Clinicopathological changes associated with Campylobacter jejuni infection in broilers

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1. INTRODUCTION

Poultry has become an important source of meat in developing countries. Enteric disease in broilers is a common and important illness beside a risk for poultry industry in world (Kaakoush, et al. 2015). Campylobacter caused gastroenteritis is carried by two closely related species (Campylobacter jejuni and Campylobacter coli) but Campylobacter jejuni is the more predominant (Leonard, et al. 2020). Campylobacter can appear in broilers as early as 14-day age at rearing with low percentage and increase to a high percentage at the end of grows out period (Evans, 2012). Most common routes of transmission are fecal-oral ingestion of contaminated food, water and eating of raw meat. Foods implicated in campylobacteriosis (Skarp, et al. 2016). Campylobacter infection is a wide range of avian spp. and rarely transmits vertically from parents to chicks (Huang, et al. 2017). Campylobacter cause diarrhea and health problem contributing substantially to childhood morbidity and mortality (Zhang, et al. 2018). Campylobacters are small and slender gram -ve spiral shaped rods beside its food and water-borne zoonotic diseases (Aneesa and Mohamed, 2019).

Antibiotics are used for bacterial infections (Thornrongsuwannakij, et al. 2018). Campylobacteriosis is treated by antibiotics such as aminoglycosides which act by irreversible inhibition bacterial ribosomes and impairs protein synthesis of bacteria (Fernandes and Marten, 2017). Neomycin is a member of aminoglycoside antibiotic against G +ve and G -ve organisms (Gupta and Plazomicin, 2017). The aim of the present study was isolate, identify Campylobacter and its prevalence in broilers in Sharkia province beside its effect on body performance, hematocrit and hematochemical parameters with trial of treatment was studied.

2. MATERIAL AND METHODS

2.1. Isolation and identification of Campylobacter spp

About 50 diarrheic broilers' cloacal swabs were taken from different cities of Sharkia Province. Swabs were collected aseptically and inoculated into charcoal cefoperazone deoxycholate agar medium (selective medium for isolation of Campylobacter). Plates were incubated at 37°C for 72 hrs under special microaerophilic condition (85 % nitrogen 5% oxygen, 10% carbon dioxide) (Murray, et a. 2003). Suspected colonies were identified and Bio-typing by Gram staining, oxidase test, catalase test and standard biochemical methods (Atabay and Corry, 1997).

2.2. Antibiotic sensitivity test (In vitro)

Susceptibility of isolated Campylobacter species against different chemotherapeutic agents was tested by disc diffusion method (Quinn, et al. 1994).
2.3. Antibacterial drugs
2.3.1. Pefloxacin (Peflodad10 %) solution was obtained from Dar Al Dawa Vet and Agri Industrial Co. Ltd Jordan. Each ml contains 100 mg of pefloxacin base.
2.3.2. Neomycin sulphate 20% produced from sento care Pharma comp Egypt

2.4. Experimental broilers and experimental design
About 45 apparently healthy one day-old Hubbard broilers nearly equal in live body weight (44.27-46.83gm) and received 5 mg pefloxacin/ kg bw in drinking water for 5 successive days for proving that broilers are free from any bacterial infections. Broilers were fed starter ration from Kahar Company and clean drinking water ad-libium. At 14 day of age broilers were divided into three equal groups (15/each). Gp (1) healthy chicks (control), Broilers in Gp (2) were orally infected with 0.1ml saline containing(2.5x10⁸ CFU) of isolated C. jejuni. Gp (2) infected broilers non treated and Gp (3) infected broilers, treated with 15 mg neomycin/kg Bw. in drinking water for 5 consecutive days.

2.5. Body weight:
Chicks were individually weighed at 1st day of age and at 1st day post treatment for estimation body weight gain and feed conversion rate

2.6. Re-isolation of Campylobacter spp.:
At 1st, 7th and 14th day posttreatment cloacal swabs were collected for Re-isolation Campylobacter jejuni

2.7. Blood samples:
At 1st,7th and 14th day post treatment 2 blood samples were taken.
First sample was taken in a tube contain EDTA for estimation of blood picture Jain (1986).

Table 1 Prevalence and type of isolated campylobacters

| Number of cloacal Swabs | -ve sample | +ve sample | Type of isolated campylobacters |
|-------------------------|------------|------------|---------------------------------|
|                         | No | %   | No | %   | Campylobacter jejuni | Campylobacter coli |
|                         |   |     |    |     | No | %  | No | %  |
| 30                      | 38 | 76  | 12 | 24  | 8  | 66.67 | 4  | 33.33 |

Table 2 biochemical identification of Campylobacter spp in broiler chickens

| Positive cloacal swabs | Gram stain | C. coli (4) | C. jejuni (8) | Hippurate hydrolysis | Growth on 1% glycine | Catalase | Oxidase | Hippurate hydrolysis | Growth on 1% glycine | Catalase | Oxidase |
|------------------------|------------|-------------|---------------|---------------------|---------------------|----------|---------|---------------------|---------------------|----------|---------|
|                        |            | +            | +              | -                   | +                   | +        | +       | +                   | +                   | +        | +       |

= GS. Catalase= Ox. Oxidase= Growth on 1% glycine = HH

Table 3 Antibiotics sensitivity of Campylobacter isolated from broilers to (n=5)

| Antibiotic | Sample number | Sensitive | Moderate | Resistant |
|------------|---------------|-----------|----------|----------|
|            |               | No | %   | No | %   | No | %   |
| Gentamycin  | 10            | 8  | 80  | 2  | 20  | 0  | 00  |
| Neomycin    | 10            | 6  | 60  | 4  | 40  | 0  | 00  |
| Ciprofloxacin | 10         | 7  | 76  | 3  | 30  | 0  | 00  |
| Erythromycin | 10           | 7  | 76  | 3  | 30  | 0  | 00  |
| Tetra cyclic | 10           | 4  | 40  | 6  | 60  | 0  | 00  |
| Ampicillin  | 10           | 0  | 00  | 2  | 20  | 8  | 80  |

Table 4 Mortality of healthy and diseased broilers and reisolated campylobacter

| Parameters groups | Total No | Mortality rate | Resolated of Campylobacter spp post treatment (day) |
|-------------------|----------|----------------|--------------------------------------------------|
|                    | No | %  | 7 | 1 | 7 | 14 |
| Gp (1)            | 10 | 00 | 0  | 00 | 0  | 00  |
| Gp (2)            | 10 | 4  | 40 | 10/10 | 10/10 | 10/10 |
| Gp (3)            | 10 | 2  | 20 | 00/10 | 00/10 | 00/10 |
4. DISCUSSION

Infected bird with *Campylobacter* carries very high bacterial concentration in their gastrointestinal tract and the main sites of colonization of *Campylobacter* in poultry are the caeca, colon and cloaca (Facciola, et al. 2017). *Campylobacter* infection is characterized by inflammatory, sometimes bloody diarrhea or dysentery syndrome (cramps, fever, and pain) (Liz, et al. 2020).

In the current study, the prevalence of campylobacter was 24%. Our results are in agreement with Khalifa, et. al. (2011) who observed that the prevalence of Campylobacter in broilers in Kalobiya was 26%. Campylobacter prevalence in broilers from Sharkia Province was 29.3% (Ashraf, et al. 2018). The prevalence of Campylobacterin Assuit Province was 21.5% (Mostafa, et al. 2018) in broilers. Variation in Campylobacter prevalence may be due to difference in sanitation (Leonard, et al. 2020).

In the present study, Campylobacterisolates were identified as *Campylobacter jejuni* 8 (66.67%) and *Campylobacter coli* 4 (33.33%). Same results were reported by Saad (2014) who identified *Campylobacterjejuni* in rate of 60.9% in Sharkia Province. Comparable percentages of *Campylobacter jejuni*56% were reported by Abd El-Tawab et al. (2015) in Sharkia Province. Identified *Campylobacter jejuni* in rate of 66% in Egypt (Ashraf, et al. 2018).

Disc diffusion test revealed isolated Campylobacter was sensitive to neomycin and gentamycin. (Sayed 2000). This result was consistent with Liz, et al. (2020) who stated that broilers infected with *Campylobacter jejuni* showed clinical signs (ruffled feather, depression, loss of appetite, diarrhea, reduction in body weights and mortality rate was 40%). Diseased broilers treated with neomycin showed disappearance of clinical signs and reduction in mortality rate to 20% and not reisolate *Campylobacter jejuni*. Some clinical signs were observed by Khalil (2002)in broilers infected with *Campylobacter jejuni*. This result was consistent with Liz, et al. (2020) who stated that broilers infected with *Campylobacter jejuni* showed loss of appetite, depression, diarrhea, and reduction in body weights. Neomycin is a very effective drug against *Campylobacter jejuni* as it caused
disappearance of clinical signs and decreased mortality rate in chickens (Krishna, et al. 2018).

Our results revealed that, broilers infected with *Campylobacter jejuni* showed non-significant change in RBCs, Hb, PCV % and significant increase in WBCs. Leukocytosis in infected broiler may be due to inflammatory response in intestinal tract (Radostitis, et.al. 2002). Similar result in blood picture was observed by Thrall (2004) stated that broilers infected with *Campylobacter* showed non-significant elevation in RBCs, Hb, PCV % and significant leukocytosis. *Campylobacter* induce significant elevation in leukocytic count in broilers (Lavini, et al. 2016).

In the present study, *campylobacter* infection induced significant decrease in total proteins, albumin and non-significant decrease in globulin. Reduction in total protein and albumin in broiler infected with campylobacter may be due to liver damage by *campylobacter* toxins in which liver is the sole site of albumin synthesis (Latimer, et al. 2003). Hypoalbuninemia in infected broilers may be due to inappetance and male absorption of nutrients from inflamed intestine (Thrall,2004). *Campylobacter* induce decrease in in total protein and albumin in chickens (Lavini, et al. 2016).

Our results showed that, broilers suffering from campylobacteriosis showed significant increase in AST, ALT, ALP, uric acid and creatinine. Elevation of liver enzyme, uric acid and creatinine comes from Radostitis, et.al. (2002) stated that *campylobacter*toxins induced degenerative changes and necrotic processes in liver and kidneys leading to increase in liver enzymes, uric acid and creatinine. These results were confirmed by result recorded by Lavini, et al. (2016) who stated that with *campylobacter*increased show increase in liver enzymes, uric acid and creatinine in broilers.

Our study revealed that, treatment *campylobacter* in broilers using neomycin resulted in disappearance of clinical signs, reduction in mortality rate up to (10%), improved in body weight and not re-isolate *campylobacter* beside improved in hemato-biochemical parameters to normal level at 14th day post treatment. Same result were reported previously by Hassanain, (2011) in broilers infected with *campylobacter* and treated with neomycin. Our results were reinforced by Agnes, et al. (2012) who observed an improvement in broilers infected with *campylobacter* and treated with neomycin.

5. CONCLUSIONS

It could be concluded that *Campylobacter jejuni* induce many changes in haemato-biochemical parameters in broilers but neomycin in therapeutic dose was effective in medication of *campylobacter* infection in broiler chickens.

6. REFERENCES

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