

Using the International Dysphagia Diet Standardization Initiative (IDDSI) to assess patients with oropharyngeal dysphagia: A narrative review

Utilização do International Dysphagia Diet Standardization Initiative (IDDSI) na avaliação de pacientes com disfagia orofaríngea: uma revisão narrativa

Uso de la Iniciativa Internacional de Estandarización de la Dieta para la Disfagia (IDDSI) en la evaluación de pacientes con disfagia orofaríngea: una revisión narrativa

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Abstract

Introduction: The International Dysphagia Diet Standardization Initiative (IDDSI) is an important tool for standardizing food and liquid textures for individuals with dysphagia. **Method:** This narrative review aimed to identify the use of IDDSI to standardize textures for swallowing assessment, helping

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TOS: research design, data collection, article writing.

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understand its relevance in clinical practice and research. A search was conducted in January 2024 in the databases of the Medical Literature Analysis and Retrieval System Online, Scopus, Web of Science, Cochrane Library, Scientific Electronic Library Online, Latin American and Caribbean Health Sciences Literature, and Google Scholar. **Results:** Altogether, 560 articles were found; 384 (duplicates) and 144 abstracts were excluded due to the inclusion criteria. Hence, 32 articles were selected for full reading, and 23 were admitted. There was an increase (700%) in the number of publications (2018-2023), with the participation of countries such as Brazil, USA, China, and Canada. The analysis included 14 studies with adults/older people and one with children. There was a preference for using levels 0 to 4, with swallowing safety in levels ≥ 2 . Assessments used IDDSI as a marker of clinical evolution and in dietary recommendations. **Final Considerations:** There was increased research using the IDDSI in swallowing assessments, and various countries used the tool. Few studies approached children. There was a preference for using liquids, but the level and volume were not always reported. The IDSSI method for achieving adequate and reproducible textures was more effective than the NDD. There is still a need for studies with homogeneous populations and methods.

Keywords: Swallowing disorders; Dysphagia; Patient safety; Diet Modification.

Resumo

Introdução: A implementação do *International Dysphagia Diet Standardization Initiative* (IDDSI) é uma importante ferramenta para a padronização de texturas dos alimentos e líquidos para indivíduos com disfagia. **Método:** Esta revisão narrativa teve como objetivo identificar a utilização do IDDSI como padronização das texturas utilizadas na avaliação da deglutição, possibilitando compreender a relevância na prática clínica e na pesquisa. Realizou-se busca em janeiro/2024 nas bases de dados *Medical Literature Analysis and Retrieval System Online*, *Scopus*, *Web of Science*, *Cochrane Library*, *Scientific Electronic Library Online*, Literatura Latino-Americana e do Caribe em Ciências da Saúde e *Google Scholar*. **Resultados:** Foram encontrados 560 artigos, excluídos 384 (duplicata) e 144 resumos devido aos critérios de inclusão. Foram selecionados para leitura completa 32 artigos e admitidos 23. Houve um aumento (700%) no número de publicações (2018-2023), com a participação de países como Brasil, EUA, China, Canadá. Foram analisados 14 estudos com adultos/idosos e um estudo em pediatria. Houve preferência por utilização de níveis 0 a 4, segurança da deglutição com níveis ≥ 2 , iniciativa sendo utilizada durante a avaliação, como marcador de evolução clínica e em recomendações dietéticas. **Considerações finais:** Observou-se o aumento de pesquisas com o IDDSI nas avaliações da deglutição e a diversidade de países utilizando a iniciativa. Foram poucos estudos em pediatria. Houve preferência por utilização de níveis líquidos, nem sempre relatado nível e volume. A metodologia do IDSSI para alcançar a textura adequada e reprodutível foi mais eficaz que a NDD. Mantém-se a necessidade de realizar estudos com populações e métodos homogêneos.

Palavras-chave: Transtorno de deglutição; Disfagia; Segurança do paciente; Modificação na Dieta

Resumen

Introducción: La implementación del IDDSI (Iniciativa Internacional de Estandarización de la Dieta para la Disfagia) es una herramienta importante para estandarizar las texturas de alimentos y líquidos para personas con disfagia. **Método:** Revisión narrativa con el objetivo de identificar el uso del IDDSI como una estandarización de las consistencias de los alimentos para evaluación de la deglución, permitiendo comprender su relevancia en la práctica clínica/investigación. Se realizó una búsqueda (enero/2024) en las bases de datos *Medical Literature Analysis and Retrieval System Online*, *SCOPUS*, *Web of Science*, *Literatura Latino-Americana y del Caribe em Ciências da Saúde*, *Scientific Electronic Library Online*, *Cochrane Library* y *Google Scholar*. **Resultados:** Se encontraron 560 artículos, excluidos 384 (duplicados), 144 resumen (sin criterios de inclusión), 32 32 artículos completos para leer, se admitieron 23. Hubo un aumento (700%) en el número de publicaciones, con la participación de países como Brasil, EUA, Canadá. Se analizaron 14 estudios con adultos/ancianos y un estudio en pediatria. Preferencia por los niveles 0-4, seguridad de la deglución con niveles ≥ 2 , utilizada para la evaluación, marcador de la

evolución clínica y en las recomendaciones dietéticas. **Consideraciones finales:** Ha habido un aumento de la investigación y de países que utilizan la IDDSI en las evaluaciones de la deglución. Se han realizado pocos estudios en pediatría, una preferencia por el uso de líquidos, y no siempre se informó el nivel/volumen. La metodología IDSSI para conseguir una textura adecuada y reproducible fue más eficaz que la NDD. Sigue siendo necesario realizar estudios con poblaciones y métodos homogéneos.

Palabras clave: Trastorno de deglución; Seguridad del paciente; Modificación de la Dieta.

Introduction

Different nomenclatures for food textures are often used in clinical practice in patients with dysphagia, making communication difficult and jeopardizing patient safety and prognosis¹. Modifying food textures is part of speech-language-hearing procedures², and a precise definition of the characteristics of recommended foods and liquids is a differential in treatment.

The International Dysphagia Diet Standardization Initiative (IDDSI) emerges as an important tool for standardizing food and liquid textures for individuals with dysphagia and controlling the textures of medications and supplements³. Its eight levels are arranged in a diagram. The following are used for liquids: level 0 – thin, level 1 - slightly thick, level 2 - mildly thick, level 3 - moderately thick, and level 4 - extremely thick. The following classifications are used for foods: level 3 - liquidized, level 4 - pureed, level 5 - minced and moist, level 6 - soft and bite-sized, and level 7 - easy to chew or regular. Hence, levels 3 and 4 transition between liquids and food⁴. This initiative applies to patients of all ages, regardless of their food culture and country of origin, as it proposes flow tests and texture characteristics with different utensils such as a 10-mL syringe, fork, spoon, chopsticks, and fingers⁴.

Classification based on food textures with more direct labeling and nomenclature (rather than relying on liquid flow measurements, for instance) facilitates the use and interpretation of recommended levels⁴. The IDDSI was founded in 2013 with the help of volunteers from several countries and put into practice about 5 years later. Since then, research has increasingly aimed at implementing it⁵ in food preparation⁶ and drug studies⁷.

From a clinical standpoint, IDDSI is important because it can be replicated worldwide, enabling effective communication between research groups and professionals who care for the population with

dysphagia, and increasing patient safety. Thus, this narrative review aimed to identify the use of the IDDSI to standardize textures used in swallowing assessment, helping to understand its relevance in clinical practice and research.

Material and method

In this narrative review, two independent researchers searched for scientific articles in the following electronic databases: Medical Literature Analysis and Retrieval System Online (MEDLINE), Scopus, Web of Science, Latin American and Caribbean Health Sciences Literature (LILACS), Scientific Electronic Library Online (SciELO), Cochrane Library, and Google Scholar, in English, Spanish, and Portuguese, with no restriction on period or location.

The descriptors for the search strategy were selected from the controlled vocabularies Health Sciences Descriptors (DeCS) and Medical Subject Heading Terms (MeSH). The search strategy used a combination of descriptors and Boolean operators: [(swallowing disorder) AND (IDDSI)] AND [(dysphagia) AND (IDDSI)] AND [(deglutition disorders) AND (IDDSI)], [(*transtorno de deglutição*) E (IDDSI)] E [(*trastorno de deglución*) E (IDDSI)]. The search was concentrated in January 2024.

Studies published as letters to the editor, guidelines, literature reviews, narrative reviews, systematic reviews, meta-analyses, and abstracts were specifically excluded to ensure the retrieval of articles describing how the IDDSI was used in clinical and instrumental assessments. Studies unavailable in full or not using the approach in question were not part of the narrative review sample.

The following data were extracted for study eligibility, using a form prepared by two researchers in Excel®: year of publication, research location, language of publication, type of study, sample, method, and main results (Chart 1). The information was added by the first researcher (researcher 1,

TOS) and then checked by another one (researcher 2, DLO). The studies were initially selected according to their titles and abstracts, and the eligible ones were included. The articles were selected based on the abstracts for full reading, and those that met all the pre-determined criteria to answer the research question were admitted.

First, eligibility reviewers 1 and 2 were calibrated for the review. After this procedure and having their questions answered, one of them (who was not blind to the authors' and journals' names) examined the titles and abstracts independently. Those whose titles were within the scope, but whose abstracts were unavailable, were also obtained and analyzed in full. In specific cases, when the study with potential eligibility had incomplete data, the authors could be contacted by e-mail for

more information – although this was not necessary for the present research.

Results

Altogether, 560 articles were found in MEDLINE (n = 207), LILACS (n = 17), SciELO (n = 7), Scopus (n = 225), WOS (n = 71), Cochrane (n = 32), and Google Scholar (n = 1). A total of 384 articles were excluded for being duplicates, and 144 abstracts for not meeting the inclusion criteria. Hence, 32 articles were selected for full reading, of which nine were excluded for not using the approach in question. Therefore, the review included and analyzed 23 studies that used the IDDSI to assess swallowing (Figure 1).

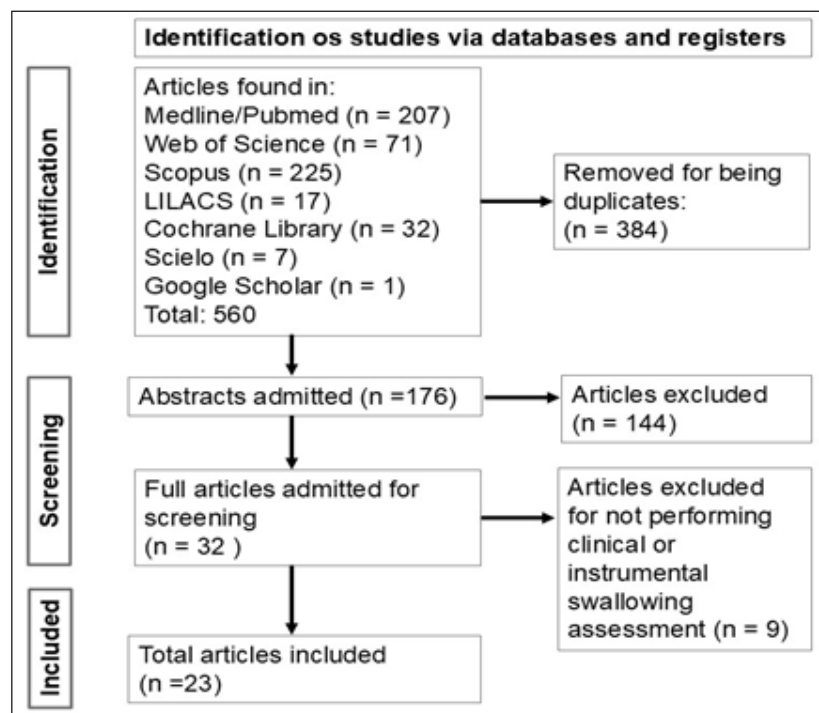


Figure 1. Flowchart of the article search process

From 2018 to 2023 (Figure 2), there was an exponential increase (700%) in the number of publications using IDDSI to standardize food textures in swallowing assessment, with greater participation from the USA⁹⁻¹³, Brazil¹⁴⁻¹⁸, China^{9,19,20}, and Canada (Figure 3). Regarding the samples, 61% of the studies were heterogeneous, with a

mixed population regarding age group, 22% with adults^{9,20-22}, 13% with older adults^{14,19,23}, and 4% with children⁸. As for clinical characteristics, there was a prevalence of studies with mixed etiologies (26%)^{9,13,23-27}, healthy individuals (13%)^{9,20,28}, with a stroke 13%^{10,21,29}, Parkinson's disease (4%)³⁰, and so on (Chart 1).

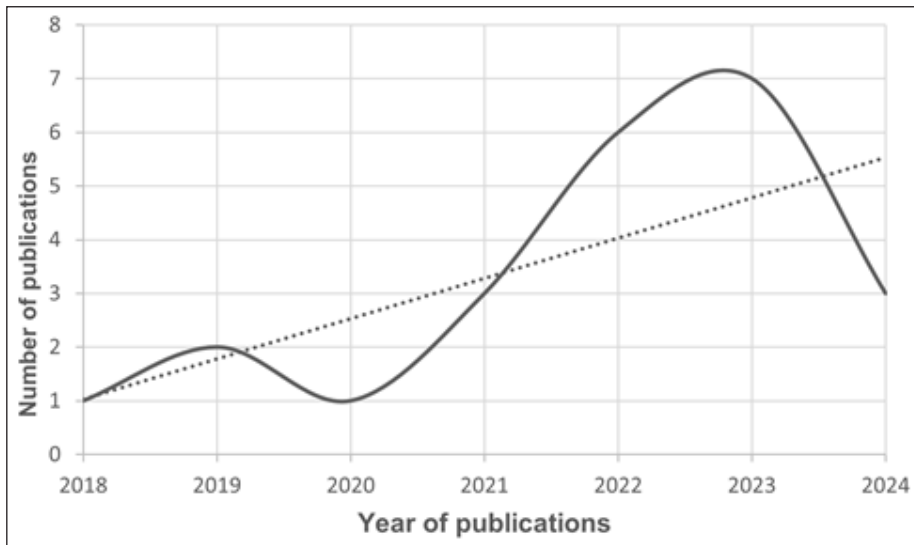


Figure 2. Graph of publications included in the review, per year

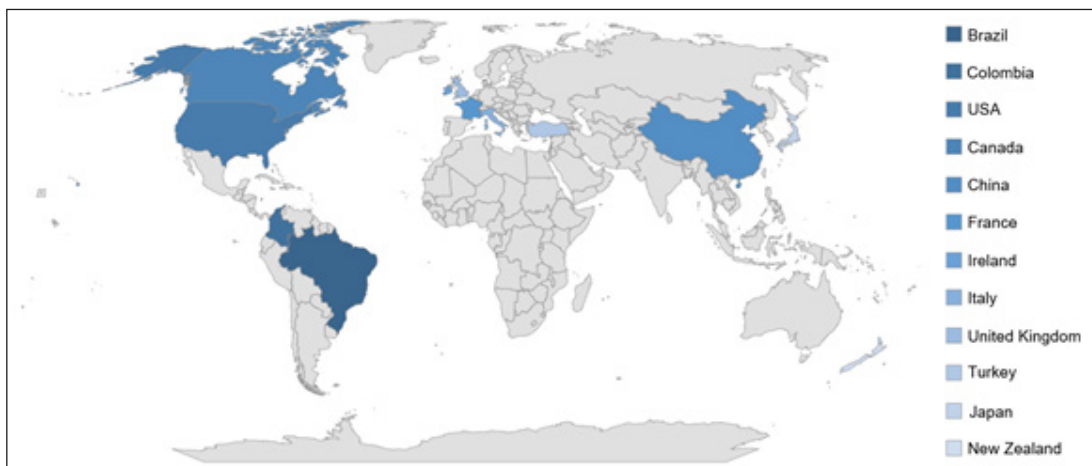


Figure 3. Countries with publications on the use of IDDSI in swallowing assessment

Chart 1. Characteristics and information of the articles included in the review and analyzed

Author/ Year/ Country/ Language	Search site	Study type	Sample	Method	Main results
Su et al. (2018) China English	MEDLINE PubMed	Cross-sectional	26 older individuals with dysphagia (mixed etiology) Females: 4, males: 22 Age: 87.9 ± 11.6 years	- Water swallowing test (30mL) - IDDSI: texture in swallowing assessment (V-VST®) (levels 0, 1, 2, and 3) volume (5, 10, and 20 mL)	Dysphagia severity by water swallow tests correlates positively with liquid thickening – greater severity, higher IDDSI level (2,3, and 4)
Souza et al. (2019) Brazil English	Google Scholar	Case report	An older patient with muscular dystrophy type I (10 years since diagnosis, follow-up for 1 year and 2 months) 66 years Male	- Fiberoptic endoscopic evaluation of swallowing (Yale Scale, Severity Rate Scale, and PAS) IDDSI: textures for the examination: level 0, 3, and 4. Volumes: 3, 5, 10 mL	After 4 months: pureed food (level 4) – residue level in piriform recesses went from residual to moderate trace. Severity index higher in the last month. PAS – increased in all textures tested. Laryngotracheal aspiration in the last month – thin liquid (level 0).
Hadde et al. (2019) China English	MEDLINE PubMed	Cross-sectional	8 healthy adults Males: 6, females: 2 Age: 22-30 years	- IDDSI: texture definition (levels: 1, 2, 3, and 4) and viscosity analysis of thickened liquids (rheological test) with different commercial thickeners and barium - Videofluoroscopic swallowing study (pharyngeal transit time and proportion of bolus at the UES opening).	Longer pharyngeal transit time with level 4 than with level 1. Starch-based thickener and xanthan gum have different extensional rheology. Higher amount of pharyngeal residue with a starch-based thickener (low extensional viscosity).
García et al. (2020) Colombia Spanish	LLACS	Case report	One adult. Locked-in Syndrome (stroke) Female Age: 27 years	- MBGR - Videofluoroscopic swallowing study (liquid, nectar, honey, pudding) (PAS) - IDDSI: texture in therapy (levels 2 and 3) (5 and 10mL) - FOIS	Proprioceptive and motor tongue stimulation and oral training with textures – strategies for releasing volume via the oral route.
Haywood et al. (2021) United Kingdom English	MEDLINE PubMed	Retrospective cohort	44 adults and older adults Stent removal follow-up (laryngotracheal stenosis) Females:25, males:19 Age:46.7±14.4 years	- fiberoptic endoscopic evaluation of swallowing (PAS) - IDDSI: textures ingested before and after stent removal - FOIS	FOIS and PAS were worse postoperatively, returning to baseline at hospital discharge. Oral route: 80% level 6 or 7, some maintaining level 4. 93% exclusively oral route at hospital discharge
El Gharib and Dantas (2021) Brazil English	MEDLINE PubMed	Cross-sectional	29 adults and older adults with megaesophagus (Chagas disease) Females: 21, males: 8 Age: 63.8 ± 5.1 years	- Videofluoroscopic swallowing study (PAS) - IDDSI: textures during swallowing assessment (level 0 and 3) Volume: 10 mL each	Laryngeal penetration (level 0 - 17% and level 3 - 8%) Patients with esophageal dilation had more pharyngeal residues (level 0) than patients without esophageal dilation. There was no difference in oral/ pharyngeal transit time with the levels evaluated between the groups
Salle et al. (2021) France English	Cochrane Library	Multicentric cross-sectional	30 adults and older adults with dysphagia for liquids (mixed etiology) Females:15, males:5 Age:74.3±13.5 years	- Aspiration screening (PASS) - Clinical Predictive Aspiration Scale - Cough observation - IDDSI: thickened water (levels 2 and 3) and gelled water (level 4)	86% - Risk of aspiration. Successful swallowing (without coughing) was considered: 93% with level 4 and 82.8% with thickened water (levels 2 and 3). Taste and texture were evaluated, with a preference for gelled water.
Heslin and Regan (2022) Ireland English	MEDLINE PubMed	Cross-sectional	15 adults and older adults with dysphagia (mixed etiology) Females: 7, males: 8 Age: 63 (45 to 86) years	- High-resolution pharyngeal manometry - IDDSI: texture in assessment - level 0.	Swallowing maneuver with effort increased: pharyngeal tension, tongue base pressure, and UES opening time.



Author/ Year/ Country/ Language	Search site	Study type	Sample	Method	Main results
Santos et al. (2022) Brazil Portuguese	LILACS	Observational analytical cross-sectional	77 adults and older adults with multiple sclerosis Females: 65, males: 12 Age: mean of 40 years (19 to 61 years)	- Videofluoroscopic swallowing study (pharyngeal residues, dysphagia severity, and PAS) - IDDSI: texture used in the swallowing assessment: level 1: 5 mL and 10 mL level 4: 8 mL	Compared swallows with and without pharyngeal residues. 231 swallows: 31.6% with pharyngeal residues. Similar mean number of swallows between groups in each texture/volume tested (levels 1 and 4). Prevalence of pharyngeal residues with level 4.
Reedy et al. (2022) USA English	MEDLINE PubMed	Retrospective cohort cross-sectional	57 adults and older adults after stroke. Males: 23, females: 34 Age: 70.12±12.57 years	- Videofluoroscopy (MBSImP protocol) (PAS) - FOIS - IDDSI: textures used in assessment and recommendations. Liquids (level 0 to 3) Solids (level 4 to 7) Assumed levels of old nomenclature.	60.3% of the sample with IDDSI levels. 57.9% with slow esophageal emptying. Association between level 7 and changes in esophageal clearance.
Feng et al. (2022) China and USA English	MEDLINE PubMed	Cross-sectional	30 healthy adults Age: 34.8±11.54 years (19 to 60 years)	- Digital cervical auscultation - IDDSI: textures evaluated. Liquid (levels 0 to 3) Volume of 5 mL Solid (levels 4 to 7) Volume of 15 mL	The duration of the acoustic signal increased with liquid thickening and bolus texture. Similar intensity of the acoustic signal from levels 0 to 3 and 4 to 7. Level 3 identified with the acoustic signal of liquid.
Webler et al. (2022) USA English	MEDLINE PubMed	Retrospective	40 adults and older adults with severe acute respiratory syndrome -COVID-19 Females: 11; males: 29 Age: 65.9±13 years	- MASA Clinical Assessment - Videofluoroscopic swallowing study (PAS) - FOIS - IDDSI: texture recommended on admission and after videofluoroscopy	27% performed videofluoroscopy in the acute phase of the disease 51% of patients achieved level 7, level 0, and FOIS 7 after the swallowing exam. 13% maintained the modified texture. 27% with MASA < 170 points: risk of aspiration.
Bandini, Smaoui, and Steele (2022) Canada and Italy English	MEDLINE PubMed	Cross-sectional	59 healthy adults and older adults No speech, swallowing, gastroesophageal, or neurological disorders Age: 44.7±17.9 years	- Videofluoroscopy (ASPEKT protocol) - IDDSI: textures for exams (levels 0 to 4) 2 types of thickeners, 3 offerings for each (in comfortable sips/spoonfuls)	Detection of the pharyngeal phase and the location of the bolus were observed together. Location of the bolus correlated with trajectories greater than 0.9, without manipulation/training
Jukic Peladic et al. (2023) Italy English	MEDLINE PubMed	Observational retrospective study	267 older people with different diagnoses Females: 161 Males: 106 Age: 80.5 ± 12.3 years	- GUSS Protocol - ASHA's NOMS Scale - GLIM Scale: nutritional status - IDDSI: textures indicated for oral use	96% of patients had dysphagia, of which 22.1% were malnourished. Dysphagia treated with nutritional therapy and texture-modified diets (foods - level 4, liquids - level 0).
Oliveira et al. (2023) Brazil English	MEDLINE PubMed	Prospective study	56 adults with cerebral palsy Age: 44± 11 years	- BMI - FOIS - PARD - IDDSI: usual food texture for assessment - IDDSI-FDS: oral texture threshold	The more severe the dysphagia, the worse the nutritional condition and the greater the food texture restriction. There was no difference in swallowing, oral intake, or nutritional condition in the periods evaluated (2015 and 2016).
Nakagawa et al. (2023) Japan English	MEDLINE PubMed	Cross-sectional	36 adults and older adults with dysphagia (mixed etiology) Age: 80 (39-90) years Females: 58.4%	- Fiberoptic endoscopic evaluation of swallowing (Yale Scale and PAS) - IDDSI: texture of the gelatinous solution and thickened water offered in the evaluation (level 2) Volume: 5 mL 3 offers	Gelatin solution (level 2): swallowing trigger time and trigger site occurred earlier. Lower prevalence of pharyngeal residues. Similar PAS with both samples, without aspiration.

Author/ Year/ Country/ Language	Search site	Study type	Sample	Method	Main results
Wright et al. (2023) United Kingdom English	MEDLINE PubMed	Observational retrospective study	31 children, adolescents, and adults with posterior fossa tumors undergoing speech therapy: 3, 6, 12 months postoperatively) Males: 20 Females: 11 Age: 9 to 238 months	- Videofluoroscopic swallowing study - IDDSI: oral textures resumed (by the speech therapist)	At first videofluoroscopy: changes in swallowing safety with levels 4, 2, and 0. Silent aspiration - 55%. Levels 0 and 7 were observed in 43% of patients at 3 months and 69% at 12 months.
Wineski et al. (2023) USA English	MEDLINE PubMed	Retrospective cohort study	39 children diagnosed with type 1 laryngeal cleft or deep interarytenoid groove Mean age: 1.35 years	- Videofluoroscopic swallowing study - IDDSI: groups divided per texture tolerated in the preoperative examination: mild dysphagia (levels 1 and 2); moderate dysphagia (levels 3 and 4); severe dysphagia (level 4 with aspiration)	Follow-up at 2, 6, and 12 months after surgical repair. Patients with mild dysphagia: faster resolution of dysphagia than those with moderate dysphagia (2 and 6 months). At 12 months the dysphagia resolution rate increased to 63.2%.
Reedy et al. (2023) USA English	MEDLINE PubMed	Retrospective cohort study	42 adults and older adults in late postoperative lung transplantation Males: 22 Females: 20 Age: 58.36 ± 9.94 years.	- Videofluoroscopy (MBSImP) (PAS) - FOIS - IDDSI: liquid and solid textures used in the examination and recommendations	Those with atypical PAS (≤ 3) were recommended for oral route with levels 2 and 3.
Gandhi et al. (2023) Canada and USA English	MEDLINE PubMed	Retrospective observational study	78 adults and older adults with Parkinson's disease, ALS, and control group. Males: 39 Females: 39	- Videofluoroscopic swallowing study (ASPEKT protocol) - IDDSI: texture during swallowing assessment (levels 0 to 4)	Parkinson's group: prolonged latencies with thin liquids compared with healthy controls. Prolonged latencies for all events after hyoid movement, except UES opening. ALS group: prolonged latencies for events before and after hyoid movement with all textures compared with healthy controls and Parkinson's group
Bengisu et al. (2024) Turkey English	MEDLINE PubMed	Double-blind controlled clinical trial	40 adults and older adults after acute stroke Females: 18 Males: 22 Age: 65.8 ± 11.9 years	- GUSS protocol - Videofluoroscopic swallowing study before/after treatment (PAS, DSRS) - FOIS - IDDSI: textures in the evaluation (levels 0 and 4) 5 mL, 3 swallows	There was a difference in the swallowing parameters on the PAS scale at level 0 before and after treatments (transcranial stimulation, electrostimulation, conventional therapies). There was no change in the PAS at level 4 (before and after treatments), the safest texture since the initial evaluation.
Saleem et al. (2024) New Zealand English	MEDLINE PubMed	Clinical trial	71 adults and older adults with Parkinson's disease Age: 69 ± 8 years Males 76%	- EAT-10 - Videofluoroscopic swallowing study - IDDSI: level 0: 1 mL, 3 mL, 20 mL, 100 mL -High-resolution pharyngeal manometry - IDDSI: level 0: 5 mL, 10 mL, 20 mL	73% - EAT-10 > 3. 29% - impaired maximum UES opening at 20 mL (level 0). 33% - impaired maximum hyoid elevation. Comparing the two exams: Pharyngeal transit time was correlated with peak pressure, hypopharyngeal contractility, and maximum UES opening.
Mancopes and Steele (2024) Canada and Brazil English	MEDLINE PubMed	Retrospective	28 adults and older adults with stable COPD compared with the control group Age: 65 (41-79) years Males (n = 18)	- Videofluoroscopic swallowing study (ASPEKT protocol) - IDDSI: texture in evaluation (levels 0, 2, 3, and 4) Comfortable sips	Patients with COPD had shorter laryngeal vestibule closure times than controls at all levels. Earlier onset and shorter durations of UES opening (levels 2, 3, and 4). Reduced pharyngeal constriction compared to controls at all levels.

Caption: ASPEKT: Analysis of Swallowing Physiology: Events, Kinematics, and Timing; MBSImP: Modified Barium Swallowing Impairment Profile; ASHA's NOMS: American Speech-Language-Hearing Association's National Outcomes Measurement System; COPD: chronic obstructive pulmonary disease; DSRS: Dysphagia Severity Rating Scale; EAT: Eating Assessment Tool; UES: upper esophageal sphincter; ALS: amyotrophic lateral sclerosis; FOIS: Functional Oral Intake Scale; GUSS: Gugging Swallowing Screen; GLIM: Global Leadership Initiative on Malnutrition; BMI: body mass index; IDDSI-FDS: International Dysphagia Diet Standardization Initiative - Functional Diet Scale; MASA: Mann Assessment of Swallowing Ability; MBGR: Marchesan, Berrentin-Felix, Genaro, Rehder protocol; PAS: Penetration Aspiration Scale; PASS: Practical Aspiration Screening Scheme; V-VST: Volume-Viscosity Swallow Test.

Videofluoroscopic swallowing study was the most used instrumental method ($n = 14$; 61%)^{8,10-13,15,17,18,20,21,27-30}. Three studies (13%) performed fiberoptic endoscopic evaluation of swallowing^{14,22,26}, and two (9%) used pharyngeal manometry^{25,30}. Four studies (17%) carried out a clinical assessment or screening alone, without instrumental assessment^{16,19,23,24}, and one study performed digital cervical auscultation⁹. Also, 70% of the publications defined the IDDSI texture levels evaluated^{9,10,12-15,17-20,24-26,28-30}, with a higher prevalence of levels 0 to 4 (thin, slightly thick, mildly thick, moderately thick, and extremely thick liquids, and liquidized and pureed foods). IDDSI levels were also defined according to the usual oral textures and for dietary recommendations^{8,11,27}. Moreover, 39% of the articles described the volumes tested in the method, with a preference for using 5 mL and 10 mL in most studies^{8,14,17-19,21,26,29,30}.

Discussion

The results of this review showed an increase in the number of publications using IDDSI in swallowing assessments over the last 6 years, with methodological details of the levels used in the assessment protocols in most studies, with the participation of countries from almost all continents.

There was a gradual increase in the number of publications, starting with just one in 2018, and peaking with 7 studies in 2023 – i.e., a 700% increase. Moreover, the use of standardization in various countries such as the USA, Brazil, Canada, China, Italy, Colombia, Turkey, Japan, and so forth reflects how much the scientific dissemination of the IDDSI has helped understand and implement it in clinical practices and research with global reach.

Most publications involved studies with adults and older adults in the same sample, and even those with a similar age range had heterogeneous assessment and diagnostic methods. Older people with cardiovascular, digestive, cerebrovascular, and other diseases were assessed with the water swallowing test and the Volume and Viscosity Swallowing Test (V-VST[®]), with volumes of 5, 10, and 20 mL, and levels from 0 to 3¹⁹. The authors identified a positive correlation between dysphagia impairment and increased IDDSI levels. Another study with older people with various diseases²³ did not assess them with IDDSI; instead, it used the GUSS (Gugging Swallowing Screen) for dysphagia

risk, the ASHA's NOMS (American Speech-Language-Hearing Association's National Outcomes Measurement System) for swallowing functioning, and the GLIM scale (Global Leadership Initiative on Malnutrition) to identify nutritional risk. Nutritional therapies and dietary recommendations were defined after the assessments, following IDDSI. A case study that followed the clinical evolution of an older person with type I muscular dystrophy performed a fiberoptic endoscopic evaluation of swallowing, defining levels 0, 3, and 4, and describing the volumes used (3, 5, and 10 mL). The level of residues in piriform recesses increased, the levels of laryngeal penetration increased with all textures tested, and laryngotracheal aspiration was found with level 0 in the last month.¹⁴

Regarding the pediatric population, a study on the topic was carried out with 39 patients (< 2 years old), after correction of type I laryngeal cleft or deep interarytenoid groove⁸. The dysphagia resolution rate was analyzed with a videofluoroscopic swallowing study at 2, 6, and 12 months of follow-up, using the IDDSI to identify the texture tolerated by patients in the preoperative assessment, with no description of the exact levels in the protocol. Even so, it was a criterion for defining the degree of dysphagia, classifying levels 1 and 2 as mild dysphagia, levels 3 and 4 as moderate dysphagia, and level 4 with aspiration as severe dysphagia. There is a clear need for more pediatric studies with careful methodological designs – i.e., homogeneous samples and detailed protocols.

Three studies approached healthy individuals^{9,20,28}. College students (20 and 30 years old), non-smokers, not overweight, and with a history of head and neck surgery underwent a videofluoroscopic swallowing study with levels 1 to 4, with three different thickeners. They had longer pharyngeal transit time with level 4 than with level 1 ($p < 0.001$) and more pharyngeal residues with a starch-based thickener²⁰. Healthy adults underwent digital cervical auscultation, and the acoustic swallowing signals were similar from levels 0 to 3 and 4 to 7⁹. Another study addressed the pharyngeal phase and bolus location with levels 0 to 4 in healthy individuals²⁸. This highlights the importance of describing the participants' dental and oral hygiene status, besides the usually described clinical conditions.

The publications involved different diagnoses, including neurological^{10,16,17,21,29,30} and respiratory diseases¹⁵⁻²³ and more than one underlying

disease in the same sample^{9,10,24-28}. Swallowing assessments were also heterogeneous. videofluoroscopic swallowing study was the most used instrument^{8,10-13,15,17,18,20,21,27-30}, followed by fiberoptic endoscopic evaluation of swallowing^{14,22,26} and high-resolution pharyngeal manometry^{25,30}. The importance of detailing functional or diagnostic protocols and scales is known, as observed in research that used, for instance, the Modified Barium Swallowing Impairment Profile (MBSImp)^{10,12}, Analysis of Swallowing Physiology: Events, Kinematics, and Timing (ASPEKT)^{13,15,28}, and sensitivity and pharyngeal residue scales¹⁴.

Most studies defined the levels used in their assessment protocols, such as screenings, clinical assessments, and instrumental examinations – which is quite positive. There was a prevalence of assessment with levels 0 to 4 than with levels 5 to 7, involving foods^{9,13-15,17-21,24-26,28-30}.

There was a prevalence of studies analyzing the biomechanics of swallowing, with attention not only to swallowing safety but also to oropharyngeal and esophageal transit. Changes in pharyngeal transit, pharyngeal residues, and changes in esophageal transit, for example, were found after swallowing textures at levels 1, 4, and 7^{10,14,17,30}. Changes related to laryngeal penetration/laryngotracheal aspiration were more frequent when swallowing liquids, especially thin liquids^{14,18}. It is important to describe the volumes offered in swallowing assessments, for better reproducibility of the method, which was not observed in all studies^{10,12,13,16,20,24,25,28}. Studies were found with more generalist definitions of evaluated or recommended textures, which is in line with the IDDSI objective of method transparency and patient safety^{8,10,11,22,23,27}.

The studies used thickeners of various brands and commercial thickened solutions. Patients with dysphagia for liquids had fewer signs of aspiration (cough) with levels 2 and 3 of thickened water and especially with level 4 of thickened solution (gelled water)²⁴. It is worth mentioning that no instrumental evaluation was performed to rule out episodes of silent aspiration. Another study with adults and older adults compared the swallowing of a ready-to-drink gelatinous solution with that of thickened liquid, both at level 2. The authors did not find any difference in the penetration/aspiration scale of the tested liquids, suggesting equivalent swallowing safety²⁶.

The research by Su et al. (2018)¹⁹ identified that liquid samples were classified at one level by the National Dysphagia Diet (NDD) and at different levels by the IDDSI. The use of IDDSI level definitions based on NDD textures was also observed – i.e., the recommended tests were not performed, and they were generically classified as liquids and solids¹². Assessments still use the NDD, but the IDDSI has been used in recommendations and therapy^{12,21}. The IDDSI-FDS (Functional Diet Scale) was used to classify the degree of restriction of oral textures in patients with cerebral palsy, with a prevalence of scores from 5 to 8, which does not lead to major changes in food textures¹⁶. These situations reinforce the extent to which the precision of IDDSI levels makes recommendations safer for patients with dysphagia.

The IDDSI was also used as a marker of clinical evolution (along with biomechanical data from patients with dysphagia after COVID-19)¹¹ and therapy efficacy in patients with stroke sequelae. Improvement was identified in the penetration and aspiration scale with level 1 liquids, after the listed treatments²⁹.

Study limitations

The limitations of this research were its search methodology and data analysis and the heterogeneity of the studies regarding both their population and evaluation methods. Future studies with more robust review methods and more homogeneous samples are recommended to understand the use of the IDDSI in clinical and research practices aimed at diagnosing dysphagia.

Final considerations

Most publications used levels 0 to 4 in clinical or instrumental assessments, but not all studies reported the level and volume offered. Levels higher than 2 were considered safer textures, and level 4 was associated with pharyngeal residues. Also, there is a lack of studies with children. Assessments still use the NDD method, whereas recommendations use the IDDSI. However, the latter has been more effective in achieving the appropriate texture safely than the NDD.

There has been an exponential increase in clinical research using IDDSI in swallowing assessments and oral diet recommendations. The IDDSI has achieved its intended role of increasing feeding

and swallowing safety in populations from various cultures since its method of producing textures can be reproduced anywhere in the world – as demonstrated by the diversity of countries publishing on the subject.

Studies with homogeneous populations and methods are still needed to improve future research.

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