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Assessment of liver function in malaria, typhoid and dengue diseases in Peshawar, Pakistan

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Abstract
Malaria, typhoid fever and dengue infections are considered as the most prevalent diseases in tropics and are primarily connected with poverty and underdevelopment with significant morbidity and mortality rates. In this study 90 patients both males and females between the age of 22 to 40, (30 malarial patients, 30 typhoid patients and 30 dengue patients) were included from Hayatabad medical complex Peshawar to assess their liver function, and 20 healthy individuals were included as placebo. Blood samples collected from these subjects were screened for malaria, typhoid and dengue infection using standard methods. Mean value of serum level of ALP (110.9±16.1), ALT (30.1±6.9), AST (42.5±7.3), TB (23.8±7.0), CB (6.4±1.8) for malaria, ALP (124±17.8), ALT (29.9±5.2), AST (26.9±3.5), TB (21.8±2.9), CB (5.3±1.6) for typhoid and ALP (121.7±16.1), ALT (270.2±58.0), AST (137.5±39.6), TB (65.1±16.6), CB (12.6±3.4) for dengue were obtained for these subjects. Comparison of ALP level in Malaria, Typhoid and Dengue infections were also assessed where typhoid showed high level of ALP i.e. 125(IU/L), High ALT, AST, TB and CB level showed by Dengue i.e. 140 (IU/L), 400 (IU/L), 60 (Umol/L), 12 (Umol/L) respectively. These finding suggested that if the Malaria, Typhoid and Dengue infections are not treated properly there will be an increase in the level of ALP, ALT, AST, TB and CB and will cause damage to the liver.

Keywords: Liver function, Malaria, Typhoid, Dengu

1. Introduction
Malaria is caused by intracellular obligate parasites, which target and resides in the host erythrocytes and alter these cells to deliver optimally for their own needs. According to the reports of World Health Organization nearly 99% deaths in Africa are caused by these deadly parasites [1]. Malaria is also responsible for one-fifth of infants death in africa [2]. Globally, the majority of the deaths from malaria have been credited to *Plasmodium falciparum*. Malaria pathogenesis is based mainly on extensive changes in biochemical and hematological parameters [3].

On the other hand typhoid fever is recognized as a serious health problem in the developing nations and globally it affects about 16 million people and causes 600,000 deaths annually [4]. Typhoid fever is truly a severe disease and infrequently life-threatening febrile illness caused by the bacterium *Salmonella enterica* serotype typhi. Typhoid fever is most frequently developed through consumption of water or food that has been contaminated by feces of an affected person. Typhoid fever (Enteric fever) is an acute febrile illness which is considered as a major public health problem in many developing countries of the world especially in Pakistan [5].

Dengue belongs to the family Flaviviridae. Dengue fever is the most quickly developing viral infection in all part of the world and especially in Pakistan and reported its first outbreak in 1994. Dengue fever is a vector-borne infection that has become a major recurrent health problem in South-East Asia, with a frequency of two -three rises /year. Clinical appearance of dengue fever varies from mild febrile illness to Dengue hemorrhagic fever and Dengue shock syndrome. This leads to an insufficient or late treatment of a restricting and hypothetically lethal medical condition [6]. These diseases have been associated with poverty and underdevelopment with significant morbidity and mortality [7].

Liver is an important organ present in all vertebrates. It is the largest organ located in the right upper quadrant of the abdominal cavity in humans. Liver carries variety of functions including detoxification of protein synthesis,

production of biochemical necessary for digestion, storing of glycogen etc [8].Malarial parasite and typhoid bacteria interfere with the liver and its functions. Malarial parasites and typhoid bacterium invade the liver cells which can lead to certain anomalies such as cellular inflammation, organ congestion and sinusoidal blockage [9]. In dengue case similar results are reported showing certain aberrations in the liver enzymes that ultimately causes damage to the liver [10]. The current study was conducted for the assessment of liver enzymes in malaria, typhoid and dengue patients.

2. Materials and Methods

2.1 Sample collection and processing:

The blood samples were collected from 110 patients (male and female) all patients having ages of 22 to 40 years and the study were conducted at Hayatabad Medical Complex Peshawar. Then three specimen bottles were used for each patient in which the anticoagulant bottles were used for malarial parasite, and the sterile bottles were used for Widal test, Dengue test and liver function assays. After streaking the film with a field strain the samples in the anticoagulant bottles were immediately tested for malarial parasite and the samples in the plain tubes were allowed to clot. In order to obtain the sera the clotted samples were centrifuged. The sera was separated into sterile bottles and stored at -20. Within one week interval the stored samples were used for analysis by conducting Widal test, Dengue test and liver function assays.

Blood samples were collected from the patients and were screened for the detection of malarial parasite and staphylococcus Typhi infection and dengue virus. The patient blood samples were divided into 4 groups as following: Group I =30 patients with malaria fever, group II=30 patients with typhoid fever, group III=30 patients with dengue, group IV =20 individuals were included as placebo that had no malaria, typhoid fever, and dengue. In order to calculate liver function in malaria, typhoid, and dengue patients, the liver function assays were carried out which measure the presence of a different chemical in blood prepared by the liver. Liver function assays which were conducted includes; aspartate transaminase (AST), alkaline phosphatase (ALP), alanine transaminase (ALT), total bilirubin level (TB), and control bilirubin (CB). Liver function assays were carried out on automated analyzer AUTOMATIC HITACHI/ERBA/ARCHETEC. These studied population included only those patients that had been clinically analyzed to have malaria, typhoid and dengue.

3. Results

The results of investigation of patients with malaria, typhoid and dengue in correlation with liver function are shown in Table (1, 2 and 3) individually. The result data were subjected to statistical analysis and expressed in mean and standard deviation (SD) with normal range and the analyzed data suggested that there was a significant increase occurs in the liver function assays (ALP, AST, ALT, TB and CB).

Table 1: Variation in the mean values of serum level of different liver function assays carried out for patients with malarial parasite

Parameter	Mean value±SD	Normal value (Enemchukwu, B. N. *et al.*,2014)	P value
Alkaline Phosphatases(IU/L)	110.9±16.1	25-92.0	P< 0.05
Alanine Transaminases(IU/L)	30.1±6.9	3-18.0	P< 0.05
Aspartate Transaminases(IU/L)	42.5±7.3	6-21.0	P< 0.05
Total Bilirubine (Umol/L)	23.8±7.0	3.4-17.1	P< 0.05
Control Bilirubine (Umol/L)	6.4±1.8	0.0-3.40	P< 0.05

Table 2: Variation in the mean values of serum level of different liver function assays carried out for patients with typhoid.

Parameter	Mean value±SD	Normal value (Enemchukwu, B. N. *et. al*2014)	P value
Alkaline Phosphatases(IU/L)	124±17.8	25-92.0	P< 0.05
Alanine Transaminases(IU/L)	29.9±5.2	3-18.0	P< 0.05
Aspartate Transaminases(IU/L)	26.9±3.5	6-21.0	P< 0.05
Total Bilirubine (Umol/L)	21.8±2.9	3.4-17.1	P< 0.05
Control Bilirubine (Umol/L)	5.3±1.6	0.0-3.40	P< 0.05

Table 3: Variation in the mean values of serum level of different liver function assays carried out for patients with dengue infection.

Parameter	Mean value±SD	Normal value (Enemchukwu, B. N. *et al.*, 2014)	P value
Alkaline Phosphatases(IU/L)	121.7±16.1	25-92.0	P< 0.05
Alanine Transaminases(IU/L)	270.2±58.0	3-18.0	P< 0.05
Aspartate Transaminases(IU/L)	137.5±39.6	6-21.0	P< 0.05
Total Bilirubine (Umol/L)	65.1±16.6	3.4-17.1	P< 0.05
Control Bilirubine (Umol/L)	12.6±3.4	0.0-3.40	P< 0.05

The highest level of ALP was found in Typhoid patients i.e 125(IU/L) slightly above from dengue patients (121 IU/L). In case of malaria determined ALP level was 111(IU/L) as shown in (Fig 1).

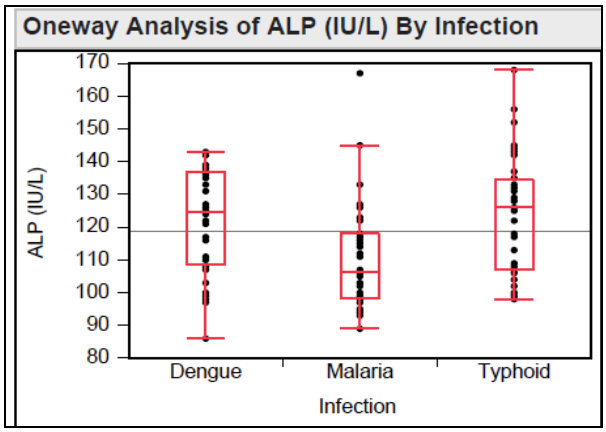

Fig 1: Comparison of ALP (IU/L) level in Malaria, Typhoid and Dengue infections.

In the case of ALT, the level was almost 140 (IU/L) in dengue patients while it was 25 (IU/L) in typhoid patients, reaching to the level of malarial patients that was about 30 (Umol/L) as shown in (Fig 2).

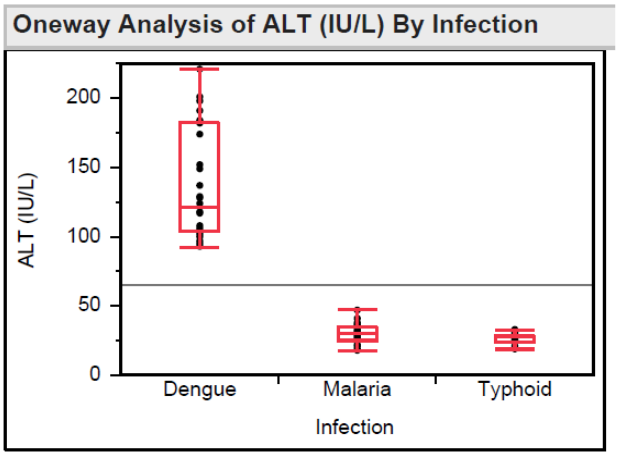

Fig 2: Comparison of ALT (IU/L) level in Malaria, Typhoid and Dengue infections.

In the case of AST, the level was nearly to 400 (IU/L) in dengue patients. The level was mainly above 10 (IU/L) in typhoid patients and the level in malarial patients that was about 60 (Umol/L) as shown in (Fig 3).

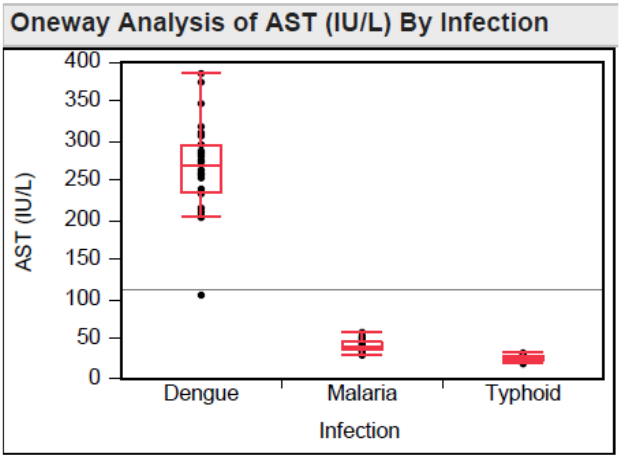

Fig 3: Comparison of AST (IU/L) level in Malaria, Typhoid, and Dengue infections.

In the case of TB, the level was above 60 (Umol/L) in dengue patients. The level was marginally above 20(Umol/L) in typhoid patients approaching to the level of malarial patients that was about 24 (Umol/L) as shown in (Fig 4).

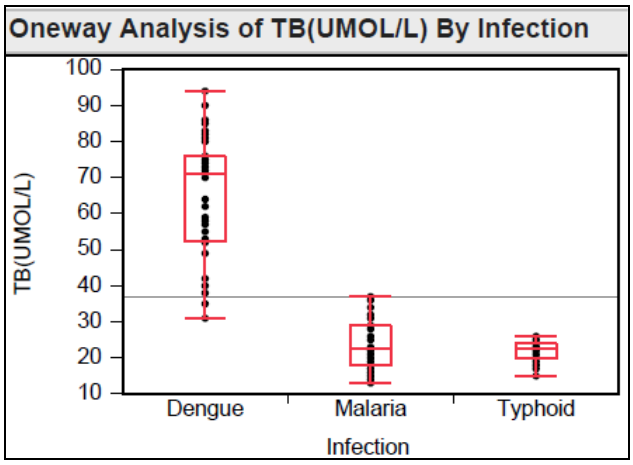

Fig 4: Comparison of TB (Umol/L) level in Malaria, Typhoid and Dengue infections.

In the case of CB, the level was somewhat above 12 (Umol/L) in dengue patients. The level was approaching to 6 (Umol/L) in typhoid patients, while it was above 6 (Umol/L) in patients of malaria as shown in (Fig 5).

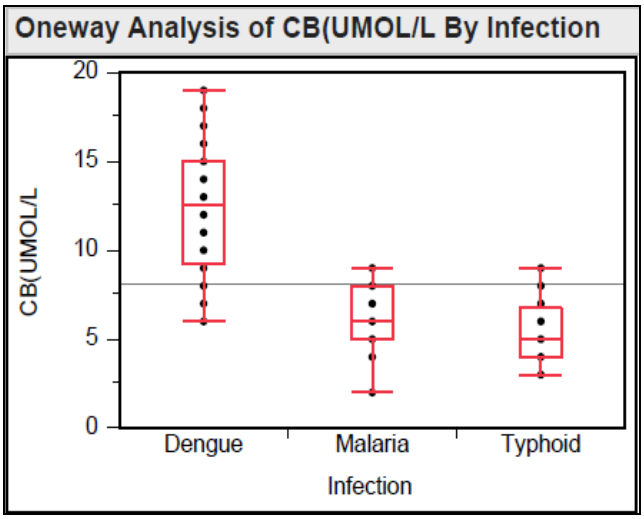

Fig 5: Comparison of CB (Umol/L) level in Malaria, Typhoid and Dengue infections

4. Discussions

Our findings revealed that LFTs increases due to malaria, typhoid and dengue infections. In malarial patient ALT, AST and ALP increased, where this study showed similarities with Ignatius *et al*., findings who reported high level of ALT, AST and ALP in the blood of malarial patient. He also showed that increase in these enzymes could lead to damaging of liver parenchyma [11]. Results showed a major increase ($p<0.05$) in the level of bilirubin (CB and TB) in malarial patient which is compared with the work of Kayode *et al*., and Etim *et al*., who reported high level of Bilirubin (CB and TB) in malarial patients [12,13].

High level of liver enzymes were also reported in patients suffering from typhoid fever. To determine the level of these enzymes liver function tests were carried out. High level of ALP, AST and ALT were reported which shows correlation with Ali *et al*., work who also reported high level of ALP, AST and ALT enzymes in typhoid patients [14]. Morgenstern *et* al., and Mirsadraee *et al*., in their results reported that 62

and 70%, respectively of patients with typhoid fever had elevated AST and ALT while Rasoolinejad *et al*., stated that 74% of patients with typhoid fever had elevated ALP [15-17].
The level of liver enzymes also get elevated in dengue patients. The same results were reported by Kuo *et al*., that due to dengue infection ALP, bilirubin get increased while, in children they reported that ALP level were 80% higher compared to normal [18]. In a study carried out by Nguyen *et al.*, AST values were reported to be frequently abnormal, reaching values higher than those of ALT, around 97.7% and 37.3% above normal levels, respectively [19]. Further studies are required to investigate the other liver functions in patients of malaria, typhoid and dengue.

5. Conclusion
Malaria, typhoid and dengue are still considered as unresolved eminent problems and pose a major health threat in many developing countries of the world. Progressions of these diseases are predominantly associated with the elevation of liver enzymes such as ALP, AST, ALT, TB and CB. This study showed the correlation between the liver enzymes and the disease progression in which it has been determined and concluded that among the liver enzymes ALP has shown a higher level in case of typhoid as compare to malaria and dengue. While the other enzymes such as ALT, AST, TB and CB are dominant in case of dengue infection. Elevation of liver enzymes than normal range is considered as anomaly and if not treated properly then these enzymes can cause severe damage to the liver.

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7. Declaration of interest
None of the authors of this paper had any personal or financial conflicts of interest.

8. References
1. Ogbodo S, Nwagha U, Okaka A, Ogenyi S, Okoko R, Nwagha T. Malaria parasitaemia among pregnant women in a rural community of eastern Nigeria; need for combined measures. Nigerian Journal of Physiological Sciences. 2009; 24(2).
2. Geneva W. WHO Guidelines for the treatment of malaria. 2010.
3. Bidaki Z, Dalimi A. Biochemical and hematological alteration in Vivax malaria in Kahnouj city. J. Rafsanjan Univ. Med. Sci. 2003; 3:17-24.
4. Hohmann EL, Oletta CA, Killeen KP, Miller SI. phoP/phoQ-deleted Salmonella typhi (TY800) is a safe and immunogenic single dose typhoid fever vaccine in volunteers. Journal of Infectious Diseases. 1996; 173(6):1408-1414.
5. Prasad N, Murdoch DR, Reyburn H, Crump JA. Etiology of severe febrile illness in low-and middle-income countries: a systematic review. PLoS One. 2015; 10(6):e0127962.
6. Ahmed A, Alvi AH, Butt A, Nawaz AA, Hanif A. Assessment of dengue fever severity through liver function tests. J Coll Physicians Surg Pak. 2014; 24(9):640-644.
7. White NJ. A vaccine for malaria: Mass Medical Soc; 2011.
8. Strickland GT. Hunter's Tropical Medicine: WB Saunders Company, 1991.
9. Petit P, Wamola I. Typhoid fever: a review of its impact and diagnostic problems. East African medical journal. 1994; 71(3):183-188.
10. Souza LJd, Nogueira RMR, Soares LC et al. The impact of dengue on liver function as evaluated by aminotransferase levels. Brazilian Journal of Infectious Diseases. 2007; 11(4):407-410.
11. Ignatius CM, Emeka EN, Blessing NE. Effect of malaria parasitaemia on liver enzyme tests. International Journal of Tropical Medicine. 2008; 3(3):49-52.
12. Kayode O, Kayode A, Awonuga O. Status of selected hematological and biochemical parameters in malaria and malaria-typhoid co-infection. Journal of Biological Sciences. 2011; 11(5):367-373.
13. Etim O, Ekaidem I, Akpan E, Usoh I, Akpan H. Effects of quinine treatment on some indices of protein metabolism in Plasmodium falciparum infected human subjects. Acta Pharm Sci. 2009; 51:21-26.
14. ABRO AH, ABDOU AM, USTADI AM. Hepatic Dysfunction in Typhoid Fever. Headache. 49:94-92.
15. Morgenstern R, Hayes PC. The liver in typhoid fever: always affected, not just a complication. American Journal of Gastroenterology. 1991; 86(9).
16. Mirsadraee M, Shirdel A, Roknee F. Typhoid myopathy or typhoid hepatitis: a matter of debate. Indian journal of medical microbiology. 2007; 25(4):351.
17. Rasoolinejad M, Alhosein NEBBM. Salmonella Hepatitis (analysis of hepatic involvement in 107 patients with typhoid fever. *Acta Medica Iranica.* 2003; 41(3):161-163.
18. Kuo C-H, Tai D-i, Chang-Chien C-S, Lan C-K, Chiou S-S, Liaw Y-F. Liver biochemical tests and dengue fever. The American journal of tropical medicine and hygiene. 1992; 47(3):265-270.
19. Nguyen T, Nguyen T, Tieu N. The impact of dengue haemorrhagic fever on liver function. Research in virology. 1997; 148(4):273-277.