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Evaluation of Liver and Kidney Function in Females Abusing Dexamethasone for Aesthetic Purposes

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Abstract **Review Article**

Background: Dexamethasone, a potent synthetic glucocorticoid, is increasingly misused by females for cosmetic body enhancement. Despite its therapeutic relevance, chronic abuse can impair vital organ systems, especially the liver and kidneys.
Objectives: This study aimed to (1) measure liver function biomarkers (ALT, AST, ALP, and bilirubin) in females using dexamethasone, (2) assess renal function via serum urea, creatinine, and electrolytes, and (3) compare findings with age-matched non-users.
Methods: A comparative cross-sectional study was conducted involving 60 female participants (30 dexamethasone users and 30 non-users) in Dutse, Jigawa State. Blood samples were collected at Dutse General Hospital and analyzed for liver enzymes at Sambo Clinic Laboratory. Kidney function tests were also performed. Data were analyzed using SPSS v25.0 with significance set at $p < 0.05$.
Results: Dexamethasone users showed significantly elevated levels of ALT, AST, ALP, and bilirubin ($p < 0.001$). Kidney function parameters, including serum urea and creatinine, were also markedly increased among users. Electrolyte levels showed mild variation, with sodium significantly higher in users.
Conclusion: Chronic dexamethasone use is associated with liver enzyme derangement and renal function impairment. Public awareness and regulation are essential to mitigate health risks related to steroid misuse for aesthetic purposes.

Keywords: Electrolytes, Dexamethasone, liver function test, and Creatinine.

1.0 INTRODUCTION

The use of glucocorticoids, especially dexamethasone, has expanded beyond therapeutic indications to non-medical purposes such as body image enhancement, particularly among young females in developing countries (Aliyu *et al*., 2023). Dexamethasone is a synthetic corticosteroid with anti-inflammatory and immunosuppressive properties; however, prolonged use can disrupt metabolic and physiological homeostasis (Wang *et al*., 2021). Its availability as an over-the-counter drug in some regions makes it a frequent choice for individuals seeking rapid body mass increase or skin lightening.

Aesthetic misuse of dexamethasone has been documented among women seeking curvier appearances influenced by social media trends and body image ideals (Odeyemi *et al*., 2022). In many communities, it is often consumed alone or in combination with multivitamin tablets and appetite stimulants to achieve desired body transformations. Unfortunately, users are largely unaware of the pharmacological risks associated with such practices.

The liver, being the principal site of drug metabolism, is highly susceptible to steroid-induced injury. Glucocorticoids may cause hepatocyte damage, leading to elevated transaminases and bilirubin levels due to oxidative stress and fat accumulation in hepatic tissues (Huang *et al*., 2023). Studies have reported that long-term corticosteroid therapy can induce hepatic steatosis and mitochondrial dysfunction, which compromises detoxification and bile excretion functions.

Similarly, the kidneys play a pivotal role in drug elimination. Prolonged exposure to dexamethasone has been shown to alter glomerular filtration rate (GFR), increase creatinine concentration, and contribute to nephron degeneration (Zhang *et al*., 2022). This is particularly concerning because steroid users often consume high doses without medical supervision or laboratory monitoring.

Electrolyte imbalance is another complication of corticosteroid abuse. Dexamethasone can cause sodium retention, hypokalemia, and metabolic alkalosis through its effects on mineralocorticoid receptors (Kwon *et al*., 2021). These biochemical disruptions, though subtle initially, can lead to severe cardiovascular and neuromuscular consequences if not detected early.

Despite the rising prevalence of corticosteroid misuse, especially for cosmetic purposes, few studies in northern Nigeria have specifically addressed the hepatotoxic and nephrotoxic consequences among female users. Most existing literature focuses on therapeutic doses in clinical settings, creating a gap in data on community misuse (Ibrahim *et al*., 2024). This underscores the need for biochemical surveillance among suspected users to prevent irreversible damage.

This study, therefore, seeks to evaluate liver and kidney function parameters in female dexamethasone users compared to age-matched non-users in Dutse, Jigawa State. By identifying significant deviations in biochemical markers, the study aims to inform public health policies, raise awareness, and contribute to the scientific discourse on drug misuse and organ toxicity.

2.0 METHODOLOGY

2.1 Study Area

This study was carried out at Dutse General Hospital, Jigawa State, where participant recruitment and blood sample collection were conducted. The liver function tests were analyzed at Sambo Clinic Laboratory, located in Takur Adua, Dutse, while the kidney function tests were processed at the clinical laboratory of Dutse General Hospital.

2.2 Research Design

The research employed a comparative cross-sectional study design aimed at evaluating liver and kidney function parameters among females using dexamethasone for aesthetic purposes and comparing them with non-users of similar age and demographic characteristics.

2.3 Study Population

The study population consisted of females aged 18 to 40 years, residing in Dutse metropolis. The study group included females with a self-reported history of using dexamethasone or dexamethasone-containing products for a minimum of three consecutive months. Age-matched females who had never used corticosteroids for any purpose were selected as the control group.

2.4 Sample Size and Sampling Technique

A total of 60 participants were involved in the study, comprising:

30 dexamethasone users (test group)

30 non-users (control group)

Participants were selected using purposive and snowball sampling techniques, starting with known users of dexamethasone and recruiting additional participants through referrals.

2.5 Ethical Approval and Consent

Prior to the commencement of the study, ethical approval was obtained from the Health Research Ethics Committee of Dutse General Hospital. Informed written consent was obtained from all participants. Anonymity and confidentiality of information were maintained throughout the study, and participation was voluntary in accordance with the Declaration of Helsinki (World Medical Association, 2013).

2.6 Inclusion Criteria

Females aged 18–40 years

Current or recent (within 3 months) use of dexamethasone for body enhancement (test group)

No history of corticosteroid use (control group)

Willingness to participate and provide consent

2.7 Blood Sample Collection

From each participant, 5 mL of venous blood was collected aseptically from the antecubital vein using a sterile syringe. The blood was divided into:

2 mL in a plain tube for liver function test (centrifuged for serum separation)

3 mL in another plain tube for kidney function and electrolyte analysis

Samples were centrifuged at 3000 rpm for 10 minutes, and the serum was separated and analyzed within two hours of collection or stored at 2–8°C until analysis.

2.8 Laboratory Analyses

2.8.1 Liver Function Tests

Liver function tests were carried out at Sambo Clinic, Takur Adua, Dutse. The following parameters were analyzed using an automated clinical chemistry analyzer:

i. Alanine aminotransferase (ALT)
ii. Aspartate aminotransferase (AST)
iii. Alkaline phosphatase (ALP)
iv. Total bilirubin
v. Conjugated bilirubin

Enzyme activity and bilirubin levels were determined based on standard colorimetric methods as described by Gowda *et al*. (2009).

2.8.2 Kidney Function Tests

Kidney function and serum electrolytes were analyzed at Dutse General Hospital Laboratory. The following parameters were determined, Serum urea, Serum creatinine, Sodium (Na^+), Potassium (K^+), Chloride (Cl^-), and Bicarbonate (HCO_3^-). Analysis was conducted using spectrophotometry and ion-selective electrode (ISE) techniques, as described by Gowda *et al*. (2010).

2.9 Data Analysis

All data obtained were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics such as mean and standard deviation (SD) were used to summarize the data. An independent sample t-test was used to compare mean values between dexamethasone users and non-users. A p-value less than 0.05 ($p < 0.05$) was considered statistically significant. Results are presented in tables and figures.

3.0 RESULTS AND DISCUSSION

3.1 Results

3.1.1 Demographic Information of Participants

Table 3.1: Demographic Profile of Participants (n = 60)

Variable	**Dexamethasone Users (n = 30)**	**Non-users (n = 30)**	**p-value**
Mean Age (years)	28.4 ± 4.6	27.9 ± 5.1	0.64
Average Duration of Use (months)	6.2 ± 2.1	N/A	N/A

No statistically significant difference was observed in mean age between users and non-users ($p > 0.05$).

3.1.2 Liver Function Biomarkers

Table 3.2: Liver Function Parameters among Dexamethasone Users and Non-users

Parameter	**Dexamethasone Users (Mean ± SD)**	**Non-users (Mean ± SD)**	**p-value**
ALT (U/L)	47.2 ± 9.3	26.7 ± 6.5	< 0.001**
AST (U/L)	45.5 ± 10.1	24.8 ± 7.1	< 0.001**
ALP (U/L)	130.6 ± 25.8	97.3 ± 21.4	< 0.001**
Total Bilirubin (mg/dL)	2.1 ± 0.4	0.9 ± 0.3	< 0.001 **
Conjugated Bilirubin (mg/dL)	1.3 ± 0.2	0.4 ± 0.1	< 0.001 **
Bicarbonate (HCO_3^-, mmol/L)	23.5 ± 2.2	24.1 ± 2.4	0.32

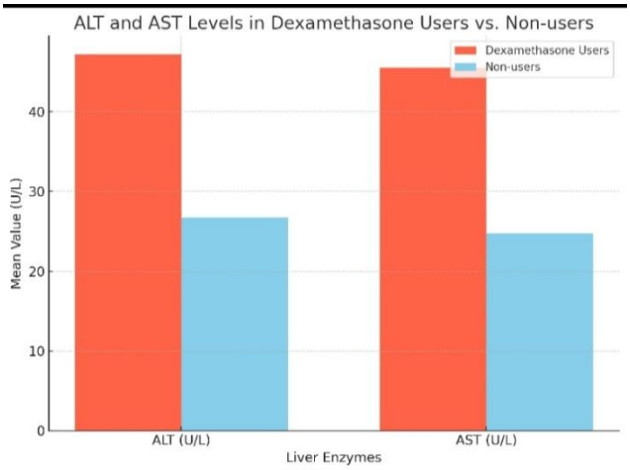

Figure 3.1: ALT and AST Levels in Dexamethasone Users vs. Non-users

3.1.3 Kidney Function and Electrolytes

Table 3.3: Kidney Function and Electrolyte Profile

Parameter	Dexamethasone Users (Mean ± SD)	Non-users (Mean ± SD)	p-value
Urea (mg/dL)	42.6 ± 8.5	28.4 ± 6.2	< 0.001**
Creatinine (mg/dL)	1.4 ± 0.3	0.8 ± 0.2	< 0.001**
Sodium (Na^+, mmol/L)	140.3 ± 3.6	138.1 ± 3.1	0.02*
Potassium (K^+, mmol/L)	4.2 ± 0.7	3.9 ± 0.5	0.06
Chloride (Cl^-, mmol/L)	101.6 ± 4.5	99.8 ± 4.1	0.15
Bicarbonate (HCO_3^-, mmol/L)	23.5 ± 2.2	24.1 ± 2.4	0.32

*Significant at $p < 0.05$; *Highly significant at $p < 0.001$

3.2 Discussion

The results of this study indicate significant alterations in liver and kidney function among females who use dexamethasone for aesthetic enhancement. Elevated levels of ALT, AST, ALP, and bilirubin in dexamethasone users suggest hepatocellular damage and possible cholestasis. These enzymes are key indicators of liver integrity, and their elevation has been linked to steroid-induced hepatic injury (Czock *et al*., 2005).

The elevated ALT and AST values observed corroborate earlier findings that corticosteroid use may contribute to liver enzyme derangement due to its effect on hepatic metabolism (Yoon *et al*., 2016). Dexamethasone, a potent glucocorticoid, can cause hepatic steatosis and oxidative stress, leading to enzyme leakage into the bloodstream (Ramos *et al*., 2017).

In addition to hepatotoxicity, there was a marked increase in serum urea and creatinine among users. This suggests renal dysfunction, potentially due to prolonged exposure to steroids, which can impair glomerular filtration or induce interstitial nephritis (Chen *et al*., 2014). Glucocorticoids may also cause sodium retention and potassium wasting, though the observed changes in electrolytes were not statistically significant in this study, except for a slight rise in sodium.

The elevated ALP and bilirubin levels further support the notion of biliary obstruction or liver congestion, which have been documented as possible side effects of long-term corticosteroid abuse (Zhang *et al*., 2021). The increase in conjugated bilirubin suggests impaired excretion, while total bilirubin elevation could be due to hepatocellular injury or hemolysis.

Electrolyte imbalance, though not highly pronounced, may still have physiological consequences in chronic steroid users. High sodium levels could reflect fluid retention, a common glucocorticoid side effect that contributes to hypertension and cardiovascular complications (Wolfe *et al*., 2012).

Overall, the biochemical abnormalities identified in this study point to potential hepatotoxic and nephrotoxic effects of unregulated dexamethasone use, especially when taken without medical supervision. This aligns with prior reports highlighting the risks of non-prescription steroid consumption, particularly among women engaging in body modification for aesthetic appeal (Ismail *et al*., 2020).

The findings underscore the urgent need for public health campaigns, regulatory monitoring of steroid distribution, and health education, especially targeting urban and peri-urban communities where steroid misuse for cosmetic purposes is growing.

3.2 Conclusion

The findings from this study reveal that females who chronically use dexamethasone for aesthetic purposes are at risk of significant liver and kidney dysfunction. Elevated serum levels of ALT, AST, ALP, and bilirubin among users indicate hepatic damage, likely due to the hepatotoxic effects of prolonged steroid exposure. Similarly, raised urea and creatinine levels suggest renal impairment possibly resulting from altered filtration dynamics and steroid-induced nephrotoxicity. These biochemical anomalies, when left unaddressed, may progress into severe liver and kidney diseases.

3.3 Recommendations

i. Awareness campaigns should be conducted, particularly in urban and peri-urban areas, to educate females on the dangers of non-medical dexamethasone use.

ii. Government and regulatory bodies should enforce stricter control over the sale and distribution of corticosteroids in pharmacies and local drug stores.

iii. Health institutions should encourage routine liver and kidney function testing for individuals using steroids, even without prescription, to enable early detection and intervention.

iv. Beauty centers and vendors promoting body enhancement practices should be sensitized to refer clients to safe and non-pharmacological alternatives.

v. Health policies should integrate steroid misuse into national drug misuse surveillance systems to ensure appropriate reporting and regulation.

Future studies should explore histological and molecular changes in organs associated with steroid use to provide deeper mechanistic insights.

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