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Review

Excipients in Orodispersible Dosage Forms for Pediatric Use: A Scoping Review of Technological Functions, Pharmaceutical Performance, and Safety

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Abstract

Background: This study aimed to identify and analyze the main excipients used in pediatric orodispersible dosage forms, their technological functions, disintegration mechanisms, and safety aspects. **Methods:** A scoping review was conducted, including studies published between 2008 and 2025 on the development of ODFs, ODTs, and orodispersible mini-tablets (ODMTs) for pediatric use. The identified excipients were grouped by technological function and analyzed for their influence on pharmaceutical performance, sensory acceptability, and safety. **Results:** The results showed that film-forming polymers were the main functional class in ODFs, especially hydroxypropyl methylcellulose (HPMC), polyvinyl alcohol (PVA), pullulan, and maltodextrin. In ODTs and ODMTs, superdisintegrants such as crospovidone, croscarmellose sodium, and sodium starch glycolate were widely used to promote rapid disintegration through wicking and swelling mechanisms. Mannitol was the most frequently used diluent due to its solubility, low hygroscopicity, and contribution to palatability. Sweeteners, including sucralose, xylitol, aspartame, and sodium saccharin, were commonly used for taste masking, whereas glycerol was the main plasticizer in films. **Conclusion:** The selection of excipients plays a critical role in the development of pediatric orodispersible dosage forms, directly influencing disintegration, mechanical properties, palatability, and safety. Film-forming polymers, particularly HPMC, PVA, and pullulan, were prominent in ODFs, whereas superdisintegrants such as crospovidone, croscarmellose sodium, and sodium starch glycolate were frequently used in ODTs. These findings highlight the importance of selecting excipients according to their technological functions and age-related safety profiles, while emphasizing the need for further evidence on their long-term safety and clinical acceptability in pediatric populations.

Keywords: pediatrics; ODF; ODT; children; disintegrants; excipients

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1. Introduction

The pediatric population comprises a highly heterogeneous group, ranging from premature newborns to adolescents, with marked differences in physiology, growth, development, swallowing ability, and dose requirements. These characteristics pose significant challenges to the development of medicines that are safe, effective, acceptable, and suitable across different pediatric age groups [1–3]. Despite these needs, the development

of child-specific formulations has historically been limited, resulting in a shortage of age-appropriate medicines and contributing to the frequent use of drugs under off-label or unlicensed conditions [1,3].

In clinical practice, the lack of suitable pediatric dosage forms often leads caregivers and healthcare professionals to manipulate adult formulations, mainly by crushing tablets or opening capsules to obtain smaller doses [1,3–5]. Although these procedures may be necessary in the absence of appropriate alternatives, they can compromise dose accuracy, physicochemical stability, and drug bioavailability, and expose children to excipients that may be unsuitable for their age group [5–7]. These risks are particularly relevant in younger children, who frequently experience difficulty swallowing conventional solid dosage forms, such as tablets and capsules, which may lead to fear of choking and reduced treatment adherence [2,8,9].

Liquid formulations are commonly used in pediatrics because they facilitate administration and allow flexible dose adjustment. However, they also present important limitations, including microbiological instability, the need for preservatives, volume measurement errors, and higher storage and transportation costs [10–12]. In addition, palatability remains a critical determinant of therapeutic success, since the bitter taste of many drugs is one of the main causes of treatment refusal in children [5,13]. Therefore, there is a growing demand for pediatric formulations that combine safety, efficacy, dose accuracy, acceptability, and ease of administration [7,14]. Figure 1 summarizes the main limitations of conventional pediatric dosage forms and highlights the potential of orodispersible dosage forms as patient-centered alternatives.

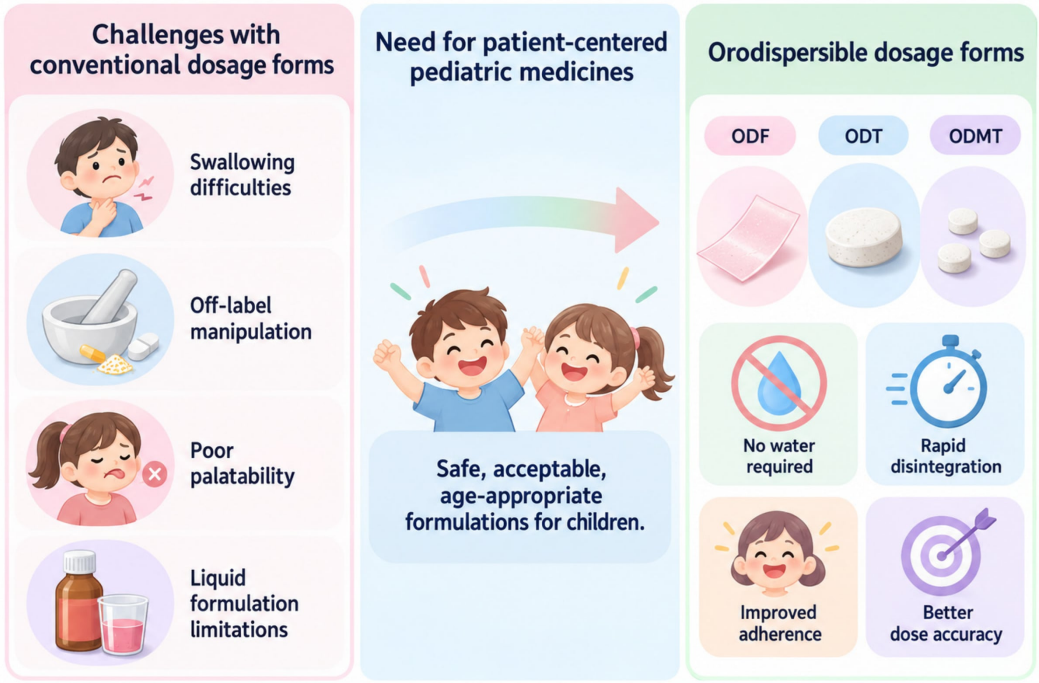

Figure 1. Main limitations of conventional pediatric dosage forms and the potential advantages of orodispersible dosage forms as patient-centered alternatives, including orodispersible films (ODFs), orally disintegrating tablets (ODTs), and orodispersible mini-tablets (ODMTs). The figure was created using artificial intelligence and subsequently reviewed by the authors (OpenAI, "ChatGPT (version Plus—Thinking)," 2026. Available: https://chatgpt.com/).

In response to this scenario, international regulatory agencies, such as the Food and Drug Administration (FDA) and the European Medicines Agency (EMA), have encouraged the development of pediatric patient-centered medicines through specific guidelines and

regulatory requirements, including the submission of Pediatric Investigation Plans (PIPs) for new chemical entities [3,15,16]. These initiatives have supported the development of innovative dosage forms capable of overcoming the limitations of conventional formulations, among which orodispersible dosage forms have gained increasing attention [17].

Orodispersible dosage forms include orodispersible films (ODFs), orally disintegrating tablets (ODTs), and orodispersible mini-tablets (ODMTs). ODFs are thin strips mainly composed of hydrophilic polymers that rapidly disintegrate or dissolve in saliva after oral administration [18]. ODTs are single-dose solid dosage forms designed to rapidly disintegrate in the oral cavity without water or chewing [7,8,19]. ODMTs represent a particularly relevant alternative for pediatric patients, as their small diameter, generally below 3 mm, may further facilitate administration to infants and young children [9–11].

These dosage forms offer several clinical and technological advantages, including administration without water, improved acceptability, easier transportation and storage, and reduced risk of choking [3,5]. Compared with liquid formulations, they may also provide greater dose accuracy and better stability [10,11,20,21]. Furthermore, partial absorption through the oral mucosa may increase the bioavailability of certain drugs by reducing gastrointestinal degradation and hepatic first-pass metabolism [14,22]. Nevertheless, important technological challenges remain, including the need for efficient taste masking due to direct drug exposure to taste buds, limited drug loading capacity in some systems, moisture sensitivity, and the need to ensure adequate mechanical strength [2,5,16].

Excipients play a central role in the development of orodispersible dosage forms, as they determine not only technological performance but also sensory acceptability and pediatric safety [23]. In ODFs, film-forming polymers such as hydroxypropyl methylcellulose (HPMC), polyvinyl alcohol (PVA), pullulan, and maltodextrin form the structural matrix responsible for mechanical properties and disintegration behavior [18]. Their concentration may directly affect the disintegration rate, since the closure of capillary pores can delay saliva penetration into the polymeric matrix [2]. Plasticizers, such as glycerol and propylene glycol, are commonly added to increase flexibility and prevent film brittleness [23].

In ODTs and ODMTs, excipients such as diluents, binders, co-processed systems, and superdisintegrants are essential to achieve rapid disintegration, adequate mechanical resistance, and acceptable mouthfeel. Mannitol is widely used due to its high solubility, low hygroscopicity, and cooling sensation in the oral cavity [7,10]. Co-processed excipients, including Ludiflash®, Pharmaburst®, and F-Melt®, have also been increasingly explored because of their improved flowability and compressibility [14,24,25]. Rapid tablet disintegration is primarily driven by superdisintegrants such as crospovidone, croscarmellose sodium, and sodium starch glycolate, which act via wicking and swelling mechanisms upon contact with saliva [7,19,26].

However, excipient selection must consider not only technological functionality but also age-related safety, especially in newborns and infants. Whenever possible, inert, non-toxic, and well-tolerated substances, preferably recognized as safe, should be selected [2,5,23]. In this context, the STEP (Safety and Toxicity of Excipients for Pediatrics) database is a valuable resource for assessing the suitability and safety of excipients used in pediatric medicines [27]. Developed by the European Pediatric Formulation Initiative (EuPFI), in collaboration with the United States Pediatric Formulation Initiative (USPFI), it compiles safety and toxicity information on excipients from the scientific literature and regulatory sources. The database allows searches by excipient, route of administration, and age group, gathers nonclinical and clinical toxicity data, including pediatric-specific data, and provides information on regulatory status and exposure limits, when available [27].

Considering the growing relevance of orodispersible dosage forms for pediatric drug administration, this review aims to identify and analyze the key excipients used in ODFs,

ODTs, and ODMTs intended for children, focusing on their technological functions, disintegration mechanisms, and their influence on pharmaceutical performance and drug release. In addition, this review discusses pediatric safety aspects related to these excipients, including potential toxic effects, regulatory suitability, and risks associated with the use of organic solvents and their residues in orodispersible formulations.

2. Materials and Methods

A scoping review was conducted, including studies on the development of orodispersible films (ODFs), orally disintegrating tablets (ODTs), and orodispersible mini-tablets (ODMTs) for pediatric use. The identified excipients were grouped by technological function and analyzed for their influence on pharmaceutical performance, sensory acceptability, and safety.

This review was conducted following the Joanna Briggs Institute's recommendations for scoping reviews, and the data were reported according to the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines, which are available in the Supplementary Material [28,29]. The study protocol is available at OSF (https://osf.io/vhb6s/overview, accessed on 16 November 2026).

2.1. Research Strategy

The literature search was conducted in PubMed, Scopus, and Web of Science, with no restrictions regarding publication date or language. The search was last updated on 9 July 2026. A specific search strategy was used for each database (Supplementary Material Table S1). Descriptors related to the pediatric population, orodispersible solid dosage forms, and excipients were combined using the Boolean operators "OR" and "AND". ODMTs were considered within the broader category of orally disintegrating tablets ODTs, rather than as a separate dosage form in the search strategy. The search term "tablet*" was used to retrieve records referring to different tablet presentations, potentially including mini-tablets, depending on database indexing and terminology.

A manual search was also performed by screening the reference lists of the included articles. The search terms were applied to titles, abstracts, and keywords and were adapted according to the requirements of each database.

2.2. Eligibility Criteria

The eligibility criteria followed the PCC framework, which stands for Population, Concept, and Context. The population comprised pediatric patients from birth to 18 years of age, including preterm and term newborns, infants and toddlers, children, and adolescents, according to the ICH E11(R1) age classification. Formulations explicitly designed, developed, or evaluated for pediatric use were eligible, even when tests were not performed in pediatric subjects. The concept encompassed orodispersible dosage forms, including ODFs and ODTs. ODMTs were considered a subcategory of ODTs due to their similar disintegration characteristics and reduced dimensions, which make them particularly suitable for pediatric administration. Accordingly, studies investigating ODMTs were eligible for inclusion when they met the predefined criteria for orally disintegrating tablets. The context focused on the excipients used in these formulations, considering their technological functions, frequency of use, pharmaceutical performance, and safety, in pharmaceutical development and evaluation studies conducted in any setting (in vitro, ex vivo, in vivo, or in human volunteers). These elements were used to formulate the guiding research question: "Which excipients are most commonly used in orodispersible films and orally disintegrating tablets, including mini-tablets, developed for pediatric administration, and what are their technological functions?"

Only original research articles describing the development, preparation, and evaluation of ODFs, ODTs, or ODMTs intended for pediatric use were eligible for inclusion, provided that the excipients employed were identified and their technological roles or formulation-related properties were described. Articles describing the development of ODTs and oral films intended exclusively for adults or older adults were excluded. Studies addressing the development of formulations intended for other routes of administration and those without a description of excipients were also considered ineligible. Reviews, case reports, errata, study protocols, conference abstracts, books, and book chapters were excluded.

2.3. Study Selection

Study selection was performed in two stages. First, two reviewers independently screened the titles and abstracts of records retrieved from the databases, then reached consensus. After this initial screening, the selected studies were read in full to assess compliance with the inclusion criteria. Articles excluded at the full-text stage were identified, and the reasons for exclusion were documented (Supplementary Material Table S2). Studies that met the eligibility criteria underwent systematic data extraction by two reviewers. The entire inclusion process was reported in a flowchart adapted from PRISMA with the extension for scoping reviews (PRISMA-ScR) [29]. This flowchart outlines the steps of identification, screening, eligibility assessment, and outcome (including the number of studies included and excluded).

2.4. Data Extraction and Synthesis

Data were extracted, organized, and stored by two independent reviewers in a Microsoft Excel® spreadsheet. The extracted variables included first author and year of publication, country, type of formulation, dosage form preparation technique, main disintegrating system, disintegration time, use of sweeteners, use of solvents in the preparation method, and the main parameters evaluated in each study (Supplementary Material Table S3).

The extracted data were analyzed using descriptive statistics to summarize the frequency and distribution of the main variables across the included studies. Graphs showing the distribution of studies by year, country, dosage form, disintegrating system, and disintegration time were generated using Microsoft Excel®.

The operational definitions, categories, and coding rules for each variable are provided in Supplementary Material Table S3. Country was assigned according to the affiliation of the corresponding author. Type of formulation was classified as ODF, ODT, or ODMT according to the authors' description, with ODMTs analyzed as a subcategory of ODTs. The main disintegrating system was defined as the main film-forming polymer for ODFs and as the superdisintegrant or co-processed platform responsible for disintegration for ODTs and ODMTs. Disintegration time was recorded for the optimized or final formulation, as reported by the authors, and grouped into <30 s, 30–60 s, and >60 s. Use of sweeteners was recorded as present or absent, with identification of the substance. Use of solvents was classified as aqueous, aqueous–organic, organic, or solvent-free. Variables not reported in the original study were coded as "NR", and those not applicable as "N/A".

In addition, an evidence-mapping approach was applied to synthesize the relationships among dosage forms, formulation characteristics, and evaluated outcomes. The Evidence Gap Map was generated with the support of ChatGPT (OpenAI, "ChatGPT (version Plus—Thinking)," 2026. Available: https://chatgpt.com/), based on the data extracted from the spreadsheet and the thematic categories identified in the review. The resulting map was subsequently checked and validated by the authors to ensure consistency with the extracted data and with the interpretation of the included studies.

2.5. Use of Artificial Intelligence-Assisted Tools

ChatGPT (OpenAI, 2026; https://chatgpt.com/) was used to support English-language editing and improve the clarity, grammar, and readability of selected passages of the manuscript. In addition, OpenAI's image-generation functionality within ChatGPT was used to create the graphical abstract and selected conceptual illustrations representing pediatric orodispersible dosage forms, excipient functions, and disintegration mechanisms.

ChatGPT was also used to support the development of the Evidence Gap Map through the organization and graphical representation of information from the data extraction spreadsheet. The quantitative charts describing publication characteristics, dosage forms, disintegrating systems, and disintegration times were generated using Microsoft Excel®.

All AI-assisted figures and graphical representations were reviewed by the authors to verify their scientific accuracy, consistency with the extracted data, and relevance to the manuscript. Generative AI was not used to conduct literature searches, select studies, independently extract data, or establish scientific conclusions. The authors take full responsibility for the accuracy, validity, and integrity of the final manuscript.

3. Results

Overall, 841 records were identified through database searches. After duplicate removal, 556 records were screened by title and abstract; 369 were excluded for not meeting the study objectives. Of the 141 full-text articles assessed for eligibility, 83 were excluded according to the predefined eligibility criteria. Finally, 57 studies met all inclusion criteria and were included for evidence synthesis (Figure 2). Details of the studies excluded after full-text assessment are available in the Supplementary Material (Table S2).

The studies included in this review were published between 2008 and 2025, highlighting a consolidated research field undergoing continuous technological evolution. A broad geographical distribution of scientific production was observed, with contributions from different regions of the world, including Romania [30,31], Italy [5,32,33], Spain [25,34], Argentina [11,19], Thailand [9,35,36], Turkey [14,37], China [38], India [21,39], Egypt [18], Finland [40], Vietnam [17], and the United Kingdom [41]. This overview demonstrates the global interest in the development of orodispersible dosage forms intended for the pediatric population.

The included studies were conducted in 25 countries across five continents. Europe and Asia accounted for most publications ([21 studies each; 39.6%]), followed by Africa ([$n = 5$; 9.4%]), South America ([$n = 4$; 7.5%]), and North America ([$n = 2$; 3.8%]), and no study from Oceania was identified. India ([$n = 6$; 11.3%]), Romania ([$n = 5$; 9.4%]), and Egypt ([$n = 4$; 7.5%]) were the most frequent countries and together accounted for [28.3%] of the studies, whereas 12 countries contributed a single study each.

Among the 57 included studies, 27 investigated ODFs, 29 focused on ODTs and ODMTs, and 1 evaluated both dosage forms. This distribution demonstrates that both formulation platforms were represented in the included literature, providing a basis for comparing their excipient compositions, technological functions, and pharmaceutical characteristics.

The preparation techniques identified in the included studies varied according to the type of orodispersible dosage form. For ODFs, the methods ranged from conventional solvent casting to advanced technologies such as electrospinning, 2D/3D printing, and solvent-free vacuum forming. For ODTs, direct compression was the most frequently described approach, although wet granulation, sublimation, and 3D printing by semi-solid extrusion were also reported. Table 1 summarizes the main preparation techniques used for pediatric orodispersible dosage forms, highlighting their technological characteristics and formulation requirements.

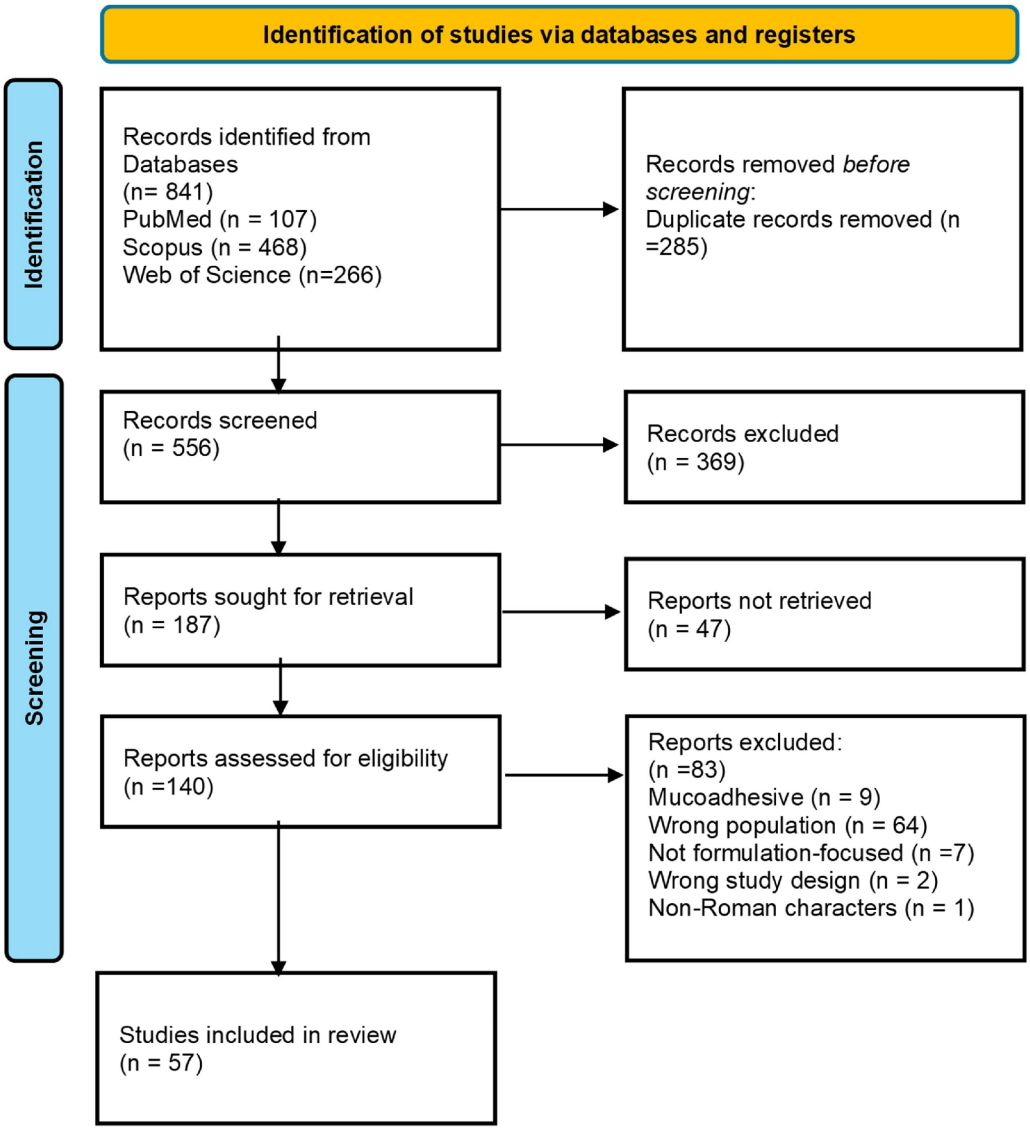

Figure 2. Scoping review flowchart. Source: PRISMA-ScR [29].

Table 1. Main preparation techniques used for pediatric orodispersible dosage forms and their technological characteristics.

Technique	Description	Technological Characteristic
	ODF	
Solvent casting	This is the most widely used method due to its simplicity and low cost. It consists of dissolving the drug and excipients in a solvent, followed by spreading and controlled drying of the mixture [3,17,42].	It uses soluble film-forming polymers and plasticizers to ensure flexibility and prevent film breakage [17,36].
Electrospinning	This technique is used to create nanofibers that form highly porous nonwoven mats with a large surface area, allowing ultra-rapid disintegration [33,43].	It uses polymers capable of forming uniform nanofibers, often without the need for plasticizers, resulting in highly porous films with disintegration times below 5 s [33,43].

Table 1. *Cont.*

Technique	Description	Technological Characteristic
Two-dimensional printing	This technique allows precise drug deposition onto edible substrates using pharmaceutical inks [40].	Semi-solid extrusion requires gels with controlled viscosity, whereas inkjet printing requires low-viscosity formulations and substrates suitable for drug deposition [40].
Three-dimensional printing	Additive manufacturing techniques enable the production of personalized orodispersible films with controlled drug loading, geometry, thickness, and dose distribution. Depending on the technology, films may be produced through semi-solid extrusion, fused deposition modeling, or other suitable layer-by-layer deposition approaches [40,44].	Both solvent-containing and solvent-free processes may be employed. Semi-solid extrusion requires formulations with suitable rheological properties, whereas thermoplastic extrusion-based techniques require polymers with appropriate thermal and mechanical characteristics. The selection of the printing technique depends on drug stability, polymer compatibility, and the desired film properties [40,44].
Vacuum forming	This technique has been identified as an innovative solvent-free method that uses heat and vacuum to fuse powder mixtures into compact films, being useful for thermosensitive drugs and small-scale production [30].	It uses thermoplastic polymers and heat-resistant plasticizers, allowing solvent-free processing without drug degradation [30].
	ODT	
Direct compression	This is the most frequently cited technique due to its simplicity, low cost, and ability to preserve the stability of thermolabile drugs. Its efficiency critically depends on the flowability and compressibility of the powder blend [7,10,37].	As the most cost-effective technique, it requires excipients with high flowability and binding capacity. The use of co-processed platforms, such as F-Melt® and Prosolv® ODT, is essential to ensure dose uniformity and mechanical strength [7,10,37].
Wet granulation	This technique is used to improve the flow properties of fine powders or to incorporate inclusion complexes [13,45].	The selection of binders such as povidone (PVP) is crucial to improve powder flow properties, although the process requires greater moisture control to avoid drug degradation [10,26].
Three-dimensional printing	Different additive manufacturing techniques, including semi-solid extrusion, fused deposition modeling, binder jetting, and selective laser sintering, can be employed to produce personalized tablets with controlled geometry, porosity, drug loading, and disintegration properties [15,34,44,46].	Depending on the printing technique, manufacturing may involve solvent-containing or solvent-free processes. Binder jetting uses a liquid binder deposited onto a powder bed to produce porous structures, whereas fused deposition modeling and selective laser sintering can operate without solvents but may expose drugs to elevated temperatures. Semi-solid extrusion requires suitable paste viscosity and structural stability. The first FDA-approved 3D-printed medicine, Spritam® (levetiracetam), was manufactured using binder-jetting-based ZipDose® technology [15,34,44,46].
Sublimation	This technique is used to produce porous tablets by incorporating sublimable agents, such as ammonium bicarbonate, which markedly accelerates water penetration and tablet disintegration [19].	It uses agents such as ammonium bicarbonate to create a highly porous structure after compression, maximizing disintegration performance and allowing harder tablets to disintegrate within a few seconds [19].

3.1. Main Orodispersible Excipients Used in Pediatric Formulations

The excipients identified in the included studies were classified by their technological functions and critically examined with respect to formulation applications, advantages, limitations, and pediatric safety considerations. Table 2 provides a comparative overview of the main excipients employed in ODFs, ODTs, and ODMTs, highlighting their roles in pharmaceutical performance, suitability for different manufacturing techniques, and potential safety concerns in pediatric populations [47–49].

In ODFs, film-forming polymers represented the main functional class, as they constitute the structural matrix and directly influence mechanical properties, hydration, and disintegration behavior. Among them, hydroxypropyl methylcellulose (HPMC) was one of the most frequently reported polymers [15], followed by polyvinyl alcohol (PVA) [50]. Natural polymers were also identified, including pullulan [33] and maltodextrin [18], as well as hydroxypropyl cellulose (HPC), polyethylene oxide (PEO), sodium carboxymethylcellulose (sodium CMC), and modified starches [18,22,38,39,51]. The selection of film-forming polymers involves balancing mechanical integrity and rapid disintegration, since higher polymer concentrations or viscosity may delay hydration and matrix erosion. Plasticizers may improve film flexibility, although their concentration must be carefully adjusted to avoid excessive tackiness and moisture sensitivity. Furthermore, although superdisintegrants are traditionally associated with tablet formulations, crospovidone, sodium starch glycolate, and croscarmellose sodium have also been incorporated into ODFs to promote faster disintegration [22,30].

In ODTs and ODMTs, superdisintegrants were particularly relevant to pharmaceutical performance, as they facilitate rapid water penetration and disruption of the compressed matrix. The most frequently reported substances were crospovidone (PVPP/XPVP) [8,37], croscarmellose sodium [7,11], sodium starch glycolate [19,26], and soy polysaccharides [52]. Although these excipients share the objective of accelerating disintegration, their mechanisms differ; crospovidone primarily promotes capillary water uptake, whereas croscarmellose sodium and sodium starch glycolate exhibit pronounced swelling behavior [49]. Consequently, their selection should consider the formulation composition, compression conditions, and the balance between tablet mechanical strength and disintegration efficiency. These technological considerations are particularly important for pediatric formulations, in which rapid disintegration must be achieved without compromising dose uniformity, palatability, or safety.

The information presented in Table 2 was supported by references from the included studies and complementary pharmaceutical literature, with particular emphasis on the technological characteristics of excipients and their pediatric safety considerations.

Table 2. Critical appraisal of the main excipients used in pediatric orodispersible dosage forms: technological applications, advantages, limitations, and safety considerations.

Excipient/Function	Pharmaceutical Applications and Advantages	Technological Limitations	Typical Concentration	Pediatric Safety Considerations	Ref.
Hydroxypropyl methylcellulose (HPMC)—Film-forming polymer	ODFs; promotes uniform film formation, mechanical strength, and controlled hydration. Suitable for solvent casting.	High polymer concentration or viscosity may delay disintegration and drug release.	Formulation-dependent; no single established range.	Generally well tolerated in oral formulations; polymer grade and exposure should be considered.	[18,35,48]
Polyvinyl alcohol (PVA)—Film-forming polymer	ODFs; provides film integrity, flexibility, and good mechanical properties.	Dissolution behavior depends on molecular weight and degree of hydrolysis.	Formulation-dependent.	Generally favorable oral-use profile; grade and exposure require evaluation.	[48,50]

Table 2. *Cont.*

Excipient/Function	Pharmaceutical Applications and Advantages	Technological Limitations	Typical Concentration	Pediatric Safety Considerations	Ref.
Pullulan—Film-forming polymer	ODFs; facilitates rapid hydration, film formation, and favorable mouthfeel.	Moisture sensitivity and limited drug-loading capacity may affect formulation performance.	Formulation-dependent.	Food-derived polysaccharide; pharmaceutical-grade quality and pediatric exposure should be assessed.	[33,48]
Maltodextrin—Film-forming polymer/carrier	ODFs; water-soluble, inexpensive, and suitable for rapidly dissolving matrices.	May require combination with other polymers to improve mechanical properties.	Formulation-dependent.	Carbohydrate exposure should be considered in patients requiring glycemic control.	[18,48]
Crospovidone—Superdisintegrant	ODTs/ODMTs; promotes rapid water uptake through capillary action (wicking), with limited gel formation. Suitable for direct compression.	Performance depends on particle size, excipient grade, and compression conditions.	2–5% *w*/*w*	Established oral pharmaceutical use; evaluate excipient grade and total exposure.	[26,49]
Croscarmellose sodium—Superdisintegrant	ODTs/ODMTs; promotes rapid swelling and water penetration, accelerating tablet disintegration.	Excessive swelling may affect tablet texture and disintegration performance.	0.5–5% *w*/*w*	Generally well tolerated at conventional pharmaceutical concentrations.	[19,26,49]
Sodium starch glycolate—Superdisintegrant	ODTs/ODMTs; promotes rapid disintegration through pronounced swelling.	Excessive concentrations may promote gel formation and impair drug dissolution.	2–8% *w*/*w*	Formulation-specific exposure should be assessed.	[19,26,49]
Mannitol—Diluent/sweetener	ODTs/ODMTs; improves palatability through sweetness and a cooling sensation. Water-soluble and relatively non-hygroscopic.	Limited compactability when used alone; may require additional binding excipients.	Depends on tablet composition.	High oral exposure may cause osmotic gastrointestinal effects.	[7,10,48]
Microcrystalline cellulose (MCC)—Diluent/binder	ODTs/ODMTs; improves powder compressibility and tablet mechanical strength. Particularly useful in direct compression.	High concentrations may compromise mouthfeel and delay disintegration.	Depends on tablet composition.	Established oral use; particle characteristics and exposure should be considered.	[7,10,48]
Glycerol—Plasticizer	ODFs; increases flexibility and reduces brittleness of polymeric films.	Excessive concentrations may increase tackiness and moisture uptake.	Depends on polymer-to-plasticizer ratio.	Generally well tolerated; high oral exposure may cause gastrointestinal effects.	[3,23,48]
Propylene glycol—Plasticizer/cosolvent	ODFs; enhances film flexibility and improves the solubilization of poorly water-soluble drugs.	Hygroscopicity and concentration-dependent changes in film properties.	Formulation-dependent.	Particular caution is required in neonates and premature infants because of limited metabolic capacity and potential toxicity.	[3,48]
Sucralose—Sweetener	ODFs/ODTs; provides intense sweetness at relatively low concentrations and improves palatability.	Taste-masking efficiency depends on drug properties and formulation composition.	Formulation-dependent.	Pediatric exposure and formulation acceptability should be evaluated.	[32,48]
Aspartame—Sweetener	ODFs/ODTs; improves palatability and masks unpleasant drug taste.	Stability may be affected by processing conditions, temperature, and pH.	Formulation-dependent.	Contains phenylalanine and must be avoided in patients with phenylketonuria.	[8,48]
Sodium saccharin—Sweetener	ODFs/ODTs; provides intense sweetness at low concentrations.	May produce a bitter or metallic aftertaste.	Formulation-dependent.	Total exposure should be considered when selecting pediatric formulations.	[39,48]

Table 2. *Cont.*

Excipient/Function	Pharmaceutical Applications and Advantages	Technological Limitations	Typical Concentration	Pediatric Safety Considerations	Ref.
Xylitol—Sweetener/diluent	ODFs/ODTs; provides sweetness, cooling sensation, and improved sensory acceptability.	High concentrations may affect formulation properties and gastrointestinal tolerability.	Formulation-dependent.	Excessive oral intake may produce osmotic gastrointestinal effects.	[3,48]
Polysorbate 80—Surfactant/solubilizer	Primarily ODFs; improves wetting, drug dispersion, and solubilization of poorly water-soluble compounds.	Potential formulation compatibility and chemical stability issues.	Formulation-dependent.	Pediatric safety assessment should consider age, administered amount, and route of exposure.	[48,53]

ODFs, orodispersible films; ODTs, orally disintegrating tablets; ODMTs, orodispersible mini-tablets; *w*/*w*, weight/weight. The technological characteristics, advantages, limitations, and pediatric safety considerations presented in this table were summarized from the included studies and complementary pharmaceutical literature, as indicated in the References column. Typical concentration ranges refer to general pharmaceutical applications, unless otherwise specified, and should not be interpreted as pediatric exposure limits. The Safety and Toxicity of Excipients for Pediatrics (STEP) database represents an important resource for evaluating excipient safety in pediatric formulations; however, individual database entries were not systematically verified in the present review. Therefore, the safety considerations presented should not be interpreted as STEP-based assessments or as confirmation of safety across all pediatric age groups and exposure levels [27,48].

Regarding disintegration time (Figure 3), the values reported in the included studies were mapped, showing that most orodispersible films and tablets intended for pediatric use disintegrated in less than 60 s (<60 s). This finding indicates the high efficiency of these pharmaceutical matrices. However, direct comparison between studies should be interpreted with caution, since there is still no universally standardized methodology for evaluating the disintegration of orodispersible films and tablets. Therefore, methodological differences among studies may significantly influence reported times, limiting comparability of data and potentially leading to different interpretations of formulation performance.

Diluents were present in both technologies. Mannitol was one of the most recurrent excipients due to its high solubility, low hygroscopicity, and sweet taste [7,37]. Other identified diluents included lactose [16,34,40], sorbitol [19], xylitol [30], and microcrystalline cellulose [7,10].

In ODFs, plasticizers played an essential role in providing flexibility and preventing brittleness of the film-forming matrix. Glycerol was the most frequently used plasticizer [3,23], followed by PEG 400 and propylene glycol [18]. Another widely observed category comprised sweeteners and flavoring agents, which were used to improve pediatric acceptability by masking unpleasant taste. The identified sweeteners included sucralose [24,32,36], sodium saccharin [39], aspartame [8,14], xylitol [54], and thaumatin [23]. Banana, strawberry, mint, and orange flavors were frequently used in ODT formulations [8,14,52].

Surfactants and solubilizing agents were also identified, particularly in ODFs. Tween 80 (polysorbate 80) was highlighted as an excipient used to improve the solubility of poorly soluble drugs [53]. Regarding the solvents used in film manufacturing, purified water was the most frequently used vehicle due to its favorable pediatric safety profile [6,55]. However, ethanol was often used as a cosolvent to facilitate the solubilization of lipophilic drugs or to accelerate formulation drying [28,51], while acetone was occasionally identified in some formulations [56].

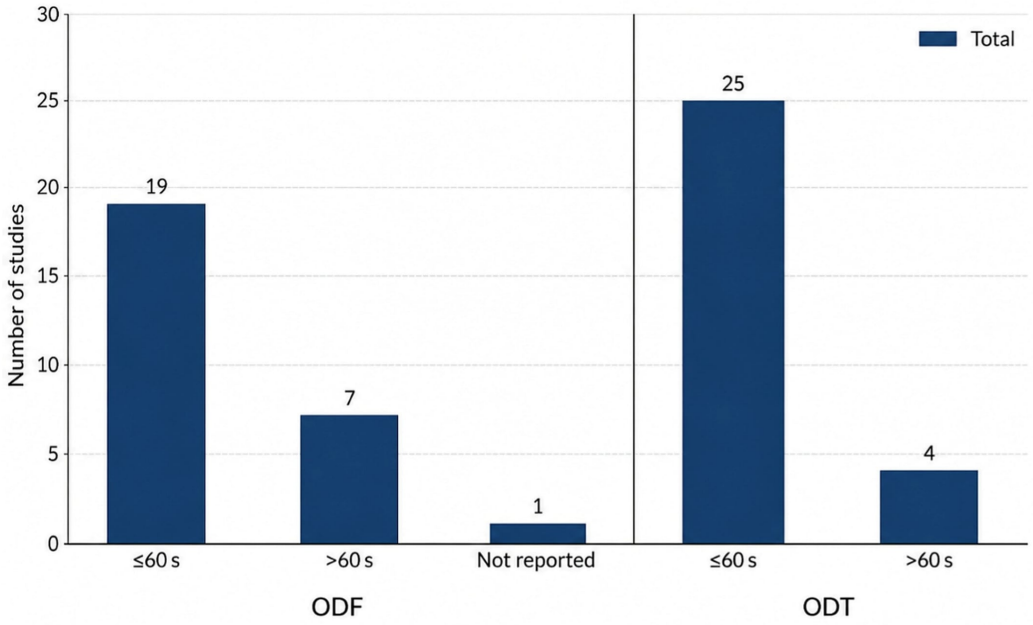

Figure 3. Disintegration time reported for pediatric orodispersible dosage forms. Distribution of disintegration times reported for pediatric orodispersible dosage forms. The category > 60 s includes studies reporting disintegration times exceeding 60 s. The upper limit of this category could not be determined from the extracted data, as exact maximum values were not consistently available.

3.2. Technological Patterns Identified in Pediatric Orodispersible Dosage Forms

The analysis of the included studies revealed several technological patterns associated with the development of pediatric orodispersible dosage forms. These patterns reflect the formulation strategies and manufacturing approaches identified in the reviewed literature rather than statistically established temporal trends. The main differences were associated with excipient selection, dosage form characteristics, manufacturing techniques, and approaches to dose personalization.

In ODFs, HPMC combined with plasticizers such as glycerol was frequently described as a film-forming system due to its favorable mechanical properties and compatibility with solvent casting technique [30,33]. Natural polymers, including pullulan and maltodextrin, were also investigated as alternative film-forming materials, particularly in formulations designed to achieve rapid disintegration and relatively simple compositions [30,33]. These findings illustrate different technological approaches to balancing film integrity, flexibility, and disintegration performance.

In ODTs, co-processed excipients, such as Ludiflash® and Pharmaburst®, were identified as strategies to improve powder flowability, compressibility, and disintegration performance [24,37]. Their use may simplify formulation development by combining complementary technological properties within a single excipient system. Nevertheless, the findings should be interpreted as evidence of their use in pediatric formulation research rather than as proof of increased adoption.

Important differences between the technologies were also observed. While ODTs mainly depend on matrix porosity and the mechanical action of superdisintegrants to promote rapid disintegration, ODFs predominantly rely on hydration and dissolution of the polymeric matrix [36]. Furthermore, ODFs are generally more suitable for low-dose drugs because their drug-loading capacity is constrained by the film's limited dimensions and thickness, and by the need to incorporate sufficient film-forming polymers, plasticizers, and other excipients to ensure adequate mechanical properties, flexibility, and rapid disintegration. Drug solubility represents an additional limitation, particularly in solvent-based

manufacturing techniques and inkjet printing, where the drug must be sufficiently soluble in the printing vehicle to achieve the intended dose. Nevertheless, higher drug loads may be achieved through alternative formulation strategies, including drug suspensions, multilayer deposition, and other manufacturing approaches. In contrast, ODTs generally offer greater flexibility for incorporating higher drug doses [36,57].

The search for therapeutic personalization strategies was also evident. The development of orodispersible mini-tablets enables greater dose flexibility for newborns, infants, and young children [9–11]. Similarly, 2D and 3D printing technologies have been explored to enable individualized dose adjustment according to the needs of pediatric patients [30].

Another observed trend is the incorporation of advanced technologies to improve the biopharmaceutical performance of formulations. Organic solvent-free techniques, such as vacuum compression molding (VCM) and hot-melt extrusion (HME), have emerged as promising alternatives to minimize risks associated with residual solvents [43]. In addition, nanotechnology-based strategies, including nanocrystals and coated microparticles, have been employed to increase bioavailability and promote more efficient taste masking [43]. In ODTs, technologies such as 3D printing by semi-solid extrusion and sublimation have also been investigated to obtain highly porous structures and extremely short disintegration times [15,19,23].

4. Discussion

4.1. Role of Excipients in Pediatric Orodispersible Dosage Forms

The excipients used in pediatric orodispersible dosage forms do not act merely as inert components of the formulation; rather, they play a decisive role in pharmaceutical performance, stability, sensory acceptability, and drug safety [3,23]. In ODTs and ODFs, the appropriate selection of these components must balance sufficient mechanical strength for handling and storage with rapid disintegration after oral administration [7,10].

In ODFs, film-forming polymers constitute the main functional structure of the formulation. Polymers such as HPMC, PVA, pullulan, and maltodextrin directly influence the mechanical strength, flexibility, and disintegration rate of films [18,33,50]. The combination of polymers with plasticizers, particularly glycerol, enables the production of flexible, durable matrices, thereby reducing the system's brittleness [23].

In ODTs, pharmaceutical performance is strongly influenced by diluents and superdisintegrants. Mannitol stands out for its high solubility, low hygroscopicity, and cooling sensation in the oral cavity, although it has limited compactability when used alone [10,37]. To overcome these limitations, the use of co-processed excipients has increased, as they can combine materials with different deformation mechanisms to produce tablets with high hardness and low friability without compromising disintegration [9,24,37].

Sensory acceptability is a critical factor for both technologies. Sweeteners, flavoring agents, and taste-masking agents are essential for reducing the perception of drug bitterness and increasing pediatric treatment adherence. Compounds such as sucralose, aspartame, sodium saccharin, xylitol, and thaumatin are widely used for this purpose [8,23,32,36].

4.2. Disintegration Mechanisms of Orodispersible Dosage Forms

Although ODFs and ODTs share the objective of promoting rapid drug release in the oral cavity, they present distinct disintegration mechanisms. In ODFs, the process begins with saliva penetration into the polymeric matrix, followed by hydration of the polymer chains and subsequent swelling of the structure [35]. The rate of this phenomenon depends on the physicochemical characteristics of the polymers used. Hydrophilic and non-ionic polymers, such as HPMC and pullulan, favor rapid water uptake and accelerate film disintegration [33,58]. After swelling, matrix erosion and system dissolution occur,

culminating in drug release for oromucosal absorption or gastrointestinal absorption after swallowing [3]. Microscopic evidence shows that macroscopically observed disintegration is preceded by structural collapse of the polymeric network at the microscale [6].

In ODTs and ODMTs, rapid rupture of the compressed matrix is mainly promoted by superdisintegrants. The wicking mechanism is predominant in crospovidone, whose highly porous structure facilitates saliva penetration without gel formation, significantly reducing disintegration time [24,26]. In contrast, croscarmellose sodium and sodium starch glycolate act predominantly by swelling, expanding their volume after hydration and generating internal forces that disrupt the compressed matrix [19,26]. Another relevant mechanism is deformation recovery, mainly observed in crospovidone and croscarmellose sodium, which partially regain their original shape upon hydration, thereby contributing to rapid disintegration [19,37]. The main disintegration mechanisms of ODFs and ODTs are schematically illustrated in Figure 4, highlighting the distinct roles of polymer hydration, matrix erosion, capillary action, and superdisintegrant swelling in promoting drug release.

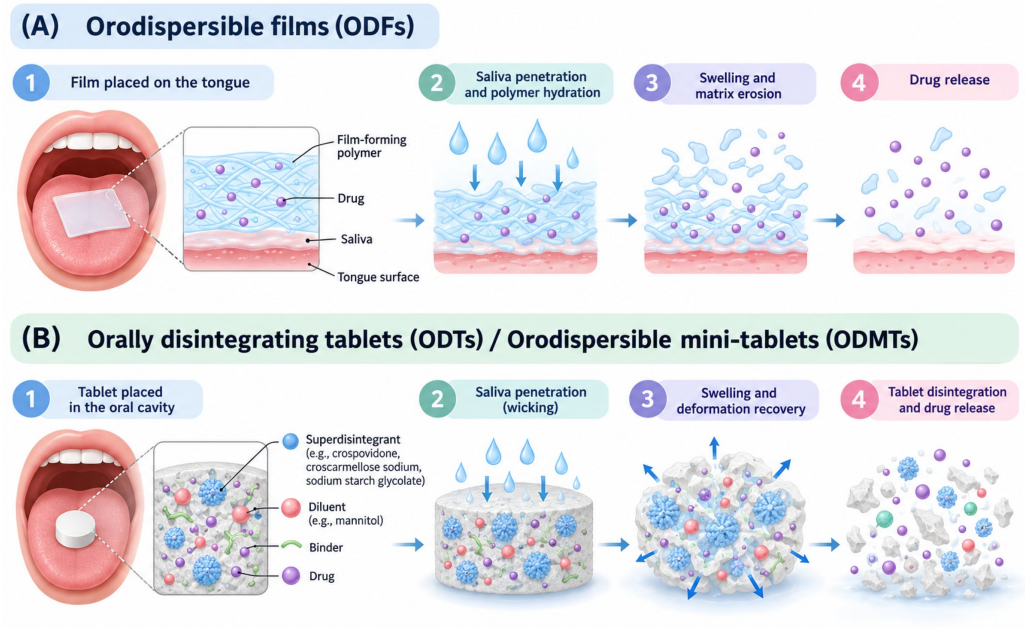

Figure 4. Schematic representation of the main disintegration mechanisms of pediatric orodispersible dosage forms. (**A**) ODFs: saliva penetration promotes polymer hydration, swelling, matrix erosion, and drug release. (**B**) ODTs: water penetration by capillary action (wicking), superdisintegrant swelling, and deformation recovery contribute to matrix disruption and rapid tablet disintegration. The figure was created using artificial intelligence and subsequently reviewed by the authors (OpenAI, "ChatGPT (version Plus—Thinking)," 2026. Available: https://chatgpt.com/).

Comparatively, ODFs depend predominantly on hydration and dissolution of the polymeric matrix, whereas ODTs rely on matrix porosity and the physical action of superdisintegrants [36]. In both cases, the balance between mechanical strength and disintegration rate is essential to ensure adequate performance and avoid discomfort during administration [2,23].

4.3. Pediatric Safety of Excipients

Safety is the primary criterion for selecting excipients in pediatric formulations, and priority should be given to substances that are well-studied, well-tolerated, and used at the lowest possible concentrations [10,34]. Among polymers, HPMC is widely recognized for its safety profile, inert character, and low toxicity [35]. PVA also shows high biocompatibility and low toxicity [50]. Natural polymers, such as pullulan and maltodextrin, stand out for

their edible origin and potential applications in pediatric formulations [30,33]. However, the use of maltodextrin warrants attention due to its glycemic index [36,46]. Superdisintegrants, including crospovidone, croscarmellose sodium, and sodium starch glycolate, are widely considered safe when used at the usual concentrations in formulations, although aspects related to purity and potential irritation should be monitored [5,26,42,59].

Among plasticizers, glycerol and PEG 400 have a well-established history of safe use [23]. However, propylene glycol requires caution in neonates and premature infants due to cardiovascular and respiratory risks described in the literature [3]. Polyols, such as sorbitol and mannitol, are generally well tolerated at the relatively low amounts typically incorporated into solid oral dosage forms. Although these excipients may exert osmotic laxative effects at higher exposure levels, the quantities administered through conventional ODFs, ODTs, and ODMTs are generally unlikely to reach such levels. Nevertheless, cumulative exposure from multiple medicinal products should be considered, particularly in younger pediatric patients [3,7].

In the group of sweeteners, sucralose stands out due to its high sweetening power and favorable safety profile, without significant effects on glycemic levels [32,38]. On the other hand, aspartame should be avoided in patients with phenylketonuria [8]. Among diluents, mannitol has advantages because it is non-cariogenic, whereas lactose requires caution in patients with congenital intolerance [10,34].

Excipient selection should also consider the target age group. In newborns, particularly preterm newborns, immature hepatic and renal function limits the clearance of excipients such as propylene glycol and ethanol, which should be avoided or strictly minimized [3]. Aqueous or solvent-free preparation methods are preferable, and dosage forms with a low excipient load, such as ODFs and ODMTs, are more suitable for this group. In infants and toddlers, well-established film-forming polymers, such as HPMC, pullulan, and PVA, should be prioritized. Polyols, including sorbitol, mannitol, and xylitol, are generally considered suitable for solid oral formulations at conventional excipient levels, as these amounts are typically below those associated with laxative effects. Nevertheless, the total daily exposure should be considered when multiple polyol-containing medicines are administered concomitantly [3,7,48]. In children and adolescents, a broader range of excipients may be considered, including co-processed platforms and superdisintegrants at usual concentrations, and sweeteners and flavors become decisive for palatability and adherence. In all age groups, aspartame should be avoided in patients with phenylketonuria [8]. The assessment of excipient suitability may be supported by regulatory guidelines and specific tools, such as EMA documents and the STEP database (Safety and Toxicity of Excipients for Pediatrics), which assist in the analysis of risks related to age and exposure time [5,27,34].

The frequency analysis performed in this review shows how often each excipient was used, but not the amount administered. Since the safety of an excipient depends on the amount per kilogram of body weight, the age of the patient, and the duration of treatment, frequency of use cannot estimate the risks associated with excipient exposure. The typical concentrations presented in Table 2 refer to general formulations and do not represent pediatric exposure limits. In most included studies, excipient concentrations were reported as percentages of the formulation, without the unit dose, dosing regimen, or target body weight, which precluded the calculation of daily exposure. This limitation is particularly relevant for excipients with dose-dependent toxicity, such as propylene glycol and ethanol in newborns and polyols at high intakes. Future studies should report the absolute amount of each excipient per dosage unit and estimate the expected daily exposure for the intended age group.

4.4. Solvents Used in the Production of Orodispersible Dosage Forms

The discussion on solvents applies mainly to ODFs, since a large proportion of these formulations are produced using solvent-based techniques. Purified water remains the solvent of choice due to its safety profile, availability, and lower environmental impact [6,55].

However, organic solvents such as ethanol and isopropanol are frequently used as cosolvents to accelerate drying or improve the solubilization of poorly water-soluble drugs [56]. The use of acetone was also identified in some formulations [56]. Despite the technological usefulness of these solvents, the presence of residues after drying represents an important concern for pediatric formulations. According to the ICH Q3C guideline, Class 3 solvents have exposure limits considered acceptable; however, there is still no specific consensus for the pediatric population, making residue minimization and strict control of drying processes essential [56]. In particular, ethanol residues may pose toxicological risks to neonates and infants [3].

4.5. Gaps in the Literature and Future Perspectives

Despite the advances observed, several gaps remain in the scientific literature on pediatric orodispersible dosage forms. One of the main limitations is the lack of standardized methods for evaluating disintegration and wettability, which makes direct comparisons between studies and different technologies difficult [5,19,36,41].

Although the included studies covered different publication years and manufacturing technologies, this scoping review did not perform a quantitative longitudinal analysis of excipient use or manufacturing techniques. Therefore, the technological patterns identified should not be interpreted as evidence of increasing or decreasing adoption over time. Instead, they reflect the range of formulation approaches documented in the included studies. Future investigations incorporating temporal and quantitative analyses may help establish how excipient selection and manufacturing strategies have evolved in pediatric orodispersible dosage forms.

The geographical distribution of the included studies may also introduce bias. Formulation choices reflect regional regulatory frameworks, such as the European Pediatric Regulation and Pediatric Investigation Plans, the local availability and cost of proprietary co-processed excipients, and regional therapeutic priorities. Therefore, the excipients and technologies identified may not fully represent the needs of underrepresented regions, such as Latin America and Sub-Saharan Africa, where cost, scalability, and stability under hot and humid conditions (ICH climatic zones III and IV) are particularly relevant for moisture-sensitive orodispersible dosage forms.

Another important limitation refers to the scarcity of clinical studies effectively conducted with pediatric patients. This limitation also reflects the design of the present review. The data extraction form prioritized formulation composition and technological performance, and no specific fields were defined for clinical safety, acceptability or palatability assessed in children, or pharmacokinetic outcomes. Therefore, evidence on these aspects was not systematically collected and may be underrepresented in this synthesis. The findings on clinical safety and acceptability should thus be interpreted as indicative, and future reviews should include dedicated extraction fields for clinical outcomes.

Most acceptability and sensory perception assessments are performed in healthy adults or using instrumental methods, which may not adequately represent children's experiences [5,32,41,56]. In addition, few data are available on the long-term safety of certain excipients, especially co-processed systems and novel materials used in formulations intended for neonates and infants [10,34].

Future perspectives point toward the increasing adoption of Quality by Design (QbD) strategies, using rational development tools to optimize formulations and improve manufac-

turing process robustness [2,9,25,40,54]. In parallel, approaches based on Patient-Centric Drug Design are expected to gain relevance, driven by the development of mini-tablets, 3D printing, precision medicine, and personalized drug delivery systems, aiming to adapt dosage forms to the physiological and sensory needs of the pediatric population [9–11,30].

Based on the gaps identified in the included literature, several potential directions for future research may be considered. First, further investigation into standardized and biorelevant disintegration methods could help improve the comparability of results across pediatric orodispersible dosage forms. Such investigations might explore the use of small volumes of simulated saliva, controlled experimental conditions, and clearly defined disintegration endpoints, as well as their potential correlation with in vivo performance [5,19,36,41]. Second, additional studies involving pediatric participants could provide valuable insights into age-related differences in acceptability, palatability, and swallowability. Where ethically and practically feasible, these investigations could incorporate age-appropriate assessment methods to complement the evidence currently obtained from adult panels and instrumental approaches [5,32,41]. Finally, the application of Quality by Design (QbD) principles could be further explored as a framework for integrating age-specific excipient safety considerations into formulation development. For example, future studies might investigate the incorporation of pediatric exposure considerations into the quality target product profile and their potential influence on formulation design and optimization [9,25,40,54]. These possibilities are proposed as areas for further investigation rather than established recommendations, as additional experimental and clinical evidence is required to determine their feasibility and practical relevance.

To visually summarize the distribution of evidence and identify research gaps, an evidence gap map was proposed based on the main formulation domains and outcomes reported in the included studies (Figure 5). The map highlights that most evidence is concentrated on technological performance, particularly disintegration behavior, mechanical properties, and drug release. In contrast, limited evidence was identified for long-term excipient safety, standardized evaluation methods, clinical studies involving pediatric patients, and the systematic application of patient-centered and Quality by Design approaches. These gaps reinforce the need for future studies that go beyond formulation development and include pediatric acceptability, safety, and clinically relevant performance assessments.

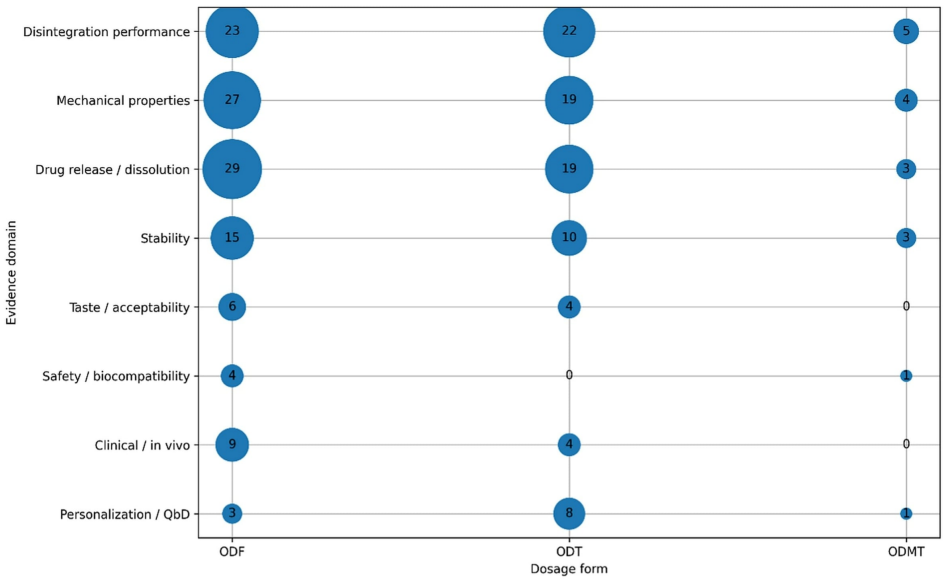

Figure 5. Evidence gap map of excipients and technological outcomes in pediatric orodispersible dosage forms. Bubble size represents the relative number of studies addressing each formulation

domain and outcome. Bubble color indicates the type or level of evidence, ranging from formulation/in vitro evidence to studies with greater translational or pediatric relevance. Empty spaces or small bubbles indicate areas with limited evidence, highlighting gaps primarily in long-term excipient safety, standardized disintegration testing, pediatric clinical evaluation, and patient-centered formulation development. Abbreviations: ODFs, orodispersible films; ODTs, orally disintegrating tablets; ODMTs, orodispersible mini-tablets; QbD, Quality by Design.

5. Conclusions

This scoping review demonstrates that orodispersible dosage forms, including ODFs, ODTs, and ODMTs, represent promising alternatives to overcome important challenges in pediatric pharmacotherapy, especially those related to dysphagia, the need for administration without water, and the low adherence often observed with conventional solid dosage forms [10,19,22,36,37,41,60,61]. In addition to favoring patient acceptance, these technologies provide greater dose accuracy compared with liquid formulations and reduce the risks associated with extemporaneous manipulation of medicines intended for the adult population [1,5,7].

The results show that excipients play a central role in the pharmaceutical performance of these formulations. In ODFs, HPMC remains the most widely used synthetic polymer due to its film-forming properties and well-established safety profile [23,31,35,58]. However, a growing trend toward the use of natural polymers, such as pullulan and maltodextrin, was observed, as these are associated with favorable disintegration profiles and pediatric acceptability [2,21,23,30,33,43]. In ODTs and ODMTs, mannitol stands out as the main diluent, while the superdisintegrants crospovidone, croscarmellose sodium, and sodium starch glycolate are responsible for rapid disintegration through wicking and swelling mechanisms [7,10,14,19,26,37].

Sensory acceptability proved to be a critical aspect for the therapeutic success of orodispersible formulations. In this context, plasticizers such as glycerol and sweeteners such as sucralose, xylitol, and other taste-masking agents play a fundamental role in improving palatability and, consequently, adherence to pediatric treatment [3,6,21,23,36,38,53]. In addition, advanced taste-masking strategies, including cyclodextrin complexation and the use of ion-exchange resins, have shown potential to improve the clinical acceptability of these formulations [5,45,62].

Pediatric safety remains the main criterion for excipient selection, reinforcing the need to prioritize substances with well-established toxicological profiles and recognized safety for this population [5,10,23,34,53]. Special attention should be given to specific excipients, such as propylene glycol, lactose, sorbitol, and mannitol, whose effects may vary according to the child's age and clinical condition [3,7,34]. Likewise, the use of organic solvents in ODF manufacturing processes requires strict monitoring to minimize potential risks associated with the presence of residues after drying. Excipient selection should therefore consider the specific physiological characteristics and formulation needs of different pediatric age groups. In neonates, particular attention should be given to physiological immaturity and its potential influence on excipient metabolism and elimination, whereas in older children, palatability and acceptability become increasingly relevant considerations for formulation development [40,55,56].

The technological trends identified point to significant progress toward personalized medicine. These include the miniaturization of dosage forms through ODMTs, the increasing adoption of 2D and 3D printing technologies for dose personalization, and the use of innovative techniques such as electrospinning, which can produce matrices with high surface area and ultra-rapid disintegration [10,15,33,34,40,41,43,58]. In parallel, the growing

incorporation of Quality by Design (QbD)-based approaches has been observed, aiming to increase the robustness of development and manufacturing processes [9,21,25,54].

Despite the advances observed, important gaps remain in the literature, including the absence of standardized pharmacopeial methods for evaluating the disintegration of orodispersible dosage forms and the limited availability of clinical studies conducted directly with pediatric patients [5,17,19,41,56]. Future research could explore the development of more standardized and biorelevant approaches for assessing the disintegration of pediatric orodispersible dosage forms, investigate age-specific acceptability and palatability through appropriately designed pediatric studies, and evaluate the potential integration of excipient exposure considerations into QbD-based formulation development. These approaches may contribute to improving the evidence base supporting the development of safe, effective, and patient-centered pediatric medicines.

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Author Contributions: M.E.A.M.: Writing—original draft, study's conception and design, material preparation, data collection, and analysis. L.G.S.: Material preparation, data collection, and analysis. W.M.d.C.R.: Material preparation, data collection, and analysis. M.H.M.S.: Writing—original draft. R.P.: Study's conception, design, and supervision. L.M.F.: Study's conception, design, Writing—review and editing, Supervision, Conceptualization. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: Ethical approval was not required for this study, as it did not involve human participants or animals. The review followed the JBI methodology and the PRISMA-ScR reporting guidelines. The study protocol is publicly available at OSF (https://osf.io/vhb6s/overview, accessed on 16 November 2026).

Informed Consent Statement: Not applicable.

Data Availability Statement: All data are available within the article or its Supplementary Materials.

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Conflicts of Interest: The authors declare no conflicts of interest.

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