

**BALB/c**  
*Klebsiella*  
*pneumoniae*

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**ABSTRACT**

The study investigated the effect of the lipopolysaccharide (LPS) which was extracted from *Klebsiella pneumoniae* on immune response of BALB/c mice infected with secondary hydatid cyst of *Echinococcus granulosus*.

The immunopathological changes accompanied with secondary hydatid disease in mice were followed in comparison with the positive control group (mice infected with hydatid disease but not activated with LPS) and negative control group (mice neither activated with LPS nor infected with hydatid disease) throughout (3-5) months period of the experiments.

Criteria taken into consideration included the changes in numbers, weights and diameters of the hydatid cysts and the percentage of their reduction. In addition, changes in the weights of liver and spleen and their organ index. The results revealed an obvious decrease in numbers, weights and diameters of hydatid cysts grown in mice activated with LPS in comparison with the positive control group, in all experiments, supported by the reduction of the cyst number in activated mice. A decrease in weight and organic index of the liver and variation in the weight and organ index of spleen in activated mice.

Therefore, it may be concluded that the lipopolysaccharide extracted from *Klebsiella pneumoniae* can be used as a non-toxic activator (stimulator) of the immune response against infection with secondary hydatid disease.

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*Klebsiella pneumoniae*

Lipopolysaccharide(LPS)

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*Echinococcus granulosus*

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(LPS

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(LPS

LPS

*Klebsiella pneumoniae*

Hydatid disease

*Echinococcus*

. [1-2]

[5] Jaundice

. [3-4]

[6]

acute anaphylactic reactions

. [2]

[7]

Benzimidazole

Mebendazole

Albendazole

[3,8] Oxfendazole

Immunomodulators

[9-11]

LPS

Endotoxins

[12]

Tumor

IL-6

IL-1

Proinflammatory cytokines

LPS

[13] Necrosis Factor (TNF- $\alpha$ )

[14]

(MHC-II) Major Histocompatibility Complex II

LPS

[15]

LPS

B

LPS

[16]

[17] TLR-4

CD14

[18-22]

*K. pneumoniae*

LPS

BALB/c

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*K. pneumoniae*

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BALB/c

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. [23-24]

[25] Learne et al.1987

[26] Leathers *et al.*1988

. [27]

[28] Dubois et al.1956

: [29]

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BALB/c

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[30]Smyth, 1985

[31] Smyth and Barrett, 1980

[32]

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Vernier

[33]

organ index

Mettler HR-200 JAPAN

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$$\times \frac{\quad}{\quad} =$$

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. [34]

**LPS**

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(p < 0.001)

(p < 0.001)

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:C<sup>+</sup>

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BALB/c

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(p < 0.05)

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:C<sup>+</sup>

. (p < 0.001)

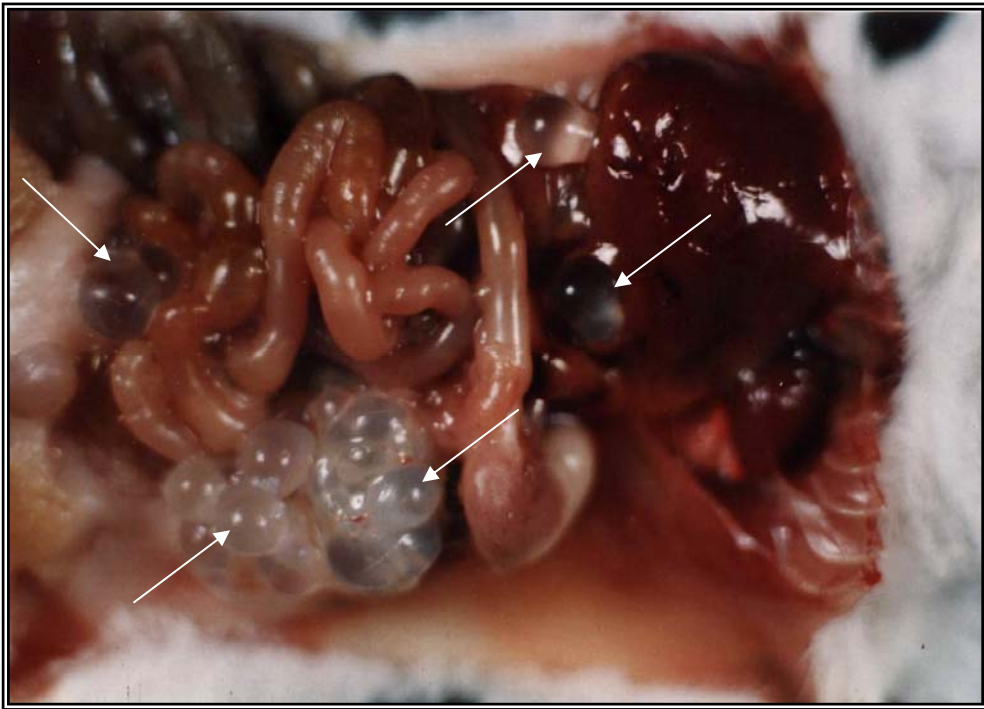
:\*\*\* (p < 0.01)

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BALB/c

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. ( $p < 0.001$ )

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( $p < 0.01$ )

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BALB/c

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BALB/c

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(p<0.01)

:C<sup>+</sup>

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(p<0.05)

(p<0.001)

:C<sup>-</sup>

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.[35]

*K. pneumoniae* (LPS)

IL-6 IL-1 ( ) Chemokines  
TNF- $\alpha$

Alternative LPS .[36-37]  
LPS .[38] pathway

B LPS [39]

[40- T

T LPS [43] IL-6 42]  
B

. [44]

/ ,

% ,

LPS

LPS .( )

ADCC

IFN- $\gamma$  LPS [45] Oden *et al.*

(MHC-I, II) II I

. [36] FC



*Salmonella Minnesota* Re- LPS Takeuchi *et al* [39]  
595

TNF- $\alpha$  TNF- $\alpha$  -

LPS

TNF- $\alpha$

LPS

MYD88

TLR-4

. LPS

Kassis

LPS

*E. granulosus*

[46] and Tanner

[47] Thompson

BCG

[48] Ali and Salih

*A. pullulans*

Pullulan

Al-Qaoud and

.BALB/c

[49] Abdel-Hafez

B

% ,

. IFN- $\gamma$

/  
( )

[51] Sarciron *et al* .[50] Reuben *et al*

Isoprinosine BCG

B

LPS

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BALB/c

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Li <i>et al.</i>	[10]	B	A
<i>K. pneumoniae</i>			LPS [52] <i>al.</i>
		B	
Takeuchi <i>et al.</i> [39]	. T		IgA IgM IgG
	<i>S. Minnesota</i> Re-595		LPS
		H <sup>3</sup> -thymidine	
		LPS	
	Pullulan	[11] Ali	
Ali and		<i>A. pullulans</i>	[53] Yaseen
		<i>E. coli</i>	
LPS			
		[57] Judson <i>et al.</i>	[54-56]
<i>E. granulosus</i>		B T	
		H <sup>3</sup> -thymidine	

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