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A survey of caregivers of Nigerian children less than 6 years of age to determine the experience and perception of acceptability of oral solid dosage forms

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ABSTRACT

Objectives: The World Health Organization (WHO) recommends flexible solid oral dosage forms such as dispersible tablet as the preferred formulation for (young) children, especially in developing/low- and middle-income countries, LMIC. The aim of this study was to assess experience, perceptions of acceptability, and formulation preferences, among 10 oral dosage forms for young children in a sample of end-users in Nigeria as an exemplar LMIC.

Methods: Using a semi-structured and validated questionnaire, 148 caregivers were surveyed. Acceptability was assessed by level of liking using a 3-point Likert scale and ease of administration. Preference was assessed from participants' dosage form of choice. Oral dosage forms assessed were those mentioned in the British National Formulary for children, 2013.

Results: The formulation perceived as the most acceptable was the chewable/suckable tablet. However, preference was for liquids. Specifically with the dispersible tablet, whilst 89% (n = 111) of caregivers of young children found it easy-to-administer, only 50% of children liked it.

Conclusion: There is a gap between the proposal of dispersible tablet as the preferred dosage form for young children and caregivers' perceptions of acceptability and preference. Educational strategies to increase acceptability of dispersible tablets as the preferred formulation for young children would be required.

1. Introduction

The oral route remains the most widely preferred route of medicines administration (WHO, 2012; EMA, 2013). For the paediatric population in particular, oral liquid medicines have been traditionally preferred for infants and younger children less than 6 years old due to the limitations in their safe swallowing of conventional tablets or capsules. However the associated shortcomings with oral liquid medicines such as stability problems, difficulties in taste masking, safety of excipients in children, and high storage and transportation costs led to the proposal of flexible solid oral dosage forms (FSODs) by the World Health Organisation (WHO) as the preferred formulations for children (WHO, 2012).

In 2006, the WHO hosted a group of experts in paediatric formulations from the academia, pharmaceutical industry (both innovator and generic), regulators, programme managers and implementers with a view to reaching a consensus on the most suitable formulations for children, with attention to conditions in developing countries. The group recommended FSODs such as dispersible tablets, effervescent tablets, chewable tablets, orodispersible tablets and sprinkle capsules as the most suitable dosage forms, particularly for developing countries (WHO, 2012). In September 2010, the United Nations Children's Fund, UNICEF, Supply Division and the WHO further reiterated the preference of solid formulations such as FSODs, with emphasis on the dispersible tablet, that can be administered in more than one form, for example, given whole to older children or dispersed in water or breast milk for ease of administration to younger children, as the most suitable, or age-appropriate, formulations for children.

Technical, economic and clinical considerations led the WHO proposal. The technical considerations include lower production costs, chemical stability, and potential absence of harmful excipients. Economically, solids, being cheaper to manufacture than liquids, could be more affordable for end-users in developing countries without access to health

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insurance. Clinically, considering that these dosage forms have a flexible mode of administration, they can be used in different subsets of the paediatric population unable to safely swallow conventional oral solids.

However, a formulation with poor acceptability may have an impact on patient safety, therapeutic outcomes, compliance, prescribing practice and ultimately commercial viability (Ivanovska et al., 2014; Kozarewicz, 2014). It is important to understand the formulation acceptability and preferences of parents/caregivers and children for oral solid dosage forms. Unlike adults, where oral solid dosage forms such as tablets or capsules will generally be acceptable to the majority of patients, potential paediatric patients from neonates to adolescents have differing needs. The qualitative features of formulations, such as form and taste, can affect acceptance and the likelihood of effective administration to paediatric patients. Moreover, certain practical considerations such as awareness of these age-appropriate dosage forms, and ease of administration, can profoundly impact the usability and acceptability of these formulations in resource-limited settings; and yet related knowledge is very limited (Orubu, 2016).

While efforts are being made internationally to increase access to age-appropriate medicines for children, FSODs have become increasingly available for children with diseases like malaria and HIV, but the barriers to implementation of FSODs in low resource settings are still not well understood. The acceptability and preference for dosage forms may vary widely between different cultural settings, socioeconomic contexts and literacy levels. For example, a national survey of medicines administration practices and preferences in Tanzania in 2013 demonstrated that forms such as dispersible tablets and granules in sachets were unfamiliar. Parents/caregivers and healthcare workers were accustomed to crushing portions of adult pills and mixing with water to attain a liquid solution (Adams et al., 2013). Similarly, other studies have demonstrated commercial unavailability, or lack of awareness of an age-appropriate medicine, forcing end-users to use medicines in ways that can affect acceptability and efficacy (Best et al., 2011; Thee et al., 2014). For instance, parents/caregivers may wish to administer dispersible tablets by means other than intended, that is, as a normal tablet without any prior dispersion. At the same time, children may not directly swallow any given tablet, but decide to keep the tablet in their mouth for a period of time thereby using it as an orodispersible tablet.

Specifically with the dispersible tablet, apart from experiential knowledge of the dosage form, there are many other obstacles such as unavailability of safe drinking water to disperse tablets, poor palatability, and cost, that impact the acceptability and effective administration of dispersible tablets to sick children in resource-limited settings (UNICEF, 2008; WHO, 2015a). Access to quality (improved) water sources is generally low in developing countries (UNICEF, 2008; WHO, 2015a). Where there is poor access to clean water, liquids may be regarded as the dosage form of choice for young children, despite the disadvantages mentioned earlier. Poor knowledge of the correct means and method of administering the dispersible tablet, appropriate dispensing device, volume of water, rinsing out the dosing device after use also can have an effect on acceptability. In 2012, poor understanding of the dispersible tablet was identified as a barrier to their proper use (UN Commission on life-saving commodities for women and children, 2012).

In addition to the capacity to use the formulation as authorised, preference can be determined by other factors such as an "overall appeal" (related to medicine presentation, or packaging), medicine belief systems, and cost (Ward and Kynvin, 2015; WHO, 2015b). While appeal and belief systems are largely subjective, cost is not. In developing countries, cost can be a major, though not much studied, driver of both acceptability and preference. If offered a choice of several products of the same medicine, a patient or caregiver who pays for their medicine out-of-pocket is likely to find the lowest-cost product most acceptable and preferred (Ward and Kynvin, 2015). Literacy levels, access to quality water, and the ability to pay for medicines show a rural-urban divide and can influence acceptability and preference for medicines. Given the critical role these aforementioned factors play in the acceptability and preference for medicines, it is important that the acceptability of FSODs is assessed among end-users living in both urban and rural areas in a developing country. In this study, Nigeria was conveniently selected as an exemplar developing country.

2. Materials and methods

2.1. Study design

The study was designed as a cross-sectional descriptive survey of parents and caregivers of children less than 6 years old for their experience with and perception on acceptability and preference among several oral dosage forms for children.

2.2. Study instrument and validation

The study instrument was a semi-structured questionnaire divided into three parts comprising 13 items (Table 1). Part I collated

Table 1
Summary of questionnaire.

Part	Questions	Specific items	Response Type/Options
Part 1	Socio-demographic information	Age, gender; highest education level and occupation of caregiver (or breadwinner[1]) and relationship of caregiver to child.	Self −completion
Part 2 (2a)	Experience with oral dosage forms	Oral dosage forms[2]:	Not administered.
	Level of liking	1. liquids 2. intact tablets, 3. chewable tablets*, 4. orodispersible tablets*, 5. dispersible tablets*,	Administered, and: • Liked • Neither liked nor disliked • Disliked
	Ease of administration	6. minitablets, 7. crushed tablets 8. intact capsules, 9. sprinkle capsules*, 10. "sachets"*[3].	Easy to administer. Difficult to administer, because: • Bad (unpleasant) taste • Needed an administration device • Long dispersion times
	Preference		Closed question, with options for comments
Part 3 (2b)	Use of the dispersible tablet	Name of dispersible tablet prescribed; Difficulties during preparation, if any; Level of liking for the dispersible tablet; Preference for dispersible tablets.	Closed and open-ended
	Water source	Tap, bottled, sachet, stream, well	Closed question

[1] Where the caregiver is not the person who provides for the family.
[2] As identified from the British National Formulary for children, 2014.
[3] Multi-particulates or powders packed in sachets.
* FSODs.