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Article

Effect of Pomegranate (*Punica granatum*) Peel Extract Powder on the Gross Consistency of Stool in Large Ruminates

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Abstract: *Punica granatum* (PG) or Pomegranate is a bush, having many trunks and often get taller 1.8 to 4.7m long and their leaves are shiny and fleshy, approximately 7 to 8cm in length. Traditionally, it is used in diarrhea and dysentery due to its strong constricting property. *Punica Granatum* covering used in dysentery, diarrhea, piles, bronchitis. It is also used to minimize the risk of heart disease. The peel extract of *Punica Granatum* contain methanol and their dried peels has antidiarrheal venture, also help in wound healing activity. Peels of the pomegranate also holds around 60% of the fruit and they contain different types of ingredients including ellagitannins and proanthocyanidin compounds and minerals such as calcium, phosphorus, magnesium, potassium, flavonoids and sodium. Some animals were found in different local areas with both acute and chronic diarrhea. The condition of these animals were quite miserable because of dehydration and loss of electrolytes in the body cells of the animals. They were unable to move due to seriousness of the disease. 8 grams of PG Peel Powder mixed with 1 liter of water, 2 g of PG Peel Powder mixed with 250 ml water and 8 g of PG Peel Powder mixed with 1 liter of water were administrated orally by using sterilized bottles to the selected three cases. 3 days after the administration of different doses, all cases of diarrheal animals show a significant recovery. The condition of the animals seem to be healthier. Before administration of the pomegranate peel powder extract, all three cases had weak body structure due to diarrhea. Watery stool that may be yellow in color and mucus was also evident in the stool, due to this reason the patient calf was weak and depressed. In sometimes they also show unconsciousness and blood glucose levels seem to be reduced from the normal level.

Keywords: Pomegranate; peel extract powder; stool; large ruminates

Introduction:

Pomegranate (*Punica granatum*) is a shrub, with many stems and often grows 1.8 to 4.7m long and their leaves are shiny and fleshy, approximately 7 to 8cm in length. *Punica Granatum* has orange red trumpet shaped flowers with hard petals. The length of the flower is about 5cm. This plant has ability to more grow in summer seasons. The colour of fruit is redish green when it is reach at its maturity stage. Traditionally, it is also used in diarrhoea, dysentery and stomatitis due to its strong astringent property (Akter, Sarker et al. 2013). Infectious diseases contribute significant role in mortality and morbidity in animals of different ages (Asif, Usmanghni et al. 2010). *Punica Granatum* peel are used in dysentery, diarrhea, piles, bronchitis. It is also used to minimize the risk of heart disease. The peel extract of *Punica Granatum* seed contain methanol and their dried peels has antidiarrheal activity, also help in wound healing activity. Different studies have also evaluated the punica granatum extract is to be effected as an antibacterial and anticandidal agents. However, its effect on the gross consistency of stool of large ruminants is poorly studied.

Moreover, different compounds have been isolated from punica granatum such as tannins, punicalagin, ellagic acid, hydroquinone pyridinium, delphinidin, cyanidin and pelargonodin (Hollebeeck, Larondelle et al. 2012). Peels of the pomegranate also holds around 60% of the fruit and they contain different types of ingredients including ellagitannins and proanthocyanidin compounds and minerals such as calcium, phosphorus, magnesium, potassium, flavonoids and sodium (Qnaïs,

Elokda et al. 2007). Intake of pomegranate peel extract potentially slow the onset and reduced the occurrence of collagen-induced arthritis and seriousness of arthritis in animals (Vroegrijk, van Diepen et al. 2011). Pomegranate fruits contain many types of ingredients in different parts such as seeds, peels and arils. Such constituents show therapeutic role in the health management through the alteration of various biological processes. Calf diarrhea (also known as calf scouring) is a well-known reported disease and a root cause of economic loss to cattle producers. According to 2007 National Animal Health Monitoring System (NAHMS) for U.S. dairy reported that diarrhea cause 57% of calf mortality and a number of cases occurred in calves less than 1 month old (Cho and Yoon). Epidemiological studies suggest that a reduced risk of cancer is associated with the consumption of a phytochemical rich diet that includes fruits and vegetables (Seeram, Adams et al. 2005). Especially in summer, with increased risk of drought, diarrhea is particularly common in the summer, with hot weather and climate contributing to an increased incidence of the disease, with an increased risk of drought (Ali, Ibrahim et al. 2020). Therefore, current study investigated the its effect on the dehydration status and absorption of water in intestine by observing gross appearance of stool in cows and buffalos.

Materials and Methods

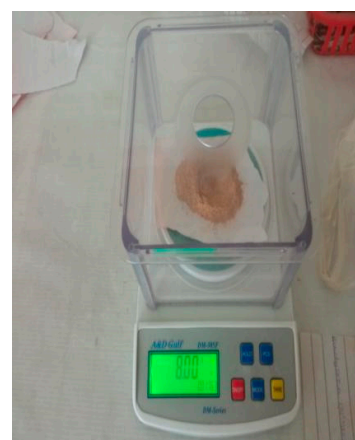
All the animal procedures were conducted in accordance with institutional ethical regulations (CVAS/BS#652 dated 13-04-2022). The study included the use of plant (pomegranate peel) obtained from local market at Punjab province, Pakistan. In first step, it transferred to the laboratory, washed with sterilized distilled water and dried on sterilized filter papers under shade at laboratory temperature, crushed and grinded by using an electric grinder placed in nutrition Laboratory in the College of Veterinary and animal Sciences Jhang Campus , UVAS Lahore, Pakistan as shown in Figure 1 A and B, related to (Ali, Ibrahim et al. 2020). After grinding the peel powder was weighed by using weighing balance machine. For the animals of different age, sex, weight, breed and the severity of diarrhea, different doses were weighed and packed by using paper according to the method described by (Qnais, Elokda et al. 2007) as shown in Figure 1 C, D, E and F.



(A)



(B)



(C)

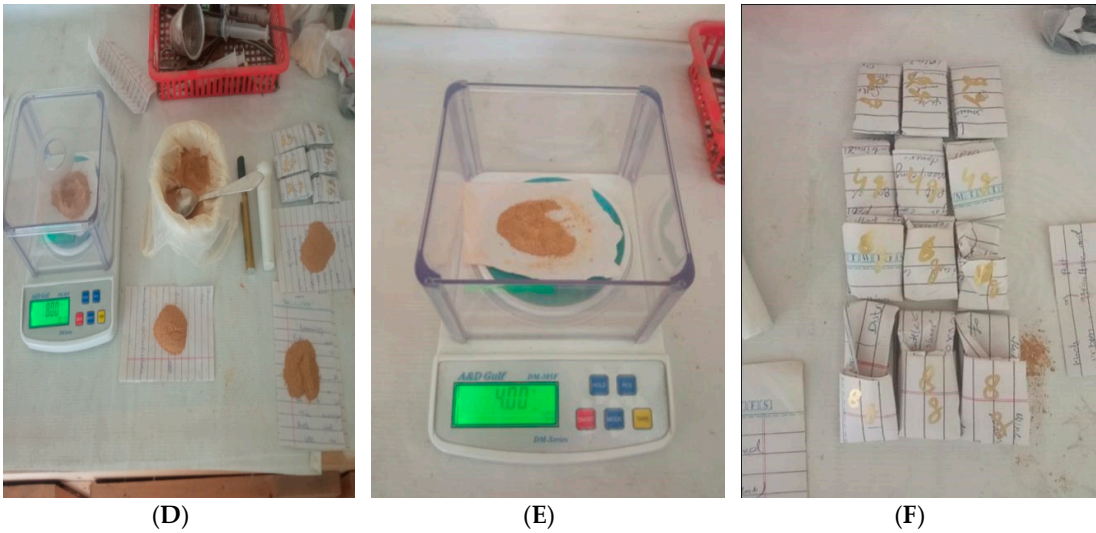


Figure 1. A: Dry Pomegranate Peels pouring into the grinder machine. B: After grinding of Dry Pomegranate Peels, the fine powder was obtained. C: Digital weighing machine used to weight the Dry Pomegranate Peels Powder of 8 grams which further categorized for the animals of weight 40 Kgs and above. D: Weighed the Dry Pomegranate Peels Powder of 6 grams which further categorized for the animals of weight 30 Kgs. E: Digital weighing machine used to weight the Dry Pomegranate Peels Powder of 4 grams which further categorized for the animals of weight 20 Kgs. F: Different doses of 2, 4, 6 and 8 grams packed for the animals of weight 10, 20, 30 and 40 Kgs and above respectively.

Some animals were found in different local areas with both acute and chronic diarrhea. The condition of these animals were quite miserable because of dehydration and loss of electrolytes in the body cells of the animals. They were unable to move due to seriousness of the disease. 8 grams of Pomegranate Peel Powder mixed with 1 litre of water, 2 grams of Pomegranate Peel Powder mixed with 250 ml water and 8 grams of Pomegranate Peel Powder mixed with 1 litre of water were administrated orally by using sterilized bottles to the selected three cases A, B and C respectively as shown in Table 1. All administrations were orally.



Figure 2. Condition before administration of doses in the above mentioned patients of cases A, B and C.

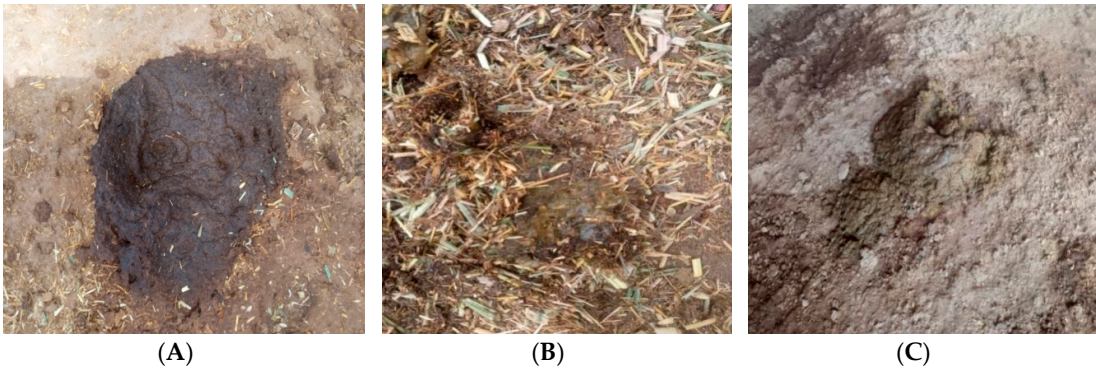


Figure 3. (A): Stool of patient (desi cow) before the administration of dilluted pomegranate peel powder. The stool was looking dark brown and like that patient has foul-smelling diarrhoea for very recent time. (B): The patient was of age 3 months and had weak body structure due to diarrhoea. Watery stool that may be yellow in color and mucus was also evident in the stool due to this reson the patient calf was weak and depressed. (C): In this case, the patient has bony prominence of their hips, shoulders and ribs become more apparent as the cow dehydrate and metabolize its body fat reserves. The color of stool was greenish and the food was not totally digested.

Table 1. showing the overall procedure of the administration periods.

Sr.#	Properties	Case (A)	Case (B)	Case(C)
01.	Animal	Desi cow	Buffalo Neeli Ravi	Desi & Sahiwal Crossed
02.	Gender	Female	Female	Female
03.	Age	5 Years	3 Months	4 Years
04.	Color	Dark Brown	Black	Red
05.	Disease	Diarrhea	Diarrhea	Diarrhea
06.	Dose Administration	Orally	Orally	Orally
07.	Treatment			
	1 st Dose Date: June 11, 2022 Time: 11:20 am	8 grams of Pomegranate Peel Powder mixed with 1 litre of water	2 grams of Pomegranate Peel Powder mixed with 250 ml water	8 grams of Pomegranate Peel Powder mixed with 1 litre of water
	2 nd Dose Date: June 11, 2022 Time: 07:20 pm	8 grams of Pomegranate Peel Powder mixed with 1 litre of water	2 grams of Pomegranate Peel Powder mixed with 250 ml water	8 grams of Pomegranate Peel Powder mixed with 1 litre of water
	3 rd Dose Date: June 12, 2022 Time: 03:20 am	8 grams of Pomegranate Peel Powder mixed with 1,000 ml. of water	2 grams of Pomegranate Peel Powder mixed with 250 ml water	8 grams of Pomegranate Peel Powder mixed with 1,000 ml. of water

Results

Three days after the administration of different doses, all cases of diarrheal animals show a significant recovery. The condition of the animals seem to be healthier. Before administration of the pomegranate peel powder extract, all three cases had weak body structure due to diarrhoea. Watery stool that may be yellow in color and mucus was also evident in the stool, due to this reson the patient calf was weak and depressed. In sometimes they also show unconciousness and blood glucose levels seem to be reduced from the normal level.

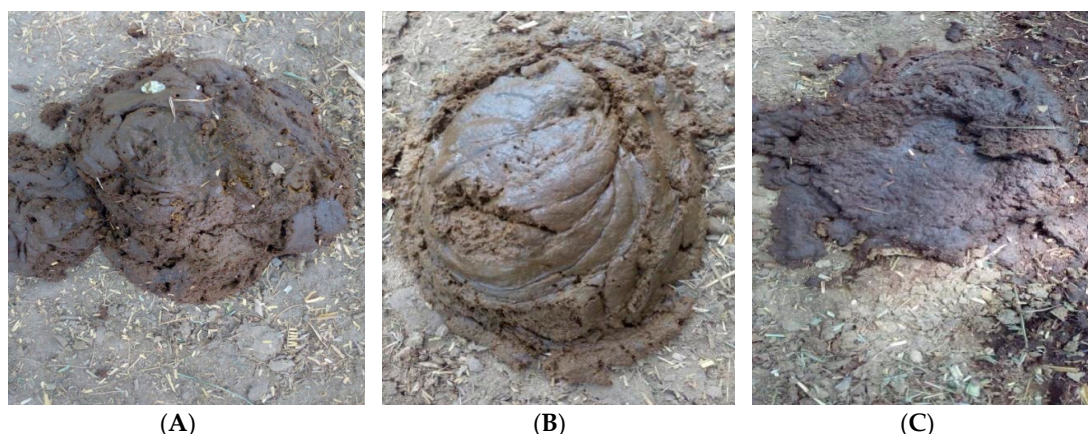


Figure 4. Condition of stools after administration of different doses in the above mentioned patients of cases **A, B and C**. **A:** After the orally administration of three doses of 8 grams of Pomegranate Peel Powder mixed with 1,000 ml. of water. All doses were given with an interval of 8 hours. **B:** The patient was orally administrated of three doses of 2 grams of Pomegranate Peel Powder mixed with 250 ml. of water. All doses were given with an interval of 8 hours. **C:** This patient was also orally administrated three doses of 8 grams of Pomegranate Peel Powder mixed with 1,000 ml. of water. All doses were given with an interval of 8 hours.

Discussion

The gift study investigated the antidiarrheal interest in experimental diarrhea fashions, a pathology referenced within the literature as a leading motive of loss of life in youngsters underneath 5 years of age worldwide, in particular in developing international locations. This pathology results in approximately one million deaths according to year, ranking 2nd amongst all causes of dying. Our consequences revealed that, in a dose-structured manner (2, 4, 6 and 8 gm consistent with 30, 60, 90 and one hundred twenty kg body weight respectively), the aqueous extract of *Punica granatum* peels seems to contain substance(s) that decreased diarrhea by way of inhibiting intestinal motility and intestinal fluid accumulation. The inhibitory effect of the aqueous extract of *Punica granatum* peels justifies the usage of the plant in people medicinal drug and its use as a nonspecific antidiarrheal agent(Qnais, Elokda et al. 2007). Following administration of miRNA-29a inhibitor, the impairment of the intestinal mucosal barrier was alleviated. miRNA-29a inhibitor also decreased the expression of ZO-1. This may be implicated in the role of the intestinal mucosal barrier in IBS-D and diarrhea (Zhu, Xiao et al. 2020).

Current and Future Developments

Pomegranate gained more attention due to a rich source of bioactive compounds and contains a variety of secondary metabolites. It has promising biological activities, including anti-inflammatory, antibacterial, antidiarrheal, immune modulatory, antitumor, wound healing and antifungal that have been reported with various constituents/extracts of different parts (peel powder, seeds, bark, juice, pericarp and leaf) of this tree across the globe (Saeed, Naveed et al. 2018).

Conclusion

The chemical composition of almost all parts of pomegranate peel powder extract have been investigated, as well as a lot of bioactive and pharmacokinetic studies in vivo and/or in vitro have been carried out on individual compounds or extract of some parts. These results provided us a solid basis for the development and utilization of pomegranate as both pharmaceuticals, herbal and dietary supplement. However, the compound bioactivity relationship and structure-bioactivity relationship were studied relatively less in-depth. Further investigation in this area can lead us thoroughly understand this plant and provide a foundation for safe and efficient use.

Author Contributions: Conceptualization, A.R.A. and D.M.H.S.; methodology, I.M. and D.M.H.S.; software, M.S.; validation, A.R.A., D.M.H.S. and M.S.; formal analysis, D.M.H.S. and M.S.; investigation, D.M.H.S. and I.M.; resources, I.M.; data curation, D.M.H.S.; writing—original draft preparation, D.M.H.S.; writing—review and editing, A.R.A.; visualization, M.S.; supervision, A.R.A.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflicts of interest.

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