



Short Communication

Breeding and Mortality of Royal Bengal Tiger (*Panthera tigris tigris* Linnaeus 1758) at Bahawalpur Zoo, Punjab, Pakistan

Ahmad Ali^{1,*}, Sheikh Muhammad Azam², Khalid Javed Iqbal¹, Ghulam Mustafa¹ and Mujahid Kaleem³

¹Department of Life Sciences, The Islamia University of Bahawalpur, Bahawalpur, Pakistan

²Department of Zoology, University of Education, Lahore, DG Khan Campus, Pakistan

³Punjab Wildlife & Parks Department, 2-Sanda Road, Lahore, Punjab, Pakistan

ABSTRACT

Study was conducted on breeding and mortality of Royal Bengal Tiger (*Panthera tigris tigris* Linnaeus 1758). There are five big cat species in the genus *Panthera* and tiger is the biggest one. Data were collected by recording observations on breeding of Royal Bengal Tiger in captivity at Bahawalpur Zoo from June 2012 to July 2014 (two years) on prescribe sheets. Data from June, 2003 to December, 2011 (nine years) were collected from zoo management. In two years study Tiger breed once and produce four cubs (female) while in nine years it breed three times; first three cubs (one male and two female), two and one cubs were produced in 2003, 2005 and 2006, respectively. Six days estrous cycle and 107 days gestation period was observed in tigress. Mortality of one cub of 32 days in August, 2013 and second cub in Jannuary, 2014 of 173 days was observed due to congenital abnormality of liver. Parent tigress (Rani) was also died in May, 2014 due to respiratory failure and cardiac arrest and female cub died in 2005 due to canabalism.

Article Information

Received 22 February 2016

Revised 05 May 2016

Accepted 21 November 2016

Available online 08 June 2017

Authors' Contributions

AI and SMA planned the study. SMA, GM and MK executed experimental work. AA and KJI statistically analyzed the data, and wrote the article.

Key words

Breeding, Mortality, Cat, Tiger, Bahawalpur, Zoo, Capavity.

There are five big cat species in the genus *Panthera*, the lion (*Panthera leo*), snow leopard (*Panthera uncia*), leopard (*Panthera pardus*), tiger (*Panthera tigris*) and jaguar (*Panthera onca*) (Davis *et al.*, 2010). Tiger *Panthera tigris* Linnaeus 1758 is the biggest member of family felidae. Eight living sub-species of tiger have been recognized (Mazak, 1979). The type sub species Royal Bengal Tiger *Panthera tigris tigris* is ranked as endangered since 2010 IUCN red list with decreasing trend in its population (IUCN, 2011). In the wild Royal Bengal Tiger, sexual maturity is attained at three to four years in females, and four to five year in males (Mazak, 1965, 1979). In captivity, maximum age of tiger has been recorded twenty to twenty six years; this may also be near about their age in the wild (Mazak, 1965, 1979).

Tiger mating may occur throughout the year; however this is most likely to occur from November to April (Kaplanov, 1948; Locke, 1954; Corbett, 1961; Stroganov,

1969; Sankhala, 1967, 1978; Geptner and Sludskij, 1972). Tiger female is receptive for three to six days and comes to oestrous at intervals of about three to nine weeks (Mazak, 1967). Gestation period ranges between 96 to 111 days, while 104 to 106 days being the optimum (Mazak, 1979). Usually the litter is two or three and mostly in range of one to four (Mazak, 1979); in exceptional cases six cubs are also noticed (Sankhala, 1967, 1978). Tigress has been noticed making a roofed nest for offsprings with hair, dry grass and leaves (Abramov and Pikunov, 1976). The interval between offsprings born is usually twenty to forty minutes (Sankhala, 1967). The mean yearly growth frequency has been estimated to be up to six percent of all the tiger populations to reach the double number of tigers in twelve years to fulfill the Global requirement that would be a noble but seems impossible (Miquelle *et al.*, 2015).

Most adult tigers die evidently having been poisoned, shot or snared by the humans than of any other cause. In exceptional cases some large ungulates fatally wound a tiger (Mazak, 1979). Moreover, a group of elephants or cave buffaloes can take life of tiger. Reportedly encounters with porcupines also occasionally result in serious injuries

* Corresponding author: ahmads1976pk@yahoo.com
0030-9923/2017/0004-0001 \$ 9.00/0

Copyright 2017 Zoological Society of Pakistan

and fatality of tigers. The tiger cubs have to face excessive dangers as compared to the adults, including being killed by full grown tiger males. Fifty percent survival ratio has been considered the highest (Corbett, 1961; Krumbiegel, 1955). In Pakistan, for the local threatened status of carnivores, it is the more important to properly manage the wild ungulate and predator populations to help conserve the population of wild carnivores in general (Anwar *et al.*, 2012). There is scanty information about the diseases of tiger in the wild; only two cases of rabies have been reported from India (Mazak, 1979).

The tiger is of course, extinct in Pakistan but it should be a sobering thought that it has only become so within the last seventy years, in a region which cradled man's civilization for over 4000 years. The last survivor in Sindh, a tigress was shot in 1886 by Col. Mchae. The late Amir of Bahawalpur, H.H. Sir Sadiq Muhammad Khan Abbasi, related how his father had shot thirteen tigers within Bahawalpur state territory in the Indus riverine jungles and that the last specimen was shot by him in 1906 a few miles below Panjnad. At that time Indus River was surrounded by a continuous belt from four to twelve miles wide of *Tamarix dioica* and *Sacharum bengalensis* forest (Roberts, 1997).

At Bahawalpur Zoo, the study site, only one breeding pair was being maintained in captivity during the study period from June 2012 to July 2014. The major factors that impose us to start this work are poor conservation strategies as not a single effort made by any governmental or NGO to save this species. Moreover; the natural beauty of this fascinating species and its ecological role as predator in ecosystem are also inductive factors to study this species. Furthermore, short gestation period allows studying more progenies in a short time period. No significant work has been done in Pakistan on breeding and mortality of this big cat in captivity prior to this work. The present study was initiated to understand the breeding cycle and mortality of the tiger in captivity that may help for the rehabilitation in his wild ecosystem and also useful for commercial purposes like as pet or in public shows. Further it is our responsibility to save this species for our future generation.

Material and methods

Bahawalpur (N 29.3956°, E 71.6836°), now a large city has been a part of Cholistan desert, where the tiger was once naturally distributed. The average rainfall in Bahawalpur is 20 to 25 cm annually. Tiger breeding data spanned over eleven years since July 2003 to June 2014 has been analysed for this study. Data for two years, from July 2012 to June 2014 were collected by our research team by recording direct observations while the nine years data since July 2003 to June 2012 were collected from

the Zoo management (Wildlife and Parks Department of Punjab). During pregnancy a close watch was kept on female's behavior and only one keeper would attend the female to reduce the disturbance level. Gestation period and congenital defects were also recorded. Cubs or adults mortality causes were examined by postmortem examination with the help of veterinarian. Data analysis and Graphs were made using Excel 2007.

Table I.- Breeding record of Royal Bengal Tiger during the study period July 2012 to June 2014.

Study name of animals		Duration of oestrus	Date of birth	Gestation period in days	Breed name	Litter size	
M	F					M	F
Raja (9 Y)	Rani (13 Y)	23-28 March 2013	12 July 2013	107	CBT-1	-	4

Total CBT during study period, 4.

Results and discussion

The age of parent tigress was 13 years while male parent tiger was 9 years old at the start of the study *i.e.*, July 2012. Tiger bred only once during study period and produced four female cubs (Table I). Previous data (2003-2011) showed that the pair bred for the first time in 2003 when three cubs (one male and two female) were produced. In 2005 and 2006 two (one male and one female and one (female) cubs were born, respectively. However, breeding was not recorded during the period 2007 to 2012 (Fig. 1). According to Sunquist (1981) the captive tigeress breeds mostly from two to sixteen years of age however maximum litters are produced when her age is above 6.2 years.

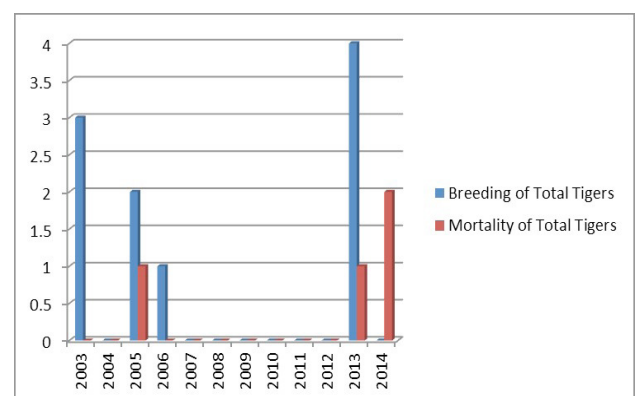


Fig. 1. Total breeding and mortality of tigers by years (2003-2014).

Very little information is available on these aspects in wild tiger populations. Sunquist (1981) once observed the oestrus in a thirty month old female that was perhaps the earliest. Sunquist (1981) also observed that in wild tiger populations litter size ranged from one to seven cubs.

During present study six days oestrous cycle and 107 days gestation period was observed in the tigress (Table I), while Mazak (1979) reported three to six days of oestrous cycle and 104 days of gestation in tigress. Further he reported that gestation period ranged from 96 days to 111 days.

In our study mating was observed in the month of March (Table I) while several scientists stated that mating in Tigers may occur throughout the year; however this was most likely to happen from November to the April (Kaplanov, 1948; Locke, 1954; Corbett, 1961; Stroganov, 1969; Sankhala, 1967, 1978; Geptner and Sludskij, 1972).

It was observed that one cub of 32 days in 2013 while second cub in 2014 of 173 days died due to congenital abnormality of liver. Parent tigress (Rani) also died in 2014 due to respiratory failure and cardiac arrest (Table II); and another female cub had died in 2005 due to cannibalism. No death of male tiger has been reported during the period 2003 to 2014 (Fig. 1). Cavaliere in 2015 reported that the Siegfried and Roy's white lion died due to cardiac and respiratory arrest.

Table II.- Mortality of Royal Bangal Tigress and cubs during the study period July 2012 to June 2014.

Study name of animals	Male/ Female	Date of death	Total age	Reason of death
CBT-1 (1)	Female	12.08.2013	32 Days	Congenital abnormality of liver
CBT-1 (2)	Female	31.01.2014	173 Days	Congenital abnormality of liver
Rani	Female	18.05.2014	14 Years	Respiratory failure and Cardiac arrest

Mortality of female cubs, 2; Mortality of breeding female, 1; Total mortality, 3.

Aknowledgement

Authors are grateful to the management of Bahawalpur Zoo for their cooperation and providing us access to the previous data on tigers. We also grateful to the attendant of the Zoo for handling the tigers during observation and data collection.

Statement of conflict of interest

Authors have declared no conflict of interest.

References

- Abramov, V.K. and Pikunov, D.G., 1976. The rare species of carnivores of the Far East of USSR, *Redkie mlekopitayushchie fauny SSSR* (The Rare Mammals of the Fauna of USSR), Nauka, Moscow, pp. 67–96.
- Anwar, M.B., Nadeem, M.S., Shah, S.I., Kiayani, A.R. and Mushtaq, M.A., 2012. Note on the diet of Indian wolf (*Canis lupus*) in Baltistan, Pakistan. *Pakistan J. Zool.*, **44**: 588-891.
- Cavaliere, V., 2015. *Siegfried and Roy's white lion, legend, dies following diagnostic procedure.* www.phillyvoice.com/siegfried-and-roys-white-lion-dies-procedure/
- Corbett, J., 1961. *Man-eaters of Kumaon*. Oxford University Press, London, pp. 252.
- Davis, B.W., Li, G. and Murphy, W.J., 2010. *Mol. Phylogenet. Evol.*, **56**: 64-76. <https://doi.org/10.1016/j.ympev.2010.01.036>
- Geptner, V. G. and Sludskij, A.A., 1972. *Mlekopitajušcie Sovetskogo Soiuza*. Vysšaia Škola, Moskva. (In Russian; English translation: Heptner, V.G., Sludskii, A. A., Komarov, A., Komorov, N., Hoffmann, R. S., 1992. *Mammals of the Soviet Union. Vol III: Carnivores (Feloidea)*. Smithsonian Institution and the National Science Foundation, Washington DC.
- IUCN, 2011. <http://www.iucnredlist.org/details/15955/0>
- Kaplanov, L.G., 1948. *Tigers in Sikhote-Alin. Tiger, red deer, and moose*, pp. 18-49.
- Krumbiegel, I., 1955. *Biologie der Säugetiere*. Band 1. Agis Verlag GmbH, Krefeld, pp. 356.
- Locke, A., 1954. *The tigers of Trengganu*. Museum Press Ltd., London, pp. 192.
- Mazák, V., 1965. *Der Tiger: Panthera tigris Linnaeus, 1758*. 1st ed. Wittenberg Lutherstadt: A. Ziemsen. (Neue Brehm-Bücherei; Vol. 356) (German), pp. 162.
- Mazák, V., 1967. *Mammalia*, **31**:537-573. <https://doi.org/10.1515/mamm.1967.31.4.537>
- Mazák, V., 1979. *Der Tiger: Panthera tigris. 2nd ed. Wittenberg Lutherstadt: A. Ziemsen, (Neue Brehm-Bücherei; Vol. 356) (German)* (Second, revised and expanded edition), pp. 228.
- Miquelle, D.G., Smirnov, E.N., Zaumyslova, O.Y, Soutryina, S.V. and Johnson, D.H., 2015. *Integr. Zool.*, **10**:315-328.
- Roberts, T.J., 1997. *The mammals of Pakistan*. Oxford University Press Pakistan, pp. 525.

- Sankhala, K.S., 1967. *Int. Zoo Yearb.*, **7**:133-147. <https://doi.org/10.1111/j.1748-1090.1967.tb00353.x>; <https://doi.org/10.1111/j.1748-1090.1967.tb00354.x>
- Sankhala, K.S., 1978. *Tiger! The story of the Indian tiger*. Collins, London, pp. 220.
- Stroganov, S.U., 1969. *Carnivorous mammals of Siberia*. (Zveri sibiri: Khishchnye). Izdatel'stvo Akademii Nauk SSSR, Moskva 1962. Translated from Russian. Jerusalem: Israel Program for Scientific Translation.
- Sunquist, M.E., 1981. *Smithsonian Contrib. Zool.*, **336**: 1-97. <https://doi.org/10.5479/si.00810282.336>

Online First Article