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EFFECT OF BISPHENOL-A ON THE MORPHOLOGY OF SMALL INTESTINE IN PREGNANT RATS

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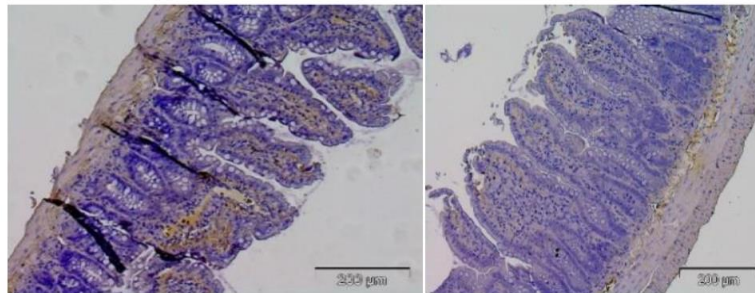
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GRAPHICAL ABSTRACT

EFFECT OF BISPHENOL-A ON THE MORPHOLOGY OF SMALL INTESTINE IN PREGNANT RATS



Pregnant rats receiving BPA in drinking water



Expression of intestinal claudin 3 by Immunohistochemical staining

ABSTRACT

Bisphenol A (BPA) is an environmental pollutant. Human beings are exposed to BPA through food and water. Due to its prolonged contact with the intestinal tract (IT), it might have harmful effects on the IT particularly in pregnant women and the fetuses. Objective of this study was to investigate the effect of BPA on the morphology and tight junction protein expression of the small intestine of pregnant rats. Twelve Pregnant Sprague Dawley rats were divided into group 1 (control, n=6) and group 2 (BPA treated, n=6). Group 1 received tween 80 and group 2 received BPA (0.2mg/ml) in drinking water. There were no significant differences in the villus height, crypt depth and the number of goblet cells in the jejunum and ileum between the two groups. Intestinal tight junction protein (ITJP) claudin 2 expression was similar in both groups. ITJPs claudin 3 and 4 were expressed less intensely in the ileum of group 2 as compared to group 1. Chronic low dose BPA throughout pregnancy in rats did not affect the morphology of villi, crypt, goblet cells and ITJP claudin 2 but reduced the expression of claudin 3 and 4 in the ileum, which might compromise intestinal barrier.

Keywords: Bisphenol A, villi, crypt, goblet cells, claudin 2, 3, 4

INTRODUCTION

- Bisphenol A (BPA) is one of the most widely used industrial compounds worldwide.
- It is mainly used in consumer products, such as epoxy resin lining food and beverage cans, plastic food containers, tablewares, baby feeding bottles and toys.
- Chronic low dose exposure to BPA has several harmful effects in the body (1,2,3)
- Gastrontestinal (GI) mucosa is in prolonged contact with BPA contaminated food and beverages before their absorption.
- It is not known whether chronic exposure of the intestinal tract with BPA causes any GI mucosal injury.

Flow Chart

Non pregnant (n=12)

Pregnant rats (n=12)

Group 1

Group 2

Group 1

Group 2

(Vehicle; Tween 80 control group, n=6) (Treated with BPA 0.2mg/ml, n=6)

(Vehicle; Tween 80 control group, n=6) (Treated with BPA 0.2mg/ml, n=6)

Jejunum

Ileum

Hematoxylin and Eosin staining

Height of villi
Crypt depth
Goblet cell

Height of villi
Crypt depth
Goblet cell

Immunohistochemical staining

Claudin 2
Claudin 3
Claudin 4

Claudin 2
Claudin 3
Claudin 4

RESULTS AND DISCUSSION

There were no significant differences between the height and width of the villi, crypt depth and the number of goblet cells in the jejunum of group 1 and group 2 of pregnant and non pregnant rats.

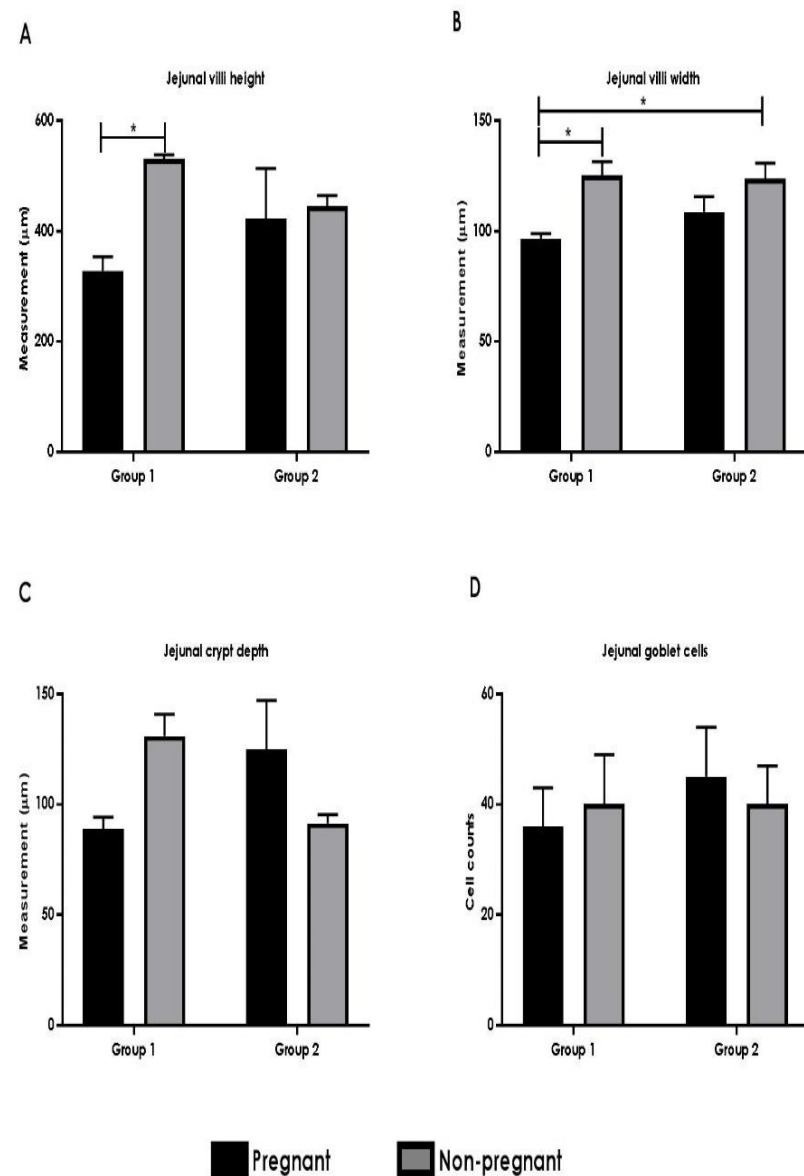


Figure 1. Measurement of jejunal villi height (A), villi width (B), crypt depth (C) and goblet cell counts (D) in Group 1 and 2 of pregnant and non-pregnant rats. Data presented as mean \pm S.E.M (n=6). Results were compared between Group 1 and Group 2 of pregnant and non-pregnant rats. * for p<0.05.

RESULTS AND DISCUSSION

There were no significant differences between the height and width of the villi, crypt depth and the number of goblet cells in the ileum of group 1 and group 2 of pregnant and non pregnant rats.

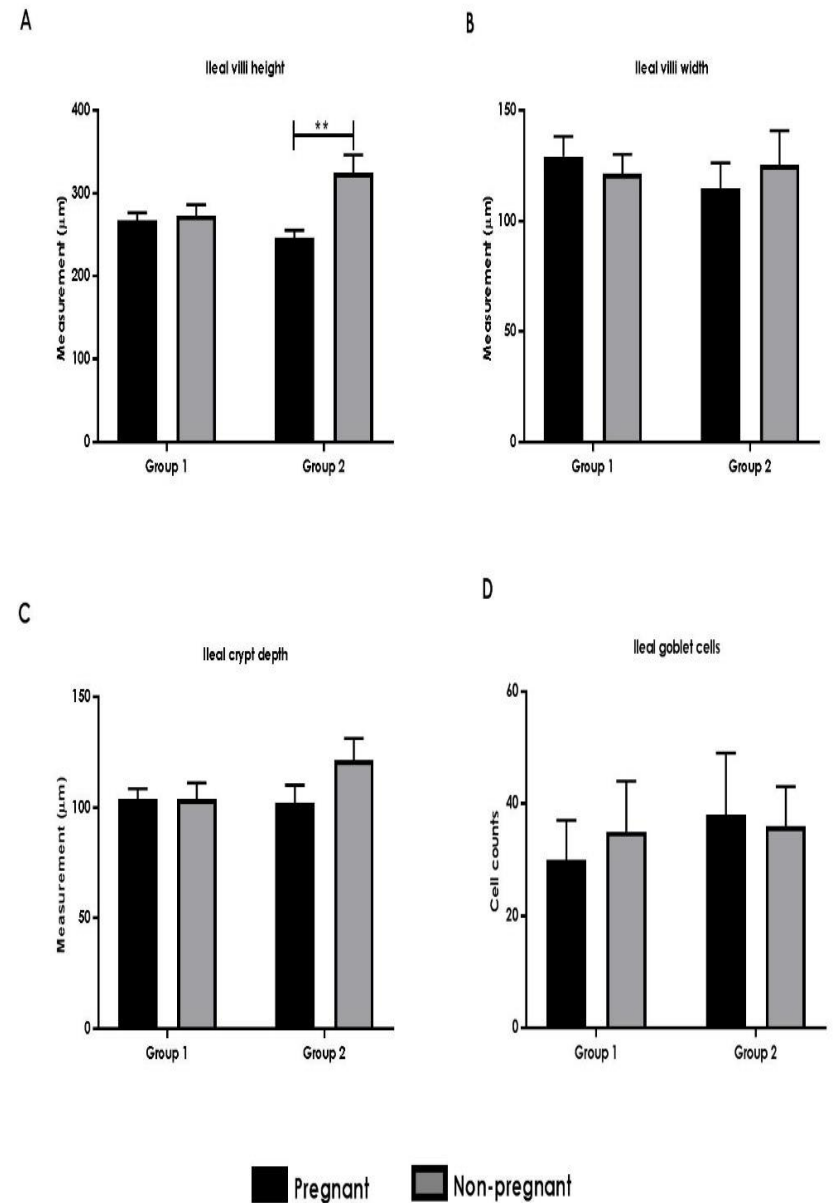


Figure 2. Measurement of ileal villi height (A), villi width (B), crypt depth (C) and goblet cell counts (D) in Group 1 and 2 of pregnant and non-pregnant rats. Data presented as mean \pm S.E.M (n=6). Results were compared between Group 1 and Group 2 of pregnant and non-pregnant rats. ** for $p < 0.01$.

RESULTS AND DISCUSSION

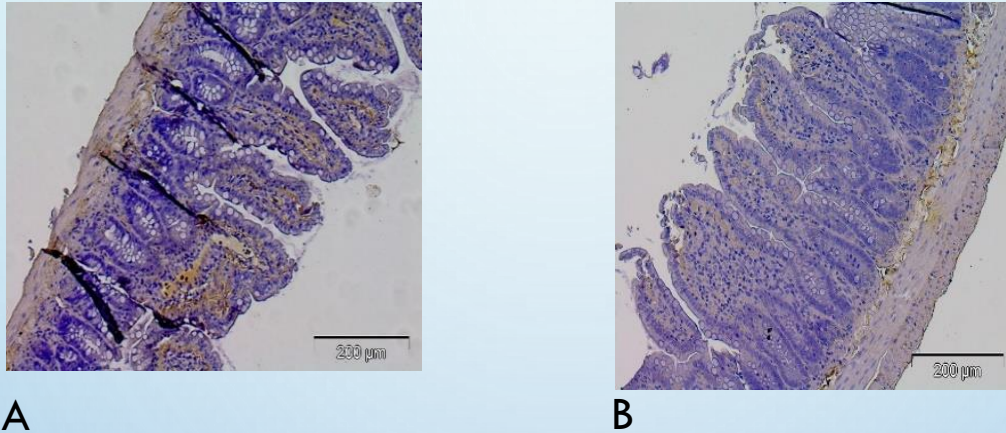


Figure 3 Displaying the expression of claudin 3 in group 1 (A) and 2 (B) of pregnant rats

Claudin 3 expression was reduced in group 2 as compared to group 1.

Claudin 2 expression was not different between the 2 groups. (Picture not shown)

Claudin 4 was a bit faint in group 2 as compared to group 1 (Picture not shown).

CONCLUSIONS

Prolonged low dose BPA exposure throughout pregnancy have the tendency to compromise intestinal barrier in rats.

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