

# Glucocorticoids: A Boon or Bane in Dentistry

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## Abstract

The people who had undergone or are undergoing glucocorticoid therapy present distinctive issues for dental surgeons. The people receiving the steroid therapy have their responses altered to infection and injury assuage. More importantly, the patients who are taking or have taken glucocorticoids have a possibility of suffering from acute-adrenal insufficiency when they are introduced to a stressful situation. When a patient with a history of glucocorticoid therapy is under treatment, actual details on the medical history must be obtained. The dentist must regulate the requirement for the ensuing preventive measures: a) Systemic antibiotic therapy, b) anxiety control, c) increased administration of glucocorticoids.

**Keywords:** *glucocorticoid therapy, acute-adrenal insufficiency, prophylactic measures, administration of glucocorticoids.*

## Introduction

Glucocorticoids are powerful medicines that work with our immune system and fight against the inflammation to treat the various health problems. Although corticosteroids were used in the field of medicine since 1944, it was not until 1951 that the field of dentistry began to use them. Corticosteroid is one of the anti-inflammatory drugs that has been listed in Dental Practitioners' Formulary.<sup>1</sup> These have been used for managing the inflammatory diseases for the last 50 years. Glucocorticoids or steroids are the substances that are naturally synthesized in our body. They are one of the most widely prescribed drugs in both the dental and medical fields. Dental patients with a history of corticosteroid therapy may require special consideration and brief medical information before receiving any treatment. The current misuse of the steroids is that it is overly prescribed, even before minor dental procedures. Glucocorticoids or corticosteroids have revolutionized

the treatment of several disabling conditions, but its use in terms of the dosage is not appropriate.<sup>2</sup>

**Glucocorticoids-A Brief Idea:** Glucocorticoids are derived from "glucose+ cortex+ steroid" which reflects their i) role in the regulation of glucose metabolism ii) adrenal cortex origin iii) steroidal structure. Glucocorticoids are a class of corticosteroids, which are a class of steroid hormones. They are a kind of corticosteroid hormone that shows their effects in the reduction of the inflammation and annihilation of the immune system. Due to inflammation, our immune system acknowledges intruding substances and trauma and hence is an important part of our alleviating process. They include corticosteroid hormones that are synthesized naturally in the adrenal cortex and are comparable to those produced in laboratories.<sup>3</sup> These have been used broadly and are successful in treating many oral diseases, due to outstanding anti-inflammation and immune-modulation effects. However, if the habitual control systems that are in charge of switching off the action of the inflammation do not work, then the tissues are in danger of being destroyed. The continuation of the inflammation is seen to be in association with several chronic conditions which include obesity, diabetes, depression, cancer and lastly heart diseases. Hence, they are sometimes termed as "double-edged sword" due to their potential side-effects. Glucocorticoids include an applicable diagnosis, a crystal view of the desirable

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management, and the understanding of whether the treatment is pointed at a chronic illness or a heightened resolution of a small-term issue. The positive effects must be considered concerning the probable risks.<sup>4</sup>

All the glucocorticoids have a similar structure but differ in their doses (potency). 5 mg of prednisolone is considered to be equivalent to 4 mg of triamcinolone and 0.75 mg of betamethasone. High doses of prednisolone most likely cause salt and water confinement and an increase in the elimination of potassium. Its adverse effect is more than that seen in the intake of increased doses of triamcinolone, dexamethasone or betamethasone. The standard prescriptions and doses of prednisone, triamcinolone, and methylprednisolone last from 12-36 hours in the body while dexamethasone and while betamethasone lasts from 32-72 hours. Prednisone is considered one of the most popular glucocorticoids due to its inexpensiveness. It is transformed into prednisolone in the liver and it is available only through oral route.<sup>5,6</sup>

**Use of glucocorticoids in dentistry:** Among the various specialties of dentistry, oral and maxillofacial surgery, oral medicine, and endodontics are the most avid users of glucocorticoids. Most of the glucocorticoids used in dentistry are mostly prescribed for topical application for a short term use.<sup>7</sup>

**Endodontics:** The effects are seen in the reduction of the inflammation of the pulp as well as root resorption. Zinc oxide eugenol along with steroids helps as an effective root canal sealer. It is also used to reduce postoperative thermal sensitivity.<sup>8</sup>

**Pain following root canal treatment:** One of the main reasons that people avoid going to the dental offices is anxiety and fear of getting the root canal treatment done. Hence, managing pain during the treatment and after it, is very important. The pain following the root canal treatment is undesirable, for the patient as well as the dental practitioner. It has been investigated that there are several reasons for the occurrence of pain after root canal treatment. It is a multi-factorial phenomenon, including mechanical, chemical, host and microbiological factors. Besides, the pain before treatment could be due to demographic factors such as age and gender. The post-operative pulp status and the type of teeth also influence the pain. Investigations have shown glucocorticoids can be used for pain management following root canal treatment.<sup>9,10</sup>

**Orthodontics:** Patients need to be reviewed and

asked for their previous history of steroids use since it has appeared that upon the treatment with hydrocortisone, teeth show a lower amount of tooth movement.

**Oral Surgery:** It is used to limit the postoperative inflammation after oral surgical procedures. It is also reported that steroids help to prevent ulceration and excoriation, which occurs during retraction during surgery over the lips and corners of the mouth.

**Oral Medicine:** Topical glucocorticoids have proven to be very effective in the treatment of a variety of oral mucosal lesions which includes oral ulcerations and manifestations of the auto-immune diseases of the body. In oral medicine, corticosteroid injections are an integral part of the management of temporo-mandibular joint degeneration. Glucocorticoids are an important part in the treatment of various diseases as summarized below:-

**OSMF:** Topical application over the painful or ulcerative mucosa shows a direct healing action on the mucosal patch due to its anti-inflammatory property.<sup>11</sup>

**Oral Lichen Planus:** Clobetasol propionate with nystatin in orabase -0.05% 3-4 times per day appears to be effective in controlling lichen planus.

**Erythema Multiforme:** Prednisolone is the drug of choice for erythema multiforme.

**Pemphigus:** Prednisolone or topical and systemic steroid combination-betamethasone is the drug of choice for pemphigus.

**Desquamative Gingivitis:** The drug of choice is triamcinolone and fluocinonide.

**Oral Submucous Fibrosis:** A dose-dependent enhancement of fibroblast collagen phagocytosis is caused by corticosteroids. Hydrocortisone, betamethasone are the drugs of choice.

**Melkersson Rosenthal Syndrome:** Due to the anti-inflammatory action of steroids, it is used to reduce persistent edema and swelling. Prednisolone is the drug of choice.

**Bell's Palsy:** The drug of choice here is prednisolone 60-80 mg daily during the first few days.

**Central Giant Cell Granuloma:** For non-surgical treatment, intracellular corticosteroid injections are given and topically, triamcinolone acetonide can be given as it

works by suppressing an angiogenic component of the lesion.

These are some of the conditions and their management using glucocorticoids. There are innumerable diseases and conditions, for which steroids are very beneficial.<sup>12</sup>

**Guidelines for dental use:** Evidence shows that maximum people suffering from adrenal insufficiency can go for non-surgical regular dental treatment without the requirement for any glucocorticoid. The dental treatments do not encourage cortisol secretion as much as those of oral surgical procedures, and the local anesthesia blocks neural stress pathways that are needed for the production of adrenocorticotropic hormone secretion. For patients who undergo general anesthesia for minor surgery, then hydrocortisone of 100 mg should be administered intramuscularly and the usual glucocorticoid doses should be maintained. For any major surgery, 100 mg of hydrocortisone must be delivered as a tablet preoperatively, which is then followed by 50 mg 8-hourly for 48 hours.<sup>13</sup>

**Adverse effects:** When the glucocorticoids are prescribed in an approved dosage for a small period, then the drugs are safe. Regular or large doses of the drug can cause some severe adverse effects. Many of the complications start with the dose and the duration of the therapy. Several of the complications occur in patients who are already under extensive therapy. So in patients like these the administration of steroids must be monitored.

If glucocorticoids are given regularly or daily then the adrenal cortex stops producing it and the tissues of the adrenal gland get atrophied. It becomes a concern when the drug therapy is suddenly stopped, because adrenal glands cannot immediately produce it again. This is known as acute adrenal insufficiency. The manifestations include nausea, irritation; joint problems, vertigo, and low blood pressure. So to avert this from happening, the corticosteroid drugs have to be removed unhurriedly, over some time, like in weeks or months, to allow the adrenal cortex to restart its complete functional competency.<sup>14</sup>

For patients under long-term therapy, an additional amount of glucocorticoids must be given amid stressful times such as surgery or serious infection, similar to the cortisol rush usually produced in the system. Since these hormones subdue the immune system, the danger of

infection increases. Certain viral infections like measles and chickenpox may be more serious in patients on steroid therapy.

An increased use of glucocorticoids can result in causing Cushing's syndrome whose manifestations include a protuberance between the shoulders, a round face, irregular menstrual cycles, and an increase in weight, depression, and weariness. Other effects include-Discomposure and irritation, Cataracts(or glaucoma), Vertigo, Blurred vision, Rise in facial hair in women, Difficulty in concentration, Retention in fluid, Headache, Irregular heartbeat, Increase in blood pressure, blood sugar levels, cholesterol, or triglycerides levels, Rise in the level of gastric ulcers or gastritis, Osteoporosis caused due to the body's inability to absorb calcium, Osteonecrosis, Reactivation of latent tuberculosis, Sleeplessness, Weight gain, breathlessness.

**Minimizing the effects of steroid therapy:** When under steroid therapy, probiotics play a very crucial role in minimizing the effects of candidiasis. The action of probiotics is in three ways. Firstly, it helps in inhibiting pathogenic enteric bacteria. Secondly, it improves the function of the epithelial and mucosal barrier by enhancing the mucus production, and hence enhancing the barrier integrity and the production of short-chain fatty acids Thirdly, it helps in altering the immune regulation by stimulating the secretor immunoglobulin production, hence decreasing the tumor necrosis factor expression, by the introduction of interleukin-10.<sup>15</sup>

## Conclusion

The risks that are associated with glucocorticoids are parallel to the benefits of their therapeutic power. The benefits are many but the side effects are well known. Hence they are known as a double-edged sword. Their potential to cause many adverse effects presents the dental practitioner with the difficulty of the management of the patients undergoing steroid therapy. The drugs should not be used for trivial reasons and it should be carefully considered before each individual is administered these drugs. However if the dental practitioner maintains the proper guidelines of administration and care then the patients on glucocorticoid therapy have the highest benefits and the lowest possible risks. Hence, glucocorticoids are a boon in our profession and relief to our patients but when administered carefully.

**Ethical Permission:** Not required

**Conflict of Interests:** None

**Funding:** None

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