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### ORIGINAL ARTICLE

# Toxic exposure to laundry detergent capsules in Spain<sup>☆</sup>



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#### KEYWORDS

Laundry detergent pods;  
Children;  
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Risk;  
Poison centre

#### Abstract

**Introduction:** Laundry detergents capsules (CDR, for its acronym in Spanish) in compact powder format (tabs), powder and liquid (caps), or liquid (pods), have experienced great marketing development since its release in Spain. The objective is to describe the consultations registered in the Spanish Control Center related to CDR exposure.

**Material and methods:** A retrospective study of poison centre calls due to exposure to laundry detergents in capsule format between January 1st, 2008 and December 31st, 2014. The information has been obtained from the Spanish Poison Centre database (Servicio de Información Toxicológica).

**Results:** A total of 806 cases that implicated CDR were recorded, accounting 9 cases in 2008 and rising to 398 in 2014. The profile of the intoxicated/victim corresponds to a 19–24 month-old male who swallows the contents of the capsule.

**Conclusions:** There has been such an increase of queries related to CDR exposure that, due to an increased risk of clinical effects, we have to insist about the need for this type of product to be kept out of children's reach.

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#### PALABRAS CLAVE

Cápsulas de detergente de ropa;  
Niños;  
Ingestión;  
Intoxicación;

#### Exposiciones tóxicas a las cápsulas de detergentes de ropa en España

#### Resumen

**Introducción:** Las cápsulas de detergente de ropa (CDR), tanto en forma de polvo compacto, como en polvo/líquido o como líquido han experimentado un gran auge desde su comercialización en España. El objetivo es describir las consultas por exposición a CDR que se han registrado en el centro antitóxico español de referencia.

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*Material y métodos:* Estudio observacional de casos de consultas telefónicas por exposiciones a CDR entre el 1 de enero de 2008 y el 31 de diciembre de 2014. La información se obtuvo de la base de datos del Servicio de Información Toxicológica.

*Resultados:* Se registraron 806 casos en los que el producto implicado eran CDR, pasando de 9 casos en el año 2008 a 398 en el año de 2014. El perfil del intoxicado corresponde a un varón de entre 19 y 24 meses que ingiere el contenido de la cápsula.

*Conclusiones:* Se ha producido tal incremento de las consultas por exposiciones a CDR que, debido a un mayor riesgo de efectos clínicos, es importante incidir en la necesidad de mantener este tipo de producto fuera del alcance de los niños.

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## Introduction

Laundry detergent capsules (LDCs) are a new way of packaging laundry detergent that arrived on the European market in 2001 with the aim of replacing liquid detergents. In spite of their higher cost, consumption of capsules has increased greatly due to their being easier to transport, store, use and measure.

Spanish consumers can buy them in three formats. In 2004, the solid powder pill format appeared ( $\pm 21$  g), known as tabs, which dissolve immediately. This format is currently disappearing at the industry's initiative. The content of tabs is granular and hygroscopic, and it binds easily to the oropharyngeal and oesophageal mucosa if swallowed; moreover, their more alkaline pH (10.5–12 in a 1% solution) can generate liquefactive lesions in the digestive tract if contact is prolonged. In September 2010, the caps format arrived with a liquid/powder interior and an approximate weight of 19–20 g. Caps remain intact so long as they are dry, but they dissolve completely in water in less than 2 min. In 2012 the liquid pod format appeared. (Pods is the term that is used in the U.S., and which marketing teams have applied for all markets.) Pods are small soft packets or single-dose bags wrapped in an alcohol/polyvinyl film or membrane that is highly water soluble. They have an approximate volume of 28 ml and weigh  $\pm 23$ –29 g.<sup>1,2</sup> The wrapping is designed to degrade quickly and homogeneously when it comes into contact with liquid, regardless of the number of chambers in the pod (1–3). Distributing the pod's components into different chambers makes it more stable (Fig. 1). The main ingredients in a typical laundry detergent are anionic and nonionic surfactants, plus sequestrants, optical brighteners, anti-redeposition agents, soaps, perfumes, enzymes and preservatives.<sup>3</sup> While the quantitative composition of detergents does not vary from one format to another, in capsule formats (especially pods) the concentration range is 2.5–5% higher. The higher the concentration of the surfactants, the greater the cytotoxicity they can produce. While powder detergents contain up to 20% anionic surfactants, in capsules this increases to 50%. The purpose of sequestrants is to achieve optimal cleaning in spite of hard water. They are high-cost components that come in concentrations under 1%. Phosphates are avoided since they are harmful to the

environment. There is no water in the composition because it would attack the integrity of the membrane. There are various alcohols that act as nonionic surfactants (glycol, propylene glycol, alcohol ethoxylates C12-14 and C14-15) which represent up to 34% of the volume. These detergent formats do not contain sodium hydroxide. The pH is neutral (7–9) in laundry detergents.<sup>3</sup>

Since the format is attractive for children due to the brighter colours and texture, they may mistake LDCs for candies or toys. Children may be tempted to play with them, squeeze them or pop them, or even put them in their mouths, which may lead to toxic contact or poisoning. The greatest risk is the capsule being ingested, with digestive symptoms and potential breathing complications.

The goal is to review the cases of toxic exposure from LDCs in Spain based on the reference information from the Spanish poison centre.

## Material and methods

Observational study of cases of telephone calls for exposures to LDCs. The source of information was the Spanish Poison Information Service (SIT), which is part of the Madrid Department of the National Toxicology and Forensic Sciences Institute (INTCF). The SIT has acted as a poison centre since 1971<sup>4</sup> and it has a medical/poisoning phone line that is free, anonymous and confidential with its emergency line (915 620 420) which is open 24 hours a day, 365 days a year. The continuity of this help line means that cases of exposure to toxic substances or possible poisonings can be evaluated and tracked. The phone line receives calls from throughout Spain, and calls come from healthcare professionals of all levels and from people with no specific healthcare training.

The main tool the SIT uses to perform its tasks is a database that it has prepared internally with over 179,000 files of products that may be sources of poisoning, and which include both active ingredients and products on the market in Spain. A toxicology study has been conducted for each file that makes it possible to provide an immediate response regarding possible poisonings from any of the products communicated to our service. The compositions of multiple commercial products are reported to the INTCF in

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