

Evaluation of the cost of lubricating eye drops based exclusively on carboxymethylcellulose in the Brazilian market

Avaliação do custo de colírios lubrificantes a base exclusivamente de carboximetilcelulose no mercado brasileiro

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ABSTRACT

Objective: The objective of this study is to evaluate the cost of the use of lubricant eye drops, which are more used in the national market and contain in its formulation the same active ingredient - carboxymethylcellulose -, by considering their total number of drops in each flask. **Methods:** An experimental study was accomplished by using three flasks of each one of the following eye drops: Lacrifilm® (eye drop 1) and Fresh Tears® (eye drop 2). To the analysis of their cost, the number of drops of each flask was counted, correlating them with their price. The price considered for each medication was the minimum to consumer with an aliquot of 17% published for the month of January 2012. The statistical analysis was accomplished in SPSS® 18. The comparison of the quantitative variables evaluated was followed through the non-parametric test Mann-Whitney and Spearman linear correlation, in which a significant statistical difference was considered, a value of probability inferior to 0,05. **Results:** It was verified statistically significant difference between brands of eye drops evaluated in relation to their total number of drops per flask as well as to their prices. Eye drop 1 presented greater number of drops. **Conclusion:** Eye drop 1, which has the greater number of drops per flask, also has the lowest price. Therefore, it is verified that the product is the most economical, what means that the patient will pay less for each drop.

Keywords: Ophthalmic solutions/economy; Drug price; Health expenditures; Comparative study; Brazil

RESUMO

Objetivo: Avaliar o custo do uso dos colírios lubrificantes mais utilizados no mercado nacional que apresentam na formulação o mesmo princípio ativo - carboximetilcelulose, considerando o número total de gotas presente em cada frasco dos colírios. **Métodos:** Foi realizado um estudo experimental utilizando três frascos de cada um dos colírios Lacrifilm® (colírio 1) e Fresh Tears® (colírio 2). Para análise do custo dos colírios contou-se o número de gotas de cada frasco correlacionando os preços dos mesmos. O preço considerado para cada medicação foi o mínimo ao consumidor com alíquota de 17% publicado para o mês de janeiro de 2012. A análise estatística foi efetuada em SPSS® 18. A comparação das variáveis quantitativas analisadas foi procedida através do teste não paramétrico Mann-Whitney e correlação linear de Spearman, sendo considerada uma diferença estatisticamente significativa um valor de probabilidade inferior a 0,05. **Resultados:** Verificou-se que há diferença estatisticamente significativa entre as marcas de colírios avaliados com relação ao número total de gotas. O colírio 1 apresentou o maior número de gotas. **Conclusão:** O colírio 1, que tem o maior número de gotas por frasco, também é o que tem o preço mais acessível. Portanto, verifica-se que é o produto mais econômico, ou seja, o paciente pagará menos por cada gota.

Descritores: Soluções oftálmicas/economia; Preço de medicamento; Gastos em saúde; Estudo comparativo; Brasil

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INTRODUCTION

Dry eye syndrome is a multifactorial disease of the tears and ocular surface that results in tear film instability with consequent visual disturbances⁽¹⁾.

It is one of the most frequent complaints in ophthalmic practice. Its prevalence is comparable around the world, with rates ranging from 7 to 33%. This variation in prevalence is in part due to the different definitions of dry eye. The estimated prevalence also depends on the study sample — it tends to be lower in studies conducted in specialist clinics and higher in studies assessing the general population^(1,2).

The natural history of the condition is variable, with symptoms ranging from mild to severe⁽²⁾. The most common symptoms are fatigue, eye irritation, red eyes, photophobia, blurred vision, and foreign body sensation^(3,4).

The incidence of the condition has been increasing in recent decades. One of the main reasons for this is the significantly increased use of computers and similar devices^(5,6). Other factors include increased use of air-conditioning, pollution from large urban centres, and low air humidity⁽⁷⁾.

Treatment is most often symptomatic and is based on tear substitutes known as lubricating eye drops⁽¹⁾. It is estimated that 87% of patients with the condition use lubricating eye drops⁽⁸⁾. These products stabilise the tear film and change the viscosity of tears, preventing evaporation and draining.

As dry eye syndrome becomes increasingly common, the demand for lubricating eye drops also increases⁽⁹⁾. Consequently, the industry offers more products in order to meet the demand. It is estimated that about 100 different medications are used in the world for dry eye syndrome. In 2003 the International Market Survey reported that among the 750 million bottles of eye drops sold that year, nearly 120 million were for dry eye syndrome^(1,10).

Eye drops differ in their formulations mainly with regard to viscosity, mucoadhesive composition, and preservatives. Still, they are all indicated for dry eye syndrome, since the advantages of one formulation over another, as suggested in advertisements, are not always demonstrated in controlled clinical trials^(1,2,11).

Long-term, often chronic use of lubricant eye drops leads to significant expenses for users⁽²⁾.

Few clinical trials have addressed quality of life and economic issues. Studies show that around 2-5 days of work are lost each year due to dry eye symptoms⁽²⁾. Although there are studies evaluating the average annual cost of this prevalent disease and its treatment in other countries, such data are still scarce in Brazil^(2,12,13).

Thus, this study aimed to determine which of the lubricating eye drops assessed here is the most economical, taking into account the number of drops in each bottle.

METHODS

Experimental study conducted in the laboratory of the Institute of Biological Sciences of the Passo Fundo University. Two standard lubricating eye drops were studied in their 15 ml presentation: Lacrifilm™, henceforth called Product 1, and Refresh Tears™, called Product 2. These products were chosen because they have same active ingredient and are among the most popular in the market according to a sales audit of DDD (Drug Distribution Data). The active principle of both products was carboxymethyl cellulose.

Drop counts were done using three original bottles for each product. Bottles were purchased in random pharmacies. The batch number of each product was registered. We assumed that the volume in each bottle was correctly indicated in the label and that the weight of the drops was directly correlated with their volume, since the density of each formulation is the same for all the drops in a bottle.

The number of drops in each bottle was counted by three investigators, each responsible for one bottle of each product. The drops of all bottles were instilled at a 90° angle between the bottle and a reference plane.

We assumed that each laboratory standardised drop volume according to what they deemed effective for their product and that this is irrelevant to customer satisfaction.

Each bottle was opened, its batch number was registered, and its drops were then counted. Each bottle was gently pressed to instil one drop at a time. The bottles were chosen randomly. The process was repeated three times for each product to avoid measurement bias, and the mean number of drops in each bottle was then calculated.

We surveyed the minimum selling price of each product in January 2012 with a 17% tax rate and found R\$ 15.32 for Product 1 and R\$ 33.89 for Product 2.

Statistical analysis was done using SPSS™ version 18. Comparison of quantitative variables was done using the Mann-Whitney non-parametric test and Spearman's linear correlation; comparisons with $p < 0.05$ were considered statistically significant.

RESULTS

The number of drops in each bottle was counted and the mean and standard deviation were calculated, as shown in Table 1. After variance analysis using the Mann-Whitney test, a statistically-significant difference was found between the two products for the total number of drops and the price ($d < 0.000$).

Product 1 had a higher mean number of drops, as shown in Figure 1.

There was a correlation between the price and the number of drops, i.e. the most expensive product did not have a higher number of drops. Considering the price of each product and the number of drops per bottle, Product 1 was considered the most economical, as shown in Chart 1.

DISCUSSION

Dry eye syndrome is a condition of great social importance due to its morbidity and high prevalence.

Its symptoms interfere directly with the quality of life of patients, therefore most patients require therapy. Studies show that 11% of patients report reduced work time because of their symptoms⁽²⁾.

Initial therapy consists of lubricating eye drops, also known as tear substitutes or artificial tears.

Thus, as these drugs are increasingly used, it is necessary to assess the cost and effectiveness of products available in the market. It is essential that the prescribed therapy be effective, as this is directly related to patient adherence to treatment.

The cost of lubricating eye drops is one among many factors that should be considered when prescribing a product. The number of drops in a bottle is one of the factors that determine how economical a product is for the patient.

Table 1
Mean and standard deviation of the number of drops per bottle (January 2012).

Product	Mean number of drpos	p-value
Lacrilfilm (product 1)	390,7 ± 7,6	≤ 0,000
Fresh Tears (product 2)	270,0 ± 13,5	

* Mann-Whitney test (p ≤ 0,05)

Chart 1
Confidence Interval (95%) for the number of drops per bottle of each product.

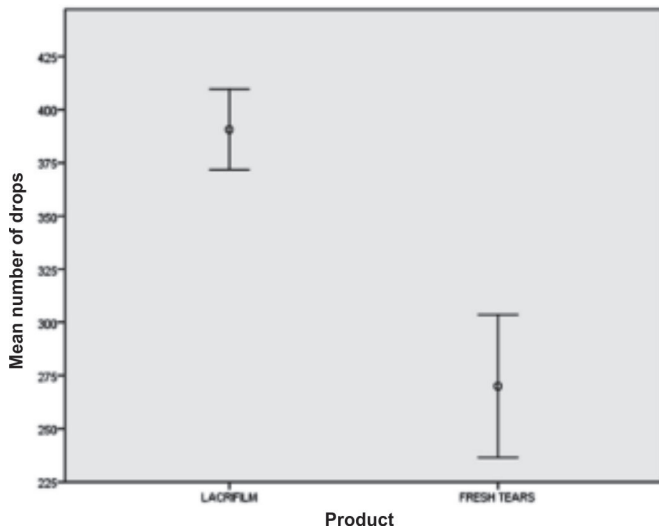
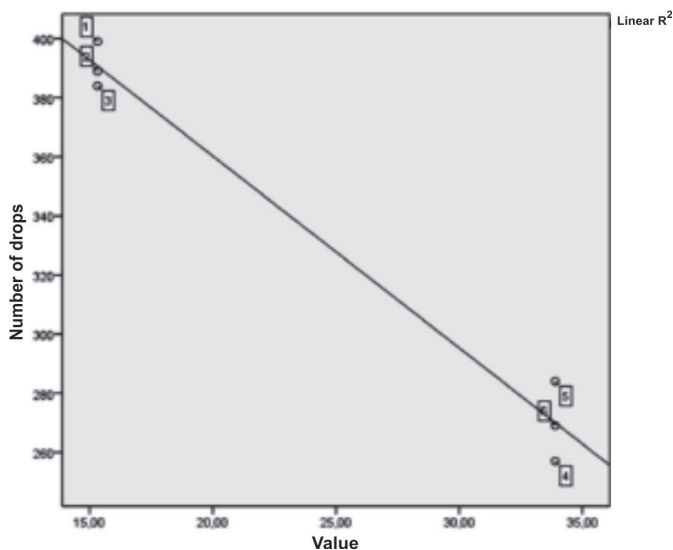


Chart 2
Spearman's linear correlation between the value (price) and the number of drops in all bottles of both products.



LACRIFILM: 1, 2 and 3; FRESH TEARS: 4, 5 and 6.

Most studies on lubricating eye drops evaluate their effectiveness in improving ocular symptoms, but the cost of products is not often assessed.

In this study we assessed the cost of two products offered in the Brazilian market; these products are indicated for primary dry eye syndrome without comorbidities.

An important factor to consumers is how long the product will last. The number of drops in each bottle is therefore a determining factor in the choice of eye drops.

Previous studies on eye drops for glaucoma have shown wide variations in the number of drops per bottle among different drugs with the same reported volume, as well as between different bottles of the same product⁽¹⁴⁾. We found a statistically-significant difference in the number of drops of different products with the same reported volume, as well as between the three samples of the same product. Product 1 had the highest mean number of drops per bottle.

The prices of both products also differed significantly. The product with the highest number of drops had the lowest price.

Product 1, which had the highest number of drops, had one of the most affordable prices. Therefore it appears to be the most economical product, i.e. the patient will pay less for each drop.

The effectiveness of each product in relieving the signs and symptoms of dry eye syndrome was not assessed in the present work. Further studies are needed to assess the cost-effectiveness of these products.

CONCLUSION

We found a difference in the number of drops per bottle of the studied products.

Considering that both products have same active ingredient and the same therapeutic indication, one of the most relevant factors to the consumer is the number of drops in each bottle and its price, i.e. the price per drop.

In the sample assessed here, Product 1 was found to be the most economical for the user.

Thus, when prescribing lubricating eye drops ophthalmologists should also take into account the cost of treatment, which is closely linked to patient adherence.

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