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EXPERIMENTAL STUDY ON ANTIBACTERIAL EFFECT OF DEXAMETHASONE CONTAINING ANTIBIOTICS*

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Dexamethasone을 含有한 抗生劑의 殺菌效果에 關한 實驗的 硏究

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》 국문초록 《

最近 齒髓炎症 生活齒髓切斷術 齒髓覆罩 象牙質知覺過敏症 等에 Cortisone製劑가 널리 使用되는 바 著者는 抗生劑에 Dexamethasone을 含有시켜 實驗群으로 삼고, 抗生劑 單獨으로 使用한 것은 對照群으로 삼아, 두 群의 殺菌效果를 比較하기 爲하여 寒天培養基上에선 白色 葡萄狀球菌으로, 血液加 寒天培養基上에선 α—溶血性 連鎖狀球菌과 β-溶血性 連鎖狀球菌을 使用하여 菌 成長抑制帶를 測定 觀察한 바 다음과 같은 結論을 얻었다.

1. Dexamethasone이 含有된 抗生劑에선 抗生劑 單獨으로 使用한 것보다 菌이 더 넓게 成長했다.
2. 抗生劑의 殺菌效果는 Dexamethasone에 依해 약간 底下되는 것을 볼수 있었다.
3. 따라서 Dexamethasone과 抗生劑 製劑는 菌이 存在時 別 效果가 없다고 思料되는 바이다.

INTRODUCTION

Since the discovery of the action of cortisone in rheumatoid arthritis and rheumatic fever in 1949, adrenal steroid and relative compounds are most widely used in medicine, because of their anti-inflammatory effect.

Also in dental fields, corticosteroids used to the pulp inflammation, or other endodontic operations.

The use of corticosteroids in pulp capping procedures to reduce the pulp inflammation has been established.

Recently, Lawson[1], Schroeder[2], Kiriyati[3], and Grossman[8] indicated that painful

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pulpitis may be treated successfully with corticoid and antibiotic drugs, used separately or combined.

In contrast to these studies, other investigators[5)6)11)12)] found the enhancement of bacterial infections resulting from therapy with glucocorticoids has been thought to result from their general suppressive effect upon inflammation and general response to injury.

kiriyati[3)], Schroeder[2)] and Triadan have suggested the concomitant use of corticosteroid and antibiotics because of the dangers inherent in a reduction of the inflammatory response in the presence of bacteria.

The mesenchymal block occured by glucocorticoids could aid the dissemination of microorganisms, lead to total suppuration.

Klotz[7)] reported that the spread of microorganism from localized region of infection to the entire pulp or, by means of the blood streams, to the entire body was a distinct possibility, when prednisolone used topically in infected pulps.

Since the anti-inflammatory properties of corticosteroids are well known and since the bactericidal effect of antibiotics is believed to offer the good results, the purpose of this experiment was to determine if the containing of corticosteroid to antibiotics would improve its bactericidal effect.

MATERIAL AND METHOD

1) Microorganisms:

Staphylococcus aureus, α-hemolytic streptococcus, and β-hemolytic streptococcus were tested for bactericidal effect to dexamethasone containing and dexamethasone free antibiotics.

2) Antibiotics:

Dihydrostreptomycin(10mcg), bacitracin(10units), and erythromycin(2mcg) sensitivity disks(BBL) were used in this experiments.

The diameter of sensitivity disk(BBL) was 6.6mm.

3) Medium:

Nutrient agar(DIFCO) and blood agar enriched with 5% human whole blood in nutrient agar were used in this experiment.

4)Method:

a) control group-antibiotic sensitivity disk only

b) experimental group-each antibiotic sensitivity disk charged with 0.016ml oradexon. (dexamethasone sodium phosphate in aquous solution 5 mg/ml, N V Organon OSS Holland)

As a general rule, the disks of control and experimental groups were aseptically placed on the surface of agar plates inoculated with bacteria.

All plates were incubated aerobically for 48 hours at 37°C. The presence of zones of growth inhibition around these disks was used as the parameter to asses the antimicrobial activity of dexamethasone-antibiotics and antibiotics only.

In all experiments, 95 agar plates were used.

The control and experimental groups were set in one plate.

The degree of bacteriostasis was recorded by subtracting the diameter of the sensitivity disk from the total diameter of zone of inhibition and dividing by two.

RESULTS

Representative deta, Which show the in vitro antibacterial activity of control and experimenal groups against staphylococcus aureus, α-and β-hemolytic streptococcus, are summerized in the Table.

Dexamethasone containing antibiotics impaired to some degree in inhibition zone of bacterial growth.

Table : Inhibition zone of control and experimental groups

Micro-organism	Medium	No of Cases	Inhibition zone (mm)					
			SM	SM+D	Ba	Ba+D	Er	Er+D
Sta. Au.	NA	55	3.11	2.89	4.97	4.62	4.33	3.88
α-H. Str.	BA	20	3.61	3.09	9.56	9.15	6.96	6.36
β-H. Str.	BA	20	5.78	4.57	9.61	8.26	9.37	8.50

Sta. Au., Staphylococcus Aureus
α-H. Str., α-Hemolytic Streptococcus
β-H. Str., β-Hemolytic Streptococcus
NA, Nutrient Agar
BA, Blood Agar
SM, Dihydrostreptomycin
D, Dexamethasone sodium phosphate
Ba, Bacitracin
Er, Erythromycin

DISCUSSION

From the results of this experiments, it was found that the inhibition zone of cortisone free antibiotic was slightly greater than of cortisone containing antibiotic.

It was, also, obtained that corticosteroids impaired bactericidal effect of antibiotics.

Eisenstein[5], andR. H. Williams[6] found that the administrated glucocorticoids intravenously or orally was an important factor in decreased resistant to infection.

Goodman and Gilman[11] reported that glucocorticoids inhibit not only the early phenomena of the inflammatory process, but also the capillary proliferation, fibroblast proliferation, deposition.

The conjoint use of an anti-inflammtory agent and antibiotic currently applied was thought to work adversely on defense mechanism of a vital tissue.

Allison, [10] observed that the pretreatment with prednisolone failed to change the

phagocytic and killing capability of human leukocyte.

According to Kiriyati[3], the administration of hydrocortisone did not promise any sensational results, even if an antibiotic was given concurrently.

On the other hand, Nagai, K. et al. [13] studied that cortisone was effective on inhibitory effect of granulation and on anti-inflammation.

Fry et al.[4] reported that the high potential of the topical use of meticortelone(prednisolone) for the relief of dentinal and pulp pain, hypersensitivity and for conserving the vitality of exposed dentin and pulp tissue.

Bhaskar, S. N., et al.[9] studied that metimyd (prednisolone-sulfacetamide with neomycin) plus calcium hydroxide markedly reduced edema, inflammatory infiltrate and eliminated necrosis of tissue and dystrophic calcification in the tissue.

SUMMARY AND CONCLUSION

Ninety-five agar plates were used for antibacterial activity of dexamethasone containing antibiotics and dexamethasone-free antibiotics.

In this experiment, it was found that cortisone has tendency to cause decreasing bactericidal potency of antbiotics.

Corticosteroids, also, might have affected the bacterial growth.

In addition to this, corticosteroid-antibiotic preparations may not be available when the microorganisms present.

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