



## **A Review: Positive Outcome of Resveratrol Dry Suspension in Piglets against Rotavirus Infection**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author HS and IJ conceived concept and designed the experiment. Author MA collected data, performed data analysis. Authors KK and MW performed the experiments. Author MK wrote the manuscript. Authors HS and IJ contributed reagents, helped in write-ups and final critical reviewing and editing of the manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Rota virus that cause diarrhea and other diseases in small infants is belonging to a virus family called Reoviridae with death rate of about more than 200000 annually. Although many vaccines are available for Rotavirus infection but still primary reason of death among infants. To prevent infection caused by this virus as diarrhea and other gastroenteritis in piglets we use a resveratrol, a natural phenol and a phytoalexin with a potential of strong antibiotic and antiviral, which has preventive and protecting outcome against Rotavirus infection in piglets. Pretreatment done and resveratrol dry suspension added to the adequate essential nutrient (basal diet) and the animal through oral route done Rotavirus and then know about the outcome of resveratrol dry suspension. Therefore, our main concern is to use the resveratrol dry suspension, which produced immunity in piglets against Rotavirus. It has positive outcome and reduced the diarrhea and other

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gastroenteritis. Therefore, the outcome of resveratrol dry suspension shows that it could be the best one to treat the diarrhea and other disease, which caused by this virus.

*Keywords: Resveratrol dry suspension; rotavirus; piglets; diarrhea score; diarrhea index.*

## 1. INTRODUCTION

Rotavirus, which causes diarrhea, have a genome made up of about 11 double-stranded dsRNA segments belong to a virus family Reoviridae [1]. This virus found in water bodies. It infects bowel and the major causing inflammation of the stomach. Globally it infects infants and leading cause of death of children worldwide [2]. In Pakistan, among other diseases in infants diarrhea, which were cause by Rotavirus infection, are main cause of death among infants [3]. Possibly this virus may be transmitted from fecal oral contact or may be contaminated surfaces, hands or foods and infect the children worldwide [4]. It also infects and cause disease in animals, birds, cats, bats and pigs [5].

In piglets, Rotavirus cause diarrhea and a major source of mortality [6]. Earlier studies showed that this virus could affect the pigs and have adverse effect that cause weight loss and lessen feed intake in comparison with non-infected piglets [7]. The morphology of the virus observed that it effects small intestine and intestinal epithelium [8]. It is conclude that this virus changes the morphology, which cause the malabsorptive [9], and destruction of the small intestine and epithelium lining [10]. There are many vaccines available for the infants who is infect with this virus, which cause diarrhea and gastrointestinal lining such as Rota Teq and Rotarix [11]. Nevertheless, for the piglets, which are infect with Rotavirus, have no proper vaccine. Past studies shows that resveratrol dry suspension has many biological activities [12], as like, it is anti-bacterial [13] anti-fungal [12], anti-viral, and effective against many types of the viral disease [14]. Therefore, to save the piglets from gastroenteritis we used resveratrol with some types of basal diet through a process, which produced immunity in the piglets.

Resveratrol is a natural phenol phytoalexin [15], which produced by plants in response by any type of injury. It has anti-bacterial, anti-viral anti-fungal anticancer, anti-oxidative and anti-inflammatory properties [16] and have a lot of biological application [17]. It found that resveratrol has antiviral effects against many types of viral infection. After infecting the piglets with Rotavirus

than we examine diarrhea degree [18], changes that taken place, and know about their immunological function, which developed after resveratrol dry suspension, applied [19].

MA-104 is a cell line that is suitable for Rotavirus isolation because of its large range of sensitivity [20], quiet simple to handle, maintenance and resistance to toxic effects it used for the detection of virus [21]. Dulbecco's Modified Eagle's medium (DMEM) is a medium used for the growth and support the mammalian cells supplemented [22] with penicillin, streptomycin with 10% fetalbovine serum Porcine RV.

The virus was cultivating in MA-104 cell line that is best for the growth of Rotavirus [23], about twenty to twenty five days old piglets taken and divided into four groups and each group contain six piglets and placed in an isolated unit area [24]. After one month, three-resveratrol dry suspension (RDS) added with essential nutrient at doses of 3mg/kg/d (RDSA low) 10mg/kg/d (RDSB medium) and 30mg/kg/d (RDSC high) administered into the piglets [25]. After 50 days all groups of piglets including the untreated with resveratrol (RVC) were orally challenged with Rotavirus.

Four days post infection all the animal were sacrificed and their liver was harvested( ~5g) samples are taken from all animal and the samples were frozen at 80 C [26] than we can done our further analysis and find the diarrhea scores in these piglets which tells us that how many percentage of piglets were infected with Rota virus [27].

## 2. METHODOLOGY

All procedures carried out in according to approved guidelines. For conducting the experiment 104- cell purchased and grown in a medium, Dulbecco's Modified Eagle Medium with some supplement like streptomycin and fetal bovine serum. The rotavirus gown in 104-cell lines in the presence of tyrosine. A 50 percent tissue culture infectious dose per milliliter used to calculate the virus's titer. Than after that resveratrol dry suspension are prepared for the further experiment.

About 30 days old piglets also purchased and divided into groups for further experiment. After 32 days the piglets were treated with the resveratrol dry suspension (RDS) with the addition of basal diet at a dose of 3 (RDSA) 10 (RDSB) 30 (RDSC) mg/kg/day. After 50 days, all the groups of the piglets orally challenged with the 4 ml rotavirus supernatant.

After 4 days of post infection all the piglets scarified, their liver harvested, and the sample were stored for further analysis. Finally, we can find the diarrhea score and diarrhea index.

### 3. RESULTS

#### 3.1 Diarrhea Score

Finally, the diarrhea score calculated from each group of the piglets. There were four levels of scores: 0, means no diarrhea; 1, shows pasty diarrhea; 2, moderate diarrhea; and 3 liquid diarrhea [28]. Severe diarrhea may cause severe abdominal pain and the signs of dehydration [28]. Before, the diarrhea was not present and the entire animal are normal. Rotavirus infect the piglets. The diarrhea score are calculated and represented as following.

Diarrhea score after two, three and four days of post infection of the piglets given in the table. However, when the low dose of resveratrol dry suspension 3mg/kg/d applied to RDSA group [30], the diarrhea score become less means the number of the piglets infected with Rotavirus is less [31]. Then we can say that they produced immunity when the low dose of resveratrol dry suspension applied to the piglets [14].

In the same manner when medium dose 10mg/kg/d is given to the second group RDSB [32], then the number of piglets infected with Rota virus become more less. When high dose 30mg/kg/d is given then all the piglets immunized [33]. It means when high dose of RDS is given, and then the piglets remain safe from the Rotavirus infection [34].

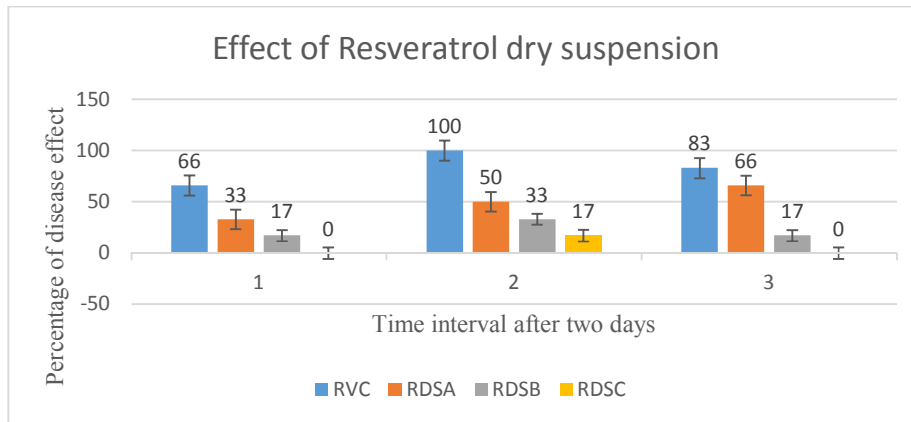
#### 3.2 Diarrhea Index

The diarrhea index calculated after the resveratrol dry suspension applied to the groups of the piglets, which infected with the Rotavirus [35]. The diarrhea index formula given below of the four groups are given:

$$\text{Diarrhea Index} = \frac{\text{summary of diarrhea scores}}{\text{animal number in the group} \times \text{Number of days of trials}}$$

**Table 1. Representation of diarrhea score when Rotavirus affects the animal and the effects of resveratrol dry dose suspension with low, medium and high dose.**

Diarrhea score > 2 ( No. of piglets)			RVC	RDSA 3mg/kg/d	RDSB 10 mg/kg/d	RDSC 30 mg/kg/d
2	days	post infection	4/6	2/6	1/6	0/6 [29]
3	days	post infection	6/6	3/6	2/6	1/6 [29]
4	days	post infection	5/6	4/6	1/6	0/6 [29]

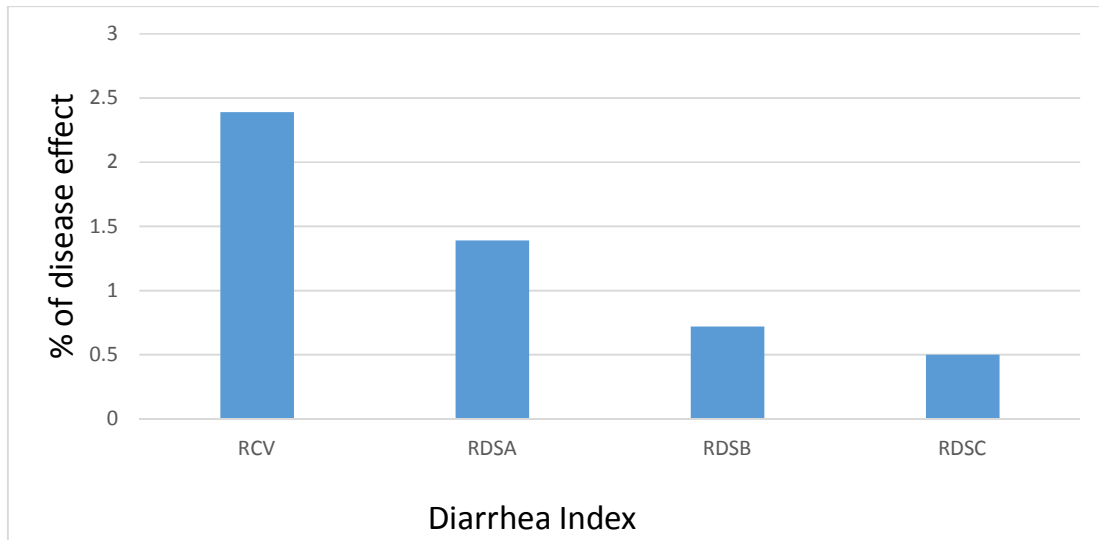


**Fig. 1. Effects of resveratrol dry suspension in different piglets group**

**Table 2. Representation of diarrhea index of piglets infected with Rotavirus and the effects of resveratrol dry suspension with low, medium and high dose.**

Parameter	RVC	RDSA Low 3mg/kg/d	RDSB Medium 10 mg/kg/d	RDSC High 30 mg/kg/d
Index diarrhea	2.39	1.39	0.72	0.50 [29]

*RVC, control group rotavirus; RDSA, low dose (3mg/kg/day); RDSB, medium (10mg/kg/ day); RDSC, high dose (30mg/kg/day).*



**Fig. 2. Representation of diarrhea index in after the application of resveratrol dry suspension in different group of piglets**

#### 4. DISCUSSION

Resveratrol was important in past because it used as a medicine [36]. It made from many plants like polygonum cuspidatum herbaceous plant and resveratrol supplement made from the red wine grape skins and from peanuts [37]. In addition, their main function is that to combat against tough environmental conditions [38].

Resveratrol have many antiviral properties and used against the Rotavirus diarrhea and enterovirus [39], which cause the inflammation of the hearts of mice, which reduced the hearts ability to pump he blood normally and blocked the replication of enterovirus [40]. Therefore, we use he resveratrol against the Rotavirus, which is harmful for the piglets [41], which cause diarrhea and gastroenteritis in piglets and we know that resveratrol dry suspension could regulate the immune response and inhibit the diarrhea and other viral infection [42].

One of the proved study that how resveratrol can inhibit the Rotavirus infection. A chemical name as DSS attenuated dextran sulphate sodium [43],

which infect the mice and cause diarrhea in mice [44]. When resveratrol dry suspension applied in that mice they have no significant effects means the mice not fully recovered from diarrhea [45]. These results indicate that resveratrol inhibit that diarrhea which are cause by Rotavirus in piglets. Then we conclude that resveratrol dry suspension produced immunity in the piglets, as they have no symptoms of diarrhea. The diarrhea score and the diarrhea index indicate that as we given the dose of resveratrol dry suspension to the piglets with different doses they developed immunity against the Rotavirus and show no signs of diarrhea.

#### 5. CONCLUSION

We know that rotavirus cause the disease and death with major cause of mortality in piglets.

In conclusion, we conclude that resveratrol dry suspension produced immunity in the piglets, as we applied the resveratrol dry suspension to the piglets different group, it produced immunity in the piglets, as they have no symptoms of diarrhea. The diarrhea score and the diarrhea

index indicate that as we given the dose of resveratrol dry suspension to the piglets with different doses they developed immunity against the Rotavirus and show no signs of diarrhea. It is empirically important to manage more study and enhanced the used methods of diagnostic diseases, which is faster, and no time consuming.

## DISCLAIMER

The article has not been previously presented or published, and is not part of a thesis project.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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