

# Packaging Design and Research of Oral Liquid Drugs for Younger Children

Gao Wenhua

*College of Packaging & Printing Engineering Tianjin University of Science & Technology Tianjin, China*  
gaowenhua@tust.edu.cn

**Abstract:** While most oral liquid drugs for children is impeccable in taste, and the packagings are also basically suitable. But for younger children the existing packagings are faced a series of issues, such as sucking difficulties, easily spilling out when they grasp to drink independently. By the analysis and research of 1-3 year-old children's psychological and physiological characteristics, based on ergonomic principles, this paper designed an oral liquid drug packaging for the special group of younger children and this made a deeper study on packaging practicability and rationality of the drugs. The cap adopted a structure similar to pacifier, the straw's diameter was increased and was designed integrated with the cap. So the sucking force was reduced, and the spilling liquid was avoided when drinking. Added the special shaping design the younger children's fear of taking the drugs could be removed largely.

**Keywords:** packaging design; oral liquid drugs; younger children; nipple

## 1. Introduction

Child is a special consumer groups. All should be concerned and taken attention to that for children. As a special commodity, children's medicine should get more attention. Packaging designers should put their consideration for the patient through the pharmaceutical packaging.

The number of children is about 30% of the total population in China, and the account of patients that suffers pediatric diseases is about 20% of all the number to see the doctors. Oral medicine is a large class of drugs for children, and there are many forms, such as tablet granule, powder, liquid and so on. Compared with other drugs liquid drugs have the advantages of easy to take, good taste etc. For younger children, liquid form is a good choice according to the particular physical characteristics of the age. Nowadays, pharmaceutical packaging still consider very little to human factors, is lack of humanity cares such as simply to use, easy operation, needs of aesthetic and psychological. Medicine should give the patients not only treatment, but also attention of humanity cares<sup>[1]</sup>. Medicine not only should have good results, but also pay attention to ease of use. In the current market, the packages of oral liquid medicine for younger children exist many unsuitables of the age, and need improvement urgently.

## 2. Psychological Characteristics of Children

People of different ages have different psychological characteristics. Psychological characteristics of children and adults are completely different. Children's psychological characteristics can be classified into the following three points:

### 2.1 Hyperactivity

People often say: "Whether this child has ADHD or not?" In fact, on the one hand, activity is human's nature, it with him when he is born. If they are forced to sit aside quietly, that's unfair for them. Children's hyperactivity because they didn't develop the ability to restrain themselves, and their attention poorer than adults. Their emotion dominated mainly by perception, so they are impulsive and hyperactivity. On the other hand, for children, thought is achieved through actual object, and along with action. Action is the starting of thinking and is also the result of thinking. From action to action is the outstanding feature of their thinking.

### 2.2 Imitative Ability

Parents should set a good example for children because the children have a strong ability to imitate. About one year old child can simply imitate things around, such as sound and movement. With increasing of age, children's imitative ability also growing. Imitation is an important means for children to learn. Children will imitate adults, peers, or even smaller themselves because these people's behavior can affect them largely.

### 2.3 Curiosity

Curiosity is the nature of children and is the power of exploring the world. Interesting shaped, beautiful packaged, bright colored items can particularly attract children's eyes. Because of curiosity, children are willing to try everything, no matter good or bad. If there is no curiosity, children will not touch things, and if they do not touch things, they will not understand the world.

If we can correctly use the children's characteristic in packaging design, taking medicine will be relatively simple and relaxed. So reasonable packaging design is quite important for children's liquid medicine.

### 3. The packaging actualities of Children's oral liquid medicine

#### 3.1 Unprotected Opening

Unprotected opening means that children open the medicine and lead to misuse without an adult beside. Children desire to understand the world very much because they have strong curiosity<sup>[2]</sup>. So they often imitate the elders to take some unwanted medicine, or they eat them only because of mistaking the medicine as some drink that they like. All these will cause unnecessary harm to children's bodies. This type bottle shown in Figure 1.



Fig. 1 Ordinary medical bottle

#### 3.2 Too Much One Bottle

Most children liquid medicine are big bottled, and children cannot drink up a bottle completely at one time, so the left is easy to be polluted and when the patient takes next time the medicine maybe have already been out of date. It's waste for the resources. Some careless parents often can't notice whether the medicine is out of date and feed it to the child lead bad effect to the child's body. Of course, some child liquid drugs are single packaged and the quantity can be use up at one time, but the package materials are usually glass that is easy broken and the package structure are also not very suitable for children to use.

#### 3.3 Dose Can Not Easily Control

Dose can not easily control refers to the children liquid drugs cannot correctly control the dose of one time. Some package has marked scale ruler on the wall of the bottle, and some are matched with a measurement<sup>[3]</sup>. Shown in Figure. 2. But how much medicine can be pour out each time depends on the adult's "feel" completely. For children the dose is more important.



Fig. 2 Drugs Marked scale or with measurement

#### 3.4 Not Conducive to Take Independently for Younger Children

Today, liquid medicines for children are generally sweet or fruity in the taste and suitable for children taking<sup>[4]</sup>. However, the packaging is not suitable or attraction for children. Although infants are younger, Their activity has been strong enough. They like doing everythings by themselves. And generally the devices such as spoon, dosing do not easy to use. Therefore, some oral drugs include straw. The children's sucking power of this age is limited, it is also difficulty to use the thin straw. And now, most container materials of the liquid medicine is glass. It easily to hurt the children when the glass is broken.

### 4. Packaging Structure Improvement of Children Oral Liquid Drugs

Firstly, the packaging design of children's medicine should reflect the affinity as possible in order to reduce children's fear and hatred to drugs, the shape of drugs and package can be used like a cartoon or animals. It can attract children's attention, make children produce a vague sense of trust to the drugs. Secondly, in order to facilitate the consumption and successfully take medicine by the ability of children, the low-dose packaging of the bottle is better used. A bottle for children one time taking can avoid secondary pollution and drugs eating mistakenly.

#### 4.1 On the Packaging Materials

In order to get children to drink children's liquid medicine facilitate, the glass material is not to selected as much as possible<sup>[5]</sup>. Food safety grade plastic material will be better. Because infants and young children's ability of control their own bodies are very limited, if they are walking or running, the medication may be falling off. The glass bottle is possibly broken and injury the body. To avoid squishing and leaking when taking drugs, the material must has a certain strength.

#### 4.2 Cap and Straw Design

The design in this paper includes a bottle cap and straw integration design. The cap uses rubber material and seal can be better. As a result of the larger diameter straw, it

can reduced the risk of sucking due to a sudden increase pressure. It avoid liquid being choked into the lungs when the babies sucking drugs, and reduce the possibility of liquid suffocation. The pressure in the larger diameter straw filled with liquid is mitigation. Only by small amount sucking power, babies can obtained as feeling as sucking of breast. It provides a way to reduce the baby's resistance to reaction of medication. The straw top connects with a latex nipple, so children can feel similar to sucking of breast when having medicine. It reduces the feeling of children reject drugs. The structure sketch map in Figure 3. It can reinforce by plastic hoop sets after the lid.

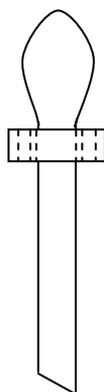


Fig. 3 Ordinary medical bottle

### 4.3 Bottle Body Design

By changing the common bottle of cylindrical glass, the plastic flat and oval bottle is designed. On the one hand, it can attract children's attention by this different shape, reduce the psychological grudge of child while taking medicine. On the other hand, plastic bottle can avoid the unnecessary harm to a child. In decorating, cute or cartoon patterns and colors can attract some kids for further and create a harmonious atmosphere as much as possible for children. It can ease physical ailments and mental disorder caused by illness. Structure of bottle body is shown in figure 4. Sketch map of the overall structure is shown in Figure.

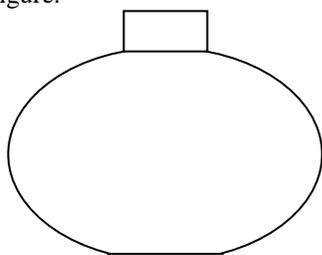


Fig. 4 Sketch map of bottle body

## 5. Conclusion

Compared to most of packaging of recent oral liquid

drugs for younger children, the packaging structure design in this paper can not only relief the rejection of children when taking medicine by the design of bottle body and nipple on bottle cap, and ease the tention. Taking medicine maybe can be completed in a very relaxed state, but also from physical and psychological characteristics of children, avoided a lot of unnecessary damage on medication process. So there can be feasibility and application prospect.

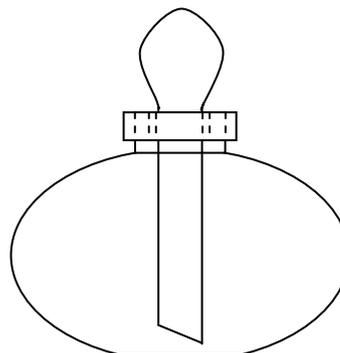


Fig. 5 Sketch map of overall structure

## References

- [1] Zhu Hui, Huang Zhigang & Zhang Yudong, Care About Vulnerable Groups and Secure—Packaging Design of Children's Drug, *Packaging Engineering*, Vol. 27, pp:157-158,165.
- [2] He Yu and Xiong Xingfu, Discussion on the Safety of Children Drugs Packaging, *Packaging Engineering*, Vol. 27, pp:341-342, December, 2006.
- [3] Wu Heng, Discussion on the Safety of Children Drugs Packaging, *Market of Technology & Economy*, 2009.9, pp:118-119.
- [4] Liao Sheng Bin, Pharmaceutical Production Should Attach Importance to Children Drug Problem, *China Pharmacy*, Vol. 22, pp:748,788.
- [5] Xiong Yan & Sun Yong, The Pleasant Packaging for Medicine, *Packaging Engineering*, Vol. 18, pp:1-3.