Effects of griseofulvin on some haematological and histological parameters of wistar albino rats

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Abstract

Griseofulvin, an antifungal agent was investigated *invivo* for its possible effects on some haematological and histological parameters of wistar albino rats (Rattus rattus). Different concentrations (0.1, 0.3. 0.7, and 1.0 mg/ml) of griseofulvin were administered to wistar albino rats (*Rattus rattus*). Packed cell volume (PCV), blood haemoglobin (Hb), white blood cell (WBC) counts were monitored periodically (weekly) for four weeks. The results showed that there were significant reduction P=< 0.05 in both PCV and blood haemoglobin values. The highest decrease in PCV and Hb values was observed in fourth week (25.0±1.4) as compared to the control (41.0±2.0) for PCV and Hb (7.76±1.3) as compared to the control (13.60±1.8). There were significant increase P(<0.05) in the WBC count, with the highest increase in the first week(12.70±2.4) as compared to the control of (8.50±0.2).Histological examinations of the rat's liver tissue was also carried out following administration of griseofulvin. It was observed that griseofulvin did not cause any serious damage to the rat's liver tissues.

Key Words: Griseofulvin, PVC, Hb, WBC

1. Introduction

Fulvin is an antibiotic fungistatic drug administered orally in the treatment of dermatophyte and ringworm infections. It is fungistatic against various species of microsporum, epidermophyton and trichophyton *invitro*. It is generally given for infections that involve the scalp, hair, nails, skin (e.g: *Tinea corporis* (ringworm of the body), Tinea pedis (athelete's foot), tinea cruris (ringworm of the groin or thigh), tinea barbae (barbers's itch), tinea capitis (ringworm of the scalp), tinea unguium (onychomycosis, ringworm of the nails) and which do not respond to topical treatment, infections of the soles of the feet, the palms of the hands and the nails respond slowly. (Royal pharmaceutical society of Great Britain, 2000). It is used in both humans & animals.

Its generic name is Griseofulvin which is an antifungal substance typically produced by the growth of certain strains of penicillium grisoefulvum (Royal pharmaceutical society of Great Britain, 2000). A method for the synthesis of griseofulvin from dimethoxyphenol has also been reported (Pirrung *et al.,* 1991).

Also, because griseofulvin has some vasodilatatory activity, its uses has resulted in some improvement in a small number of patients with Reynaud's disease and angina pectoris. Because it is structurally similar to colchicine and shares its activity as a metaphase inhibitor, griseofulvin has been used in the treatment of gout. (Royal pharmaceutical society of Great Britain, 2000).

It is fungi static; it is thought to inhibit fungal cell mitosis and nucleic acid synthesis. It also binds to and interferes with the formation of spindle and cytoplasmic microtubules by binding to alpha and beta tubulin. It does this by arresting the metaphase of cell division by disrupting the structure of the mitotic spindle. (Weber *et al.,* 1976).

Also, following administration, griseofulvin is deposited in the Keratin precursor cells and becomes concentrated in the stratum corneum of the skin, hair and nail thus preventing invasion of newly formed cells by fungus.

2. Materials and Method

2.1 DRUG

Fulcin (Griseofulvin) 500mg was obtained from Reals pharmaceuticals Ltd. P.O Box 3560. Ikeja, Lagos, Nigeria.

2.2 Reagents

Drabkin's solution which contains potassium ferricyanide (200mg) potassium cyanide (50mg), Hemlgobin cyanide standard. White Blood Cell Count (WBC): glacial acetic acid, distilled water and methyl violet

2.3 ANIMAL COLLECTION/ TREATMENTS

A total of 60 Wistar Albino rats were used for the tests. These rats were obtained from the animal house of the Biochemistry department, faculty of science, University of Port Harcourt. Average weights of 100.0g -150g rats were used for the analysis. The animals where fed with their conventional diet before fulcin (griseofulvin) was introduced. This drug was administered to them by intubation. fulcin (500mg) dissolved in 500ml of distilled water was administered at different concentration of 0.1, 0.3, 0.7 and 1.0(mg/ml) to the animals which were grouped into four groups of twelve animals each to represent the four different concentrations and also there was a control group which did not get the drug. The test was monitored for a total of four weeks with three rats being sacrificed from each group every week.

3. Discussion

The effect of griseofulvin (fulcin) on some haematological and histological parameters of wistar albino rats was assayed. The hematological parameters included packed cell volume (PCV), blood hemoglobin and white blood cell (WBC) count. The results are shown in tables 1,2 and 3. The result indicated that there was a significant decrease in packed cell volume (PCV) of the wistar albino rats following administration of griseofulvin. Similarly, a progressive decrease was indicated in the blood hemoglobin of the Wistar albino rat following administration of fulcin. It was found that both reductions were dosage and time dependent. For instance the highest reduction in PCV values were 25.0 ± 1.4 in week four of 1.0mg/ml fulcin concentration as compared to the control of 41.0 ± 2.0, while that of hemoglobin were 7.76 ± 0.8 in the fourth week of 1.0mg/ml fulcin concentration. The effect of griseofulvin on the white blood cell of wistar albino rats as represented in table 2 indicated a significant elevation and the highest elevation being 12.70 ± 2.4 in first week of 1.0mg/ml fulcin concentration. Histological examination on the effect of griseofulvin on the liver of wistar albino rats shows that there were no significant effects on the liver when compared to the control as shown in fig 1- 6. It indicated that the section of the liver showed a normal architecture with normal portal triads and central veins. This was seen arranged radially around the central veins and between the single cells cords of the hepatocyte were the hepatic sinusoids.

Table 1. Effect of griseofulvin (Fulcin) on the packed cell volume (PCV) of wistar albino rats

FULCIN(mg)/ 100g Body weight	PCV (L/L) Time Interval (Weeks)			
	1	2	3	4
0.0	40.0 + 2.0b	40.0 + 2.0b	42.0 +3.0b	41.0 + 2.0b
0.1	38.8+2.0b	38.0+1.5b	36.3 +1.5b	36.0+4.0b
0.3	36.3+2.0b	35.3 +3.1b	34.7+1.0b	34.7+ 2.7b
0.7	34.0+ 2.0b	32.5+3.8a	32.3+2.0a	32.0+2.1a
1.0	32.3+ 2.5a	30.3 +4.4a	25.3 +2.5a	25.0+ 1.4c
Results are means + SD of triplicatesdetermination. Values with different superscript letters are statistically significant of 95% confidence level				

Table .2 Effect of griseofulvin on wistar albino rat on blood haemoglobin

Fulcin (mg)/ 100g Body weight	Haemoglobin(g/dl) Time Interval (Weeks)			
	1	2	3	4
0.0	14.10 +1.7a	12.26 +1.6a	14.43 +1.8a	13.60 +1.8a
0.1	13.33+1.2a	12.16+0.9a	11.60+1.5a	10.82+1.5a
0.3	10.84+0.95a	10.72 +0.2a	10.32+1.1a	10.00 +0.8a
0.7	10.60+1.99a	9.00 +0.6a	9.81 +0.6a	9.40 +0.3a
1.0	10.08+3.2a	8.8+1.3a	8.69+1.7a	7.76+0.8a
Results are mean ± SD of triplicate determinations. Values with the same superscript letters are not statistically significant at 95% confidence level.				

Table 3. Effect of griseofulvin (fulcin) on the white blood cell (wbc) of wistar albino rats

FULCIN(mg)/ 100g Body weight	WBC (109/l)			
	Time Interval (Weeks)			
	1	2	3	4
0.0	7.30 + 3.1a	7.90 + 0.1a	8.00 +0.5a	7.60+ 0.4a
0.1	8.50 +0.2a	9.40 +3.3a	9.36 +4.2a	7.63+1.4a
0.3	8.60 +0.3a	9.90 +1.5a	9.50+2.8a	8.45 + 0.5a
0.7	11.40 +0.1a	10.70+1.4a	9.50 +2.3a	8.60 +3.1a
1.0	12.70 +2.4a	11.40+0.1a	11.43+3.1a	8.77 + 1.2a
Results are means ± SD of triplicate determinations. Values with the same super-script letters are not statistically significant at 95% confidence level.				

Histological examination on the effect of griseofulvin on the liver of wistar albino rats shows that there were no significant effects on the liver when compared to the control as shown in Fig: 1- 6.

Fig 1.Rat liver not treated with griseofulvin

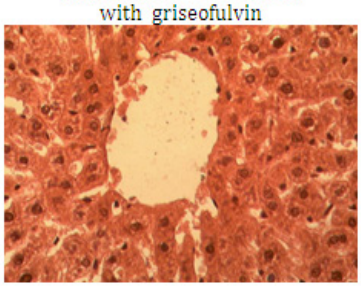


Fig 2. Rat liver treated with 0.3 mg/dl griseofulvin

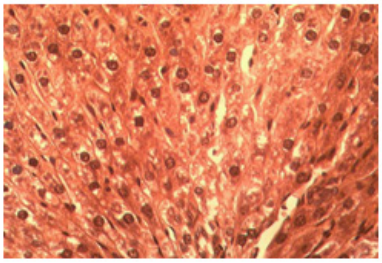


Fig 3: Rat liver not treated with griseofulvin

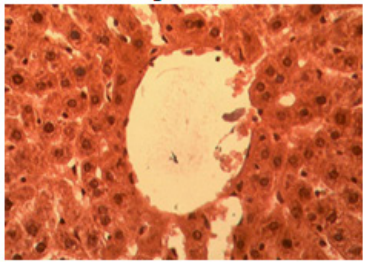


Fig 4: Rat liver treated with 0.7mg/dl griseofulvin

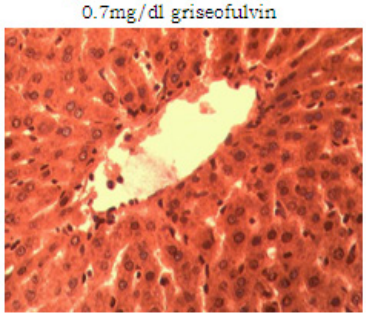


Fig 5: Rat liver not treated with griseofulvin

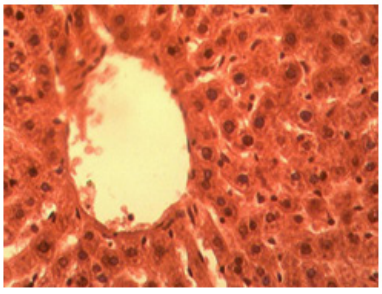
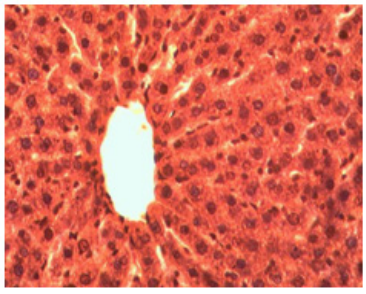


Fig 6: Rat liver treated with 1.0 mg/dl griseofulvin



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4. References

1• Alberts F and Bruce D (2005) Leucocyte functions and percentage breakdown. Mol. Bio.Cell. NCBI Bookshelf. 10(2).

2• Axelrod J (1950) The enzymic cleavage of aromatic ethers. Biochem. J. 63, 634

3• Bell HG, Emslis-Smith D and Paterson CR (1976) Text book of physiology and biochemistry, 9th edn. Churchill livingstone, Edinburgh. pp: 82

4• Cheesebrough M (2004) District laboratory practice in tropical countries, Part 2. UK: Cambridge University Press.

5• Connie C (1998) Respiratory function of haemoglobin. Eng. J. Med. 338, 239-248.

6• Costanzo D and Linda S (2007) Physiology. Hagerstwon; Lippicott Williams and Wilkins.pp:14

7• Devlin TM (1997) Text book of biochemistry with clinical corelation 4th ed. A John

8• Willey and Sons Publication U.S.A. pp:568

9• Donald V Judith GV and Charlotte WP (2006) Fundamentals of biochemistry. Life at the molecular level. 2nded. John and Wiley Publication

10• Eshaghian S (2006) An unexpected inverse relationship between HbAlc levels and motility in patients with diabetes and advance systolic heart failure. Am. Heart J. 151 (1), 91

11• Farley JR, Chesnut CH and Baylink DJ (2002) Improved methods for quantitative determination in serum of alkaline phosphatase of skeletal origin.

12• Royal pharmaceutical society of Great Britain (2000) Matindale. The extra Pharmacopoeia, 13th edn, London, the Pharmaceutical Press. pp: 45

13• Pirrung MC, Brown WL, Rege S and Laughton P (1991) Total synthesis of griseofulvin. J. Chem. Soc. 113, 8561-8562