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Full Research Article

PROFILE OF VETERINARY DRUGS IN A SPECIALIZED PHARMACY FOR MANUAL PRODUCTION OF DRUGS IN JOÃO PESSOA, BRAZIL

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Abstract

This is a cross-sectional study conducted in a veterinary pharmacy for manual production of drugs located in the city of João Pessoa, Brazil. The data collected comprised the period from January 2017 to December 2019, using the records system present in the pharmacy itself. We are seeing a growing demand for veterinary manipulated drugs, with a 40% increase in sales from 2017 to 2019. Among the pharmaceutical forms, capsules were the most commonly requested, followed by solutions, and among the active ingredients, itraconazole was the most frequent. With the diversity of pet species, the manipulation pharmacies have arisen to supply market needs, enabling the development of pharmaceutical forms that meet the physical characteristics of each pet species.

Key words: Drugs, Pharmacy for manual production of drugs, Veterinary pharmaceutical form, Veterinary medicine

INTRODUCTION

After their resurgence in the late 1980s in Brazil, pharmacies for manual production of drugs have gained prominence and today represent a large part of the Brazilian market. In the beginning, the pharmacies for manual production of drugs had a focus on handling dermatological and homeopathic products. With the introduction of

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generic drugs, pharmacies for manual production of drugs began to enlarge their market share with the manipulation of drugs for which the required presentations were not made available by the pharmaceutical industry (Bonfilio et al., 2010).

Pharmacies for manual production of drugs allow individualization of medical prescriptions, allowing individualized assistance according to the needs of each patient. This advantage allows patients to receive the correct dosage when they need it and reduces the risk of overdose, contributing directly to the patient's health. As a disadvantage, the manipulated medications present concerns regarding their quality control. Despite the low quality control criteria compared to industrial-scale products, the pharmacy for manual production of drugs is still the best option when it comes to individualized drugs (Shah, 2010; Spivey, 2020).

With the advancement in technology, more sophisticated equipment was introduced in the pharmacies for manual production of human drugs, which enabled the insertion in the market of the most diverse pharmaceutical forms, thus facilitating the adherence to prescription in the treatment of children and the elderly, as well as opening market opportunities, as is the case in the treatment of animals with specific pharmaceutical forms for veterinary application (Anselmo and Mitragotri, 2014; Ramirez et al., 2015).

Domestic animals are part of many people's lives, considered as life companions and even part of the family. Living with a pet is a privilege for many. This increasingly growing interaction drew the attention of the drug manufacturers and even more of the pharmacies for manual production of drugs, who saw an opportunity to innovate and assist in veterinary medicine. The search for veterinary medicines is on-going, and in 1998, the world animal health market was worth around US$11 billion, wherein North America and Western Europe represented 60% of the animal health pharmaceutical market. The diversity of species and breeds of animals makes the pharmacy for manual production of drugs a viable alternative, as it adheres to a range of pharmaceutical forms that can be adapted to each species of animal (Ahmed and Kasraian, 2002). Thus, this study aimed to assess consumer interest in veterinary medicines in pharmacies for manual production of drugs, aiming to highlight the importance of these pharmacies in the development of products for veterinary use.

MATERIALS AND METHODS

This is a cross-sectional study, based on data analysis from a veterinary manipulation pharmacy in the city of João Pessoa, Brazil. Data collection was carried out in December 2019, with the help of the system present in the pharmacy itself, to collect the following data: annual sales of veterinary drugs, the best-selling pharmaceutical forms between 2017 and 2019, and the most sought-after active ingredients in pharmaceutical forms. The search for data allowed us to understand the main needs of each client and to verify the search for these veterinary medicines per year.

As inclusion criteria, data available between the period January 2017 to December 2019 were included, which were related to the sale of products for veterinary use and/or to pharmaceutical forms developed for veterinary application. As exclusion criteria, sales data for non-veterinary products, data related to formulation values, and data not registered in the system were excluded. As for the data analysis, they were plotted in the GraphPad Prism 8 program.

RESULTS

The results obtained in the study allowed us to see the sales profile of veterinary products in the pharmacy for manual production of drugs in João Pessoa, Brazil. In Figure 1 we can see that a year after the pharmacy opened in 2018, sales practically

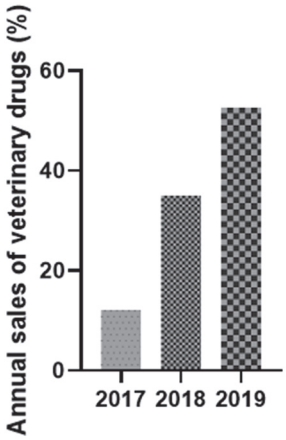

Figure 1. Sales profile of veterinary drugs

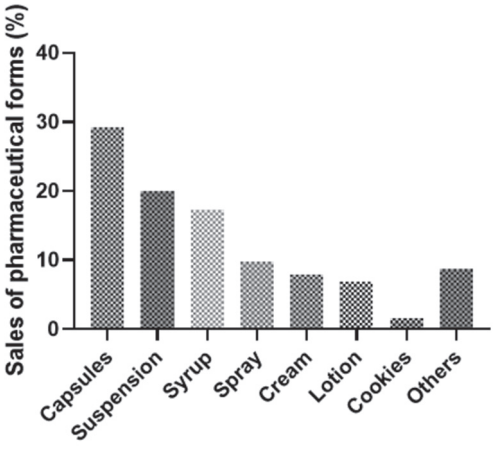

Figure 2. The most commonly sold pharmaceutical forms in the veterinary pharmacy for manual production of drugs

tripled, with a 23% increase in sales of veterinary medicines compared to 2017. This was also observed in 2019 with a 17% increase in sales compared to 2018.

Among the pharmaceutical forms available in the pharmacy are cookies, lotion, suspension, spray, syrup, cream, capsules and shampoo, with cookies being the only formulation exclusively for veterinary use. Figure 2 shows the most commonly sold pharmaceutical forms in the pharmacy, capsules being the most common, representing 29% of sales, followed by suspensions and syrups representing 20% and 17% respectively.

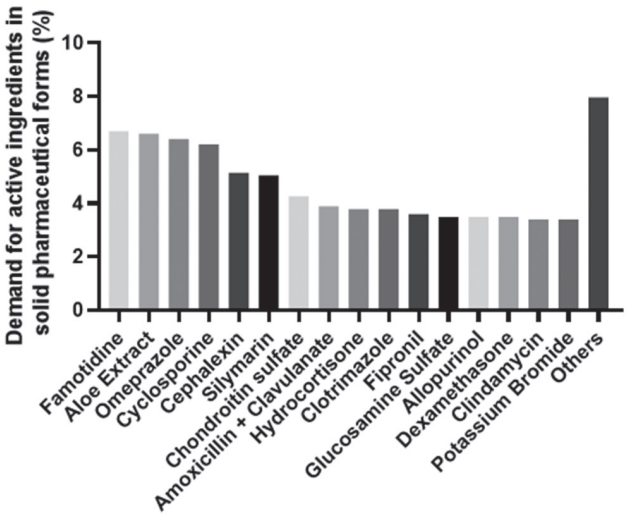

Figure 3. Active ingredients available in solid pharmaceutical form

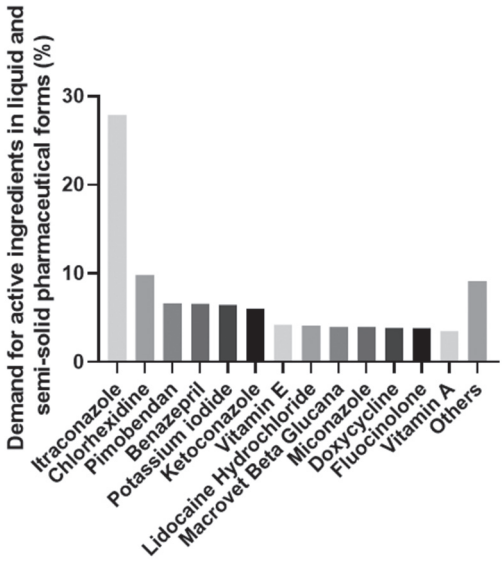

Figure 4. Active ingredients available in liquid or semi-solid pharmaceutical form

When evaluating the demand for active ingredients in solid formulations, we can see in Figure 3 that famotidine was the most sought-after active ingredient, with 6.69%, followed by aloe extract and omeprazole with 6.60% and 6.40% respectively. For liquid and semi-solid formulations (Figure 4), itraconazole was the most requested active ingredient, present in 27.87% of the formulations sold, followed by the active ingredients chlorhexidine (9.83%), pimobendan (6.67 %) and benazepril (6.57%).

DISCUSSION

The pet medication market is growing and in transition. With the introduction of specialized pharmacies that sell medicines for pets, in addition to changes in the methods of selling these medicines, they have changed the consumer's perspective and expanded the range of options and formulation that meet customer needs (Ramirez et al., 2015).

Worldwide, the costs of treating and maintaining pets are considerable to their owners. In the United States, approximately 65% of families own pets, the most common of which are dogs and cats, which is equivalent to 79.7 million homes (Ramirez et al., 2015). In Brazil, estimates indicate that 59% of households have a pet, in which 44% have at least one dog and 16% have at least one cat. Brazil occupies second place in the world ranking in numbers of pets, behind only the United States (Pessanha and Portilho, 2008). The data obtained in the study demonstrate the growing interest in veterinary products in pharmacies for manual production of drugs with an increase in sales of more than 40% from 2017 to 2019, showing these enterprises to be very promising. This increase could be related to the increase in pet numbers, as well as due to the diversity of pharmaceutical forms that meet the needs of the veterinary market, facilitating the development of drugs with greater acceptance by pets. In addition, some manipulated drugs are cheaper than industrialized ones.

As for the pharmaceutical forms, oral and injectable drugs have been the most frequent, but there is a increasing trend of pharmaceutical products being in dosage forms such as tablets, oral suspension, spray and oral paste, among others (Ahmed and Kasraian, 2002). The veterinary pharmacy faces a great challenge due to the variety of animal species that affects the design and performance of the pharmaceutical forms, with differences in pharmacokinetics, eating habits and environment, among other interferences. This makes the veterinary manipulation pharmacy an important base in care and support for pets, allowing the development of different pharmaceutical forms that meet the characteristics of each animal species (Baggot, 1997; Janus and Antoszek, 1999; Ahmed and Kasraian, 2002). We can see in the current study that the pharmaceutical forms for oral use were the most sought after, being capsules, suspensions and syrups, followed by topical formulations such as sprays, creams and lotions. It is interesting that the manipulation pharmacies are already looking to the development of pharmaceutical forms more appropriate for animal use, as is the case of cookies (biscuits) that can be easily administered to dogs and cats.

Studies show that famotidine is widely used to relieve abdominal pain in animals with gastritis and gastric ulceration. Due to its immediate effects and its ease of administration to animals, and the fact it can be administered in conjunction with a complete meal, famotidine is often prescribed, in comparison to omeprazole, which is a proton pump inhibitor that takes days to reach its peak action and should be administered on an empty stomach (Golly et al., 2019). The studies by Markovich et al. (2015) and Gould et al. (2018) show that famotidine is one of the main drugs prescribed, mainly for use in cats. These data corroborate the results obtained, showing that famotidine was the most commonly prescribed active ingredient (in 6.69% of solid formulations) and omeprazole appeared in third place with 6.40% of prescriptions.

Aloe vera extract (*Aloe vera*) has several constituents, including polysaccharides, enzymes, anthroids, lignins, saponins, vitamins, amino acids and minerals. Due to the presence of these components, aloe vera extract has several therapeutic effects such as anti-inflammatory (Hamman, 2008; Jensen et al., 2015), antimicrobial (Ramasubramanian et al., 2010; Shireen et al., 2015), antiviral (Sadeghi and Gholamhoseinpoor, 2015), antifungal (Hashemi et al., 2015), hypoglycaemic (Rajasekaran et al., 2004) and antitumor (Kim et al., 1999). Aloe vera extract is widely used in animals due to its therapeutic effects as well as its safety, as it is a well-tested natural product (Yohannes, 2018). In the current study, aloe vera extract came in second place as one of the most frequent products in solid formulations, present in 6.60% of the formulations.

In liquid formulations, itraconazole was the most prescribed, as it is a drug widely used in the treatment of systemic and cutaneous mycoses, and it can be used in dogs and cats for oral application in the form of capsules or solution (Hasbach et al., 2017; Mawby et al., 2018). The second most commonly prescribed active substance in liquid pharmaceutical form was chlorhexidine, a disinfectant and antiseptic that is used for skin disinfection. When it comes to topical antibacterial drugs for dogs, chlorhexidine is still the main choice of veterinarians (Maxwell et al., 2018; Frosini et al., 2019).

CONCLUSIONS

The veterinary drug market is growing every year, with the increase of pets, and Brazil occupies second place among countries according to pet ownership. With the challenges faced in the veterinary clinic due to the diversity of animals, each with different physical characteristics, different pharmacological responses to each active principle and different pharmacokinetic profiles, the pharmaceutical industry has been studying different pharmaceutical forms to serve the varied pet species. The pharmacy for manual production of drugs, as it is development that allows low-scale care, enabling the fractionation of dosages and the development of the most diverse pharmaceutical forms, has gained space among the competition for the veterinary drug market. This is causing a change in the form of presentation and application of some medications, and the pharmacies directing their care to each species of animal.

The development of cookies, for example, allows the application of medications directed at dogs and cats, facilitating their administration without causing stress to the animal and allowing them to adhere to the treatment. Although capsules are still the main pharmaceutical forms sold in pharmacies for manual production of drugs, interest in the development of other pharmaceutical forms, such as suspensions, syrups, sprays and creams that are also prescribed by veterinarians, has been gaining ground.

Pharmacies for manual production of drugs allow the development of formulations directed to the needs of each client. In addition, with the advances and challenges of veterinary medicine, the veterinary pharmacy for manual production of drugs is gaining prominence in the market, as an excellent alternative in the development of specific pharmaceutical forms for each animal species, managing to meet the needs of the current market, and developing safe pharmaceutical forms.

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Authors' contributions

Jhennyfer Camilla da Silva Barros: participated in all stages from study design to review of the final version of the article. Iago Dillion Lima Cavalcanti: participated in all stages from study design to review of the final version of the article.

Conflicts of interest:

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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PROFIL VETERINARSKIH LEKOVA U APOTECI SPECIJALIZOVANOJ ZA RUČNU PROIZVODNJU LEKOVA U ŽOAU PESOA, BRAZIL

Jhennyfer Camilla da Silva Barros, Iago Dillion Lima Cavalcanti

Kratak sadržaj

Studija je sprovedena u veterinarskoj apoteci za magistralnu proizvodnju lekova u gradu Žoau Pesoa, u Brazilu. Podaci su prikupljeni korišćenjem sistema koji postoji u samoj apoteci i obuhvataju period od januara 2017. do decembra 2019. godine. Zapažen je porast potražnje od 40% za veterinarskim magistralnim lekovima u periodu od 2017. do 2019. Među farmaceutskim oblicima, kapsule su najtraženije, a zatim rastvori, i kao aktivni sastojak je najtraženiji bio itrakonazol. Uzimajući u obzir raznolikost vrsta i rasa kućnih ljubimaca, apoteke za magistralnu proizvodnju lekova nastoje da zadovolje potrebe tržišta, omogućavajući tako razvoj farmaceutskih oblika koji zadovoljavaju fizičke karakteristike svake vrste kućnih ljubimaca.

Ključne reči: Lekovi, Apoteke za magistralno pravljenje lekova, Veterinarski lekovi, Veterinarska medicina