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Study of protective role of ascorbic acid against betamethasone in female guinea pigs (*Cavia porcellus*)

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Abstract
The objective of this study was to detected the role of Ascorbic acid against Betamethasone in female guinea pigs, the experimental design involved the use of 40 female guinea pigs which are divide into four groups: 1-Control group (C1). 2- Ascorbic acid 500 mg/ kg group (C2). 3- Betamethasone 0.5 mg/kg B.W group (C3). 4-Ascorbic acid and Betamethasone 0.5 mg/kg.BW group (C4). The Betamethasone given through intra peritoneal and the ascorbic acid given subcutaneously for 30 days, then blood collection from animals for acting complete blood count (CBC), urea, creatinine, albumin, and liver enzyme tests. The results show blood urea, creatinine, albumin, bilirubin and the hepatic enzymes (ALT, AST, ALP) data showed increase in blood in treated guinea pigs (C3) after exposed to Betamethasone in 0.5 mg/kg. These increases returned to normal values upon treatment with Ascorbic Acid in the C4 group compared to the control group.

Keywords: Ascorbic acid, betamethasone, female guinea pigs

1. Introduction
Supplements are vital for a variation of biological and functional in the living body, some vitamins cannot be created in the living body means that they necessity added in the nutrition. According the solubility in fats and water vitamins are divided into two groups based on their solubility (A, D, E, K). Nobel Laureate Szent-Gyorgyi was revealed Ascorbic acid in 1923 and created by Howarth and Hirst (Chambial *et al*., 2013) [1]. The vitamin C has two forms: ascorbate (reduced) and dehydroascorbic acid (oxidized), the two form which are readily changeable and biologically active making it advantageous antioxidant. (Chambial *et al*., 2013) [1]. The ascorbic acid help in healing of wound through production of collagen fibers at the injury-burning position through the postoperative stage is therefore recommended in order to speed up the healing progression by administering 500 to 1,0 g/day of ascorbic acid. Vitamin C pretreatment notice to be suitable in therapy for X-rayed wounds and a healing strategic approach associated with vitamin C to fasting wound recovery below certain conditions and the combined injury(Chambial *et al*., 2013; Jagetia *et al*., 2007) [1, 2]. Also function of Ascorbic Acid increases in humeral immunity is supported. Ascorbic Acid with other vital nutrients help converse possible harm induced by cellular free radicals by regulation redox responsive copy factors and influence the production of prostaglandins and cytokines. also ascorbic acid intake and other vitamins and vital nutrients, such as B complex, vitamin E, ACE, Zn, Cu, and Ferrous sulfate, help a cytokine mediated Th1 immune reaction that is essential to sustain successful immune response by producing pro inflammatory cytokines. (Maggini *et al*., 2007; Wintergerst *et al*., 2007; Jeong *et al*., 2011) [3-5].

1.1 Betamethasone
Corticosteroids are commonly used in neurocritical care. A maintenance unit with primarily anti-inflammatory & immunosuppressive special effects. In spite of extensive usage, partial confirmation occurs for their efficiency in illnesses challenged in neurocritical maintenance. Cortisol exists in three dissimilar shape in the plasma, free cortisol hormone, proteins, and cortisol metabolites, approximately five percentage of cortisol in blood circulation is un bound; Evenly 80 percentage of blood circulation cortisol is bound to cortisol, binding (globulin or albumin). When inflammatory occurs, the binding sympathy of cortisol hormone decreases, alleviate free cortisol concentrations in areas of interest dynamic inflammatory operation. Greatest synthetic, corticosteroids likewise establish bound to cortisol binding globulin, but, these glucocorticoids similarities bind fewer professionally associated to native

cortisol. Cortisol hormone metabolites are biologically inactive and weakly bound to circulating plasma proteins. (Pugeat and Dunn, 1981) [6] extensive care concerns related through administer these medications & must be present partial to, particular conditions, in which aids offset the dangers (Sophia, 2017) [7]. Betamethasone Dipropionate is a very strong glucocorticoid hormone receptor agonist which lacks immune inhibitor, anti-inflammation and anti-proliferative properties. Dipropionic acid is used for topical treatment for the slight to modest psoriasis disease (Baboota *et al*., 2011; Rustin, 2012) [8, 9]. Neonatal corticosteroids Life, saving treatment early babies infant. In spite of being fit documented, Efficiency & dissemination, questions about the composition, it remains, Dosage, route of administration, and Repeat administration (Wapner, 2011) [10]. Single dose of betamethasone acetate help in fetal lung development (Augusto *et al*., 2018) [11].

2. Materials and Methods

The experimental design involved the use of 40 female guinea pigs which are divide into four groups:

1. Control group (C1).
2. Ascorbic acid 500 mg/ kg group (C2).
3. Betamethasone 0.5 mg/kg. Body weight. Group (C3).
4. Ascorbic acid and betamethasone 0.5 mg/kg. Body weight. Group (C4).

The betamethasone given through intra peritoneal and the ascorbic acid given subcutaneously for 30 days into all groups, then blood collection from animals for acting complete blood count (CBC), urea, creatinine, albumin, and liver enzyme tests.

3. Results

3.1 Effects of Betamethasone exposure on renal function and the protective role of Ascorbic Acid

Blood urea data showed a significant (p<0.05) increase in blood in treated guinea pigs (C3) after exposed to Betamethasone in 0.5 mg/kg. These increases returned to normal values upon treatment with Ascorbic Acid in C4 group, paralleled to the control group, (Table1). Blood creatinine data showed a significant (p<0.05) increase in blood guinea pig animals exposed to 0.5 mg/kg(C3). These increases returned to normal values inC4 group, paralleled to the controller group upon treatment with Ascorbic Acid (Table1).

Table 1: Protective role of Ascorbic Acid from betamethasone exposure in urea and creatinine in female guinea pigs

Parameter Group	Urea mg/dI	Creatinine mg/dI
C1	18.7±0.85a	0.4±0.03a
C2	21.8±0.95a	0.6±0.04a
C3	73.2±0.63c	5.3±0.2c
C4	42.8±0.88b	3.1±0.07b

Altered letters, represent significant variances at (p<0.05)
The numbers signify mean ± standard Error. N=10

3.2 Effects of Betamethasone exposure on liver function and the protective role of Ascorbic Acid

Blood albumin ranks data indicated significant, p<0.05 rises in blood of treated guinea pigs after exposed to Betamethasone at 0.5 mg/kg. These rises were returned back to its standard values after treated with Ascorbic acid(C4) as paralleled with control group (Table 2). Full serum bilirubin data revealed significant, p<0.05 rises in t blood of treated guinea pigs after exposed to Betamethasone at 0.5 mg/kg. These rises were returned back to its standard values after treated with Ascorbic acid (C4), as paralleled with control group (Table 2).

Table 2: Protective role of Ascorbic Acid on blood albumin and serum total bilirubin following dexamethasone exposure in female guinea pigs

Parameter Group	Albumin mg/dI	Bilirubin mg/dI
C1	4.9±0.7a	0.2±0.006a
C2	5.4±0.8a	0.4±0.009a
C3	8.7±0.4c	4.3±0.100c
C4	7.5±0.3b	2.7±0.091b

Altered letters represent significant variance at p<0.05.
The numbers signify mean ± standard Error. N=10

3.3 Effects of Betamethasone exposure and the protective role of Ascorbic Acid on hepatic enzymes

Alanine, transaminase (ALT) and aspartate, transaminase (AST), alkaline phosphatase (ALP) enzymes revealed significant p<0.05 rises in the blood of the treated guinea pigs after exposed to Betamethasone at 0.5 mg/kg. These rises were returned back to its standard values after treated with Ascorbic acid (C4) paralleled with control group (Tables 3).

Table 3: The protective role of vitamin C from Betamethasone exposure on female guinea pigs in some hepatic enzymes

Parameter Group	AST U/I	ALT U/L	ALP U/I
C1	94.1±5.7a	26.5±2.6a	81.1±2.5a
C2	98.1±6.1a	27.7±1.7a	84.2±2.4a
C3	409.6±2.7c	125.1±1.7c	426.6±7.1c
C4	289.2±5.8b	89.4±0.5b	294.5±7.5d

Different letters represent significant variance at (p<0.05)
The numbers signify the mean ± standard Error. N=10

3.4 Effect of Betamethasone exposure and protective role of Ascorbic Acid on white blood cells.

White blood cells, (neutrophil, lymphocyte, monocyte, eosinophil, and basophil) counts were displayed significant p<0.05 rises in blood of guinea pigs after exposed to C3 at 0.5 mg/kg. These rises were returned back to its standard values after treated with Ascorbic acid group as paralleled with control group (Table 4).

Table 4: The protective role of vitamin C from Betamethasone exposure on female guinea pigs on white blood cells.

Parameter Group	WBC counts (10∧3/µl)	Neutrophil counts (10∧3/µl)	Lymphocyte counts (10∧3/µl)	Monocytes counts (10∧3/µl)	Eosinophil counts (10∧3/µl)	Basophil counts (10∧3/µl)
C1	3.1±0.1a	0.3±0.06a	2.7±0.06a	0.04±0.007a	0.04±0.004a	0.01±0.003a
C2	5.4±0.2b	0.6±0.05a	4.5±0.2b	0.08±0.005b	0.06±0.004a	0.05±0.003a
C3	16.2±0.2d	5.3±0.13c	8.9±0.06d	0.24±0.006d	0.27±0.007c	1.39±0.039c
C4	10.3±0.2c	3.3±0.09b	5.5±0.08c	0.16±0.009c	0.19±0.011b	1.04±0.057b

Altered letters represent significant variance at p<0.05
The numbers signify mean ± standard Error. N=10

4. Discussion

The ascorbic acid decrease the levels of blood urea this result corresponding with (Alshamsi *et al*., 2006; Alsadoon, 2021) [12, 13] in diabetic rats and male rats. Ascorbic acid found to perfect the adverse special effects of the levels of reproductive hormones (Sadeghzadeh *et al*., 2019) [14] & increasing the immunity in mice (Uchio *et al*., 2019) [15]. This studies corresponding with the present study data of improving the hepatic action in guinea pigs. The Betamethasone has note recorded decrease or increase in the total albumin and bilirubin in blood serum of female guinea pigs and has not enhancing on kidney function in this study this finding corresponding with(Yu and Li,2013;Zhang *et al*., 2018; Li *et al*., 2019) [16-18]. While when renal injuries or in case of renal inflammation the Betamethasone reduce the healing process and apoptosis. The free radical actions are created through biotransformation wound to hepatic cells via hepatotoxic substances. Ascorbic acid and vitamin E are great antioxidants that fight free radicals. The effect of Ascorbic acid and vitamin E on hepatic enzymes in rabbits exposed to aflatoxin when giving the poison to the animals, the activities of AST, ALT, and ALP were noticeably increased and the reduced levels of AST, ALT, and ALP after applying Ascorbic acid. (Karakilicik *et al*., 2004) [19]. The authors (Ki *et al*., 2005) [20] notice that in the little-dosage Dexamethasone & great-dosage Dexamethasone groups, the whole bilirubin, AST & ALT ranks have been reduced in contrast to the group not given Dexamethasone this results corresponding with this study. The authors (Hughes *et al*., 2017) [21] noticed that white blood cells (Neutrophil, lymphocyte, monocyte, & eosinophil) increase when treatment by Dexamethasone. In contrast with the control group of steers. Through two hours after giving Dexamethasone, rank of neutrophils, Monocytes increase intensely this results confirmed significant rises in the totals of these cells after the animals were administered with Dexamethasone, The present result approves with(Hughes *et al*., 2017) [21].

5. Conclusion

Betamethasone raises the ranks of hepatic enzymes and the numbers of white blood cells. Ascorbic acid reduce the side effects of betamethasone, especially at low doses of it

6. References

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