CORTICOSTEROID OVERUSE AND UNINTENDED CONSEQUENCES IN CLINICAL PRACTICE

Zarina Farheen

Department of Pathology

United Institute of Medical Sciences, Rawatpur, Prayagraj, Uttar Pradesh, India - 211012

Received on : 15-04-2023
Accepted on : 29-08-2023

Address for correspondence

Dr. Zarina Farheen
Department of Pathology
United Institute of Medical Sciences,
Prayagraj, India - 211012
Email: zarina.atif@gmail.com
Contact no: +91-70074 32009

ABSTRACT

Corticosteroids, heralded for their potent anti-inflammatory and immunosuppressive properties, have emerged as pivotal agents in the multifaceted landscape of medical therapeutics. While their efficacy in addressing an array of inflammatory conditions is well-established, the dynamic interplay between the therapeutic benefits and potential risks associated with corticosteroid use demands comprehensive examination. This expansive review delves into the intricate fabric of corticosteroid administration, unravelling the complexities of their mechanisms of action, broad-ranging indications, and the delicate equilibrium between therapeutic advantages and the potential for adverse effects. By scrutinizing the evolving evidence surrounding corticosteroid overuse, we strive to provide a comprehensive perspective on the medical, economic, and societal dimensions, advocating for a nuanced and balanced approach that maximizes the therapeutic potential of corticosteroids while minimizing the risks associated with their potential overuse.

KEYWORDS: Corticosteroids Overuse, Medical Therapeutics, Adverse Effects.

INTRODUCTION

Corticosteroids, heralded for their potent anti-inflammatory and immunosuppressive properties, have emerged as pivotal agents in the multifaceted landscape of medical therapeutics (1). While their efficacy in addressing an array of inflammatory conditions is well-established, the dynamic interplay between the therapeutic benefits and potential risks associated with corticosteroid use demands comprehensive examination (2). This expansive review delves into the intricate fabric of corticosteroid administration, unravelling the complexities of their mechanisms of action, broad-ranging indications, and the delicate equilibrium between therapeutic advantages and the potential for adverse effects (1).

1. CLASSES OF CORTICOSTEROIDS

In addition to having anti-inflammatory, immunosuppressive, anti-proliferative, and vasoconstrictive properties, glucocorticoids-such as cortisol—affect the metabolism of proteins, fats, and carbohydrates. (2) Induced anti-inflammatory mediators (transactivation) and inflammatory mediators' function is blocked (transrepression) to provide anti-inflammatory effects. (2) Immunosuppressive effects are mediated through direct action on T-lymphocytes, which suppresses delayed hypersensitivity reactions. (2) The suppression of epidermal cell turnover and DNA synthesis mediates the anti-proliferative effects. (2) Inhibiting the activity of inflammatory mediators like histamine results in vasoconstrictive effects.In (2)

Mineralocorticoids: by modifying ion transport in the renal tubule epithelial cells, minerals like aldosterone mainly contribute to the control of electrolyte and water balance in the kidney.

One of the most significant and widely used classes of anti-inflammatory medications is represented by glucocorticoids (GCs). Although GCs have been used and recognized for their therapeutic effects for over 50 years, significant progress in understanding the underlying molecular mechanisms has only been accomplished in the last ten to fifteen years. Everyone agrees that GCs' intended anti-inflammatory actions are primarily mediated through the suppression of gene transcription. On the other hand, the molecular pathways that underlie GC-mediated adverse effects are intricate, unique, and sometimes only partially comprehended. According to recent research, some side effects-like diabetes and glaucoma—are mostly mediated by transactivation, while other adverse

effects-like the suppression of the hypothalamic-pituitary-adrenal axis-are primarily mediated by transrepression. For a significant number of side effects, the exact molecular mechanism is either not known yet or appears to entail both transactivation and transrepression (e.g., osteoporosis). The present drug-finding initiatives focused on the creation of dissociated GC receptor (GR) ligands are based on the varied molecular regulation of the main anti-inflammatory properties of GCs and their adverse effects. These ligands selectively cause the GR to transrepress, but only little or not at all transactivate. From a clinical to a molecular standpoint, the most significant GC-mediated adverse effects are currently understood to be summarized in this article. Predicting the possible benefits of selective GR agonists over classical GCs should be made easier by concentrating on the molecular factors.

Understanding the nuanced nature of corticosteroid administration requires a comprehensive exploration of their multifaceted role in clinical practice (2). From their historical significance to the ever-evolving understanding of their molecular mechanisms, this review aims to provide a thorough examination of corticosteroid use, moving beyond mere acknowledgment of their efficacy to a nuanced consideration of the intricate balance required in their deployment (1).

2. MECHANISMS OF ACTION AND INDICATIONS

The complexity of corticosteroid mechanisms is a tapestry of anti-inflammatory and immunomodulatory actions. Their ability to suppress pro-inflammatory genes, modulate immune responses, and reduce the release of inflammatory mediators underscores their efficacy across a spectrum of conditions, including rheumatoid arthritis, asthma, dermatitis, and inflammatory bowel disease (4).

As we embark on this exploration, a deep dive into the molecular underpinnings will elucidate the foundations upon which corticosteroid therapy rests (1).

3. EFFICACY AND SHORT-TERM BENEFITS

While the therapeutic benefits of corticosteroids in providing rapid relief and preventing disease progression are well-documented, it is imperative to consider the temporal dynamics of their effects (3). Short-term use is celebrated for its efficacy, with patients experiencing tangible improvements in symptoms (^3^). However, this short-term efficacy must be viewed through the prism of potential long-term complications, prompting a nuanced assessment of their role in various clinical scenarios (3).

4. RISKS AND COMPLICATIONS OF CORTICOSTEROID OVERUSE

a. Osteoporosis and Musculoskeletal Effects:

The association between prolonged corticosteroid use and diminished bone density, leading to an increased risk of fractures and osteoporosis, is a facet that demands careful consideration (^5^). The intricate dance between the skeletal system and corticosteroid-induced changes forms a crucial component of the risk profile associated with their prolonged use (5).

B. METABOLIC EFFECTS

As the corticosteroid tapestry unfolds, the intricate interplay with metabolic processes introduces a potential for insulin resistance, culminating in glucose intolerance, diabetes, and metabolic syndrome. The delicate balance between anti-inflammatory effects and metabolic repercussions forms a critical aspect of the risk-benefit analysis (4).

C. CARDIOVASCULAR COMPLICATIONS:

The long-term use of corticosteroids has been tentatively linked to hypertension, dyslipidaemia, and an increased propensity for cardiovascular events (4). The cardiovascular implications, often overshadowed by their anti-inflammatory prowess, add a layer of complexity to the risk assessment inherent in prolonged corticosteroid use (4).

D. IMMUNODEFICIENCY AND INFECTIONS

The immunosuppressive effects of corticosteroids, while pivotal in controlling inflammatory responses, expose individuals to a heightened susceptibility to infections (7). The delicate balance between immune modulation and the potential for opportunistic infections adds a layer of complexity to the risk profile associated with corticosteroid use (7).

E. PSYCHIATRIC EFFECTS:

Mood disturbances, anxiety, and insomnia emerge as documented adverse effects, especially when higher doses or prolonged use of corticosteroids are employed. The intricate interplay between corticosteroids and the central nervous system introduces a layer of complexity that necessitates careful consideration in the risk-benefit assessment (7).

5. ALTERNATIVES AND STRATEGIES TO MINIMIZE OVERUSE

As we navigate the complexities of corticosteroid use, the quest for alternative treatment modalities becomes imperative. Disease-modifying agents, biologics, and non-pharmacological interventions present themselves as viable alternatives, providing clinicians with an array of tools to tailor therapeutic approaches to individual patient needs. The stepwise approach,

emphasizing the use of the lowest effective dose for the shortest duration, forms a cornerstone in the quest to strike a delicate balance between therapeutic benefits and potential harm (8,9).

Topical, inhalation, and injectable steroids may have certain adverse effects. But oral steroids are mostly responsible for adverse effects. (10–11)

Oral steroids may cause the following side effects:

- Atrophy of the skin and muscles
- Elevated blood pressure
- Mood swings or behavioral abnormalities
- Osteoporosis
- Glaucoma
- Diabetes

Prolonged use is linked to:

- Depression
- Weight gain
- Face puffiness or swelling (fluid retention)
- Vomiting and nausea
- Additional stomach irritations
- Fractures in the bones

The following are possible side effects of inhaled corticosteroids:

- cough
- dysphonia or trouble speaking
- oral thrush

The following are possible side effects of topical corticosteroids:

- Perioral dermatitis
- Stretch marks
- Acne
- Rosacea
- Atrophy
- Delayed wound healing (rare)
- Corticosteroid injection side effects can include
- Transient soreness and pain
- skin color loss at the injection site
- Elevated blood sugar
- Flushing of the face
- Sleeplessness
- Infection

Not everyone who uses corticosteroids will experience negative effects. If corticosteroids are taken for an extended length of time at a high dose, side effects are more likely. The use of a corticosteroid medicine may be impacted by specific medical problems.

Examples:

- HIV/AIDS
- Herpes Simplex Infection of The Eye
- Tuberculosis
- Gastrointestinal Issues
- Diabetes
- Glaucoma
- High Blood Pressure
- Any Type of Infection (Viral, Bacterial, or Fungal)
- Disorders of The Heart, Liver, Thyroid, or Kidney
- Recent Surgery or Grave Injuries.

Additionally, corticosteroids can change how other drugs work. On the other hand, interactions involving steroid injections or sprays are unlikely to occur.

6. CONCLUSION

In the labyrinthine landscape of corticosteroid therapy, the narrative extends beyond their historical significance and established efficacy. While corticosteroids continue to play an indomitable role in the management of inflammatory conditions, the spectre of overuse demands a meticulous and judicious approach. As we conclude this comprehensive review, we advocate for clinicians to embrace prudent prescribing practices, explore alternative therapeutic avenues, and actively engage in ongoing research endeavours aimed at refining guidelines (^8^). By doing so, clinicians can navigate the delicate equilibrium between maximizing the therapeutic potential of corticosteroids and minimizing the potential detrimental effects associated with their overuse.

REFERENCES

1. Barnes PJ. Corticosteroid effects on cell signaling. Eur Respir J. 2006; 27 (2):413-426.
2. Da Silva JA, Jacobs JW, Kirwan JR, et al. Safety of low dose glucocorticoid treatment in rheumatoid arthritis: published evidence and prospective trial data. Ann Rheum Dis. 2006; 65 (3):285-293.
3. Fardet L, Petersen I, Nazareth I. Prevalence of long-term oral glucocorticoid prescriptions in the UK over the past 20 years. Rheumatology (Oxford). 2011; 50 (11):1982-1990.

4. Schacke H, Docke WD, Asadullah K. Mechanisms involved in the side effects of glucocorticoids. Pharmacol Ther. 2002; 96 (1):23-43.
5. Van Staa TP, Leufkens HG, Cooper C. The epidemiology of corticosteroid-induced osteoporosis: a meta-analysis. Osteoporos Int. 2002; 13 (10):777-787.
6. Curtis JR, Westfall AO, Allison J, et al. Longitudinal patterns in the prevention of osteoporosis in glucocorticoid-treated patients. Arthritis Rheum. 2005; 52 (8):2485-2494.
7. Dixon WG, Abrahamowicz M, Beauchamp ME, et al. Immediate and delayed impact of oral glucocorticoid therapy on risk of serious infection in older patients with rheumatoid arthritis: a nested case-control analysis. Ann Rheum Dis. 2012; 71 (7):1128-1133.
8. Buttgereit F, da Silva JA, Boers M, Burmester GR, Cutolo M, Jacobs J. Standardised nomenclature for glucocorticoid dosages and glucocorticoid treatment regimens: current questions and tentative answers in rheumatology. Ann Rheum Dis. 2002; 61 (8):718-722.
9. Loke YK, Cavallazzi R, Singh S. Risk of fractures with inhaled corticosteroids in COPD: systematic review and meta-analysis of randomised controlled trials and observational studies. Thorax. 2011; 66 (8):699-708.
10. National Institute for Health and Care Excellence (NICE). Rheumatoid arthritis in adults: management. NICE guideline (NG100). Updated 2018.
11. www. Medicalnewstoday.comarticles/ corticosteroids#uses. (Assessed on 1st December2023).

Orcid ID:

Zarina Farheen - https://orcid.org/0000-0002-8317-7703

How to cite this article:

Farheen Z. Corticosteroid Overuse and Unintended Consequences in Clinical Practice. Era J. Med. Res. 2023; 10(2): 56-59.