INTERNATIONAL JOURNAL OF ADVANCED BIOLOGICAL RESEARCH

www.scienceandnature.org

STUDY THE PRIMARY AND SECONDARY HISTOPATHOLOGICAL CHANGES IN LIVER INDUCED EXPERIMENTALLY IN THE RATS FOLLOWING IMMUNIZATION AND INFECTION WITH *SALMONELLA TPHIMURIUM*

[a]Khalil H. Aljeboori & [b]Khalil G. Chelab
[a]College of Dentistry, Aliraqia, University, Iraq
[b]College of Veterinary Medicine, University of Alqadissiy, Iraq

ABSTRACT
Two groups of rats 200mg b. wt, each group (15 rats), the first group were immunized with whole sonicated *Salmonella typhimurium* antigen, 3 doses 0.1ml, S/c .The 2nd group were received I/P phosphate butter saline 0.2ml both two groups were challenged with *S. typhimurium* I/P $1x10^8$ CFU/ml after 4th week all the lesions were studied and found extensive hepatic lesions in group received pbs without immunization comparable to the local and mild lesion in liver in the immunized group, also sever clinical signs recorded in the pbs group comparable to the mild clinical signs in the immunized group.

KEYWORDS: *S. typhimurium*, liver lesions, rat.

INTRODUCTION

Salmonella typhimurium is a gram negative bacilli that cause a self limiting gastroenteritis in human and a typhoid like systemic infection in mice[1]. Hosts are infected after ingestion of the contaminated food or water. The bacteria then survive in the acidic P^H of the stomach, penetrate the gut barrier via the sepeciliazed M cells and colonize the peyer's patches[2,3] subsequently, they spread into draining mesenteric lymph nodes and disseminate via the blood stream to the spleen, liver and bone marrow where they replicate in the cellular niches, the macrophages of the reticuloendothelial system[4]. Then it will replicate within the lymph nodes to cause lymphangitis[5,6] due to death of several bacteria and produce endotoxins. Clinical symptoms showed like fever, depression, weakness and the bacteria disseminated into liver, kidneys and execrated in urine and feces[7,8]. Through the importance of liver as a target organ in the body for any bacterial infection or and any toxins, this study aimed at to identify both primary and secondary hepatic lesions in rats experimentally following immunization and infection with *Salmonella typhimurium*

MATERIAL AND METHODS

Two groups of rats 200 mg b.wt (in each group) first group were immunized with 0.1ml s/c of whole sonicated *Salmonella typhimurium* antigen 3doses (10days intervals). The whole sonicated *Salmonella typhimurium* Antigen (WSSTA) were prepared according to[9]. After immunization this group were challenged with 0.3 ml of suspension of *S. typhimurium* ($1x10^8$ CFU) prepared according to[10]. The 2nd group of rats received phosphate buffer saline (pbs) 0.2ml I/p then challenged with S. typhimurium suspension (0.3ml, I/P) similar to immunization group. After 3-4th weeks all the clinical signs were recorded and pieces of hepatic lesions were taken for histopathology, processed routinely[11] for histopathological changes identification

RESULTS AND DISCUSSION

Clinical signs

Showed along the experiment depression restlessness , partial alopecia, ulceration and hyperkeratosis in skin at the site of injections, dyspnea and Jaundice, paleness of mucous membrane, the severity of clinical signs were appear more in group received *S. typhimurium* challenged dose only whereas mild clinical signs in immunized group and challenged with *S. typhimurium*.

Among the hepatic lesions in non immunized group that considered as a primary lesions were infiltrating of neutrophils around central vein (Fig-1), congestion of blood vessels, thrombosis, also there is hyperplasia of bile duct, where there is infiltration of portal areas with neutrophils, the aggregation of neutrophils (Fig-2) in liver parerehyme lead to micro abscesses formation with extensive necrosis, when lesions progressed lead to grandomatous reaction in some areas of liver tissue.

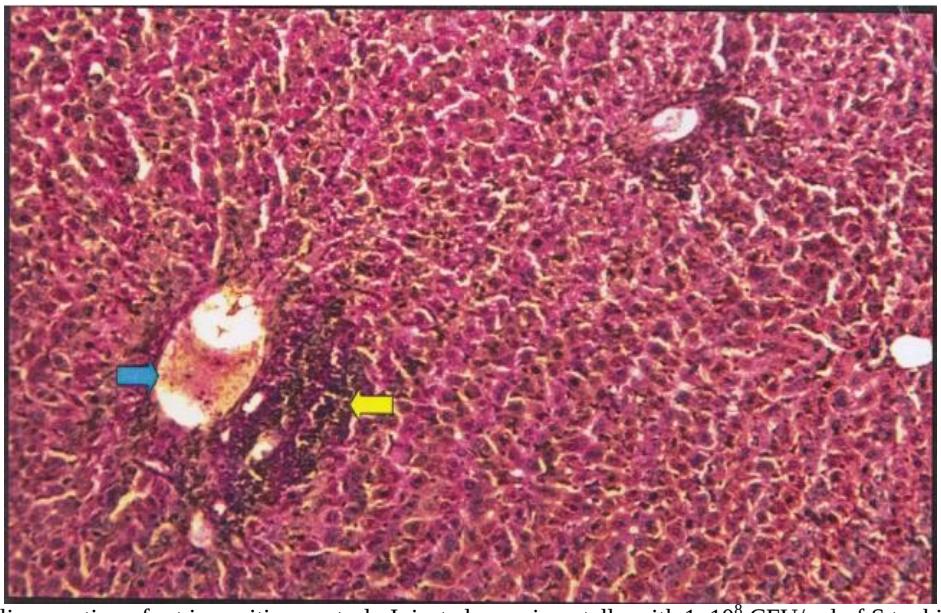

FIGURE 1: liver section of rat in positive control .Injected experimentally with $1x10^8$ CFU/ ml of S.typhimurium S/C .Note there is high infiltration of inflammatory cells (yellow arrow) with large thrombl (blue arrow) in the central veins , Also there is loss of hepatic architecture .50X H & F.

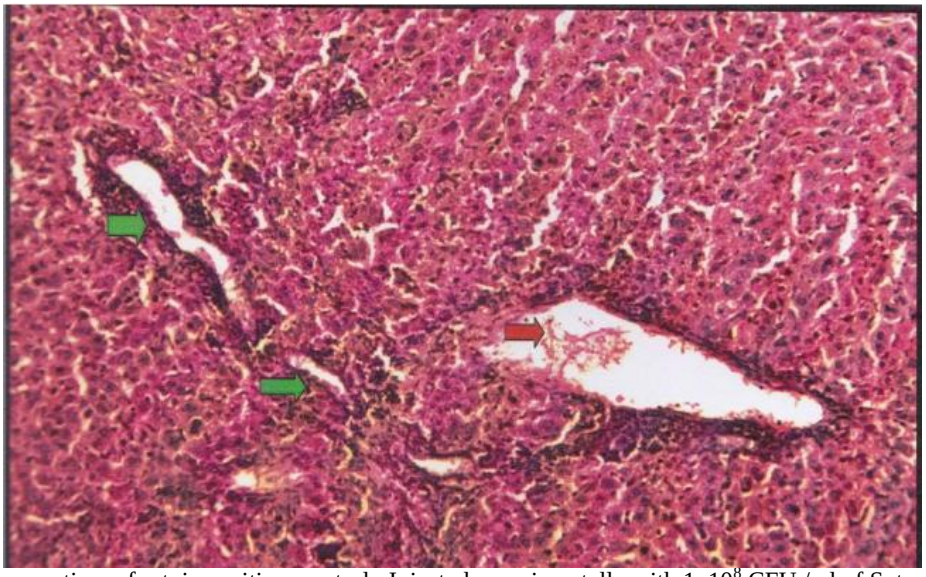

FIGURE 2: liver section of rat in positive control .Injected experimentally with $1x10^8$ CFU /ml of S. typhimurium S/C .Note there is infiltration of inflammatory cells with congestion of central veins (red arrow) .Also there is hyperiasia of the epithelial cells which lining of bile ducts (green arrows) . 50X H & F.

The hepatic lesions were occurred as a result of proliferation of the *S. typhimurium bacilli* in liver tissue as a target organ and during their proliferation produce endotoxins which cause congestion , thrombosis and neutrophils infiltration [12, 13, 14] both those workers found these liver lesions in mice when infected by the similar bacteria, also the proliferated bacteria and their endotoxin cause damage to bile epithelia and induce leakage of bile as an irritant and resulted in hyperplasia of bile epithelia and inflammatory reaction. A similar evident was given by[15]. Regarding group of immunization with WSST Ag and challenged with *S. typhimurium* showed mild focal lesion (Fig-3) comparable to diffuse lesions in infected group. the mild and focal lesions which consisted of mild congestion, thrombosis and focal microabssess formation which developed into focal granuloma (Fig - 4)together with mild hyperplasia of bile duct epithelium. with focal lesion in portal area, these lesions occurred because elevation of immunological state of rat resulted in inhibition of bacterial growth and their endotoxins production, so the lesions still mild and focal . A similar finding recorded by[16] whom reported that the state of Immunization of animal induced focal lesion, mild granuloma indicating that the immunization state act as anti inflammatory process against microbial challenge.

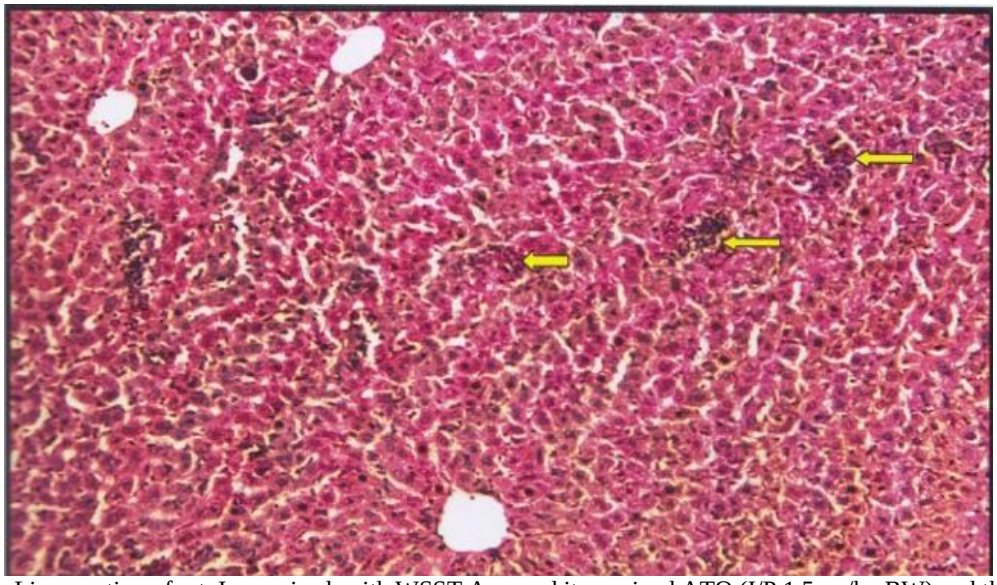

FIGURE 3: Liver section of rat. Immunized with WSST Ags and it received ATO (I/P 1.5mg/kg BW) and then injected experimentally with $1x10^8$ CFU /ml of *S. typhimurium* S/C .Note there is inflammatory cells aggregations (yellow arrows), moderate necrosis with loss of hepatic architecture. 50X H&E

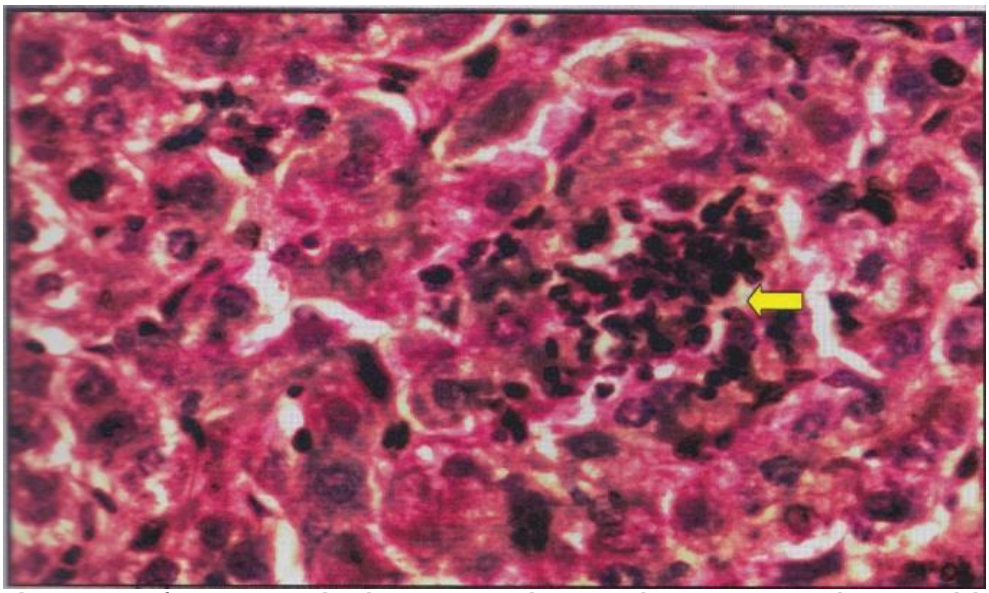

FIGURE 4: liver section of rat. Immunized with WSSTAgs and it received ATO (I/P 1.5 mg /kg BW) and then injected experimentally with $1x10^8$ CFU/ml of *S. typhimurium* S/C. Higher magnification. Note there is inflammatory cells aggregation (yellow arrow), moderate necrosis of hepatocytes, 200X H&E .

CONCLUSION

S. typhimurium induced sever hepatic lesion in non immunized group comparable to mild, localized lesion in immunized group of rat.

REFRENCES

[1]. Darwin, K.H. & Miller, V.L. (1990) Clin. Microbiol Rev.12: 405-428
.

[2]. Jones, B.D., Ghori, N. and Falkow, S. (1994) J. Exp. Med. 180:15-23.

[3]. Jenson, V.B., Harty, J.T. and Jones, B.D. (1998) Infect. Immunity, 66:3758-3766.

[4]. Richter-Dahlfors, A., Buchan, A.M. and Finlay, B.B. (1997) J. Exp. Med.186:596-580.

[5]. Santos,R.L., Zhang, S., Tsolis, R.M. Baumler, A.J. and Adams, L.G (2002) Morphological and molecular character action of *Salmonella typhimurium* infection in neonatad calves. Vet. pathol. 39: 200 -215.

[6]. Nillson, A.I., kugelberg, E., Berg, O.G. and Anderson, D.I. (2005) Experimental adaptation of *Salmonella typhimurium* to mice AJ Gene 168:119-130.

[7]. MahZounich, M., Karimi, L., Salehi, I. and Marjanian (2006) the preventaion effect of

Saccharomyces boulardii in pathogenesis of *Salmonella typhimurium* in experimental infected rat Pakistan J. of Biol. Sci 9(4) : 632-635 .

[8]. Swanson, S.J., Snider, C., Braden, C., Boxrud, D., Wunshmann, A., Rudoff, A., Lockett, J. and smith, E. (2007) Multidrug resistant *Salmonella neteica* serovar typhimurium associated with pet Rodents .New England J. Med. 356:21-28

[9]. Mitove, I., Denchen, V. and Linde, K. (1992) Humoral and cell Mediated immunity in mice after immunization with live oral Vaccine of *Salmonella typhimurium*: auxotrophic Mutants with two attending markers Vaccine 10:61-66 .

[10]. Quinn, P.J., Carter, M.F., Narkey, B.K. and Carter G.R. (2007) clinical Veterinary microbiology 6th .ed. wife publishing, Mosby–yearbook Inc. Europe. limited p: 61-64 .

[11]. Jungueria, L. and Carneiro, J. (2003) Basic Histology 10th .ed. The McGraw–Hill Book companies Inc. USA.

[12]. Conlan, J.W. (1996) Neutrophils prevent Extra cellular colonization of the liver microvascular by *Salmonella typhimurium*. Infect. Immun. P: 1043-1047.

[13]. Hormaeche, C.E., Mastroeni, P., Arena, A., Udden, J. and Joysey, H.S. (1990) T cell do not mediate the initial suppression of a Salmonella infection in the Res. Immunology 70: 247-250.

[14]. Mastroeni, P., Skepper, J.N. and Hormaeche, C.E. (1995) Effect of antitumor necrosis factor alpha antibodies on histopathology of primary Salmonella infection. Infect Immun .63 : 3674-3682 .

[15]. Zaghair , Z.R. (2012) Histopathological study of *Salmonella typhimurium* infection in laboratory mice by using the light and electron microscope .Kufa J. Vet. Med. Sci. 3(1): 124 -131

[16]. Kwieciene, B., Dudek, M. Bilska- Wilkosz, A., Knutelska, J. Bednarski, M., Kwieciene, I., Zygmunt, M., Iciek, M., Sokolow–Ska–Jezewiez ,M; Sapa, J.& lodek, L. (2013) *in vivo* anti inflammatory activity of lipoic acid derivatives in mice. postepy Hig Med Dosw 67:331 -338 .