

ISSN 0973-3914



# RESEARCH *Journal Of* SOCIAL AND LIFE SCIENCES

PEER-REVIEWED RESEARCH JOURNAL

UGC JOURNAL NO. (OLD) 40942

IMPACT FACTOR- 5.125 (IIFS)

Indexed & Listed at: Ulrich's International Periodicals Directory

ProQuest, U.S.A. Title Id: 715205

VOL- XXXVII

ENGLISH EDITION

YEAR-19

July- Dec. 2022

# 2022

[www.researchjournal.in](http://www.researchjournal.in)

# *Research Journal of Social and Life Sciences*

**Peer-Reviewed Research Journal**

**UGC Journal No. (Old) 40942, Impact Factor 5.125 (IIFS)**

Indexed & Listed at: Ulrich's Periodicals Directory ©, ProQuest

U.S.A. Title Id: 715205

---

<b>Volume- 37</b>	<b>English Edition</b>	<b>Year- 19</b>	<b>July- Dec. 2022</b>
-------------------	------------------------	-----------------	------------------------

---

**Honorary Editor**  
**Dr. Akhilesh Shukla**

Honored with Prestigious Pt. G.B. Pant Award  
and Bhartendu Harishchand Award, Government of India  
Professor, Department of Sociology & Social Work  
Institute for Excellence in Higher Education  
Government T. R. S. College, Rewa (M.P.)  
akhileshtrscollge@gmail.com

**Dr. Sandhya Shukla**

Professor and Head  
Department of Political Science  
Institute for Excellence in Higher Education  
Government T. R. S. College, Rewa (M.P.)  
drsandhyatrs@gmail.com

**Dr. Gayatri Shukla**

Additional Director, Center for Research Studies  
shuklagayatri@gmail.com

**Dr. R. N. Sharma**

Retired Professor, Rewa (M.P.)  
rnsharmanehru@gmail.com



## **Journal of Center for Research Studies**

**Rewa (M.P.) India**

**Registered under M.P. Society Registration Act, 1973**

**Reg.No. 1802, Year, 1997**

**[www.researchjournal.in](http://www.researchjournal.in)**

## **Subject Experts/ Advisory Board**

---

1. **Dr. Pratibha J Mishra**  
Professor, Department of Social Work, Guru Ghasidas University,  
Bilaspur (C.G.) pjmlndn@gmail.com
2. **Dr. B. K. Sharma**  
Retired Professor, Department of Pathology, Bundelkhand Medical College,  
Sagar (Madhya Pradesh) bk\_drsharma@rediffmail.com
3. **Dr. N. Sundaram**  
Professor, School of Social Sciences, VIT University,  
Vellore- 632014 (Tamilnadu) nsundaram@vit.ac.in
4. **Dr. Chandrashekar. E.**  
Associate Professor, Department of Sociology (ACEEFO), Kuvempu  
University, Shankaraghatta-577451, District- Shimoga, Karnataka.  
chandru22@yahoo.co.in
5. **Dr. B.C.M. Patnaik**  
Associate Professor, School of Management, KIIT University, Bhubaneswar  
(Odisha) bcmpatnaik@gmail.com
6. **Dr. Yogambar Singh Farswan**  
Department of History & Archeology, H. N. Bahuguna Garhwal University,  
Srinagar, Garhwal -246174 Uttarakhand farwanys@yahoo.co.in
7. **Dr. Vijay Agarwal**  
Retired Professor, A.P.S. University, Rewa (M.P.) apsvka57@gmail.com
8. **Dr. Urmila Sharma**  
Retired Professor, Government Girls P.G. College, Rewa (M.P.).  
urmilabks@gmail.com
9. **Dr. P. Malyadri**  
Principal, Government College Patancheru, Hyderabad-502 319 (A.P)  
drpm16@gmail.com
10. **Prof. Safiqur Rahman**  
Assistant Professor, Department of Geography, Guwahati College  
Bamunimaidam, Guwahati-21. safiq.rahman@rediffmail.com
11. **Dr. M. Razaullah Khan**  
M. Razaullah Khan, Associate Professor, Maulana Azad College  
Aurangabad.drrazaullahkhan@gmail.com
12. **Padmegowda. A. T.**  
Assistant Professor, Dept. of Economics, Sahyadri Arts & Commerce  
College, Shimoga SHIMOGA- Karnataka. padmegowda1965@gmail.com
13. **Dr. Umesh Shukla**  
Department of Zoology, Agra College, Agra (U.P.)  
drumeshshukla13@gmail.com
14. **Dr. Minaxi Mansukhbhai Patel**  
Director of Physical Education, Shree Jasani Arts & Commerce College,  
Rajkot, Gujarat. minaxi.sports.598@gmail.com
15. **Dr. A.P. Mishra**  
Retired Professor of Zoology, Rewa (M.P.) drakhandmishra@gmail.com

16. **Dr. George Abraham**  
Department of Physical Education and Sports Sciences,  
Annamalai University, Tamil Nadu profgeabraham@gmail.com
17. **Prof. A. P. Onkarappa**  
Associate Professor, Department of Political Science, Kuvempu University,  
Shankarghatta, Shimoga, Karnataka omkarshila26@gmail.com
18. **Dr. O.P. Parmeswaran**  
Assistant Professor, Govt. College for Girls, Sector-11 CHANDIGARH-  
160011 (U.T.) parmeswaranop@gmail.com
19. **Dr. Monika Kannan**  
Head, P.G Department of Geography, Sophia Girls' College Ajmer, Rajasthan  
kannanmonika@gmail.com
20. **Dr. Richa Mishra**  
Assistant Professor, Department of Oral Medicine and Radiology, School of  
Dental Sciences, Sharda University, Greater Noida  
doctorricha86@gmail.com, richa.mishra@sharda.ac.in
21. **Shikha Tiwari**  
Head, Department of Paramedical, Unique College of Paramedical,  
Amarpatan, Satna (M.P.)  
shikhatiwari5135@gmail.com

### **Guide Lines**

- **General:** English and Hindi Editions of Research Journal are published separately. Hence Research Papers can be sent in Hindi or English.
- **Manuscript of research paper:** It must be original and typed in double space on the one side of paper (A-4) and have a sufficient margin. Script should be checked before submission as there is no provision of sending proof. It must include Abstract, Keywords, Introduction, Methods, Analysis Results and References. Hindi manuscripts must be in Devlys 010 or Kruti Dev 010 font, font size 14 and in double spacing. All the manuscripts should be in two copies and in Email also. Manuscripts should be in Microsoft word program. Authors are solely responsible for the factual accuracy of their contribution.
- **References :** References must be listed cited inside the paper and alphabetically in the order- Surname, Name, Year in bracket, Title, Name of book, Publisher, Place and Page number in the end of research paper as under- Shukla Akhilesh (2018) Criminology, Gayatri Publications, Rewa : Page 12.
- **Review System:** Every research paper will be reviewed by two members of peer review committee. The criteria used for acceptance of research papers are contemporary relevance, contribution to knowledge, clear and logical analysis, fairly good English or Hindi and sound methodology of research papers. The Editor reserves the right to reject any manuscript as unsuitable in topic, style or form without requesting external review.

© Center for Research Studies

Single Copy Rs. 500

**Membership fee**

<b>Term</b>	<b>For Individual</b>	<b>For Institutional</b>
One year	Rs. 2000	Rs. 2500
Two years	Rs. 2500	Rs. 4000

**Mode of payment-**

- The amount may be deposited in the account number 30016445112 of GAYATRI PUBLICATIONS, SBI Rewa City Branch (IFS Code: SBIN 0004667, MICR Code 486002003). Please inform on Mobile (7974781746) after depositing money.

**Publisher**  
**Gayatri Publications**  
Rewa (M.P.)

**Printer**  
**Glory Offset**  
Nagpur

**Editorial Office**  
**186/1 Vindhya Vihar Colony**  
**Little Bambino's School Campus**  
**Rewa- 486001 (M.P.)**  
**Mob- 7974781746**

**E-mail- [researchjournal97@gmail.com](mailto:researchjournal97@gmail.com)**  
**[researchjournal.journal@gmail.com](mailto:researchjournal.journal@gmail.com)**

**[www.researchjournal.in](http://www.researchjournal.in)**

---

Opinions expressed in this journal do not reflect the policies or views of this organization, but of the individual contributors. The authors are solely responsible for the details and statements in their Research papers. The Judicial Jurisdiction will be Rewa (M.P.)

## *Editorial*

The basic and most important unit of the society has been the family from the beginning. For the empowerment and development of the country, first of all it is necessary to pay attention to the moral, social, economic and cultural dimensions of basic institutions like family. Balanced development of the family is very important for the development of the society. Therefore, if we want to have a complete and balanced development of the country, then we need to lay maximum emphasis on the basic institution called family. It is necessary that we should not make any discrimination between son and daughter in the family and we must explain this to our sons and get them involved in their activities. Even today, those who belong to the old belief believe that a woman cannot get any freedom, she cannot go anywhere alone, she cannot roam anywhere alone, but today's youth refuse to accept these values.

Some people also say that the importance of the walls in the house, the same importance is given to the education of the boys in the society. But how is a house made? Who are in the base of the house? The base of the house is our daughters, our girls, that means they are related to the roots. If our root becomes weak in the society, then our house or house cannot be strong at all. There is a need to understand this social context in reality.

The extent of favoritism is reached when we see discrimination in small tasks. Some people think that a girl is someone else's wealth, what job she should do. That's why some parents discriminate between boys and girls and this discrimination is visible somewhere in our behavior, in feeding and dressing. This is sheer injustice. God has given the same brain to boys and girls and today girls are proving it by bringing better results.

Girls stay at their parents' house for only a few days, so it is our duty to pay deep attention to their education, upbringing, only then we can fulfill the concept of a strong society. God has made us the trustee of our children so it is our duty to treat all members equally with full justice because both boys and girls have same power, same soul. So we should give them equal opportunities for development.

The basic objective of women empowerment is the development of women and communication of self-confidence in them. Women empowerment is important for the overall development of the society. Empowerment of women is the most important social phenomenon because they are the creators. If you empower them, make them strong, encourage them, it is better for the society. Women and men are the basis of creation and human society. Both complement each other. These are the wheels of the chariot of life by which the journey of life runs

smoothly. The role of both has been equally important for stability in family and society. The basis of change and development in a society depends on the mutual interaction of men and women, walking step by step and equal mobility of both. A chaotic situation is created in social life when any one side lags behind. The history of mankind is witness to this that where women have been neglected, the development of the society has been stunted. The role of women in creation of creation, education of children, upbringing of family is much more important than that of men, thus her position becomes central in the society. Therefore, without the progress of women, there can be no upliftment of mankind and society. As far as India is concerned "Yatra Naryastu Pujayante Ramante Tatra Devta" means where women are worshipped. The deities reside there. With this ideal any Indian woman can feel pride in comparison to the western woman. The ideal of learning in Saraswati, the ideal of wealth in Lakshmi, the ideal of valor in Durga, the ideal of purity in Ganga, even the ideal of creation in the form of Jagad Janani we find only in India.



**Professor Akhilesh Shukla**  
Chief Editor

## CONTENTS

01.	Analysis of the concept of victim logy with special reference to domestic violence	09
	<b>Akhilesh Shukla, Aanchal Shukla</b>	
02.	Ecofeminism and Environmental Movements in India	17
	<b>Rani Tyagi</b>	
03.	Socio-Economic Conditions of Elderly Women Slum Dwellers	21
	<b>Archana Mishra</b>	
04.	Public Health and the Disputed Issue of Subsoil Water in Colonial Bombay City: 1860-1900	26
	<b>Madhu Kelkar</b>	
05.	Rock Art of Keraha: A Critical Study	33
	<b>Neha Singh</b>	
	<b>Pritam Kumar</b>	
	<b>Mahesh Chandra Srivastava</b>	
06.	Socio-Economic Inequalities in Chhattisgarh	39
	<b>Shashi Kiran Kujur</b>	
	<b>Upendra Kumar Sahu</b>	
07.	The Study of Augmented Reality Advertising and growing trends in India	46
	<b>Rita Khatri</b>	
08.	Drug Abuse and the Criminal Justice System	50
	<b>Ajay Kumar Dwivedi</b>	
09.	Theory of basic structure in reference to the amendment of the Indian constitution (An observation)	55
	<b>Om Dutt</b>	
10.	A Comparative Study on The Anthropometrical Variable of Volleyball and Basketball Players of Senior Secondary School	63
	<b>Mohammad Muqarram</b>	
11.	Effect of Anxiety and Achievement Motivation in Sports Performance	68
	<b>Alok Kumar Pandey</b>	
12.	Significance of projection	72
	<b>Mohammed Imran Khan</b>	
13.	Tourist places in Meerut District: an over View	78
	<b>Poonam Chaudhary</b>	
	<b>Aanchal</b>	

14. Give to All an Equal Liberty: A Study of Abolitionist Sentiments and Anti-Slavery Historiography in the Anti-Slavery Alphabet (1847) 85  
**Anirban Guha Thakurta**
15. Supplementary effect of methionine on the growth and survival *Channa punctatus* 94  
**Umesh Shukla**
16. Random-amplified polymorphic DNA profiling of isolates from dung sample of camel for sorting out distinct isolates 96  
**Shikha Tiwari**
17. Estimation of nitrogen fixation by different genera of *Azotobacter* and *Azospirillum* and effect of herbicides on nitrogen fixation of *Azospirillum* in malate medium under laboratory conditions. 100  
**Vandna Krishna**
18. Duration of parental care received by fawns of *Antilocapra cervicapra* in captivity 106  
**Sonia Yadav**  
**Raksha Modi**
19. Salinity tolerance on germination and growth of chickpea (*Cicer arietinum* L.) 114  
**Archana Tiwari**  
**Archana Mishra**
20. Serum sodium level in men and Women belonging to different blood groups 117  
**Umesh Shukla**
21. The Mystery of Maharaas, the Cosmic Dance 119  
**Patel Nilaben Alpesh kumar, Yogesh Bhatt**
22. A New Dimension of Leadership: Ethical Leadership 124  
**Parul C. Dave**
23. Impact of COVID - 19 Pandemic on Perceptions towards Physical and Mental Health 128  
**Bhavna L. Gajera**
24. New Education Policy in reference with Physical Education and Sports 131  
**Minaxi Masukhbhai Patel**

## ***Duration of parental care received by fawns of Antilope cervicapra in captivity***

• Sonia Yadav  
•• Raksha Modi

---

**Abstract-** Blackbuck (*Antilope cervicapra*) is an antelope belonging to family Bovidae. It is indigenously found in the plains of India. The behavioural attributes observed in blackbucks are territoriality, lekking, parental care, foraging, etc. The research was conducted to study the detailed analysis of the duration of parental care in blackbucks in the captivity. The study area selected is Kamla Nehru Prani Sangrahalaya, Indore, Madhya Pradesh. The present investigation was done using visual observations. Parental care is a type of behavioural and evolutionary strategy adopted by animals. It involves parental investment made to the evolutionary fitness of offspring. Parental care differs in different animal groups in terms of how parents care for offspring, and the amount of resources invested by parents. The parental care is generally displayed in blackbucks till 2 months of age. The blackbuck juveniles upto the age of about 2 months remain closely connected to their mother. The type of parental care seen in blackbucks is maternal care as only mothers care for the young and the fathers (male parents) have no role in parental care. The first fifteen days of the fawns are wholly spent with the mother blackbuck and in the next fifteen days fawns were seen performing various activities with their mother which include following, playing, feeding, etc. The duration of parental care and beginning of weaning was observed in 10 subject fawns and the average was calculated. The duration of parental care in blackbucks is about 2 months in captivity. Soon after weaning begins, the parental care ceases.

---

**Keywords-** Captivity, behavioural, weaning, maternal, duration

---

**Introduction-** Blackbuck (*Antilope cervicapra*) is an antelope belonging to family Bovidae. It is indigenously found in the plains of India. Blackbucks are completely Indian sub-continental in terms of distribution (Rahmani, 1991). The blackbuck belongs to the same tribe (Antilopini) that includes the springbok, the gerenuk and gazelles. Wild Blackbuck population is likely to continue to decline; the population of blackbucks is declining as a consequence of poaching, hunting, shrinkage of natural habitats and deforestation, and predation with probably fewer than 25,000 individuals in their native range. The Blackbuck acts as an indicator for natural disturbances in the forest habitat (Rajagopal, 2009). Adult male blackbucks have long horns that are V-shaped and spirally twisted. There is a wide difference seen in

---

• Ph.D. scholar, DAVV University, Indore, Madhya Pradesh, India  
•• Associate professor, Department of Zoology, P.M.B. Gujarati science college, Indore Madhya Pradesh, India

coloration of adult males and females. Adult males are black and white in color while the adult females are reddish yellow in color. Immature males also look reddish yellow in color. This type of contrast in coloration is not seen in any of the blackbuck's tribal relatives. Blackbuck is also known as the Indian antelope. It is very commonly found in India, Nepal, and Pakistan.

Blackbucks are primarily grazers and form herds which are characteristically loose and unstable associations; the number of individuals in herds can range from less than ten individuals to several hundred (Rajagopal and Archunan, 2016). Prasad (1985) stated that blackbucks spend a large amount of time in foraging almost 34%. Chiefly blackbucks are found frequently in open short grassy regions. Generally, woodlands and shrublands are avoided by them. When the grass is sparse, they browse for it as they love green grass. In the semidesert areas of Rajasthan, the blackbucks drink water twice a day. Day time is the time when they are most active and seek shade for hardly 2 to 3 hrs in mid-day. They can normally tolerate hottest sun. The blackbucks are called diurnal animals. Meena et al. (2017) reported that blackbucks are mainly active during the day; they live in small herds of around twenty to thirty members most of the time.

Major behavioural activities observed in blackbucks are foraging, walking, standing and resting; foraging includes both browsing and grazing. Three types of groups, generally small are found. They are of females, males and bachelor herds. Males attract females for mating by lekking. Lek is a gathering of male individuals that engage in competitive displays and rituals of courtship to entice females for mating. Other males are restricted from such places. Lekking takes place at spots where females go for foraging. So, at those places males can attempt to get a mate and can undergo mating. Blackbucks are herbivores and mostly prefer low grasses and found browsing for substantial time.

Blackbucks have prominent eyesight by which they avoid capture. Blackbucks run very fast, so that they outrun most of their predators. Blackbuck is the major wild prey of wolf in India. The only predator which blackbucks can't outrun is the cheetah. Mughals once used cheetah for the sport of coursing blackbucks and gazelles. The chief predators of blackbuck now are jackals and pariah dogs. The captive Indian Blackbuck also varies highly within captive populations; there is a need to increase their breeding in captivity. Extremely high levels of visitor density influenced various behaviours; the affected behaviours were moving, resting, reproductive, social, and aggressive behaviors (Rajagopal et al., 2011). The behaviour of an animal is influenced by environmental factors as well as social interactions (Isvaran, 2005).

Study area selected is Kamla Nehru PraniSangrahalaya, Indore, Madhya Pradesh. Indore, formerly spelled Indur, is a city located in western part of Madhya Pradesh state, central India. Indore is the most populous city and the largest city of Madhya Pradesh; it serves as the headquarters of both Indore District and Indore Division. Indore is situated at an average altitude of 553 meters (1,814 ft) above sea level and located on the southern edge of Malwa Plateau. Among the major cities of Central India, it has the highest

elevation. Indore is situated 190 km (120 mi) west to Bhopal; Bhopal is the state capital of Madhya Pradesh. According to 2011 census, estimated population of Indore is 1,994,397 (municipal corporation) and 3,570,295 (urban agglomeration). The land area of the city is 530 square kilometres (200 sq mi); this value makes Indore the most densely populated major city in the central province. Indore zoo or Kamla Nehru PraniSangrahalaya is a zoological park situated in Navlakha, Indore, Madhya Pradesh; it is managed completely by Indore Municipal Corporation which looks after its management, maintenance and administration. Kamla Nehru PraniSangrahalaya is a well recognised zoo, even recognised by CZA (Central zoo authority of India). Indore zoo is also known as "Land to many wildlife wonders". Indore zoo is the most advanced zoo of India for many reasons; it deploys online booking of tickets and it powers animal health app. The blackbucks are also introduced to the Ralamandal Wildlife Sanctuary. The Ralamandal Wildlife Sanctuary is located in Indore, Madhya Pradesh; Madhya Pradesh is the state located in the heart of India. The Ralamandal Wildlife Sanctuary was established in 1989 and one of the most popular wildlife reserves in India.

**Materials and methods-** The research was conducted to study the detailed analysis of the duration of parental care in blackbucks (*Antilocapra americana*) in the captivity (Indore zoo). The present study was mainly based on the behavioural attributes of blackbuck relating to parental care; study was mainly conducted to find the duration of the parental care provided to the fawns. The present investigation was done using visual observations. The field binoculars were the important tools used throughout the study to conduct observations. All the important activities were keenly observed and noted down. In this study, certain activity refers to any action which resulted into a change in the position of the creature in relation to space. Whenever a group or individual animal came into the sight the observational information were recorded in the data sheet. A safe distance was maintained for observing the animals. The changes in the various aspects of behaviour were also studied taking various parameters in consultation such as activities which are performed exclusively by fawns, the companionship of fawns with mother and many other activities. Cameras were used at different spots and different angles and their activities were monitored. For live observation, binoculars were used. With the help of binoculars, the objects located far from us can also be observed clearly.

**Results and discussions-** Parental care is a type of behavioural and evolutionary strategy adopted by animals. It involves parental investment made to the evolutionary fitness of offspring. Patterns of parental care are widespread and highly diverse across the animal kingdom (Kokko and Jennions, 2008). Parental care differs in different animal groups in terms of how parents care for offspring, and the amount of resources invested by parents. For illustration, there may be significant variation in the amount of care invested by each parent. In some animals, mother invest more in parental care while in some fathers care more for the offsprings and in some investment may be shared equally by both the parents. Gonzalez-Voyer and

Kolm (2010) reported that many hypotheses have been proposed to describe this variation and patterns in parental care that exist between the sexes, as well as among species. Parental care is beneficial in cases when it increases the parent's inclusive fitness by activities such as by improving offspring survival, quality, or reproductive success (Klug and Bonsall, 2010). Parents make sure that any investment is well-spent because parental care is costly and often affects the parent's own future survival and reproductive success. Parental care is the set of behaviours that contributes to offspring survival. It includes activities such as building a nest, provisioning offspring with food, or defending offspring from predators. Young of reptiles need almost no care as they are produced self-sufficient but some hatchling birds may be helpless at birth, relying on their parents for survival. Parental care may be of mainly four types: maternal or paternal care, biparental care and alloparental care (Kokko and Jennions, 2008).

Paternal care is the type of parental care where the main investment is done by the male parent for the offsprings fitness and health; it is most commonly observed in very few bird species where males care for the eggs after they are laid. Maternal care is the type of parental care where mothers care for the offsprings the most; the most evident form of maternal care is seen in mammals. In mammals, the female parent (mother) undergoes gestation and also shows lactation; gestation is the period from fertilization of gametes to form zygote to delivery of the young and lactation is feeding the mother's milk to the young as preliminary food. Biparental care is the type of parental care in which both parents (mother and father) contribute almost equally for the care of the young. Remes et al. (2015) noted that this type of parental care is common in animals where the adult sex ratio is quite balanced.

Silver (1983) reported that nearly all the species of birds have monogamous relationships and they display biparental care. Alloparenting is a type of parental care in which the parents care for the youngs that are not theirs; the offsprings are non-descendants of the parents. This type of care is selfless but it costs the parents the reproductive benefits. Mating may cause sexual conflict and further familial conflicts may continue after mating when there is parental care of the eggs or young. Conflicts may arise between male and female parents over how much care each should provide; conflict may arise between siblings also over how much care each should demand, and conflicts may arise between parents and offspring over the supply and demand of care (Parker et al., 2002). The evolutionary fitness of the offspring receiving the care is benefitted, but it produces a cost for the parent organism as parents spend energy on caring for the offspring; this may result into loss of mating opportunities (Bednekoff, 2010; Fox et al., 2018). Parental care is a costly mechanism so it only evolves only when the costs are outweighed by the benefits (Klug and Bonsall, 2014).

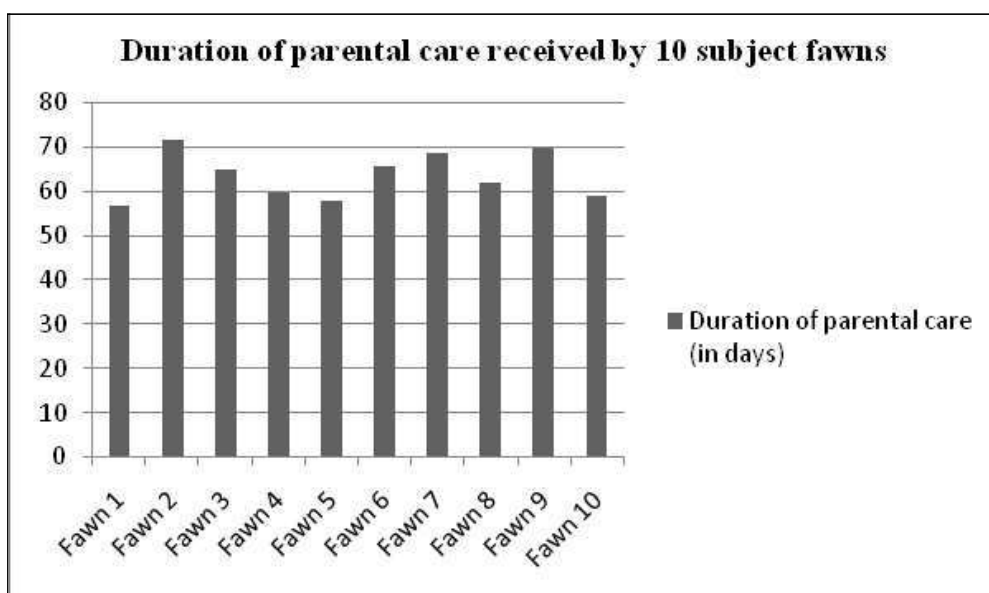
Blackbucks are the mammals that belong to family Bovidae; they inhabit grassy plains and lightly forested areas. Blackbucks show clear sexual dimorphism as the males have long ringed horns and their body is dark brown coloured with white colour in underparts and the insides of the

legs while the females and fawns are very light brown colored. The blackbucks are usually sexually active throughout the year and the litter size is 1. The female blackbucks give birth to usually one young at a time.

The parental care in blackbucks was well observed; the parental care is generally displayed in blackbucks till 2 months of age. The blackbuck juveniles upto the age of about 2 months remain closely connected to their mother. The type of parental care seen in blackbucks is maternal care as only mothers care for the young and the fathers (male parents) have no role in parental care. The relationships are not monogamous but polygamous in blackbucks. The male blackbuck distances itself from the female blackbuck just after the mating. The mother takes care of the offspring alone for around 2 months. For the time period of those 2 months, the fawns completely derive their nutrition from mother's milk. Lactation is the process of secretion and yielding of milk by females after giving birth. The milk produced during lactation is contained in the mammary glands; the growth of mammary glands takes place during gestation due to the ovarian and placental hormones (Donovan, 2022). The milk is produced in the mammary glands during gestation but is held in them without release, by the action of combination of estrogen and progesterone; estrogen and progesterone inhibit milk secretion by blocking the release of prolactin from the pituitary gland and by making the mammary gland cells unresponsive to this pituitary hormone (Donovan, 2022). The stimulus of nursing or suckling supports constant lactation; it is done by the secretion of prolactin and also leads to release of oxytocin, which causes the contraction of muscles around the alveoli in the breast and ensures the ejection of milk (Donovan, 2022). After about 2 months, weaning starts in fawns. Weaning is the act of switching from mother's milk to other food options by the fawn. Once the weaning begins and the fawn gets accustomed to the outside food options, the mother moves away from the fawn. This marks the end of the parental care in blackbucks.

The fawns, till about 15 days of the age, spend their whole time in company of their mother and it is hard to find such young fawns away from their mothers. In zoo, the environment is free from predators, so there is no chance of spotting any young fawn without his mother; however, in wild, the young fawns may be found alone or without their mother in case when their mother is being preyed by some predators. The male blackbuck moves away from the female just after the copulation, so the males never get connected to neither the females nor their offsprings. This is because of the existence of polygamous relationships in blackbucks. The first fifteen days of the fawns are wholly spent with the mother blackbuck and after this period, the fawns develop a little more strength so, they were observed performing various activities with their mother which include following, playing, feeding, etc. The duration of parental care and beginning of weaning was observed in 10 subject fawns. The values were recorded in a table and average was calculated.

<b>Duration of parental care received by 10 subject fawns</b>	
<b>Subject Fawns</b>	<b>Duration of parental care (in days)</b>
Fawn 1	57
Fawn 2	72
Fawn 3	65
Fawn 4	60
Fawn 5	58
Fawn 6	66
Fawn 7	69
Fawn 8	62
Fawn 9	70
Fawn 10	59



The average duration of parental care in blackbucks in zoo was 63.6 days which is nearly equal to 2 months. There is a difference in days of parental care received due to early weaning in some fawns (such as in Fawn 1) and delayed weaning in other fawns (such as in Fawn 2). Though there is a good difference in cessation of lactation and weaning in fawns, the physical health of the fawns is not affected by it. At zoos, the animals are well-nourished so, the fitness of a fawn which receives parental care for few days more is almost same as the fitness of a fawn which receives parental care for few days less than others. After the beginning of weaning, the parental care faded and then disappeared as the female (mother of the fawn) left the fawn and resumed its other behaviours except the parental care.

**Conclusion-** The blackbuck (*Antilope cervicapra*) are mammals that belong to family Bovidae and are exclusively found in the Indian subcontinent. The blackbucks show a clear sexual dimorphism as the males have horns while usually females lack horns and also there is huge difference in colouration in males and females. The blackbucks mate round the year and they give birth to just one offspring at a time. The offspring is being cared by its mother only as the blackbucks show maternal care. Maternal care is a type of parental care in which only the female parent takes care of the young to support its fitness and health. The young, during first 15 days of its birth, remains stick to its mother; it starts showing different activities with the mother such as feeding, playing, etc., after the age of 15 days. For the first about 2 months of its life, the fawn is taken care by its mother. The parental care ceases in blackbucks when the weaning starts. Due to weaning, the fawns start consuming food other than the mother's milk; it is this time during which the mother distances herself from the fawn and fawn starts living its life on its own without depending on its mother for any need.

#### **Acknowledgement**

I am very thankful to Dr. Uttam Yadav sir (Director, Kamla Nehru PraniSangrahalaya) for providing complete support and help in data collection for the purpose of research. I would also like to acknowledge zoo volunteers for the assistance provided in carrying out the research. My heartfelt thanks to my research supervisor Dr. Raksha Modi ma'am (Associate Professor, Department of Zoology, P.M.B. Gujarati science college, Indore) for always guiding and helping me in every step of my research.

---

#### **References-**

- Bednekoff, P. A. (2010). Life Histories and Predation Risk. Encyclopedia of Animal Behavior. Academic Press. pp. 285-286.
- Donovan, B. T. (2022). Lactation. Encyclopedia Britannica.  
<https://www.britannica.com/science/lactation>
- Fox, R. J., Head, M. L. and Barber, I. (2018). Good Parenting May Not Increase Reproductive Success Under Environmental Extremes. Journal of Evolutionary Biology. doi: 10.1111/jeb.13358.
- Gonzalez-Voyer, A. and Kolm, N. (2010). Parental Care and Investment. Encyclopedia of Life Sciences. doi: 10.1002/9780470015902.a0021907.
- Isvaran, K., (2005). Variation in male mating behaviour within ungulate populations: patterns and processes. Current Science, 89(7), pp.1192–1199. doi: <https://www.jstor.org/stable/24110971>
- Klug, H. and Bonsall, M. (2010). Life history and the evolution of parental care. Evolution, 64(3), pp.823-835. doi: 10.1111/j.1558-5646.2009.00854.x.
- Klug, H. and Bonsall, M. B. (2014). What are the benefits of parental care? The importance of parental effects on developmental rate. Ecology & Evolution. 4 (12): 2330–2351. doi: 10.1002/ece3.1083.
- Kokko, H. and Jennions, M.D. (2008). Parental investment, sexual selection and sex ratios. Journal of Evolutionary Biology, 21, pp.919–948. doi: 10.1111/j.1420-9101.2008.01540.x.

- Meena, R., Saran, R.P., Chourasia, V. (2017). Population Characteristics, Habitat Availability, Forage Preferences and Threats to the Blackbuck *Antilope cervicapra* (Linn) in the Sorsan Region of Baran, Rajasthan. World Journal of Zoology, 12, pp. 53-59. doi: 10.5829/idosi.wjz.2017.53.59
- Parker, G.A., Royle, N.J. and Hartley, I.R. (2002) Intrafamilial conflict and parental investment: a synthesis. Philosophical Transactions of the Royal Society of London. Series B, 357, pp.295–307. doi: 10.1098/rstb.2001.0950.
- Prasad, N.L.N.S. (1985). Activity-time budget in blackbuck. Proc Ani Sci, 94, Pp.57–65. doi: 10.1007/BF03186327
- Rahmani, A. R, (1991). Present Distribution of the Blackbuck (*Antilope cervicapra*) in India, With Special Emphasis on the Lesser Known Populations. Journal of Bombay Natural History Society, 73. 35-45. doi: <https://biostor.org/reference/152949>
- Rajagopal, T. (2009). A study on the reproductive behaviour and pheromones of an endangered Indian Blackbuck (*Antilope cervicapra* L.) to enhance captive breeding and conservation. Ph.D. thesis, Bharathidasan University, Tiruchirappalli, India. doi: 10.12944/CWE.4.1.18
- Rajagopal. T., Manimozhi. A., Archunan. G. (2011). Diurnal variation in preorbital gland scent marking behaviour of captive male Indian Blackbuck (*Antilope cervicapra* L.) and its territorial significance. Biol Rhythm Res 42:27–38. doi: 10.1080/09291011003693161
- Rajagopal, T., Archunan, G. (2016). Dominance Hierarchy in Indian Blackbuck (*Antelope cervicapra* L.): Sources, Behavior and Role of Pheromone Signals. In: Schulte, B., Goodwin, T., Ferkin, M. (eds) Chemical Signals in Vertebrates 13, pp.217-228. doi: 10.1007/978-3-319-22026-0\_16
- Remeš, V., Freckleton, R., Tökölyi, J., Liker, A. and Székely, T. (2015). The evolution of parental cooperation in birds. Proceedings of the National Academy of Sciences, 112(44), pp.13603-13608. doi: 10.1073/pnas.1512599112.
- Silver, R. (1983). Symbiosis in Parent-Offspring Interactions. Boston, MA: Springer US, pp.145-171. doi: 10.1007/978-1-4684-4565-7\_7.
- Vats, R. & Bhardwaj, C.S. (2009). “A study of reproductive behaviour of Indian black buck (*Antilope cervicapra*) Linn. With reference to courtship, breeding, fawning and colouration” (PDF). Current World Environment. 4 (1): 121–125. doi:10.12944/CWE.4.1.18.