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A review on status of avian diversity of Haryana, India

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Abstract
Birds are integral components of natural ecosystems, occupying a significant place in the food chain. They provide various ecosystem services, such as acting as pollinators, agents of seed dispersal, pollution indicators, providing sustenance for other animal predators, and contributing to nutrient recycling processes. Haryana, located in northern India, is considered as a remarkable birding destination due to presence of diverse natural habitats, such as agricultural land, wetlands, grasslands, wildlife sanctuaries, forest patches and national parks etc. harbouring huge diversity of residential as well as migratory birds coming from different countries all over the world especially through Central Asian Flyways. A large area of Haryana is included in the economically important National Capital Region (NCR) for planning and development purposes. The visitor birds of Haryana are facing threat of extinction due to uncontrolled development resulting in change in land use pattern of natural habitats of the state, causing decline in their diversity. They serve as a significant indicator for both qualitative and quantitative evaluation of various habitats; hence, it is very essential to study their diversity and conservation status regularly. This review is prepared on the basis of information available from previous studies, with an objective to understand the diversity and status of birds in different regions of Haryana. Effective biodiversity conservation strategies and proper action plan should be prepared to protect and monitor the bird population of the state. It will form a base for further studies required to assess the avian diversity of Haryana.

Keywords: Birds, wetland, Haryana, diversity, ecosystem, habitat, extinction, conservation

Introduction
Birds, the most fascinating and conspicuous creature of the Animal Kingdom, are a group of vertebrates which have feathers, wings and hollow bones as aerial lifestyle adaptation. They are the most liked animals owing to their rich colouration, song, easy identification and liveliness. Being warm-blooded animals, they can adapt or change themselves to make it possible for them to live in varying environmental conditions i.e., from the hot arid deserts of Rajasthan to the thick tropical rain forests of the Western Ghats and northeast India [1]. Ecologically, birds are of tremendous importance because of their key roles as pollinators, scavengers, predators, crop protectors and agents of seed dispersal [2]. Birds are the integral part of the food chain and food web hence, it is very important to know their diversity and conservation status. They play a key role in pest management which helps humans in agriculture and keeps the biodiversity balanced [2, 3]. Bird diversity also plays a pivotal role in evaluating the overall health of natural habitats [4].

Biodiversity of a particular place is an indicator of the availability of the environmental resources, their distribution and utilization by the organisms in that habitat [5]. Haryana is a State in the northern region of India with 22 districts. The State shares its boundary with Punjab and Himachal Pradesh to the North and Rajasthan to the south and west. The river Yamuna defines its eastern border with Uttar Pradesh and Uttarakhand. Haryana also surrounds Delhi on three sides, forming the northern, southern and western borders of Delhi. Consequently, a large area of Haryana is included in the National Capital Region (NCR). Haryana is primarily an agricultural state with almost 80% of its land under cultivation. The geographical area of the state is 44212 sq. km which is 1.3% of India's geographical area [6]. The climate of Haryana is arid to semi-arid with an average rainfall of 354.5 mm. The temperature is hot in summer often soaring above 40°C (104°F) during the day and markedly cold in the winter. Haryana, with a wetland area covering 42,480 hectares [7], serves as a habitat for a diverse range of wildlife, including various bird species [8]. The Aravallis and

the Shiwaliks are two biodiversity hotspots of the state. Among total 1450 bird species found in South Asia, 1263 species belonging to 23 orders and 107 families have been spotted from Indian subcontinent, contributing 13% of the total bird species of the world [9]. (Praveen, *et al*, 2016). Out of 1263 avian species reported in India [9], 530 species have been recorded from various habitats of Haryana =. Out of which about 450 bird species have been documented in water bodies, whether they are flowing or stagnant [11].

Wetlands are important bird habitats and birds use them for breeding, nesting, resting, social interactions and rearing their young ones. Migratory birds are an important biotic component of the wetland ecosystem as they occupy several trophic levels in the food web of wetland ecosystem [12]. Wetlands provide food for birds in the form of plants, vertebrates, and invertebrates. Some feeders forage for food in the wetland soils, some find food in the water column, and some feed on the vertebrates and invertebrates that live on submersed and emergent plants [13]. A large number of migratory birds visited the wetlands during winter months to improve their chance of survival due to better climate conditions for rearing their young ones and availability of feeding resources. Many of these travel thousands of miles between their breeding places and their wintering grounds. At the end of the breeding season, there is a corresponding return movement. Their migration and local movements help in the dispersal of nutrients and spores from one place to another [14]. More than 40% of these migratory species are declining, and nearly 200 are now classified as globally threatened [15].

Wetlands in India are under tremendous pressure due to various anthropogenic activities such as reclamation, deforestation and extensive concrete construction [3]. Birds, being very sensitive are prone to such activities and respond by changes in species composition and density. Thus, a considerable number of wetlands are declared as IBAs (Important Bird and Biodiversity Areas) by Bird Life International. According to Islam and Rahmani (2004) there are 465 IBAs in India, out of which, 266 (57%) are protected and 199 (43%) are unprotected. Haryana has 5 IBAs, which include Basai Wetlands, Bhindawas Wildlife Sanctuary, Kalesar Wildlife Sanctuary, Sultanpur National Park and Wetlands of Yamuna River [16]. The influence of human activities on birds is easy to cause a change in bird composition and behaviour, which needs further research. Hence, the failure to understand the consequences of modification in these natural habitats is likely to increase the anthropogenic pressure on wetland biodiversity of Haryana including birds.

Hotspots for bird migration in Haryana

A lot of work has been done on various aspects of avian diversity in different region of Haryana. Haryana has two national parks, eight wildlife sanctuaries, two wildlife conservation areas, four animal and bird breeding centres, one deer park and three zoos, all of which are managed by the Haryana Forest Department of the Government of Haryana [6]. Interestingly, Sultanpur (Gurugram) and Bhindawas (Jhajjar) have been granted the status of National Park and Wildlife Sanctuary, respectively, Basai wetland, on the other hand, doesn't fall under any conservation area.

Sultanpur National Park is a notable IBA, located on the outer periphery of district Gurugram. It has been the most popular destination for birders and had been considered as niche-habitat of this state. The region is known as suitable nesting site especially for Painted Stork; Mycteria leucocephala [17]. Various studies have been conducted to assess the diversity and conservation status of birds in the park. Chopra, G. *et al*. (2012) conducted study from February, 2011 to January, 2012, identified a total of 113 species of birds belonging to 14 orders, 35 families and 80 genera [17]. Another study conducted during January 2018 to June 2019 by Singh, J. *et al*. (2021) claimed the presence of 111 species of birds belonging to 90 genera, 42 families and 17 orders in this region [18]. According to a recent study conducted from February to July 2022, a total of 1130 individuals belonging to 149 species, 55 families and 19 orders were identified. Out of which, Passeriformes was reported to be most diverse order [19]. The numbers of species are thought to be declining as the National park is facing large scale habitat fragmentation, disturbance and degradation due to various anthropogenic activities in the vicinity.

Basai wetlands, located at 28°292 N latitude and 76° 592 E longitudes in Gurugram district is also among one of the five IBAs of Haryana. It is located about 8 km east of Sultanpur National Park. In spite of its small size, Basai Wetland supports a good number of orders and families of birds, owing to its diverse habitats. Basai Wetlands (an IBA site) supports resident birds throughout the year, while acting as a refuge to the migratory birds during the winter season [16]. Harvey (2003) gave a checklist of avifauna of Basai wetlands which comprised 240 species including the state bird Black Francolin [20]. Solanki, V. *et al*. (2017) focussed on the current status of Basai wetland and also draws a comparison with Sultanpur National Park [21]. The wetland is an ideal grazing ground for Bar-headed Geese Anser indicus which flock here during winters. The Basai wetland is a proof that even treated sewage water can be a home of thousands of birds if properly protected and maintained [21]. But in recent years there has been a rapid increase in the urbanization around this site, causes habitat degradation, cutting of trees, increase human interference, lack of clean water source etc., affecting the avian diversity of this site. This IBA site requires proper attention and it should be upgraded in the form of Wildlife Sanctuary.

Bhindawas Bird Sanctuary is the largest wetland spreads over an area of 1016.94 acres, located 25 kms south-east of Jhajjar (280 37‟N and 760 40‟E) and about 80 kms north-west of Delhi [22] It was notified as wildlife Sanctuary on 7th May, 1986. The area also has a lake with a periphery of about 12 kms. Eucalyptus, Cassia, Acacia, Azadirachta, Melia and Zizyphus are the main trees planted around the lake [22, 23]. Cormorants, egrets, herons, storks etc. use them for roosting and nesting [22]. According to a survey conducted in and around this bird sanctuary in one year from January, 2015 to December, 2015; a total of 104 bird species belonging to 15 orders and 39 families were found. Of these, 67 bird species were resident, 32 species were winter migrants and only 5 species were summer migrants. The study revealed that in last few years, huge anthropogenic pressure is being witnessed in this region [23].

Kalesar Wildlife Sanctuary spreaded over 13209 ha area along the Yamuna in Yamuna Nagar district of Haryana is the largest sanctuary of the state. It comprised within the Kalesar National Park, situated in the foothills of Shiwalik ranges of mighty Himalayas. The whole area is full of bio-diversity having dens Sal forest, Khair forest and patches of

grass lands, which supports an amazing variety of plants and animal species. It is a popular destination for bird-watching. In Haryana it is the only National Park having good natural forest supporting such a large bio-diversity. So it has got a special significance in terms of conservation, education, tourism and research opportunities [3]. For long term management of these IBA sites of Haryana, proper action plan and regulation strategies are needed.

Other than IBA sites, various researchers have conducted studies to assess the bird diversity time to time in other interesting regions of Haryana such as-

Rohtash Chand Gupta *et al*. (2012) studied the bird diversity status of the biggest natural lake of Haryana i.e., 'Damdamma Jheel' located in district Gurugram near Sohna town in Haryana during 2005-2012. A total of 128 species of birds spotted at Damdamma Jheel [24]. Winter migratory birds like Open-bill Stork and Eurasian Spoonbill found in the lake were not seen in these high numbers anywhere else in Haryana, while White-necked Stork, Oriental White Ibis and Painted Storks were observed rarely [24]. The study mentioned that Sarus crane, was spotted in an agricultural field in the vicinity of Damdamma Jheel in 2007 only. After that Sarus Crane was never seen there [24].

Avian diversity of Tilyar Lake (28.883-28.879◦N & 76.637-76.634◦E) located 5km away from Rohtak city on Rohtak-Delhi road, Haryana was conducted from May 2017 to April 2018. A total of 73 avian species belonging to 62 genera and 31 families under 15 orders were observed [18]. A very large density of tourists visits the lake every day. They cause disturbances in the ecological system which affects the bird's activity in the lake area. The lake is undergoing unwanted change in biodiversity composition due to unplanned management strategies of lake authorities [25].

Najafgarh Lake Wetland (Najafgarh Jheel) is another large, semi-natural seasonal freshwater wetland located along the Delhi–Haryana border. This lake is fed by natural channel called the Sahibi River and functioned as stormwater reservoir and drainage channel for neighbouring areas of Delhi and Haryana. It consists of an open lake surrounded by agricultural fields, marshes, and drainage channels. Although not officially designated as a protected area, it is crucial refuge for water-dependent species. A study by Bhanot and Chatterjee (2023) focuses on ornithological significance and deterioration of this wetland due to urban anthropogenic factors [26].

Rajiv Kalsi explains in his book named 'Birds of Haryana-A field guide' that, "A number of winter migrants reaching Haryana are on the IUCN Red List categories, like Lesser white-fronted Goose, Marbled Teal, Ferruginous duck, Falcated duck, Lesser Flamingos, Horned Grebe, Spot-billed and Dalmatian Pelicans, Eurasian curlew, Himalayan and Cinereous vultures and a large number of eagles, flycatchers, and thrushes" [10].

Significance Of Wetlands Of Haryana Region

1. **Ecological Significance:** Wetlands of Haryana region provide significant ecosystem services like habitat for migratory and residential birds, groundwater recharge, livelihood support, climate regulation, water purification and floodwater buffering.
2. **Biodiversity Hotspots:** Haryana's wetlands provide critical habitats for a variety of flora and fauna, including migratory birds that travel from Siberia, Europe, and Central Asia through Central Asian Flyways.
3. **Education and Research:** Many of them like Sultanpur National Park and Bhindawas Wildlife Sanctuary have great potential for bird-watching, tourism and recreation. They also provide natural environment for ecological, hydrological and environmental research.
4. **Maintaining Ecosystem Balance:** Wetlands support fish, amphibians, reptiles, and aquatic vegetation, contributing to the food web and ecosystem health.
5. **Breeding & Nesting Grounds:** Many endangered species of these wetlands such as the Sarus Crane**,** Black-necked Stork**,** and White-rumped Vulture depend on these wetlands for breeding and nesting.
6. **Socio-economic value:** Some of the wetlands are part of the floodplain or natural drainage systems (e.g., the floodplain of the Sahibi River connected to Najafgarh Jheel) thus their conservation also helps in urban resilience.

Table 1: Major Challenges facing Wetlands of Haryana and their Impacts

Sr.No.	Major challenges	Discription/ Impact
1.	Habitat loss and degradation	Land use changes for agriculture, infrastructure development, and urbanization has significantly influence ecological habitats and reduces biodiversity [27].
2.	Pollution and eutrophication	Agricultural runoff containing pesticides and fertilizer leads to nutrient enrichment, algal blooms, and oxygen depletion. Industrial and domestic waste discharge introduces toxins and heavy metals [28].
3.	Climate change impacts	Rise in sea level, droughts, and altered rainfall patterns threaten coastal and inland wetlands, reducing carbon sequestration capacity and habitat stability [29].
4.	Poor management and governance	Insufficient policy enforcement, limited funding, and lack of formal protection and unawareness hinder effective wetland protection and restoration [30].
5.	Loss of ecosystem services	Degraded wetlands lose their ability to store carbon, purify water, mitigate floods, and support livelihoods, leading to ecological and socio-economic losses [31].
6.	Overexploitation of natural resources	Unsustainable harvesting of wetland plants, overgrazing and illegal fishing and poaching disrupt ecological balance and release stored carbon [32].

Factors affecting bird population

In Haryana, due to increasing population, developmental projects, urbanization and unsustainable utilization of bio-resources, many species of animals and plants are getting extinct every year. Human activities have enhanced this extinction rate by almost 50 to 100 times. Wetlands help in maintaining the healthy balance between terrestrial and aquatic ecosystem, but, now-a-days, they are facing the threat of extinction owing to development and urbanisation which is leading to a decrease in their total area day by day [21]. The distinct seasonality of rainfall and seasonal variation in the abundance of food resources result in seasonal changes in the species composition of birds [33]. Due to various anthropogenic factors like habitat destruction

and degradation, infrastructure development, pollution, fish harvesting, illegal hunting and poaching, most migratory birds are facing a number of threats, and their species diversity and populations are declining in most parts of the world [34]. Any change in the physical, chemical and biological factors of wetlands affects the density, diversity and richness of avian fauna. Dispose of sewage, water bottles, plastic wrappers, and bags can be seen frequently near the banks of the wetlands. Generally, water bodies get shallower in the summers and water area gets reduced for wetland and wading birds, but less rainfall makes these areas prone to eutrophication and it creates anoxic conditions for the fauna of that wetland. The environmental impacts on birds are typically assessed by recording changes in the population density, abundance or distribution of species in different habitat types of the state [35]. Recently, it has also been investigated that nocturnally passerines are more strongly affected by light pollution [36]. Due to above factors, many local and migratory species of birds in Haryana are declining.

Conservation measures adopted by the government

The overall development of any region adversely affects the biodiversity of environment mainly due to change in land use and habitat destruction. Due to closeness of NCR, large area of agricultural land of Haryana has been acquired for various development projects, such as building of national and state highways, industries, hospitals and universities etc. Urbanization, pollution from industries and also the ignorance of local population about the merits of wetlands leads to decrease in their total area which indirectly augments the degradation of bird's habitat. The migratory avifauna requires effective management of their critical sites. The Important Bird Areas (IBAs) provide an important foundation for such action and function effectively in conserving migratory species. To ensure the sustainability of migratory birds, a large number of conservation measures have been adopted at the intergovernmental level, and multi-lateral treaties/cooperation have been enforced, such as Convention on Migratory Species, Ramsar Convention, Convention for the Protection of Migratory Birds, State of the World's Birds, and Neotropical Migratory Bird Conservation Act [34]. Haryana State Biodiversity Board (HSBB) was established as per the provisions of Biological Diversity Act, 2002 to protect and preserve the biodiversity in the State. Haryana Chief Secretary, Mr. Sanjeev Kaushal has prepared a State Biodiversity Strategy and Action Plan 2021-2030 for biodiversity conservation and management, which aims to balance the conservation of biodiversity with sustainable development and the well-being of local communities. The Ramsar convention, which came into force in December 1973, demands an urgent need to develop the conservation strategies and management plan by inventorying, monitoring and documenting the diversity and density of biodiversity with special reference to water fowl [33]. However, due to inadequate attention and ignorance by the authorities and local people, avian diversity of many regions is disappearing in Haryana.

Following recommendations has been suggested on the basis of present investigation to prevent further loss:

1. Awareness programs should be organised to make the local people aware about the importance of wildlife.
2. Hunting and Poaching of birds should be completely prohibited.
3. Plantations should be done on the bank of wetlands to protect bird's habitat and there should be check on deforestation.
4. Water quality of wetlands should be monitored at regular intervals.
5. Intrusion of water body for settlements and misuse of holy revers for religious activities like idol immersion should be restricted.
6. There should be ban on dumping of garbage, harmful chemicals like pesticides and sewage water in and around water bodies to maintain the water quality which will indirectly help to conserve the bird diversity [37].

Conclusion

From the above literature we can conclude that several researchers have contributed to document and monitor the bird diversity of Haryana. These studies are rich in information regarding avian diversity and are essential for proper planning and management of the ecosystem as a whole. Strengthening conservation measures, restoring wetlands, and promoting community-based awareness programs are essential for safeguarding Haryana's bird diversity and ensuring ecological sustainability. This review highlights various aspects of avian diversity which were enlisted over several years. But still, there is vast scope in this field for further research in future as many aspects are still untouched. Hopefully, this review will encourage more birders and researchers to see Haryana as a remarkable birding destination and provide Government authorities a chance to value the state's bird diversity and work to preserve it.

Conflicts of Interest

All the authors declare that there is no conflict of interest.

References

1. Grimmett R, Inskipp T. Birds of Northern India. New Delhi: Oxford University Press; 2003.
2. Bibi F, Ali Z. Measurement of diversity indices of avian communities at Taunsa Barrage Wildlife Sanctuary, Pakistan. J Anim Plant Sci. 2013;23(2):469–474.
3. Rai D, Vats P, Gulia R. Avifaunal status of Kalesar National Park, Haryana (India). J Exp Zool India. 2017;20(2):827–833.
4. Gregory RD, Noble D, Field R, Marchant J, Raven M, Gibbons DW. Using birds as indicators of biodiversity. Ornis Hung. 2003;12–13:11–24.
5. Singh J, Hooda S, Phogat A, Malik V. Avian diversity and habitat use of Sultanpur National Park, Haryana, India. Asian J Conserv Biol. 2021;10(1).
6. Haryana State Biodiversity Board. http://sbb.haryanaforest.gov.in/about-department/introduction/
7. Panigrahy S, Patel JG, Parihar JS. National Wetland Atlas: High Altitude Lakes of India. Ahmedabad: Space Applications Centre (ISRO); 2012.
8. Singh J, Antil S, Goyal V, Malik V. Avifaunal diversity of Tilyar Lake, Rohtak, Haryana, India. J Threat Taxa. 2020;12(8):15909–15915.
9. Praveen J, Jayapal R, Pittie A. A checklist of the birds of India. Indian Birds. 2016;11(5–6):113–172A.
10. Kalsi RS, Sharma SC, Chaoudhary JR. Birds of Haryana. Haryana: Rajiv S. Kalsi; 2019.

11. Yadav S, Verma R, Jatav S, Jangra L, Yadav K. Assessment of bird diversity along Yamuna River, Haryana, India. Indian J Entomol. 2023;50:2110–2113.
12. Malik DS, Joshi N. Habitat selection pattern of migratory avifauna in relation to nutrients in Asan wetland at Doon Valley (Garhwal Himalaya), India. Int J Recent Sci Res. 2013;4(10):1470–1475.
13. Stewart RE Jr. Technical aspects of wetlands. US Geol Surv Water Supply Pap. 1982;49.
14. Niemi GJ. Patterns of morphological evolution in bird genera of New World and Old-World peatlands. Ecology. 1985;66:1215–1228.
15. BirdLife International. Migratory bird species. 2015. http://www.birdlife.org/datazone/sowb/casestudy/144
16. Rai D, Gulia R, Chopra G. Status of migratory avifaunal diversity of Basai wetlands, Haryana (India). J Exp Zool India. 2017;20(2):981–985.
17. Chopra G, Tyor AK, Kumari S, Rai D. Status and conservation of avian fauna of Sultanpur National Park, Gurgaon, Haryana (India). J Appl Nat Sci. 2012;4(2):207–213.
18. Singh J, Hooda S, Phogat A, Malik V. Avian diversity and habitat use of Sultanpur National Park, Haryana, India. Asian J Conserv Biol. 2021;10(1).
19. Rani S, Rani A, Rai D. Assessment of diversity and IUCN status of birds at Sultanpur National Park (Haryana) India. Biol Bull. 2023;50(6):1304–1315.
20. Harvey B. Checklist of the Basai Wetlands. 2015. http://www.delhibird.com/Checklists/Basai.html
21. Solanki V, Joshi A. Disappearing wetland: A study of Basai wetlands, Haryana (India). Int J Econ Res. 2017;14(21):159–169.
22. Chhikara M, Singh V, Goyal V, Kumar P, Malik V. Avian diversity and conservation status in Bhindawas Bird Sanctuary, Jhajjar (Haryana), India. J Appl Nat Sci. 2024;16(2):730.
23. Chopra G, Rai D, Jyoti J. Avian diversity and their status in and around Bhindawas Bird Sanctuary, Haryana (India). J Appl Nat Sci. 2017;9(3):1475–1481.
24. Gupta RC, Kaushik TK. Description of avian biodiversity of Damdamma Jheel in Gurgaon District in Haryana, India. J Trop Life Sci. 2012;2(3):119–125.
25. Singh A, Laura JS. Avian and plant species diversity and their interrelationship in Tilyar Lake, Rohtak (Haryana). Bull Environ Pharmacol Life Sci. 2012;1(9):65–68.
26. Bhanot C, Chatterjee S. Conservation of urban wetland with potential international significance: a case study on Najafgarh Jheel, Delhi, India. Int J Conserv Sci. 2023;14(3):1057–1070.
27. Goyal P, Rai D, Kumar S. Changing land use and land cover dynamics in Chhilchhila Wildlife Sanctuary, Haryana, India: A winter migratory bird study. Environ Monit Assess. 2025;197(10):1–19.
28. Vigyan Varta. Wetland conservation: The key to a thriving ecosystem. 2022;3(6). https://www.vigyanvarta.in/adminpanel/upload_doc/VV_0625_18.pdf
29. Singh G, Khalid MA. Study on seasonal variation and diversity of avifauna in some wetlands in Haryana. J Exp Zool India. 2022;25(2).
30. Earth-Site Education. Wetland restoration. 2022. https://www.earth-site.co.uk/Education/wetland-restoration/
31. Climate Change Academy. Assessing the vulnerability of wetlands to climate change. 2023. https://climatechange.academy/impacts-of-climate-change/assessing-wetland-vulnerability-climate-change/
32. Kuchara V *et al*. Wetland degradation and loss due to the expansion of anthropogenic activities. IABCD J. 2023;2(2). https://iabcd.org.in/index.php/iabcd/article/view/191
33. Singh A, Laura JS. Avian and plant species diversity and their interrelationship in Tilyar Lake, Rohtak (Haryana). Bull Environ Pharmacol Life Sci. 2012;1(9):65–68.
34. Kumar A, Alam I. Migration of birds and their flyways in India. Rec Zool Surv India. 2023;123(1S):25–35.
35. Tanalgo KC, Pineda JA, Agravante ME, Amerol ZM. Bird diversity and structure in different land-use types in lowland South-Central Mindanao, Philippines. Trop Life Sci Res. 2015;26(2):85–103.
36. Burt CS, Kelly JF, Trankina GE, Silva CL, Khalighifar A, Jenkins-Smith HC *et al*. The effects of light pollution on migratory animal behaviour. Trends Ecol Evol. 2023.
37. Chopra G, Jakhar P. Avian diversity of wetland habitats of District Fatehabad, Haryana (India). Int J Pharm Life Sci. 2016;7(9).