

## Effectiveness of povidone–iodine to treat infectious conjunctivitis in dogs (Eficacia de la povidona yodada para tratar las infecciones conjuntivales en perros)

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### Abstract

Purpose: To report the efficacy of povidone-iodine as a treatment for conjunctivitis in dogs.

Material and Methods: Single-masked, controlled clinical trial. In a general clinic veterinary, 66 of dogs' acute conjunctivitis were studied during a 4 years period. Dogs were alternated to receive povidone-iodine 2% or neomycin–polymyxin- B-gramicidin ophthalmic solution, one drop 4 times daily in the affected eye. Ocular inflammation was evaluated daily by the owners' dogs and weekly by the veterinarian. The main outcome measures were days until cured and proportion cured after 1 and 2 weeks of treatment.

Results: After 1 week of treatment, povidone-iodine was as effective as the antibiotic solution.

Conclusions: povidone-iodine 2% ophthalmic solution was as effective as neomycin–polymyxin B-gramicidin for treating bacterial conjunctivitis, and as ineffective against viral conjunctivitis. Povidone-iodine ophthalmic solution should be strongly considered as treatment for bacterial conjunctivitis, especially in developing countries where topical antibiotics are often unavailable or costly.

**Keywords:** conjunctivitis | keratitis| ocular antibiotics | ophthalmology | povidone-iodine| red eye

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### Resumen

Objetivo: determinar la eficacia de la povidona yodada como tratamiento de la conjuntivitis en perros.

Material y métodos: ensayo clínico a simple ciego controlado. En una clínica de veterinaria se estudiaron un total de 66 casos de conjuntivitis aguda durante 4 años. Las conjuntivitis se catalogaban como virales si el cultivo bacteriano resultaba negativo. Los perros valorados fueron agrupados en dos grupos de tratamiento: uno con povidona yodada al 2% y otro con antibiótico en solución (neomicina–polimixina B–gramicidina). En ambos casos en forma de gotas aplicadas cuatro veces al día en el ojo afectado. La inflamación ocular fue evaluada diariamente por los propietarios de los perros y semanalmente por el veterinario. Se intentó evaluar cuántos días fueron necesarios para la curación y la proporción de curados en cada grupo después 1-2 semanas de tratamiento.

Resultados: después de una semana de tratamiento la povidona yodada mostró ser tan efectiva como el antibiótico.

Conclusiones: el empleo de povidona yodada al 2% en solución ocular es tan efectivo como el empleo de neomicina–polimixina B–gramicidina para el tratamiento de la conjuntivitis bacteriana pero inefectivo para las infecciones virales. Esto se debería de tener muy en cuenta en tratamientos de conjuntivitis bacteriana en países subdesarrollados donde los antibióticos tópicos son caros o difícilmente accesibles.

**Palabras clave:** antibióticos oculares | conjuntivitis | oftalmología | ojo rojo | povidona yodada | queratitis

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## 1. Introduction

Acute conjunctivitis is one of the most common eye conditions seen in our clinical veterinary . Without treatment, the infection may improve spontaneously or, infrequently, worsen to cause keratitis, corneal ulceration, and possible blindness.

Low cost, effectiveness, and lack of microbial resistance make povidone-iodine an appealing drug to treat ocular infections, especially in developing countries. Even in developed countries, increasing bacterial resistance to conjunctivitis treatment, as reported in the United States may also make povidone-iodine very attractive (Block et al., 2000).

Povidone-iodine interacts strongly with the double bonds of saturated fatty acids in the bacterial cell wall and cell organelle membranes and also oxidizes amino acid and nucleotides. It causes pore formation and solid–liquid interfaces at the lipid membrane level of cell walls to lose cytosol material.

Povidone–iodine ophthalmic solution has been found to be safe and effective when used after ophthalmic surgery. Povidone-iodine has an extremely broad spectrum of antimicrobial activity in vitro, including essentially all bacteria, viruses, chlamydia, and fungi, given enough contact time. Povidone-iodine has been found to be effective against chlamydia and viruses when tested in vitro in concentrations even more dilute than that used in this study (2%).

## 2. Material and Methods

The study was designed as a single-masked, controlled clinical trial so that the owners' dogs didn't know what treatment they were using. The enrollment period was from January 2003 through November 2006. The dogs's age mean was  $3.5 \pm 1.3$  years. 66 dogs were studied: 34 in the povidone-iodine group and 32 in the antibiotic group. The dogs

not completing the protocol were deleted from the study (7 in povidone group and 6 in antibiotic). These dogs were deleted from the study not for side effects but for no owner cooperation.

Dogs with a history of an untreated red inflamed eye with discharge that began within 14 days of the examination date were candidates for the study. Dogs were excluded if: oral or topical ocular antibiotics had been used within 14 days, a history of allergy to povidone–iodine, neomycin, polymyxin, or bacitracin was elicited, the eye had no discharge, the cornea or sclera had been perforated, or a hypopyon was present.

The conjunctival culture was obtained by everting the lower eyelid and scraping with a spatula. Chocolate agar plates were incubated with 50% carbon dioxide at 35 °C for at least 7 days. After incubation, colony-forming units were differentiated and enumerated by standard bacteriologic techniques.

Viral conjunctivitis was diagnosed if the bacterial cultures were negative and the clinical examination showed two or more typical findings, such as a follicular conjunctival reaction, discharge that was not primarily purulent, conjunctival membranes, or corneal infiltrates (Shiuey et al., 2000).

All dogs were alternately assigned to one of two treatment group.

Dogs received either povidone–iodine 2% in water solution prepared in the clinical veterinary using Sterile Distilled Water or an antibiotic solution consisting of neomycin-polymyxin B-gramicidin in each infected eye four times daily by their owners.

The aim of the study was to compare the percentages of recovery between povidone-iodine and the antibiotic solution used. For that reason a Chi square test was used. The confounding effect of a patient's age, gender, or duration of infection before treatment on the primary outcomes was tested using Wilcoxon Mann–Whitney tests.

The independent variables were treatment, age or age group, and onset. The statistical software used was the SPSS 10.0.

### **3. Results**

7 dogs did not complete the protocol in the povidone–iodine group and 6 in the antibiotic group. Because the number of dogs not completing the protocol was significantly equal in each group and not for side effects but for no owner cooperation.

the study results would not have been impacted, for that reason these dogs were deleted from the study. The proportion of type of infection was similar in each group. Because 49 (74.24%) of the cases were bilateral, the total number of eyes treated was 115. 85% of the dogs were younger than 7 years old. There were no statistically significant age or gender differences between the two groups (table 1). Povidone-iodine was studied in 34 dogs and the antibiotic in 32.

There was no interaction between the sex of the dog, the age or the duration of infection before treatment with medication.

The period for treatment and follow-up was 7 to 21 days. By 7 or 14 days of treatment, the proportion of eyes considered cured (no symptoms) was statistically the same for each treatment group: 94.12% (32 dogs) for the povidone–iodine group and 90.63% (29 dogs) for the antibiotic group (table 1).

No significant difference was found between the proportions of viral infections cured for either treatment group (7 -14 days). 100% of the viral infection cured positively (table1).

**Table 1: Distribution of frequencies**

	<b>Povidone Treatment</b>	<b>Antibiotic Treatment</b>
<b>Males</b>	17	16
<b>Females</b>	17	16
<b>Total</b>	34	32
<b>Total Cured</b>	32	29
<b>% Total Curados</b>	94.12	90.63
<b>Bacterial Conjunctivitis</b>	28	25
Mean time until cured	4.9 days	5.54 days
Dogs cured	26	22
% of dog cured	92.85%	88%
<b>Viral Conjunctivitis</b>	6	7
Mean time until cured	8.23 days	8.54 days

#### 4. Discussion

Leibowitz et al., reported neomycin sulfate-polymyxin B sulfate to be more effective than placebo. Polymyxin-bacitracin was also found to be superior to no treatment.(18) With this evidence, we believed that the inclusion of a placebo treatment arm in our study was not justified and might have been unethical.

We are not aware of previous controlled studies dealing with the use of povidone-iodine to treat dogs' conjunctival infections. Nevertheless there are studies that shown the effectiveness of povidone-iodine for human conjunctival infections: at 3% (Schuhman and Vidic, 1985) 5% and 10% (Abel and Abel, 1998). Our study is the first controlled and masked study to evaluate the efficacy of povidone-iodine to treat an ocular dog infection. The 2% concentration of povidone-iodine was chosen for this study based on our experience in the postoperative use of povidone-iodine after ophthalmic surgery.

We found the number of days needed for cure the bacterial process, to be shorter than the viral process. This might be due to the fact that the viral conjunctivitis has an autolimited course.

For bacterial infections in this study, the number of days until cure, regardless of treatment group, was approximately 5.5 days and for virus infections 8.4 days.

In spite of povidone-iodine might be not effective for viral conjunctival infections, if we consider that there are viral conjunctival infections not well catalogued and these infections should be due to bacteriums, povidone-iodine ophthalmic solution could be considered.

## 5. Conclusions

Povidone-iodine 2% ophthalmic solution was as effective as neomycin-polymyxin B-gramicidin for treating bacterial conjunctivitis. Povidone-iodine ophthalmic solution should be strongly considered as treatment for dog bacterial conjunctivitis, especially when bacterial resistance for antibiotics are present, or new antibiotics are costly or not available.

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