly and frequently recommended by clinicians for their patients in Pakistani population. These items have been added to a list as per the International Dysphagia Diet Standardization Initiative (IDDSI) recommendations into 8 levels to cater to the needs of the Pakistani

DECLARATIONS & STATEMENTS

Author's Contribution

The following format should be used for author's contribution.
AI: substantial contributions to the conception and design of the study.
AI and SA: acquisition of data for the study.
SUR: interpretation of data for the study.
RM: analysis of the data for the study.
GS: drafted the work.
AI, SA, SUR, RM and GS: revised it critically for important intellectual content.
AI, SA, SUR, RM and GS: final approval of the version to be published and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed to the article and approved the submitted version.

Ethical Statement

The study was conducted after Ethical approval was obtained from the Research Ethical Committee of Riphah College of Rehabilitation Sciences, Riphah International University, Islamabad vide Ref # RIPHAH/RCRS/REC/00408 and informed consent of the participants.

Consent Statement

Informed consent was taken before inclusion in the study.

Data Availability Statement

Data related to the study is available on request form the principal author.

Acknowledgments

None to declare.

Conflicts of Interest

Authors declare that there is no conflict of interest.

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Annexure 1: Difference between SLPs and Dietician's opinion about Food Consistency recommended for dysphagia patients.

			Profession (n)			Education (n)		
Food Consistency (IDDSI Category)	Food Consistency opined by professionals	n	SLP (8)	Dietician (8)	X^2, p-value	BS/BA (2)	MS/MA (14)	X^2, p-value
Water (Thin)	Thin	16	8	8		2	14	
Black Coffee (Thin)	Thin	8	1	7	9, 0.003**	2	6	2.28, 0.131
	Slightly thick	8	7	1		0	8	
Green tea (Thin)	Thin	15	7	8	1.06, 0.302	2	13	0.152, .696
	lightly thick	1	1	0		0	1	
Yakhni (Thin)	Thin	11	3	8		2	9	
	Slightly thick	2	2	0	7.27, 0.026*	0	2	1.04, 0.595
	Mildly thick	3	3	0		0	3	
Squash (Thin)	Thin	1	0	1		0	1	
	Slightly thick	13	7	6	1.08, 0.584	2	11	0.527, .768
	Mildly thick	2	1	1		0	2	
Sharbat (Thin)	Thin	5	2	3		2	3	
	Slightly thick	8	4	4	0.533, 0.766	0	8	5.03, 0.081
	Mildly thick	3	2	1		0	3	
Tea (Thin)	Thin	5	2	3		2	3	
	Slightly thick	10	5	5	1.2, 0.549	0	10	50.03,0.081
	Mildly thick	1	1	0		0	1	
Lemonade (Thin)	Thin	10	5	5		1	9	
	Slightly thick	5	2	3	1.2, 0.549	1	4	0.457, .796
	Mildly thick	1	1	0		0	1	
Rohafza (Thin)	Thin	4	2	2		0	4	
	slightly thick	7	4	3	2.47, 0.48	1	6	2.068,0.558
	Mildly thick	3	2	1		1	2	
	Liquidized moderately thick	2	0	2		0	2	
Lassi (Thin)	Thin	1	0	1		1	0	
	Slightly thick	7	3	4	1.64, 0.44	1	6	8.16, 0.017*
	Mildly thick	8	5	3		0	8	
Plain Yoghurt (Pureed extremely thick)	Slightly thick	1	0	1		1	0	
	Mildly thick	7	4	3	1.14, 0.767	1	6	8.16, 0.043*
	Liquidized moderately thick	2	1	1		0	2	
	Pureed extremely thick	6	3	3		0	6	
Dalia (Minced & Moist)	Mildly thick	1	0	1		1	0	
	Liquidized moderately thick	7	6	1	6.57, 0.037*	1	6	8.16, 0.017*
	Pureed extremely thick	8	2	6		0	8	
Homemade Yogurt (Mildly thick)	Mildly thick	7	4	3		2	5	
	Liquidized moderately thick	6	3	3	0.476, 0.79	0	6	2.94, 0.23
	Pureed extremely thick	3	1	2		0	3	
Shakes (Mildly thick)	Slightly thick	4	3	1		1	3	
	Mildly thick	5	2	3	5.2, 0.158	1	4	1.83, 0.609
	Liquidized moderately thick	4	3	1		0	4	
	Pureed extremely thick	3	0	3		0	3	
Daal (Minced & Moist)	Liquidized moderately thick	9	6	3		1	8	
	Pureed extremely thick	3	0	3		1	2	
	Minced & moist	2	2	0	8, 0.092	0	2	1.778, 0.777
	Soft	1	0	1		0	1	
	Regular	1	0	1		0	1	
Mashed banana (Soft & Bite sized)	Liquidized moderately thick	2	2	0		0	2	
	Pureed extremely thick	5	2	3	4.34, 0.227	1	4	0.849, .838
	Minced & moist	2	0	2		0	2	
	Soft	7	4	3		1	6	
Mash Potato (Soft & Bite sized)	Liquidized moderately thick	1	1	0		0	1	
	Pureed extremely thick	6	3	3	4.67, 0.198	1	5	0.762,0.859
	Minced & moist	3	0	3		0	3	
	Soft	6	4	2		1	5	
Raita (Slightly thick)	Slightly thick	2	1	1		0	2	
	Mildly thick	9	7	2	7.78, 0.051	1	8	1.02, 0.797
	Liquidized moderately thick	4	0	4		1	3	
	Regular	1	0	1		0	1	
Baisin curry (Liquidized moderately thick)	Mildly thick	2	1	1		0	2	
	Liquidized moderately thick	6	4	2	1.81, 0.613	1	5	0.544, .909
	Pureed extremely thick	7	3	4		1	6	
	Soft	1	0	1		0	1	
Custard (Pureed extremely thick)	Mildly thick	2	2	0		0	2	
	Liquidized moderately thick	1	1	0	4.33, 0.228	0	1	7.62, 0.055
	Pureed extremely thick	12	5	7		1	11	
	Soft	1	0	1		1	0	
Qeema (Minced & Moist)	Minced & moist	11	5	6		2	9	
	Soft	2	1	1	0.424, 0.809	0	2	1.04, 0.595
	Regular	3	2	1		0	3	
Ready nuggets (Regular)	Soft	1	1	0	1.07, 0.302	0	1	0.152, .696
	Regular	15	7	8		2	13	
Shami kebab (Regular)	Liquidized moderately thick	1	1	0		0	1	
	Soft	3	3	0	5.33, 0.069	0	3	0.762, .683
	Regular	12	4	8		2	10	
Churi (Regular)	Minced & moist	4	1	3		1	3	
	Soft	2	0	2	4.6, 0.1	1	1	4.57, 0.102
	Regular	10	7	3		0	10	
French toast (Regular)	Minced & moist	2	2	0		0	2	
	Soft	3	0	3	5.09, 0.078	0	3	1.04, 0.595
	Regular	11	6	5		2	9	
Rice (Soft & Bite sized)	Minced & moist	7	6	1		0	7	
	Soft	8	2	6	6.71, 0.037*	1	7	8, 0.018*
	Regular	1	0	1		1	0	
Kheer (Regular)	Liquidized moderately thick	13	7	6	0.41, 0.522	1	12	1.46, 0.226
	Pureed extremely thick	3	1	2		1	2	
Roti (Regular)	Minced & moist	1	1	0	1.067, 0.302	0	1	0.152,0.696
	Regular	15	7	8		2	13	
Khichari (Soft & Bite sized)	Minced & moist	5	3	2		0	5	
	Soft	7	2	5	2.49, 0.289	2	5	2.94, 0.23
	Regular	4	3	1		0	4	

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