International Journal of Medical Sciences, January 2019;2(1):1-4;
ISSNe 2522-7386; DOI: https://doi.org/10.32441/ijms.2.1.1

LEADING ARTICLE

Misuses and side effects of steroids derivatives.

Nemah H. Aljubori; MB.Ch B; PhD; LS3Clinical Pathology.
Editor for Basic Sciences, International Journal Medical Sciences
Babylon University College of Medicine (BUCM), Babylon, Iraq
E mail: Nemahsalih@gmail.com
Mobile: +9647800096786; ORCID: http://orcid.org/0000-0002-4075-0741
Received: 10/11/2018 Accepted: 15/12/2018 Published:1st January, 2019

The term Steroid, denotes any of a class of natural or synthetic organic compounds characterized by a molecular structure of 17 carbon atoms arranged in four rings [1]. Steroids are important in biology, chemistry, and medicine [2]. They are classified into two major categories; the catabolic and the anabolic steroids. The catabolic steroids include corticosterone cortisone and aldosterone. The main corticosteroids produced by the adrenal cortex are cortisol and aldosterone [3]. Corticosteroids have numerous side-effects, some of which may be severe:

1. Severe amebic colitis: Fulminant amebic colitis is associated with high case fatality and can occur in patients infected with the parasite Entamoeba histolytica after exposure to corticosteroid medications. [4]
2. Neuropsychiatric: steroid psychosis, [5] and anxiety, [6] depression. Therapeutic doses may cause a feeling of artificial well-being ("steroid euphoria"). [7] The neuropsychiatric effects are partly mediated by sensitization of the body to the actions of adrenaline. Therapeutically, the bulk of corticosteroid dose is given in the morning to mimic the body's diurnal rhythm; if given at night, the feeling of being energized will interfere with sleep. An extensive review is provided by Flores and Gumina. [8]
3. Cardiovascular: Corticosteroids can cause sodium retention through a direct action on the kidney, in a manner analogous to the mineral corticoid aldosterone. This can result in fluid retention and hypertension.
4. Metabolic: Corticosteroids cause a movement of body fat to the face and torso, resulting respectively in "moon face" and "buffalo hump". and away from the limbs. Due to the diversion of amino-acids to glucose, they are considered anti-anabolic, and long term therapy can cause muscle wasting [9]
5. Endocrine: By increasing the production of glucose from amino-acid breakdown and opposing the action of insulin, corticosteroids can cause hyperglycemia, [10] insulin resistance and diabetes mellitus. [11]
6. Skeletal: Steroid-induced osteoporosis may be a side-effect of long-term corticosteroid use. Use of inhaled corticosteroids among children with asthma may result in decreased height. [12]

8. Gastro-intestinal: While cases of colitis have been reported, corticosteroids are often prescribed when the colitis, although due to suppression of the immune response to pathogens, should be considered only after ruling out infection or microbe/fungal overgrowth in the gastrointestinal tract. While the evidence for corticosteroids causing peptic ulceration is relatively poor except for high doses taken for over a month, [13] the majority of doctors as of 2010 still believe this is the case, and would consider protective prophylactic measures. [14]
9. Eyes: chronic use may predispose to cataract and retinopathy.
10. Vulnerability to infection: By suppressing immune reactions (which is one of the main reasons for their use in allergies), steroids may cause infections to flare up, notably candidiasis. [15]
11. Pregnancy: Corticosteroids have a low but significant teratogenic effect, causing a few birth defects per 1,000 pregnant women treated. Corticosteroids are therefore contraindicated in pregnancy. [16]
12. Habituation: Topical steroid addiction (TSA) has been reported in long-term users of topical steroids (users who applied topical steroids to their skin over a period of weeks, months, or years).[8,17] TSA is characterized by uncontrollable, spreading dermatitis and worsening skin inflammation which requires a stronger topical steroid to get the same result as the first prescription. When topical steroid medication is lost, the skin experiences redness, burning, itching, hot skin, swelling, and/or oozing for a length of time. This is also called 'red skin syndrome' or 'topical steroid withdrawal'(TSW). After the withdrawal period is over the atopic dermatitis can cease or is less severe than it was before. [18]
13. In children the short term use of steroids by mouth increases the risk of vomiting, behavioral changes, and sleeping problems. [19]

Anabolic androgenic steroids (AAS) are usually misused by adult recreational and competitive athletes. These synthetic derivatives of testosterone are also misused by a growing number of adolescents to alter physical appearance and to increase muscular mass and strength in spite of their lack of knowledge about the detrimental effects of these compounds on health. Anabolic androgenic steroids side effects range from acne, hirsutism, clitoral enlargement and deepened voice in women and baldness in men to hypertension, heart hypertrophy, kidney failure, prostatic hypertrophy and liver dysfunction, among other life-threatening conditions (20–24). Concerning behavioral changes, AAS can trigger affective disorders that can lead to aggressive and violent episodes (25–28).

References

1. Nussey S, Whitehead S. Endocrinology: An integrated approach. Oxford: BIOS Scientific Publishers, 2001.
2. Nussey S, Whitehead S. The adrenal gland. BIOS Scientific Publishers, 2001.
3. Liu D, Ahmet A, Ward l, Krishnamoorthy P, Mandelcorn E, Leigh R, et al. A practical guide to the monitoring and management of the complications of

systemic corticosteroid therapy. Allergy Asthma Clin Imm 2013; 9 (1): 30. doi:10.1186/1710-1492-9-30. ISSN 1710-1484. PMC 3765115. PMID 23947590.
4. Shirley DA, Moonah S, Meza I. Fulminant Amebic Colitis after Corticosteroid Therapy: A Systematic Review. PLOS Neglected Tropical Diseases 2016; 10 (7): e0004879.
5. Hall R. Psychiatric Adverse Drug Reactions: Steroid Psychosis. Director of Research Monarch Health Corporation Marblehead, Massachusetts.
6. Korte SM. Corticosteroids in relation to fear, anxiety and psychopathology. Neurosci Biobehav Rev 2001; 25 (2): 117–42.
7. Swinburn CR, Wakefield JM, Newman SP, Jones PW. Evidence of prednisolone induced mood change ('steroid euphoria') in patients with chronic obstructive airways disease. Br J Clin Pharmacol 1988; 26 (6): 709–713.
8. Flores BH, Gumina HK. The neuropsychiatric sequelae of steroid treatment. 2003. http://www.dianafoundation.com/articles/df_04_article_01_steroids_pg01.html
9. Hasselgren PO, Alamdari N, Aversa Z, Gonnella P, Smith IJ, Tizio S. Corticosteroids and muscle wasting: Role of transcription factors, nuclear cofactors and hyper acettylation. Curr Opin Clin Nutr Metab Care 2010; 13 (4): 423–428.
10. Donihi AC, Raval D, Saul M, Korytkowski MT, DeVita MA. Prevalence and predictors of corticosteroid-related hyperglycemia in hospitalized patients. Endocr Pract 2006; 12 (4): 358–62.
11. Blackburn D, Hux J, Mamdani M. Quantification of the risk of corticosteroid-induced diabetes mellitus among the elderly. J Gene Intern Med 2010; 17 (9): 717–720.
12. Zhang L, Prietsch SO, Ducharme FM. Inhaled corticosteroids in children with persistent asthma: effects on growth. The Cochrane Database of Systematic Reviews. 7: 2014; CD009471. doi:10.1002/14651858.CD009471.pub2. PMI doi:10.1002/14651858.CD009471.pub2. PMID 25030198.
13. Pecora PG, Kaplan B. Corticosteroids and ulcers: is there an association? Ann Pharmacother 1996; 30 (7–8): 870–2.
14. Martinek J, Hlavova K, Zavada F, Seifert B, Rejchrt S, Urban O, Zavoral M. A surviving myth - corticosteroids are still considered ulcerogenic by a majority of physicians. Scand J Gastroenterol. 2010; 45:1156–61.
15. Fukushima C, Obase Y, Miazaki Y, Shimado T, Kohno S. Oral candidiasis associated with inhaled corticosteroid use: Comparison of fluticasone and beclomethasone. Ann Allergy Asthma Imm 2003; 90 (6): 646–651.
16. Shepard TH, Brent RL, Freidman JM, Jones KL, Miller RK, Moore CA, Polifka JE. Update on new developments in the study of human teratogens. Teratology 2002; 65 (4): 153–61.
17. Edith N, Olaniyi D, Samuel I. Misuse and abuse of topical steroids: implication. Expert Review of Dermatology 2007; 2 (1): 31–40.
18. Rathi S, Paschal D. Rational and ethical use of topical corticosteroids based on safety and efficacy. Indian J Derm 2012; 57 (4): 251–259.

19.Fukaya, M, Sato K, Sato M, Komati H, Fujisawa S, Dozono H, et al. Topical steroid addiction in atopic dermatitis. Drug Healthcare Patient Safety 2014; 6: 131–8.
20. Aljebab F, Choonara I, Conroy S. Systematic review of the toxicity of short course oral corticosteroids in children. Arch Dis Childhood 2016; 101 (4): 365–70.
21. Bonetti A, Tirelli F, Catapano A, Dazzi D, Dei Cas A, Solito F, et al. Side effects of anabolic steroids abuse. Int J Sports Med. 2008; 29:679–87.
22. Donahue JL, Lowenthal DT. Androgens, anabolic-androgenic steroids, and inhibitors. Am J Ther. 2000; 7:365–73.
23. Hall RC, Hall RC. Abuse of supraphysiologic doses of anabolic steroids. South Med J. 2005; 98:550–5.
24. Hartgens F, Kuipers H. Effects of androgenic-anabolic steroids in athletes. Sports Med. 2004; 34:513–54.
25. Kanayama G, Hudson JI, Pope HG. Long-term psychiatric and medical consequences of anabolic-androgenic steroid abuse: A looming public health concern? Drug and Alcohol Depend. 2008;98:1–12.
26. Pope HG, Katz DL. Affective and psychotic symptoms associated with anabolic use. Am J Psychiatry. 1988;145:487–90.
27. Pope HG, Kouri EM, Hudson JL. Effects of supraphysiological doses of testosterone on mood and aggression in normal men: A randomized controlled trial. Arch Gen Psychiatry. 2000;57:133–40.
28. Schwerin MJ, Corcoran KJ, Fisher L, Patterson D, Askew W, Olrich T, et al. Social physique anxiety, body esteem, and social anxiety in bodybuilders and self-reported anabolic steroid users. Addictive Behavou. 1996;21:1–8.