

Threat of Hepatic and Renal Toxicity in Patients with Chronic Suppurative Otitis Media And Possible Drug Response

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Abstract

Objective: To assess the jeopardy of hepatic and renal toxicity in patients suffering from chronic suppurative otitis media and possible drug's response to treat the condition.

Methodology: This was a case control trial that was conducted in patients with chronic suppurative otitis media reported to ENT OPD of Khalifa Gul Nawaz teaching hospital Bannu-KP. The duration of the study was from August 2021 to February 2021. Sample size was 160, that was calculated using WHO calculator. Sixty volunteers were included in the study. Negative control group, positive control group, patients treated with Co-amoxiclav, and patients treated with Ciprofloxacin, patients and healthy volunteers were randomized into four groups.

Results: The results of the study showed a significant increase in direct bilirubin levels, total bilirubin levels, SGPT, GGT and alkaline phosphatase in positive control group in comparison to negative control. The treated groups with antibiotics remained successful in recovering normal liver enzymes excepting SGPT and direct bilirubin. Blood glucose and urea was found to be insignificant in G2 and G3 groups whereas in G4 group, an increased creatinine was seen which was statistically insignificant.

Conclusion: Our study concluded that in patients suffering from chronic suppurative otitis media, hepatic toxicity might be induced if remained untreated. It is therefore, proper treatment with follow-up is required in these patients.

Keywords: CSOM, SGPT, GGT, alkaline phosphatase, Co-amoxiclav

Cite as: Khan S, Iqbal M, Khan SF, Ahmad W. Threat of Hepatic and Renal Toxicity in Patients with Chronic Suppurative Otitis Media And Possible Drug Response; A Cross Section Study. BMC J Med Sci 2021. 2(1): 20-23

Introduction

CSOM (Chronic suppurative otitis media) is an infection which is triggered in the middle ear most repeatedly. The infection is characterized by an ear discharge through the perforation of the tympanic membrane in the ear.¹ According to a report by World Health Organization, approximately 65 to 30 million individuals are affected by this infection globally.² The status of the disease is marked as progressive in under developed and developing countries. A number of reasons contribute towards its incidence and prevalence in these regions of the world. Common reasons being the malnutrition, poor hygiene, over-crowding, improper health status, inadequate health conditions and UTIs that happens to occurs repeatedly.³ When left untreated, this infection might even lead to intradural and extradural complications⁴. It is classified into two major categories. One is supposed to

be safe which is termed as "Tubotympanic" while other is unsafe and is termed as "Atticoantral". The latter is popularly known well for resulting serious complications of the ear. In this condition, the infection reaches from middle ear to the nearby structures including labyrinth, facial nerves, brain and meninges etc.⁵

CSOM is mostly characterized by the presence of numerous forms of bacteria. A fungal infection may also be super added in this condition. The economic and geographic status of the areas plays a vital role in the prevalence of these microorganisms. Due to an unusual use of antibiotics, the antibiogram of the organisms is seems to be different. Therefore, in order to avoid inappropriate antibiotics treatment, a periodic update of the prevailing microorganisms and their sensitivity pattern is done.⁵ This is because inappropriate use of antibiotics might leads to an elevated morbidity. There are various studies that have

Authorship Contribution: ^{1,2}Substantial contributions to the conception or design of the work, ^{3,4}acquisition, analysis, or interpretation of data for the work

Funding Source: none
Conflict of Interest: none

Received: April 17, 2021
Accepted: July 4, 2021

shown a predisposition of the disease towards the young age group.⁶ A cumulative incidence rate of 14% is shown by a prospective population-based longitudinal cohort study among the children aged having an age of 0–4 years. There is a meaningful difference in the microbiological profile of children and the adults and therefore, an extended research work is needed in order to assess the prevailing microorganisms and their treatment for the future. It is also evident that because of an increased antibiotic resistance, times to time evaluation and screening of the microbiological profile and its clinical association will definitely help in the disease burden reduction.

The objective of this research was to assess the jeopardy of hepatic and renal toxicity in patients suffering from chronic suppurative otitis media and possible drug's response to treat the condition.

Materials and Methods

This was a case control trial that was conducted in patients with chronic suppurative otitis media reported to ENT OPD of Khalifa Gul Nawaz teaching hospital Bannu-KP. The duration of the study was from January 2021 to August 2021. The Minimum sample size was ($n = 160$) calculated by WHO calculator. Confidence interval was taken as 95%, with 5% margin of error. Secondary data were collected from KGN hospital (enrolled CSOM patients' information of liver function tests, creatinine, urea and blood glucose (random) levels).

Sixty volunteers were included in the study. Negative control group, positive control group, patients treated with Co-amoxiclav, and patients treated with Ciprofloxacin, patients and healthy volunteers were randomized into four groups.

Inclusion criteria: The study included adult patients (both genders) aged 18–60 years old who had one or both side ear presentations of CSOM without any hepatic, renal, or metabolic disorder or history of neurological disease, any profound psychological distress, cardiac arrest, or a family history of senso-rineural hearing loss or using hearing aids.

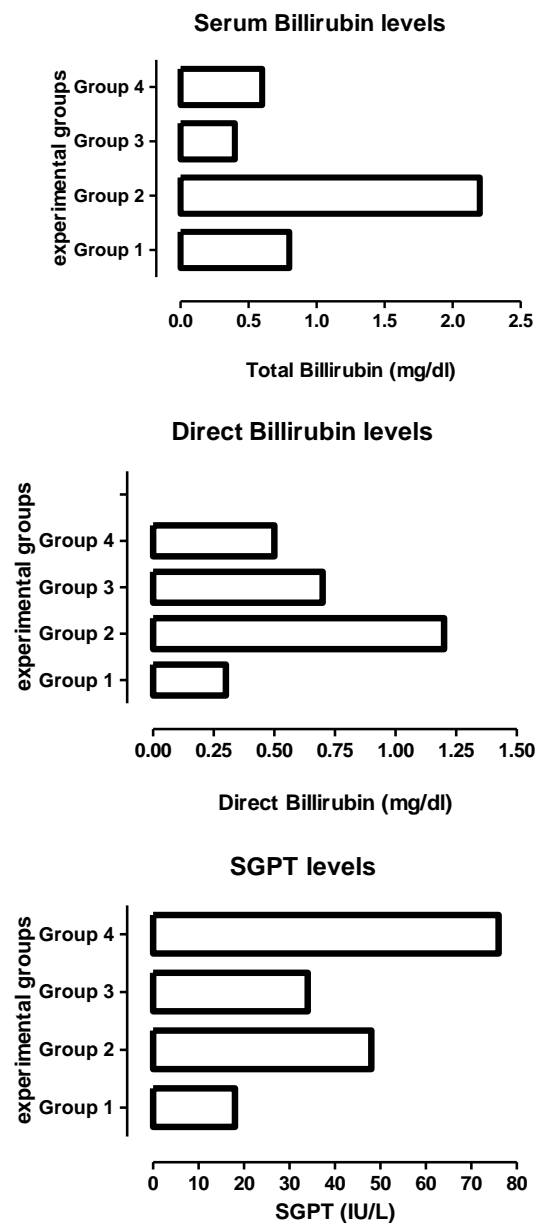
Exclusion criteria: Patients above the age of 60, as well as children, who had a chronic or acute infection in the previous six months, were excluded from the research.

The data were analyzed using SPSS version 20. Graphs were constructed using GraphPad Prism version 8. Normality test was applied to check the normality of the data. Descriptive statistics were used. Quantitative data was presented as mean and SD whereas qualitative data was presented as percentage and frequencies. A p value less than 0.05 was set as significant.

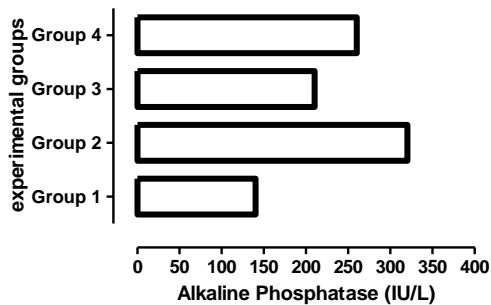
Results

Based on our inclusion criteria, 160 patients were enrolled in the study. The results of the study showed a significant increase in direct bilirubin levels, total bilirubin levels, SGPT, GGT and alkaline phosphatase in positive control group in comparison to negative control. The results are shown in table I.

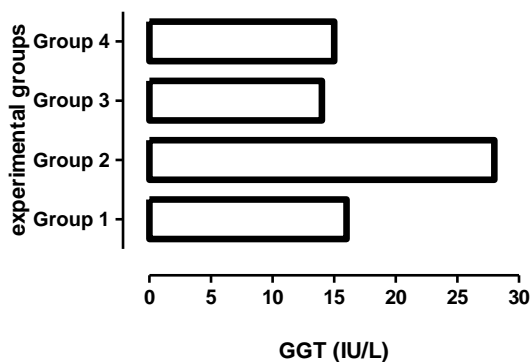
The treated groups with antibiotics (Ciprofloxacin, Co-amoxiclav) remained successful in recovering normal liver enzymes excepting SGPT and direct bilirubin. Blood glucose and urea was found to be insignificant in G2 and G3 groups whereas in G4 group, an increased creatinine was seen which was statistically insignificant. The results are shown in figures 1, 2 and 3 respectively.



Alkaline phosphatase (ALP) (IU/L) levels in positive control was significantly higher than negative control. The ALP levels of ciprofloxacin group and co-amoxiclave are shown in figure 4.



The current study showed the mean total GGT (IU/L) levels of positive control as significantly higher than negative control. The results showed that there was no significant difference in GGT concentration between healthy individuals and treated groups, as shown in figure 5.



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Discussion

CSOM is an infection of middle ear which is generally linked with numerous complications including renal and hepatic toxicity.⁸⁻¹⁰ Depression and significant hearing loss is also associated with this condition¹¹. A study narrated its link with DM.¹² The results of the study showed no significant RBS levels in patients suffering from CSOM. Renal markers were also found to be insignificant. The values of serum urea and serum glucose were found to be in a normal range.^{13,14} However, serum creatinine values were found higher in patients with CSOM.

The outcomes of the study revealed a higher value of total & direct bilirubin, ALP, SGPT and GGT in positive and untreated control group in comparison with the healthy volunteers without infection i.e., negative control. This indicated a risk of higher levels of bilirubin in patients with CSOM without any treatment. The results are in consistence with some other studies.^{15,17}

Elevated values of SGPT, GGT, ALP and bilirubin point towards hepatic injury including bile duct obstruction, primary sclerosis and chronic liver cirrhosis etc.

These results suggest that CSOM may produce a change in liver enzyme concentration in the blood, which should be investigated further. The higher bilirubin levels are an indication of depression state in patients suffering from CSOM.¹⁸⁻²⁰

The drugs Ciprofloxacin and co-amoxiclave are extensively used in the treatment of CSOM. This is evident from many studies that Ciprofloxacin is a drug of choice to treat CSOM.⁷⁻¹⁰ The current investigation showed that Ciprofloxacin proved to be better than co-amoxiclave in making ALP levels normal. On the other hand, in making bilirubin level normal, co-amoxiclave was proved to be better than Ciprofloxacin. Both the drugs remained unsuccessful in reverting normal SGPT levels which indicated that antibiotics treat CSOM in a better way.

The normalisation of liver enzymes suggested that if CSOM is treated, CSOM-induced liver damage may reappear. Antibiotics, on the other hand, are known to cause liver toxicity, which could be the reason that even treated patients

Groups	Dose (mg)	Urea (mg/dl) mean±SD	P value	Random Blood glucose (mg/dl) mean±SD	P value	Creatinine (mg/dl) mean±SD	p value
(-)ive Control	-	12.26±8	-	80±10	-	0.72±0.56	-
(+)ive Control	-	30.2±04	-	122±12	-	1.16±0.18	-
Ciprofloxacin	1000	16.00±06	>0.05	128±16	>0.05	0.9±79	<0.05
Co-amoxiclave	1000	18.04±02	>0.05	114±08	>0.05	0.78±45	<0.05

are at risk of hepatic toxicity.

Conclusion

Our study concluded that in patients suffering from chronic suppurative otitis media, hepatic toxicity might be induced if remained untreated. Ciprofloxacin and co-amoxiclav can decrease the raised liver enzymes. Therefore, patients should be follow-up with proper liver function test.

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