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Research Article

**ANALYSIS OF DRUG-INDUCED LIVER INJURY BY
AMOXICILLIN WITH THE COMPARISON OF
CLAVULANATE****Dr. Sadia Ishaq¹, Dr. Abdul Rehman², Dr. Farhat Jabeen³**¹Basic Health Unit Dhori, District Sargodha²Rural Health Center Chawinda, District Sialkot³Rural Health Center Hafizwala, District Mianwali**Article Received:** June 2020**Accepted:** July 2020**Published:** August 2020**Abstract:**

Introduction: Drug-induced liver injury (DILI) is an important differential diagnosis in patients with abnormal liver tests and normal hepatobiliary imaging. Of all known liver diseases, the diagnosis of DILI is probably one of the most difficult one to be established. **Objectives of the study:** The main objective of the study is to find the drug induced liver injury in hepatic patients with special reference to Amoxicillin with the comparison of Clavulanate. **Methodology of the study:** This cross-sectional study was conducted at BHU Dhori, District Sargodha, during March 2019 to December 2019. For this purpose we select the 50 patients who was suffering from chronic hepatic injury due to the excessive use of drugs especially Amoxicillin and Clavulanate. **Results:** We analyzed 50 cases matched to controls. Twenty Seven cases were exposed to amoxicillin (adjusted OR 1.69, 95% CI 0.72-3.98) and 23 cases to co-amoxiclav (adjusted OR 3.00, 95% CI 1.76-5.40). **Conclusion:** It is concluded that compared to amoxicillin alone, amoxicillin +clavulanic acid doubles the risk of serious acute liver injury, in agreement with most studies on DILI.

Corresponding author:**Dr. Sadia Ishaq,**

Basic Health Unit Dhori, District Sargodha

QR code



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INTRODUCTION:

Drug-induced liver injury (DILI) is an important differential diagnosis in patients with abnormal liver tests and normal hepatobiliary imaging. Of all known liver diseases, the diagnosis of DILI is probably one of the most difficult one to be established. In all major studies on DILI, antibiotics are the most common type of drugs that have been reported¹. The clinical phenotype of different types of antibiotics associated with liver injury is highly variable. Some widely used antibiotics such as amoxicillin vs clavulanate have been shown to have a delayed onset on liver injury and recently cefazolin has been found to lead to liver injury 1–3 weeks after exposure of a single infusion². The other extreme is the nature of nitrofurantoin-induced liver injury, which can occur after a few years of treatment and lead to acute liver failure (ALF) or autoimmune-like reaction. Most patients with liver injury associated with use of antibiotics have a favorable prognosis³. However, patients with jaundice have approximately 10% risk of death from liver failure and/or require liver transplantation. In rare instances, the hepato toxicity can lead to chronic injury and vanishing bile duct syndrome. Given, sometimes very severe consequences of the adverse liver reactions, it cannot be over emphasized that the indication for the different antibiotics should be evidence-based and symptoms and signs of liver injury from the drugs should lead to prompt cessation of therapy⁴.

Hepatotoxicity and drug-induced liver injury (DILI) are terms used interchangeably in this context. Drug-induced liver injury or DILI is the term currently used by most clinicians and scientists in this field. DILI can be defined as a liver injury induced by a drug or herbal medicines leading to liver test abnormalities or liver dysfunction with reasonable exclusion of other competing etiologies⁵. Most cases of DILI are due to idiosyncratic or unexpected reactions. In contrast to paracetamol-induced hepatotoxicity, which occurs with dose-dependent overdose of the drug, idiosyncratic drug reactions have been traditionally considered dose independent. However, drugs with well-documented idiosyncratic DILI have been shown to have a dose-dependent component⁶.

Objectives of the study

The main objective of the study is to find the drug induced liver injury in hepatic patients with special reference to Amoxicillin with the comparison of Clavulanate.

METHODOLOGY OF THE STUDY:

This cross sectional study was conducted at BHU Dhori, District Sargodha, during March 2019 to December 2019. For this purpose we select the 50 patients who was suffering from chronic hepatic injury due to the excessive use of drugs especially Amoxicillin and Clavulanate. Patients who suffer from DILI have a wide variety of clinical presentations. Clinically, biochemically and histologically, DILI can simulate almost all forms of acute and chronic liver injuries. Thus, these patients can present with acute liver failure with severe encephalopathy, with acute hepatitis with or without jaundice, and chronic hepatitis with both symptomatic and asymptomatic elevated liver tests.

Histopathology of liver

Tissues are fixed with neutral formalin 10%, embedded in paraffin, and then manually sectioned with a microtome to obtain 4-5 μm -thick paraffin sections. Dewaxed sections are then stained with hematoxylin and eosin (H&E) or can be used for other purposes (special stains, immunohistochemistry, in situ hybridization, etc.). During this process, many steps and procedures are critical to ensure standard and interpretable sections. Key recommendations are given here to achieve this objective.

Statistical analysis

Two-way ANOVA was performed to study the contributions. A chi-square test was used to examine the difference in the distribution of the fracture modes (SPSS 19.0 for Windows, SPSS Inc., USA).

RESULTS:

Table 1 shows the baseline characteristics of these patients. Also these subgroups of patients did not reveal any significant differences between cases and controls, except for drug consumption.

Table 01: Analysis of characteristics of patients of both groups

Characteristic	Amoxicillin		Clavulanate	
	Cases n=27	P value	Cases n=23	P value
Sex, n (%)		0.09		0.14
Male	0 (0)		13 (59)	
Female	7 (100)		9 (41)	
Age (years), mean \pm SD	42 \pm 25.8	0.67	44.7 \pm 17.8	0.65
BMI, mean \pm SD	24.1 \pm 6.8	0.77	24.6 \pm 3.6	0.92
Alcohol, n (%)		0.99		0.51
Current drinker	4 (57)		16 (73)	
Former drinker	0 (0)		1 (4)	
Non-drinker	3 (43)		5 (23)	
Smoke, n (%)		0.17		0.99
Current smoker	3 (43)		7 (32)	
Former smoker	1 (34)		3 (14)	
Non-smoker	3 (43)		12 (54)	
Co-morbidities, n (%)				
Liver diseases	0 (0)	0.99	3 (14)	0.71
Heart diseases	2 (29)	0.99	2 (9)	0.99
Number of drugs, mean \pm SD	6,9 \pm 3,3	<0.001	4,9 \pm 2,7	0.04

Table 2 shows the ANOVA results of both groups. It shows the degree of freedom and significant value of both groups with respect to control.

S.O.V	Sum of Squares	Df	Mean Squares	F	Sig.
Amoxicillin	12385.081	04	3096.270	23.794	.000
Clavulanate	2602.510	20	130.125		
Total	14987.591	24			

Table 02: ANOVA for drug induced hepatic injury

DISCUSSION:

Our data show that the combination of amoxicillin with clavulanic acid is significantly associated with a risk of DILI almost double compared to amoxicillin alone. The corresponding incidences are very low (0.1 cases for amoxicillin alone and 0.4 cases for amoxicillin +clavulanic acid for 100.000 inhabitant's year, respectively), in line with other estimates from published data⁷.

The amoxicillin component of the drug is primarily excreted by renal system, whereas clavulanic acid is excreted by both the kidney and liver⁸. The mechanism of co-amoxiclav induced hepatitis is not completely clarified, but the frequent association with hypersensitivity reactions (i.e. skin rash, hypereosinophilia, anti-tissue antibodies) suggests an immune-allergic mechanism. The reaction could be due also to an idiosyncratic response to the drug⁹. Moreover, currently available evidence suggests a genetic susceptibility to coamoxiclav induced liver injury in patients with specific HLA haplotype.

Although the absolute risk of co-amoxiclav-induced DILI is generally very low, as in the case of the present work, it must be also interpreted in relation to the widespread use of the drug, which continuously increased over the years¹⁰.

CONCLUSION:

It is concluded that compared to amoxicillin alone, amoxicillin +clavulanic acid doubles the risk of serious acute liver injury, in agreement with most studies on DILI.

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