



POSSIBLE PATHWAY OF CORONAVIRUS TRANSMISSION THROUGH BAT TO POSSIBLE RANGE OF INTERMEDIATE HOSTS.

Zoology

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ABSTRACT

The novel coronavirus is recently causing pandemic disease around the globe. Scientists are trying to identify the possible way and source of coronavirus transmission through multiple channels. In previous studies some scientist points to bat as a reservoir and pangolin, snake, camel, stray dogs as an intermediate host. In India ICMR studies confirmed two bat species as host of coronavirus. Now it is time to find out possible pathway of coronavirus transmission through bat to multiple intermediate hosts. Question arises; is it happen through the direct or indirect pathway in same time?

KEYWORDS

Bat, Coronavirus, Transmission, INTER-SPECIES, CROSS-SPECIES, ON-TREE, OFF-TREE.

INTRODUCTION

The bats whose are specially adapted for piercing fruits and leave rest then the possibility of direct consumption of rest fruit by other avian or mammals is high and the transmission of corona virus through bat to multiple intermediate hosts including avian and mammals is possible. In this channel of transmission fruit piercing avian and mammals like parrot, oriole, barbet, nightingale, squirrel, woodpecker, hornbill and humans including pangolin (Hu B. et al. 2020, Liu P. et al. 2019), dog (Binn L. N. et al. 1974) may be the possible suspect of intermediate host for coronavirus. According to Bennett et al. (2002) and Rob Wallace (2016) cultural practice and the relationship between people and ecology may the factor for the coronavirus transmission. While Banerjee A. et al. (2019) also mentioned that in addition to the human coronaviruses, other coronavirus species cause agriculturally important disease in animals.

Present hypotheses representing the most possible way of coronavirus transmission while multiple species of bat is identified as host of coronavirus (Li W. et al. 2005, Pool et al. 2005, Z Shi. et al. 2008). Some scientist points out that bat eating by snake or by humans may be the possible way of transmission through bat to humans. But the possibility through meat eating is less than proposed method because mostly humans consume cooked meat and the survival of coronavirus is less than without cooked items that may consumed by multiple intermediate hosts in same time series.

POSSIBLE RANGE OF POTENTIAL HOST SPECIES THROUGH FRUIT PIERCING PATHWAY:-

We believe that in the search of desired extent multiple species visit plant to plant including wild, semi-wild and cultivating areas. Most of predator try to consume ripen fruits and the partially eaten fruits with rest part been forbidden and predator move on another fruit due to their gregarious nature. In this mode of fruit consumption possibility of multiple participant on each fruit which was infected by bat is possible. Due to bat is a vector of viruses (Li W. et al. 2005, Donaldson et al. 2010, Graham et al. 2010, Li X. et al. 2020) and nocturnal visitor and other possible consumer are diurnal predator for their survival. Transmission of virus may take place by bat to fruit and fruit to other various consumers of the similar feeding choices (TABLE: 1).

This wide scale movement of possible multiple host in same time within and across semi-wild to agricultural activity raises the hypotheses concerning possible transmission through INTER-SPECIES infection (Chan J f. et al. 2015) to CROSS-SPECIES infection (Osterhaus et al. 2001) by fruit piercing in the search of desired food (FIGURE: 1). In the term of CROSS-SPECIES infection, populations which have contact in their natural habitats, the coronavirus can transmit very fast in overcrowded conditions. Like bat and others which fly with the appearance of large swarms. It may happen by ON-TREE & OFF-TREE method.

ON-TREE & OFF-TREE TRANSMISSION PATHWAY:-

In this pathway when transmission occurs through consuming infected

fruit by any intermediate host on tree, it represents ON-TREE transmission pathway. While transmission occurs from fallen or harvested infected fruits, it represents OFF-TREE transmission pathway.

INTER-SPECIES TRANSMISSION PATHWAY:-

In the search of food when a similar species of individual got infected by consumed fruit by same species virus reservoir, it represents INTER-SPECIES transmission pathway.

CROSS-SPECIES TRANSMISSION PATHWAY:-

When the transmission of virus occurs through ON-TREE or OFF-TREE pathway by consuming rest part of infected fruit by any individual of different species, it represents CROSS-SPECIES transmission pathway.

SUGGESTIONS FOR PREVENTIVE MEASURES:-

It is known fact that bat are the reservoirs of viruses and a variety of zoonotic disease are possibly through the culture of eating bat and other wild animal or through the infected fruit eating by the multiple hosts.

There are more opportunities that zoonotic disease may be more transmissible or deadly in humans in future including the missing puzzle of coronavirus outbreak. In fact many viruses have present in the multiple hosts like bat, molluscs and other wild creatures for a long time. If they come in contact of humans and get a chance for spillover and the outbreak like COVID-19 takes place.

As we are not able to eliminate wild reservoirs of viruses, new zoonotic viruses might emerge in future and again spread outbreak. To minimize the widespread, continuous surveillance in mammals, understanding the pathway of transmission, understanding the ecology of cross species-infected hosts will prove useful in preventing animal to animal or animal to human transmission and future outbreaks. It will perform the task to detect under which circumstances transmission occurs in same or different ecological niches. The awareness campaigns should be organized to aware peoples to avoid consumption of partially consumed fruits. Further investigation needed in the area of COVID-19 suspect mapping to prevent and control this outbreak in humans.

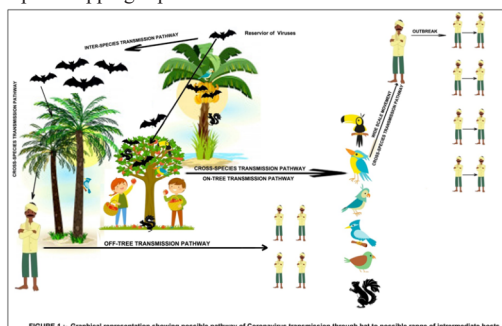


FIGURE 1 :- Graphical representation showing possible pathway of Coronavirus transmission through bat to possible range of intermediate hosts.

Table 1:- Possible Range Of Potential Host Species Through Fruit Peircing On The Basis Of On-tree And Off-tree Methods.

Possible Species Of Fruits Infected By Bats	Scientific Name	Possibility Of Participant On Infected Fruits	Scientific Name	Mode Of Feeding	Geographical Distribution
GUAVA	<i>Psidium guajava</i>	PARROT	<i>Psittacula eupatria</i>	PULP AND SEED FEEDER	THROUGHOUT INDIA
BANANA	<i>Musa paradisiaca</i>	BARBET	<i>P. krameri</i>	PULP AND SEED FEEDER	
MANGO	<i>Musa balbisiana</i>		<i>P. cyanocephala</i>		
	<i>Musa acuminata</i>		<i>Psilopogen viridis</i>		
PAPAYA	<i>Mangifera indica</i>	ORIOLE	<i>P. haemacephalus</i>	PULP FEEDER	
SAPATO	<i>Carica papaya</i>		<i>P. lineatus</i>		
FIG	<i>Manilkera zapota</i>	NIGHTINGALE	<i>Oriolus kundoo</i>	PULP FEEDER	
PLUM	<i>Ficus carica</i>		<i>O. xanthornus</i>		
APPLE	<i>Flacourtia indica</i>	SPARROW	<i>Pycononotus cafer</i>	PULP FEEDER	
	<i>Syzygium cumini</i>		<i>P. jocosus</i>		
	<i>Oemleria cerasiformis</i>		<i>P. flaviventris</i>		
CUSTARD-APPLE	<i>Malus domestica</i>	WOODPECKER	<i>Passer domesticus</i>	PULP FEEDER	
STRAWBERRY	<i>Nnona squamosal</i>		<i>P. pyrrhonotus</i>		
PALM	<i>Fragria ananassa</i>	HORNBILL	<i>Chrysocolaptes lucidus</i>	PULP AND SEED FEEDER	
CITRUS	<i>Borassus flabellifer</i>		<i>Melanerpes superciliaris</i>		
	<i>Cocos nucifera</i>	SQUIRREL	<i>Bucorvus leadbeateri</i>	FRUIT FEEDER	
	<i>Areca catechu</i>		<i>Funambulus palmarum</i>		
CITRUS	<i>Phoenix sylvestris</i>	MONKEY	<i>Ratufa india</i>	FRUIT FEEDER	
	<i>Citrus limetta</i>		<i>Macaca mulatta</i>		
		<i>Citrus sinensis</i>	HUMANS	<i>Macaca radiata</i>	
			<i>Homo sapiens</i>		

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