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हिंदीभाषा एवं साहित्य में अनुवाद का महत्व

डॉ.सानप शाम बबनराव

आज हिंदी ने भाषा विषयक कार्य क्षेत्र में स्वयं के लिए एक वैश्विकख्याति अर्जित कर ली है। वैश्वीकरण के इस युग में अनुवाद की भूमिका अत्यंत महत्वपूर्ण हो गई है, सभी देशों की भाषा जनसामान्य तक पहुंचाने का एक ही माध्यम है अनुवाद। यह संभव नहीं है कि प्रत्येक व्यक्ति एक या दोसे अधिक भाषाएं भलीभांति सीख व जान सके इसलिए यह आवश्यक है कि उनके लिए वैज्ञानिक तथा तकनीकी साहित्य अपनी भाषा में उपलब्ध कराया जाए। अनुवाद भाषांतरण की एक प्रक्रिया है, जिसमें स्रोत भाषा की विषयवस्तु को लक्ष्य भाषा में रूपांतरित किया जाता है। मशीनी अनुवाद तो भाषाविज्ञान की देन है। आज सूचना प्रौद्योगिकी के बढ़ते युग में अनुवाद का महत्व और बढ़ गया है। प्रस्तुत शोध अध्ययन अनुवाद के क्षेत्र में हिंदी भाषा की महत्ता एवं रोजगार के अवसर पर आधारित हैं।

भूमंडलीकरण के इस दौर में समस्त विश्व सिमट गया है। बदलते परिवेश के दृष्टिकोण से 'विश्वग्राम' की परिकल्पना साकार हो रही है। इस स्थिति में एक ऐसी संपर्क भाषा की आवश्यकता महसूस की जा रही है, जो संपूर्ण विश्व को एकता के सूत्र में बाँधकर रख सके। २१वीं सदी के विश्वग्राम की परिकल्पना और विश्वबाजार व्यवस्था की वजह से दुनिया भरके लोगों की दृष्टि हमारी हिंदी पर है। आज हमारी हिंदी विश्व के लगभग १५० देशों में प्रयोग की जा रही है, यह चीनी भाषा के बाद विश्वस्तर पर दूसरी महत्वपूर्ण भाषा है। प्रयोग के स्तर पर कुछ विद्वानों के द्वारा हिंदी विश्वकी प्रथम भाषा मानी गई है, चीनी दूसरे स्थान पर और अंग्रेजी तीसरे स्थानकी। भारत और विदेश में करीब ५० करोड़ लोग हिंदी बोलते हैं तथा इसभाषा को समझने वाले लोगों की कुल संख्या करीब ९० करोड़ है।

हिंदी भाषा का मूल प्राचीन संस्कृत भाषा में है। इस भाषा ने अपना वर्तमान स्वरूप कई शताब्दियों के पश्चात हासिल किया है और इसमें बड़ी संख्या में बोलीगत विविधताएं अब भी व्याप्त हैं। हिंदी की लिपि देवनागरी है, जो कि कई अन्य भारतीय भाषाओं के लिए संयुक्त है। हिंदी के अधिकतम शब्द संस्कृत से निर्मित हैं। इसकी व्याकरण की भी संस्कृत भाषा के साथ समानता है। भारत की सांस्कृतिक विरासत बहुत ही सुदृढ़ है, इस धनी संस्कृति को समझने की रुचि विदेशियों में भी बढ़ी है। यही कारण है कि कई देशों ने अपने यहां भारतीय भाषाओं को प्रोत्साहन देने के लिए शिक्षण केंद्रों की स्थापना की है। भारतीय धर्म, इतिहास और संस्कृति पर विभिन्न पाठक्रम संचालित करने के अलावा इन केंद्रों में हिंदी, उर्दू और संस्कृत जैसी कई भारतीय भाषाओं में भी पाठक्रम संचालित किए जाते हैं। वैश्वीकरण और निजीकरण के इस परिदृश्य में अन्य देशों के साथ भारत के बढ़ते व्यापारिक संबंधों को देखते हुए संबंधित व्यापारिक साझेदार देशों की भाषाओं की अंतर-शिक्षा की जरूरत महसूस की जाने लगी है। आज सूचना प्रौद्योगिकी के बढ़ते युग में अनुवाद का महत्व और बढ़ गया है प्रस्तुत शोध अध्ययन अनुवाद के क्षेत्र में हिंदी भाषा की महत्ता एवं रोजगार के अवसर पर आधारित है।

है। परंतु इस क्षेत्र के लिए द्विभाषी दक्षताहोना महत्वपूर्ण है। कोई व्यक्ति एक स्वतंत्र अनुवादक के तौर पर अपनीआजीविका संचालित कर सकता है और अपनी खुद की अनुवाद फर्म भीस्थापित कर सकता है। ऐसी फर्म अनुबंध आधार पर कार्य प्राप्त करती है तथा बहुत से पेशेवर अनुवादकों को रोजगार उपलब्ध कराती है। विदेशीएजेंसियों से भी अनुवाद परियोजनाओं के अवसर प्राप्त होते हैं। यह कार्यआसानी से इंटरनेट के जरिए किया जा सकता है। विश्वभर में सिस्ट्रॉन,एसडीएल इंटरनेशनल, डेट्रॉयर ट्रांसलेशन ब्यूरो, प्रोज आदि असीमित संख्यामें भाषा कंपनियां हैं। इनमें से ज्यादातर भाषाई—उन्मुख कंपनियां हैं, जो किबहुभाषी सेवाएं उपलब्ध कराती हैं और इनमें से एक भाषा हिंदी भी है। अन्यकंपनियां इन कंपनियों से अनुबंध आधार पर भाषा सेवाएं प्राप्त करती हैं। इन फर्मों में रोजगार के अवसर स्थाई या स्वतंत्र अनुवादकों तथाभाषांतरकारों के रूप में उपलब्ध होते हैं। प्रकाशन घरानों में अनुवादक,संपादक और कंपोजर के रूप में व्यापक अवसर मौजूद हैं। हिंदी भाषा मेंस्नातकोत्तरों, विशेषकर जिन्होंने अपनी पीएचडी पूरी कर ली है, के लिएविदेशों में भी रोजगार के अवसर हैं। कुछ देशों द्वारा हिंदी को बिजनेस कीभाषा स्वीकार किए जाने के फलस्वरूप विदेशी विश्वविद्यालयों में हिंदी भाषाऔर भाषा—विज्ञान के शिक्षण की जबर्दस्त मांग बढ़ी है। भारत में स्कूलों,कॉलेजों और विश्वविद्यालयों में शिक्षक के तौर पर भी परंपरागत शिक्षणव्यवसाय को चुना जा सकता है।

निष्कर्षतः

उपर्युक्त आधारों पर देखा जा सकता है कि वैश्वीकरण एवंसूचना—क्रांति के इस दौर में हिंदी भाषा की उपयोगिता और प्रयोग में वृद्धिहुई है इसका प्रमाण हमें अंतर्राष्ट्रीय स्तर पर भी प्राप्त होता है। यहअंतरराष्ट्रीय संस्कृति की शताब्दी है और संप्रेषण के नित नए माध्यमों वआविष्कारों से वैश्वीकरण के नवीन क्षितिज उद्घाटित हो रहे हैं। इन सभीप्रक्रिया में अनुवाद की महती भूमिका है। इससे “वसुधैव कुटुम्बकम्” कीउपनिषदीय अवधारणा साकार होती है। इस दृष्टि से संप्रेषण—व्यापार केउन्नायक के रूप में अनुवादक एवं अनुवाद की भूमिका निर्विवाद रूप से अतिमहत्वपूर्ण सिद्ध होती है।

संदर्भ

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डॉ.सानप शाम बबनराव

कालिकादेवी कला, वाणिज्यएवं विज्ञान महाविद्यालय, शिरूर का., जि.बीड

A Reading of Feminist Aspect in Angela Carter's *Shadow Dance* and *The Magic Toyshop*

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Abstract:

Feminism is a complex ideology that encompasses many different subcategories that are all uniquely different from one another. One of the renowned stylish fiction authors of the 20th century, Angela Carter, expresses the views of feminism through her novels, fairy tales, and re-writes of fairy tales. The English novelist Angela Carter is best known for her 1979 book *The Bloody Chamber*, which is a kind European fairy tales. She is one of the prominent and prestigious writers of her times. She began her career as a writer very early, when she was in her twenties. She has received many awards; they are James Tait Black Memorial Prize (for fiction), Kurt Maschler Award, The Cheltenham Prize, Somerset Maugham Award, and Mail on Sunday/John Llewellyn Rhys Prize.

Keywords: Patriarchy, women and Feminism.

Introduction:

Feminism is a complex ideology that encompasses many different subcategories that are all uniquely different from one another. One of the renowned stylish fiction authors of the 20th century, Angela Carter, expresses the views of feminism through her novels, fairy tales, and re-writes of fairy tales. The English novelist Angela Carter is best known for her 1979 book *The Bloody Chamber*, which is a kind European fairy tales. She is one of the prominent and prestigious writers of her times. She began her career as a writer very early, when she was in her twenties. On the widened scope of her writing Warner says,

The novels showed her baroque powers of invention and her fearless confrontation of erotic violence, of female as well as male sexuality. She marked out her territory early and men and women clash on it, often bloodily and the humor is mostly of the gallows variety. From the beginning, her prose was magnificently rich, intoxicated with words- a vivid and sensual lexicon of bodily attributes of minerals of flora and fauna and she dealt in strangeness. (Warner, p. 11)

The novels written by Carter gave her fame and name. She has received many awards; they are James Tait Black Memorial Prize (for fiction), Kurt Maschler Award, The Cheltenham Prize, Somerset Maugham Award, and Mail on Sunday/John Llewellyn Rhys Prize. Her stay in Japan has great impact of surrealism on her. During her stay in Japan, she has written two novels *Nights at the Circus* and *Wise Children*. From her childhood, Carter loved music, cinema, songs and circus. Along with the novels, she has an experience of short story writing. *The Bloody Chamber and Other Stories* (1980) and *The Black Venus* (1981) are her short stories. For children the short stories are *Miss Z*, *The Dark Young Lady* and *The Donkey Prince*. Carter's work in verse

is *Unicorn*. She has edited a work *Wayward Girls and Wicked women*. Carter's last published work is *Expletives Deleted: Selected Writings* (1992).

The term 'feminism' is used to describe a political, cultural and economic movement which aimed at establishing equivalent rights for women. It involves many theories and philosophies concerned with issues of gender difference, and a movement that advocates gender equality for women and campaigns for women's rights and interests. According to Maggie Humm and Rebecca Walker,

The history of feminism can be divided into three waves. The first feminist wave was in the nineteenth and early twentieth century's, the second was in the 1960s and 1970s, and the third extends from the 1990s to the present. Feminist theory emerged from these feminist movements. It is manifest in a variety of disciplines such as feminist geography, feminist history and feminist literary criticism. (<http://www.gender.cawater-info.net/>)

There are many criteria of feminism, among them liberal feminists were of the opinion of equal job and wages to women whereas radical feminists study deals with sexual politics, pornography, the oppressed position of women, male gaze etc. All these works are minutely discussed in the works of Angela Carter. *Shadow Dance* (1966) is the debut novel of Angela Carter. The characters in the novel, Morris, Oscar Honey prove unfaithful against women. In *The Magic Toyshop* (1967), the orphaned Melanie, in the very young age is forced to work under her tyrannical Uncle Philip, who is the representative of patriarchy. In *Several perceptions* (1968) Joseph, the protagonist watches and experiences the miseries of women and thinks that he is persecutor of women. *Heroes and Villains* (1969) focuses light on the social differences between men and women. The novel describes rape as a mean to subjugate women. In *Love* (1971), the women are shown unhappy. *Infernal Desire* *Machine of Doctor Hoffman* (1972) has a theme of science fiction and fantasy. Desidireo fought against Dr. Hoffman who wants to liberate man from reality. Carter's *Passion of New Eve* is the story in which with the advanced technique, Mother changes men into women, just for knowing the brutal experience of rape, unwanted pregnancy. *Nights at the Circus* is the story of a girl Fevvers, a girl with wings. She is shown the example of a liberated woman. *Wise Children* (1991), it is the story of twin girls Dora and Nora, the illegitimate daughters of Melchoir Hazard. He is a Shakespearean actor and acknowledges these two daughters on his hundredth birthday.

Feminist Approach:

The present research paper is going to focus on the elements of feminism in her *Shadow Dance* and *The Magic Toyshop*. Carter has elaborately described the theme of feminism through her writings. She always gives encouragement to women in the novel and assures the results against fighting with patriarchy. Even Carter's fairy tales serves the purpose of feminism. Carter's *The Bloody Chamber* becomes famous and caught attention of the many writers at the same time her novels *Wise Children* and *Shadow Dance* do not come into much limelight. Carter is a radical feminist and seeks for equality of women. The reflection of radical feminism is lucid in *The Bloody Chamber* and her early works. In *The Bloody Chamber*, mother saves her daughter from Blue Beard. In true sense, Carter is the strong advocate of women empowerment. Even though Carter's writing

span is not much lengthy, she dealt with various subjects in her works. In all the issues the gender issue was at height. She has unrevealed the truths which other writers never spoke about. Throughout the work, Carter made a women centered world. Her female characters are powerful and destructive. It is noteworthy to mention that Carter with the financial help of earlier success went to Japan and she experiences the things, which she later on depicted in her novels.

Patriarchy is nothing but the domination of male .Patriarchy proves to be a kind of hindrance in the progress of women. Even patriarchy is responsible for the subordinate position of women. It gives full freedom to men and very less to female. In short patriarchy is kind of male dominated society. Violence in other way is used as a weapon to control the power of women. Carter's first novel, *Shadow Dance* deals with the story of love triangle with two men and a woman. It is the story of violence. Honeybuzzard is shown ruthless who plays with the emotion of beautiful Ghislaine. In the course of time, the scar on the face of Ghislaine haunts Morris. The novel ends with the murder of Ghislaine by Honey. In *Shadow Dance* Ghislaine is presented an unsatisfied young woman, who is scarred after a violent sexual attack. Both Morris and Honey are shown the equal partners in crime. Violence reaches to such a peak that all the characters fall prey to the violence for which they are responsible. Ghislaine is shown a woman who obeys the rules and the values of a male dominated society. Both the women in the novel, Ghislaine and Emily are unmarried. In the early novels of Carter, marriage is not the thing of happiness, on the contrary, it is harmful and a curse. In other words marriage proves to be the means through which the women can be trapped and controlled. The women in the novel have given inferior position. Edna, the wife of Morris, without raising a question, accepts the authority of Morris. According to her, 'Husbands were a force of nature or an act of God, like an earthquake or the dreaded consumption, to be borne with to be meekly acquiesced to be impregnated by as frequently as nature would allow.' (SD, 45) Morris is presented as an innocent and able to suffer silently even though she is the sole breadwinner of the family. Edna stands for everyone to help. She does not like to see the misery of others. She even stands by the side of Ghislaine. Though she is a good hearted woman, there is no place to her in such patriarchal world. On the other hand Ghislaine with the scar wanders everywhere and rejected. When she comes to Honey, she says to him, 'I've learned my lesson, I can't live without you, you are my master, do what you like with me. (SD, 166) Ghislaine gets unfortunately murdered by the hands of Honey.

Apart from Edna and Ghislaine, Emily is one female character in the novel. She is sexually active yet unmarried. Woman tries to be equal with men. She is catholic but thinks religion as 'a lot of old rubbish' (SD, 106) she is presented as a practical and a strong girl. She serves in the junk shop to the customers. She is rather very much different from the above two female characters. Emily is,

Hard, cool, (and) impersonal, and just as she had cheerfully thrown away the enormous wardrobe of her father, her first hero...in order to clear a space for Honeybuzzard, so she might, one day, throw away Honeybuzzard when she came upon something that seemed to her more pleasing, where she loved, she loved entirely, but not necessarily, for long. (SD, 99)

In the end only, Emily comes to know that Honey has gone off with Ghislaine.

The Magic Toyshop is a very popular novel of Angela Carter. It was written in 1967. It comprises the story of Melannie and her two siblings and their shelter in her tyrannical uncle Philip's house as their parents were killed in an accident. Uncle Philip has no emotions and behaves with everyone just like puppets. In the house, the supreme power was of Uncle. He is shown as the representative of male domination. Aunt Margaret, wife of Uncle Philip too suffers a lot under Philip's supremacy. Philip has a puppet shop. In the novel these women are treated as subordinates and given inferior positions

Being a student of English Literature; Carter has great influence of English writers such as Shakespeare, Milton and also of John Milton on her writing. According to Edmund Gordon, biographer of Angela carter,

In Angela Carter's fiction – as in fairy tales – the heroine often makes a dramatic gesture, forsaking everything, giving up her oppressive past for an uncertain future. *The Magic Toyshop* – the novel that most powerfully evokes her childhood – ends with Melanie and Finn looking at each other 'in a wild surmise' as the family home is destroyed by fire. (Gordon, 47)

Like the puppets, all the characters in the novel are under the control of Uncle Philip. Margaret is completely under the power of Uncle Philip. It is strengthened by the necklace which is given to her by Philip. This necklace was allowed to wear only on Sunday. This choking and uncomfortable necklace is the act of suppression of Margaret's thoughts. As a result of all the cruelty on her by Philip made her voiceless throughout the novel. Thus Margaret becomes the victim of cruel husband Philip.

Uncle Philip dominates Melanie in each respect even sexually. It is clear in the puppet performance of Leda and the Swan. Melanie was performing the role of Leda. In the performance Uncle Philip carried out the act of rape indirectly by means of swan. On the other hand, the dumbness of Margaret is the indication of no leaving any option to Philip. She is aware of the cruelty in the nature of her husband, that's why she herself accepts dumbness. Philip doesn't give any money to these women. These poor women were living completely under the mercy of Philip. From this, it is clear that Philip must have fear, that if they would be given financial freedom, they can stand against him. For any kind of purchase the consent of male authority was important. Philip never gives time to his family nor he understands them, on the contrary, he always escaped with his puppets.

Like necklace, Philip made restrictions on Margaret's dress. Margaret has to wear a particular dress on Sunday. This dress never makes her happy. The dress was very dull and made of cheap material. The dress expresses her lack of happiness. All the women in the novel are depended on male. When Melanie was growing, she was thinking and dreaming of her marriage but due the tragic death of her parents, the things change and she has to admit the realities of life, the life under the supervision of tyrannical Uncle Philip.

Even the women in the novel have no freedom to wear the dress they like. Once Melanie wore a pair of trousers, here, Finn warns Melanie that she can't wear the dresses like that because Uncle Philip 'Can't abide a woman in trousers. He won't have a woman in the shop if she's got trousers on and he sees her. He shouts her

into the street for a harlot (MTS, 62). In this way' the theme of women exploitation is incorporated in the novel. With the weapons like magic realism, gothic fiction and fantasy Carter developed a postmodern approach and focuses on the gender issue and femininity of her times. In such a suffocated condition, the women like Margaret finds freedom with Francie and Melanie with Finn.

To sum up, Angela Carter will be remembered for her feminist writings and incorporation of different themes like magic realism, fantasy, hybridity, science fiction, gothic fiction etc. These all efforts made her a radical feminist for which she is known for.

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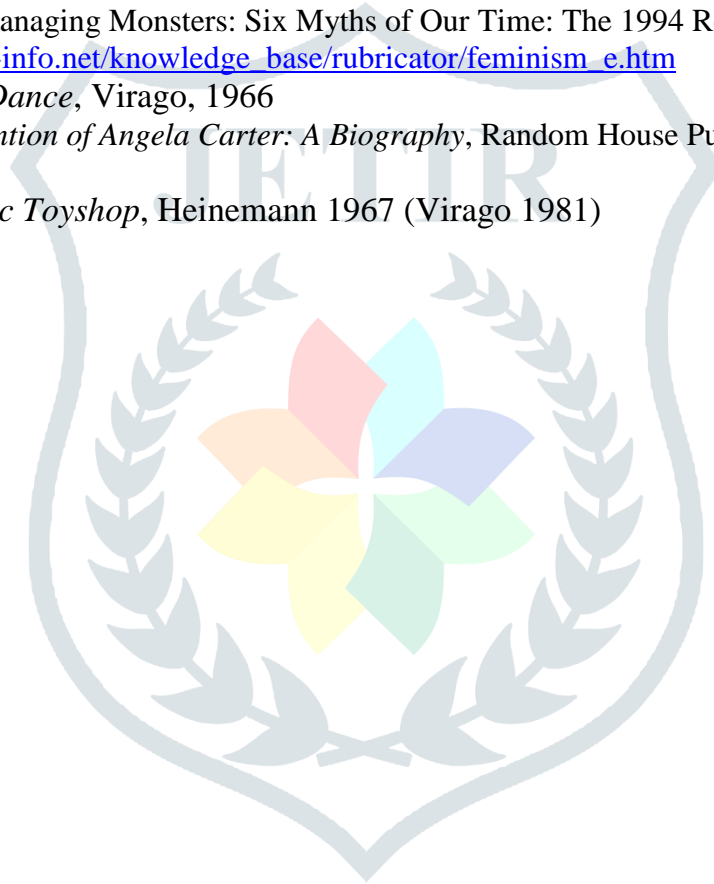
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ग्रामीण महिलांच्या सामाजिक-राजकीय सबलीकरणात पंचायतराजमधील आरक्षणाची भूमिका

डॉ. सुधीर आ. येवले

संशोधन मार्गदर्शक व समाजशास्त्र विभाग प्रमुख
कालिकादेवी कलाए वाणिज्य व विज्ञान महाविद्यालय (शिरूर ; का.) जि.
बीड

❖ प्रस्तावना ; पदजतवकनबजपवदद्ध रू

पारंपारिक पुरूषप्रधान भारतीय समाजात महिलांना अबला समजल्यात येई. त्यांना कौटुंबिकए सामाजिक तसेच राजकीय क्षेत्रातील सत्तेपासून वंचित ठेवले जात असे. राजकीय सत्ता ही दुसऱ्या ठिकाणच्या सत्तेचा स्त्रोत असते. लोकसभेतील खासदारांचे आजपर्यंतचे प्रमाण 8 टक्के पेक्षा जास्त गेलेले नाही. राज्यसभेतील महिला खासदारींचे प्रमाणही 12 टक्के पेक्षा जास्त नाही. तर महाराष्ट्राच्या विधान परिषदेत इ.स. 1952.1958 चा 13^ण89 टक्के चा अपवाद वगळता महिला आमदारांचे प्रमाण 10 टक्के पेक्षा जास्त नाही म्हणून 75 व्या घटनादुरूस्तीने महिलांना सबल बनविण्याकरीता पंचायतराज व्यवस्थेत जाणीवपूर्वक 33 टक्के आरक्षण देऊन ग्रामीण महिलांना सत्तेत सामील करून घेण्याचा प्रयत्न केला आहे. पंचायतमध्ये महिलांना 33 टक्के आरक्षण असले तरी त्यापेक्षाही जास्त महिला पंचायतराजमध्ये सरपंचए सदस्यए पंचायत समिती सदस्यए सभापतीए जिल्हा परिषद अध्यक्षए सभापती पदावर महिला कार्यरत आहेत. म्हणजेच ज्या महिलांना घराच्या बाहेर जाण्याची संधी नव्हती त्या आता गावचा कारभार पाहण्याची संधी पंचायतराजमधील आरक्षणामुळे मिळाली आहे. प्रस्तुत अभ्यास ग्रामपंचायतीच्या सरपंचाचा असून 33 टक्के आरक्षण म्हणजे केवळ इतक्याच महिला सरपंच पदावर येतील असे नाहीत तर कमीत कमी 33 टक्के महिला असाव्यात असा त्याचा अर्थ आहे. शिवाय या व्यतिरिक्तही इतर जागावर त्या निवडून येऊ शकतात. म्हणजे उरलेले 67 टक्के आरक्षण हे पुरूषांसाठी आहे असे नाही. त्यामुळे यापुढे



Vision of Dr. Ambedkar about Women and Status of Modern Women in India

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Abstract:

There have been innumerable debates about gender in India over the years. Much of it includes women's positing in society, their education, health, economic position, gender equality etc. What one can conclude from such discussions is that women have always held a certain paradoxical position in our developing country. While on one hand, India has seen an increased percentage of literacy among women, and women are now entering professional fields, the practices of female infanticide, poor health conditions and lack of education still persisting still continue. Even the patriarchal ideology of the home being a woman's 'real domain' and marriage being her ultimate destiny hasn't changed much. The matrimonial advertisements, demanding girls of the same caste, with fair skin and slim figure, or the much criticised fair and lovely ads, are indicators of the slow changing social mores. If one looks at the status of women then and now, one has to look at two sides of the coin; one side which is promising, and one side which is bleak. Today, the modern woman is so deft and self-sufficient that she can be easily called a superwoman, juggling many fronts single-handedly. Women are now fiercely ambitious and are proving their metal not only on the home front, but also in their respective professions.

Key Words: status of Women in India, Vision of Dr. Ambedkar about women,

Introduction:

The vision of Dr. Ambedkar about women is explicitly depicted in Indian Constitution. Dr. Ambedkar tried an adequate inclusion of women's right in the political vocabulary and constitution of India. i.e., Article 14 Equal rights and opportunities in political, economic and social spheres, Article 15 prohibits discrimination on the ground of sex, Article 15(3) enables affirmative discrimination in favor of women, Article 39 Equal means of livelihood and equal pay for equal work, Article 42 Human conditions of work and maternity relief, Article 51 (A)(C) Fundamental duties to renounce practices, derogatory to the dignity of women, Article 46 The state to promote with special care, the educational and economic interests of weaker section of people and to protect them from social injustice and all

forms of exploitation, Article 47 The state to raise the level of nutrition and standard of living of its people and the improvement of public health and so on, Article 243D (3), 243T (3) & 243R (4) provides for allocation of seats in the Panchayati Raj System and many others. The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, Fundamental Duties and Directive Principles. He laid down the foundation of social justice and there can be no social justice without gender equality. (1)

In tune with the global phenomenon, educated Indian women seem to have formed a vision of equality with men. They have acquired a tremendous zeal to secure what they call 'lost rights.' They no longer consider themselves silent spectators in this dynamic world situation, but feel an urgent obligation to action and role-contribution. They urge breaking away from hackneyed traditions, warped social thinking and double standards of morality, that have blocked the worthwhile contributions they could make to the country's welfare. They have the vote of course; they have legal rights, abortions has been legal for many years now; they can aspire or be elected to any office in the country that men have access to. And yet, in spite of all this, many find themselves trapped in stereotyped roles.

The status of women in India has been subject to many changes over the span of recorded Indian history. Their position in society deteriorated early in India's ancient period, especially in the Indo-Aryan speaking regions, (2,3,4) and their subordination continued to be reified well into India's early modern period. Practices such as female infanticide, dowry, child marriage and the taboo on widow remarriage, have had a long duration in India, and have proved difficult to root out, especially in caste Hindu society in northern India.(5,6) Women's rights under the Constitution of India mainly include equality, dignity, and freedom from discrimination; additionally, India has various statutes governing the rights of women. (7,8) So in this view while studying the status of modern women we have to mainly study the;

- Educational Status
- Health Status



Ethical Values in Higher Education

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Abstract:

Ethical values in Indian higher education and society are declining and require a new way of thinking which would be based on Indian ethos. Ethics are well founded standards that make the actions right and wrong. It helps categorize different values such as integrity discipline and honesty among others and apply them in daily lives. Without ethics it will be very difficult to regulate life and act responsibly. Ethics in education are essential as they help run the system smoothly. it sets the standards of what's acceptable and what's not hence protecting the interests of both the educators and the learners. Ethics in education has been given a lot of importance over the years and institutions are designing courses that help students understand these ethics. Ethics in education are applicable on both the instructors as well as the students. While it's the teacher's job to make the students aware about these ethics the school management often takes it upon them to familiarize the instructors with the ethics that are relevant to their profession. The paper focuses on the importance of ethics in the process of education in today globalized world

Key Words: Ethics and Values in Education, Ethical Education, Ethical Education in Classroom

Introduction:

Mahatma Gandhi: "Your beliefs become your thoughts, your thoughts become your words, Your words become your actions, Your actions become your habits, Your habits become your values, Your values become your destiny."

Ethics are a set of rules that tend to be adopted and upheld by a group of people. This could include medical ethics, journalism and advertising ethics and educational ethics. So ethics or intent tends to be viewed as something upheld and adopted internally, such as professionalism, while morals are ideals we impose on others.

Teachers play a very important role in a student's life. They not only impart education but also help develop the personality of a student. **Ethics in education** that are applicable on teachers require them to show patience to every student despite their learning abilities. They should treat every student equally and do justice while taking an action. It's important that an instructor understands that every student is different and shouldn't be evaluated on the same basis. **Ethics in education** doesn't allow teachers to hold grudges and to intentionally treat students unfairly. At the same time **ethics in education** requires a student to respect the instructor and abide by the rules set by them. Students should acquire academic integrity and responsibility as well as practice self-discipline. **Ethics in education** helps regulate the education system and ensures that this practice positively contributes towards human welfare. (1) For the creations of healthy relationship in a particular profession it is necessary to establish the professional ethics such as business, medical etc. as a set of values, norms, principles and duties (2). In our present age, ethics has an important place in all areas of life. Ethics has also

Avifaunal study of Majalgaon Reservoir and their tributaries, District Beed, Marathwada region of Maharashtra, India

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Abstract- An avifaunal survey was conducted at Majalgaon Reservoir for two years, starting from July 2016 to June 2018. The study reveals a rich avian diversity a total of 84 species of birds belonging to 15 orders and 30 families were identified. As the water of the wetland is clear, rich in dissolved oxygen and supports variety of aquatic weeds and fishes, it has been found to be suitable for birds and attracts many migratory birds like large egret, purple heron, white bellied heron, asian open bill stork, greater flamingo, white naked stork etc. Continuous monitoring on the avifaunal diversity was suggested to evaluate the ecological status of the habitats and birds. It can be considered as an efficient tool to the environmentalists, policy makers in order to conserve such species, because, the role of birds in an ecosystem cannot be ignored.

Keywords : Majalgaon Reservoir, Avian diversity, Sindphana river, Migratory Birds etc.

I. INTRODUCTION

Bird community evaluation has become an important tool in biodiversity conservation and for identifying conservation actions in areas of high human pressure. Indian subcontinent is known for diverse and rich bird species whose taxonomy, distribution and their general habitat characteristics are well documented in India. Bird communities have been studied fairly well both in temperate and tropical forests. However, only a very little is known about bird community structure and their dynamics in India. Understanding the diversity and structure of bird communities is essential to delineate the importance of regional or local landscapes for avian conservation. Determinations of bird population in different habitats are central to understanding the community structure and niche relationships, as well as for intelligent management of populations. Moreover seasonal monitoring is equally important to trace the dynamic movement of birds in such habitats

Researcher have studied avian fauna in Marathwada as this area is blessed with various natural habitats such as river, reservoirs, hills, forests, grassland. (Yardi, *et al.*, 2004) reported 64 species of birds in Salim Ali lake, Aurangabad. (Kulkarni, *et al.*, 2005) reported 151 species of birds in and around Nanded city. Kulkarni *et al.*, (2006) recorded 18 Piscivorous bird species in Dongarkheda irrigation tank. Dist. Hingoli. Kulkarni, *et al.*, (2006) also recorded 93 species of birds in Shikhachiwadi Wadi, reservoir Dist. Nanded; Kulkarni *et al.*, (2010) listed 62 bird species in

forest Jaldhara, Kinwat. Dist.Nanded. (Balkhande *et al.*, 2012) recorded 53 species of birds on river Godavari near Dhangar Takli; (Balkhande *et al.*, 2012) recorded 50 species of birds near river Purna Dist. Parbhani.

Through this paper we would like to draw attention towards the least known avifauna of the Majalgaon reservoir and their tributaries, Beed district.

II. MATERIALS AND METHODS

Study area

The study area comes under the Marathwada region of Maharashtra (Fig. 1).

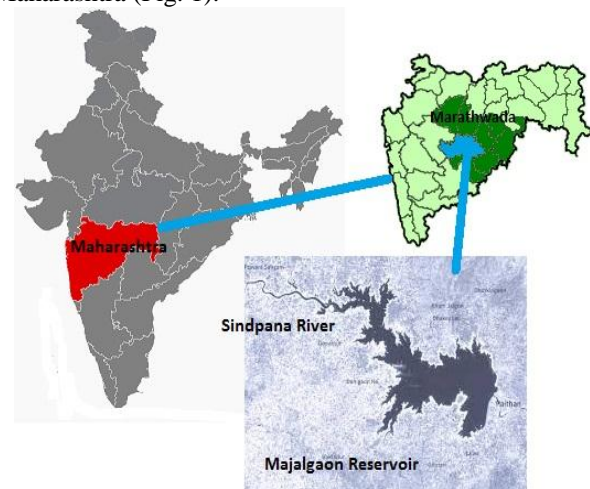


Fig. 1. Study area of Majalgaon Reservoir

Field surveys were conducted for a period of two years starting from July 2016 up to June 2018 covering all the seasons. The areas were surveyed using binoculars and digital cameras for proper bird records. Direct observations and species noting was made by walking on channel of river, reservoir tracks, and reservoir areas. The observations were carried out at different points around the large wetland. Birds were identified following with the avifaunal field guidebooks (Kazmierczak et. al., 2003; Grimmett et. al., 2011) and Internet Birds database were used. The checklist of bird species is prepared by following the guidelines for checklist of birds (Abdulali, 1981; Ali and Ripley, 1983). The population status observed of bird species was recorded as per ACOR rating (Buckland et. al., 1983). Current status of threatened categories was adopted from Bird Life International (2000).

III. RESULTS AND DISCUSSION

The present studies on bird community structure of Majalgaon Reservoir of Beed district, Marathwada region, Maharashtra revealed the presence of 84 species of birds belonging to 60 genera spread over 30 families and 15 orders. Further, it was interesting to note that the order fasseriformes dominated among the avian diversity with 29 species. (Table 1).

Family wise analysis showed that family Ardeidae (07 species) dominated the avifauna, followed by Anatidae, Columbidae, Turdinae (6 species each), Cuculidae (5 Species), Rallidae, Pycnonotidae (4 species each) Cionidae, Charadriidae, Pisttaciidae, Alcedinidae, Hirundinidae, Paridae, Passerinae (3 species each), Phalacrocoracidae, Threskiornithidae, Phasianidae, Apodidae, Meropidae, Motacillidae, Laniidae, Sturnidae, Corvidae (2 species each) whereas, Podicipidae, Phoenicopteridae, Gruidae, Recurviorstridae, Strigidae, Estrildidae and Dicuridae (1 species each) were poorly represented in the area (Table 1). Similarly, Manakadan and Pittie (2000) have reported Muscipidae as the largest bird family of India with 370 species. Recently, Mahabal (2000) reported maximum number of birds (105 species) under this family. Similarly, Thakur (2008) also found Muscipidae as the biggest family of birds with 67 species from Himachal Pradesh.

Analysis of data on residential status revealed that out of 84 species, 33 were resident common and rest 51 showed migrant common, residential migrant common, uncommon rare, migrant rare, resident rare, uncommon, seasonally migrant common, uncommon, rare and breeding migrant rare, uncommon (Table 1). The present work is in conformity with the earlier work of S. P. Chavan et.al. (2015) was reported 168 birds from Godaver river basin Nanded, Thakur et al. (2003) carried out in Balh Valley of Mandi district in lower Himalayan region of Himachal Pradesh. Similarly, this investigation is in agreement with

the earlier works of Mahabal and Mukherjee (1991), Thakur et al. (2002), Mahabal (2000), Mattu and Thakur (2006), Thakur (2008) and Thakur et al. (2010) who also reported resident, altitudinal migrant, summer and winter visitor birds in different areas of Himachal Pradesh.

Analysis of data as per ACOR and IUCN status the ACOR rating only 12 species were abundant, 33 common, 23 occasional and 16 species were rare. According to IUCN categorization 79 species were least concern, 03 nearly threatened and 01 species from vulnerable and critically endangered. No any bird species from threatened and endangered (EN) category was sighted at any selected bird habitat. Similarly, there is no report of any species of bird which has been extinct from this region in recent time. (Table 1) The present work is in conformity with the earlier work according to Kulkarni et. al. (2005) had extensively studied the birds in and around Nanded city and enlisted with their categorization and ACOR rating for abundance. S. P. Chavan et.al. (2015) also reported ACOR categorization and IUCN status of birds from Godaver river basin Nanded.

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Table 1: Systematic list of birds of Majalgaon Reservoir, Marathwada region, Maharashtra

Sr. No.	Taxon	Common Name	Population, IUCN Status	Ecological status
	Order I: Podicipediformes			
	Family I: Podicipidae			
1	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	Little grebe	C (LC)	MC
	Order II: Pelecaniformes			
	Family II : Phalacrocoracidae			
2	<i>Phalacrocorax niger</i> (Vieillot, 1817)	Little Cormorant	A (LC)	RMC
3	<i>Phalacrocorax fuscicollis</i> (Stephens, 1826)	Indian Cormorant	R (LC)	RMU
	Order III: Ciconiiformes			
	Family III: Ardeidae			
4	<i>Ardeola grayii</i> (Skyles, 1832)	Indian pond Heron	A (LC)	RC
5	<i>Egretta garzetta</i> (Linnaeus, 1766)	Little Egret	C (LC)	RM
6	<i>Bubulcus ibis</i> (Linnaeus, 1758)	Cattle Egret	A (LC)	RM
7	<i>Casmerodius albus</i> (Linnaeus, 1758)	Large Egert	O (LC)	Mr
8	<i>Ardea purpurea</i> (Linnaeus, 1766)	Purple Heron	R (LC)	Mr
9	<i>Ardea insignis</i> (Hume, 1878)	White bellied Heron	R (Cr)	Mr
10	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	Night Heron	C (LC)	Rr
	Family IV: Ciconiidae			
11	<i>Mycteria leucocephala</i> (Pennant, 1769)	Painted Stork	C (NT)	MC
12	<i>Anastomus oscitans</i> (Boddaert, 1783)	Asian Open bill Stork	R (LC)	Mr
13	<i>Ciconia episcopus</i> (Boddaert, 1783)	White Necked/Wooly Stork	O (LC)	WMr
	Family V: Threskiornithidae			
14	<i>Pseudibis papillosa</i> (Temminck, 1824)	Oriental White/Black Head Ibis	R (LC)	MU
15	<i>Platalea leucorodia</i> (Linnaeus, 1758)	Euresion Spoonbill	C (LC)	WMU
	Order IV: Phoenicopteriformes			
	Family VI: Phoenicopteridae			
16	<i>Phoenicopeterus ruber</i> (Linnaeus, 1758)	Greater flamingo	R (LC)	WMr
	Order V: Ansariformes			
	Family VII: Anatidae			
17	<i>Tadorna ferruginea</i> (Pallas, 1764)	Ruddy Shelduck	M (LC)	WMC
18	<i>Dendrocygna javanica</i> (Horsfield, 1821)	Lesser Whistling Duck	C (LC)	WMC
19	<i>Anas poicillorhyncha</i> (Forster JR, 1781)	Spot Billed Duck	C (LC)	RMC
20	<i>Netapus coromandalianus</i> (Gmelin J F, 1789)	Cotton/Pigmy Goose	O (LC)	WMr
21	<i>Aythya ferina</i> (Linnaeus, 1758)	Common pochard	O (LC)	WMr
22	<i>Netta rufina</i> (Pallas, 1773)	Red crested pochard	O (LC)	WMr
	Order VI: Galliformes			
	Family VIII: Phasianidae			
23	<i>Pavo cristatus</i> (Linnaeus, 1758)	Indian Peafowl	A (LC)	RC

24	<i>Coturnix Coturnix</i> (Linnaeus, 1758)	Common Quail	A (LC)	RC
	Order VII: Gruiformes			
	Family IX: Gruidae			
25	<i>Grus antigone</i> (Linnaeus, 1758)	Sarus Crane	O (VU)	RU
	Family X: Rallidae			
26	<i>Amauromis phoenicurus</i> (Pennant, 1769)	White-breasted Waterhen	A (LC)	RC
27	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)	Purple Moorhen	A (LC)	RC
28	<i>Fulica atra</i> (Linnaeus, 1758)	Eurasian Coot	O (LC)	RC
29	<i>Gallinula chloropus</i> (Linnaeus, 1758)	Common Moorhen	C (LC)	RC
	Order VIII: Charadriiformes			
	Family XI: Charadriidae			
30	<i>Vanellus duvaucelii</i> (Lesson, 1826)	River Lapwing	R (NT)	Rr
31	<i>Vanellus indicus</i> (Boddaert, 1783)	Red-wattled Lapwing	C (LC)	RC
32	<i>Vanellus malabricus</i> (Boddaert, 1783)	Yellow wattled Lapwing	O (LC)	RU
	Family XII: Recurvirostridae			
33	<i>Himantopus himantopus</i> (Linnaeus, 1758)	Black winged stilt	A (LC)	WMC
	Order IX: Columbiformes			
	Family XIII: Columbidae			
34	<i>Columba livia</i> (Gmelin, 1789)	Blue Rock Pigeon	C (LC)	RC
35	<i>Streptopelia senegalensis</i> (Linnaeus, 1766)	Little Brown Dove	C (LC)	RU
36	<i>Streptopelia chinensis</i> (Scopoli, 1786)	Spotted Dove	O (LC)	RU
37	<i>Streptopelia decaocto</i> (Frisvaldszky, 1838)	Eurasian Collared-Dove	C (LC)	RC
38	<i>Streptopelia tranquebarica</i> (Hermann, 1804)	Red collared Dove	R (LC)	RMC
39	<i>Treron phoenicoptera</i> (Latham, 1790)	Yellow-legged Pigeon	R (LC)	Rr
	Order X: Psittaciformes			
	Family XIV: Psittacidae			
40	<i>Psittacula eupatria</i> (Linnaeus, 1766)	Alexandrine Parakeet	O (LC)	RC
41	<i>Psittacula krameri</i> (Scopoli, 1769)	Rose-ringed Parakeet	O (LC)	RC
42	<i>Psittacula roseate</i> (Biswas, 1951)	Blssom headed Parakeet	R (NT)	RC
	Order XI : Cuculiformes			
	Family XV: Cuculidae			
43	<i>Clamator jacobinus</i> (Boddaert, 1783)	Pied Crested Cuckoo	O (LC)	BMr
44	<i>Hierococcyx varius</i> (Vahl, 1797)	Brainfever Bird	C (LC)	BMU
45	<i>Cuculus micropterus</i> (Gould, 1838)	Indian Cuckoo	A (LC)	RC
46	<i>Cuculus canorus</i> (Linnaeus, 1758)	Common Cuckoo	R (LC)	RC
47	<i>Eudynamis scolopacea</i> (Linnaeus, 1758)	Asian Koel	C (LC)	RC
	Order XII: Strigiformes			
	Family XVI: Strigidae			
48	<i>Athene brama</i> (Temminck, 1821)	Spotted Owlet	C (LC)	RC
	Order XIII: Apodiformes			
	Family XVII: Apodidae			
49	<i>Apus affinis</i> (J.E. Gray, 1830)	House Swift	A (LC)	RMr
50	<i>Apus apus</i> (Linnaeus 1758)	Common swift	C (LC)	Rr
	Order XIV: Coraciiformes			
	Family XVIII: Alcedinidae			
51	<i>Alcedo atthis</i> (Linnaeus, 1758)	Small Blue Kingfisher	C (LC)	RU
52	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	White-breasted Kingfisher	C (LC)	RU
53	<i>Ceryle rudis</i> (Linnaeus, 1758)	Pied Kingfisher	C (LC)	RU
	Family XIX: Meropidae			
54	<i>Merops orientalis</i> (Latham, 1801)	Small Bee-eater	C (LC)	RMC
55	<i>Merops philippines</i> (Linnaeus, 1766)	Blue tailed bee eater	C (LC)	RMU
	Order XV: Passeriformes			
	Family XX: Hirundinidae			
56	<i>Hirundo rustica</i> (Linnaeus, 1758)	Common Swallow	O (LC)	RMC
57	<i>Hirundo daurica</i> (Linnaeus, 1771)	Red-rumped Swallow	O (LC)	RMC
58	<i>Hirundo smithii</i> (Leach, 1818)	Coire tailed swallow	O (LC)	WMr
	Family XXI: Motacillidae			
59	<i>Motacilla alba</i> (Linnaeus, 1758)	White Wagtail	R (LC)	MU

60	<i>Motacilla maderaspatensis</i> (Gmelin, 1789)	Large Pied Wagtail	R (LC)	RM
	Family XXII: Pycnonotidae			
61	<i>Pycnonotus leucogenys</i> (Gray, 1835)	Himalayan Bulbul	C (LC)	RC
62	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	Red-vented Bulbul	C (LC)	RC
63	<i>Hypsipetes leucocephalus</i> (P.L.S. Muller, 1776)	Black Bulbul	O (LC)	WMr
64	<i>Pycnonotus jocosus</i> (Linnaeus, 1758)	Red-whiskered bulbul	A (LC)	RC
	Family XXIII: Laniidae			
65	<i>Lanius vittatus</i> Valenciennes, 1826	Bay-backed Shrike	O (LC)	WMU
66	<i>Lanius schach</i> (Linnaeus, 1758)	Rufous-backed Shrike	O (LC)	WMU
	Family XXIV: Muscipapidae			
	Subfamily: Turdinae			
67	<i>Copsychus saularis</i> (Linnaeus, 1758)	Oriental Magpie-Robin	C (LC)	RC
68	<i>Saxicoloides fulicata</i> (Linnaeus, 1776)	Indian Robin	C (LC)	RU
	Subfamily: Timaliinae			
69	<i>Turdoides striatus</i> (Dumont, 1823)	Jungle Babbler	C (LC)	RC
70	<i>Turdoides malcolmi</i> (Skyles, 1832)	Large Gray Babbler	C (LC)	RC
	Subfamily: Sylviinae			
71	<i>Prinia socialis</i> (Sykes, 1832)	Ashy Prinia	O (LC)	RC
72	<i>Orthotomus sutorius</i> (Pennant, 1769)	Common Tailorbird	O (LC)	Rr
	Family XXV: Paridae			
73	<i>Parus major</i> (Linnaeus, 1758)	Great Tit	R (LC)	Rr
74	<i>Parus monticolus</i> (Vigors, 1831)	Green-backed Tit	R (LC)	Rr
75	<i>Parus cinereus</i> (Vieillot, 1818)	Cinereous tit	R (LC)	RC
	Family XXVI: Estrildidae			
76	<i>Lonchura punctulata</i> (Linnaeus, 1758)	Spotted Munia	O (LC)	RC
	Family XXVII: Passeridae			
	Subfamily: Passerinae			
77	<i>Passer domesticus</i> (Linnaeus, 1758)	House Sparrow	C (LC)	RC
78	<i>Passer rutilans</i> (Temminck, 1835)	Cinnamon Tree Sparrow	C (LC)	RC
79	<i>Petronia xanthocollis</i> (Burton, 1838)	Yellow-throated Sparrow	C (LC)	RC
	Family XXVIII: Sturnidae			
80	<i>Sturnus pagodarum</i> (Gmelin, 1789)	Brahminy Starling	C (LC)	RC
81	<i>Acridotheres tristis</i> (Linnaeus, 1766)	Common Myna	C (LC)	RC
	Family XXIX: Dicruridae			
82	<i>Dicrurus macrocercus</i> (Vieillot, 1817)	Black Drongo	C (LC)	RC
	Family XXX: Corvidae			
83	<i>Corvus splendens</i> (Vieillot, 1817)	House Crow	O (LC)	RC
84	<i>Corvus macrorhynchos</i> (Wagler, 1827)	Jungle Crow	O (LC)	RU

Abbreviation in ACOR are A = Abundant, C = Common, O=Occasional, R = Rare

Abbreviation used for Ecological rating and status are WM = Winter Migrant, WMr= Winter Migrant Rare, WMU= Winter Migrant Uncommon, WMC= Winter Migrant Common, RU = Resident Uncommon, Rr = Resident Rare, RMR= Residence Migrant Rare, RMC = Residential Migrant Common, RMC= Residential Migrant Uncommon, RC =Resident Common, BM= Breeding Migrant, BMR= Breeding Migrant Rare, BMU= Breeding Migrant Uncommon, PM = Passage Migrant.

Abbreviation for IUCN Status are LC= Least Concern, NT = Nearly Threatened, T = Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered.

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Research Article

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Synthesis and Biological Evaluation of 2-Arylbenzothiazole as Antimicrobial and antioxidant agents

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Abstract: A facile and green protocol has been developed for the synthesis of 2-arylbenzothiazole derivatives in high to excellent yields using ethyl ammonium nitrate (EAN) as an acidic ionic liquid and their use as dual solvent-catalysts at room temperature. The Synthesized compounds were screened for antimicrobial activities against Gram-positive bacteria (*Bacillus subtilis*), Gram-negative bacteria (*Pseudomonas aeruginosa*) and fungus (*Candida albicans*). The antioxidant activities of these compounds were determined by DPPH scavenging activity. The key advantages of this protocol are high yields, short reaction times, mild reaction condition, eco-friendly, easy workup, no need of purification of products by chromatographic method and reusability of the catalyst.

Key words: Aromatic aldehyde, 2-Aminothiophenol, Ionic liquid, antimicrobial and antioxidant activity.

1. INTRODUCTION

Multi-component Reactions (MCRs) are powerful tools to build the products in organic chemistry, in which more than two starting materials react to form a product for their high degree of atom economy, saving time, minimize cost, environmental friendliness and application in the several of convergent synthesis of complex organic molecules from simple and readily available substrates in a single synthetic operation ^[1, 2].

Five and six membered heterocyclic compounds are powerful constituents that often exist in biotic active natural products and synthetic compound of medicinal interest ^[3, 4]. Among them benzothiazole derivatives possess various biological activities such as antibacterial, antiulcer, antihypertensive, antiviral, antifungal, anticancer, and antihistamine activities ^[4, 5]. In spite of their importance from a biological, industrial and synthetic point of view, a several methods for their preparation are reported in the literature.

These include condensation reactions of 2-aminothiophenol with substituted nitriles, carboxylic acids, aldehydes, acyl chlorides and esters, followed by an oxidation in the presence of K_2CO_3 , BmimPF₆ and BmimBF₄ ^[7], [pmIm]Br ^[8], acetic acid ^[9], HBF₄-SiO₂ ^[10], RuCl₃ ^[11], K₂S₂O₈ ^[12-13], SBA-Pr-SO₃H ^[14], sulfamic acid ^[15], Pd(OAc)₂ ^[16], Sm(OTf)₃ ^[17-18], SiO₂-HNO₃ ^[19], Fe₃O₄@SiO₂/collagen ^[20], Cu(OAc)₂ ^[21-22], CuCl₂, K₂CO₃ ^[23].

Many of them receive from some disadvantages such as drastic reaction conditions, use of expensive and hazardous solvent or catalyst, low yield, relatively long reaction time and high temperature. Hence, the development of clean, high yielding and environmentally friendly approaches is desirable.

Ionic liquid have recently attracted much attention in organic transformation as environmentally benign solvents due to their favorable properties like non-flammable, extremely low vapor pressure, high thermal stability, reusability and careful choice to dissolves many organic and inorganic substrates ^[24-26]. Ionic liquid have been successfully used as solvents and catalyst for diverse of reactions ^[27-30], which exhibit several of application in industry and organic synthesis.

Ethyl ammonium nitrate has recently attracted much attention in organic transformations due to inexpensive, thermal stable, non toxic and recyclable. Furthermore, current literature reveals that EAN has been utilized as an effective catalyst for the various organic reactions such as Knoevenagel condensation, 2-amino-4,6-diphenylpyridine-3-carbonitrile, α -aminophosphonate derivatives and aromatic nitration ^[31-35]

In continuation of our work to develop novel Bronsted and Lewis acid catalyzed synthetic methodologies ^[36-41]. Herein, we investigated ethyl ammonium nitrate (EAN) ionic liquid as an efficient, low cost and environmentally benign protocol for the synthesis of 2-arylbenzothiazole at room temperature, through 2-aminothiophenol and aromatic aldehyde (Scheme 1).

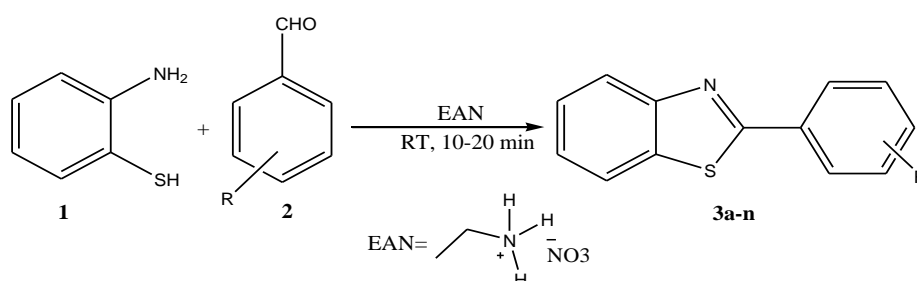
2. EXPERIMENTAL

All commercially available reagents used without further purification and the reactions were monitored by thin layer chromatography (TLC) Merck 60 F₂₅₀ silica-gel plates. All yields refer to isolated products after purification. Melting points were recorded by open tube capillary method and are uncorrected. The ¹H and ¹³C NMR were obtained using a Bruker Avance 400 and 100 MHz spectrometer in CDCl₃ solvent with TMS as an internal standard. Chemical shift values (δ) were

expressed in parts per million (ppm) and coupling constant (J) are expressed in Hertz (Hz). Mass spectra were recorded on a macro mass spectrometer, applying electrospray ionization (ESI) method.

2.1. Preparation of ethyl ammonium nitrate (EAN) ionic liquid as a catalyst: Ethyl ammonium nitrate (EAN) was synthesized according to the literature [1]. The aqueous solution of ethylamine (70%, 100 ml) was taken in a round bottom flask, the temperature of this attained below 10 °C using an ice water bath. To this cold solution, nitric acid (30%, 330 ml) was added slowly drop wise with vigorous stirring to attain a pH of the mixture of 7.3, the addition was stopped and the mixture was stirred further for 0.5 h. The water from the mixture was removed in a rotary evaporator in a boiling water bath at a pressure of 200 mmHg. The traces of water were removed at 100 °C and 1 mmHg pressure to afford the ethyl ammonium nitrate in quantitative yield (170 g). The ethyl ammonium nitrate obtained was used as the catalyst in this reaction.

2.2. General procedure for the synthesis of 2-arylbenzothiazole: A reaction mixture of 2-aminothiophenol (1 mmol), benzaldehyde (1 mmol) and EAN (2 ml) was stirred at room temperature for appropriate time (Table 2). The completion of reaction was monitored by thin layer chromatography (TLC) (hexane: ethyl acetate, 8:2). After completion of reaction ice cold water pour into the reaction mixture then solid product were isolated by filtration. The solid product was purified by recrystallization from ethanol.



Scheme 1 ethyl ammonium nitrate mediated synthesis of 2-arylbenzothiazoles

Characterization data of compounds

2-Phenyl-benzothiazole (Table 2 entry 3a): White solid; IR (KBr) ν (cm^{-1}): 3055, 3001, 2875, 1622, 1568, 1460, 1436, 881, 762 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ ppm: 8.02-8.04(d, 1H, $J = 8.4$ Hz, Ar-H), 7.71-7.73(d, 1H, $J = 7.6$ Hz, Ar-H), 7.52-7.56 (m, 5H, Ar-H), 7.21-7.25 (t, 1H, $J = 8.4$ Hz, Ar-H), 7.02-7.19 (t, 1H, $J = 7.6$ Hz, Ar-H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm: 166.8, 152.9, 133.8, 132.4, 129.4, 127.8, 126.3, 125.1, 124.0, 122.0, 120.43; MS: m/z 212.0 $[\text{M} + 1]^+$.

2-(4-Methoxyphenyl)-benzothiazole (Table 2 entry 3b): White solid; IR (KBr) ν (cm^{-1}): 2997, 2961, 2835, 1605, 1591, 1483, 833 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ ppm: 8.03-8.08 (3H, m, Ar-H) 7.91 (1H, d, $J = 8.0$ Hz, Ar-H), 7.48 (1H, t, $J = 8.0$ Hz, Ar-H), 7.37 (1H, t, $J = 8.0$ Hz, Ar-H), 7.02 (2H, d, $J = 8.4$ Hz, Ar-H), 3.89 (3H, s, OCH_3); ^{13}C NMR (100 MHz, CDCl_3) δ ppm: 167.6, 162.0, 154.3, 134.9, 129.0, 126.3, 126.1, 124.7, 122.7, 121.5, 114.3, 55.4; MS: m/z 242.0 $[\text{M} + 1]^+$.

2-(4-Bromophenyl)-benzothiazole (Table 2 entry 3c): White solid; IR (KBr) ν (cm^{-1}): 3057, 1506-1584, 1476, 1396, 1069 cm^{-1} . ^1H NMR (400 MHz, CDCl_3): δ ppm : 8.11 (1H, d, $J = 8.0$ Hz, Ar-H), 8.0 (2H, d, $J = 8.5$ Hz, Ar-H), 7.94 (1H, d, $J = 8.0$ Hz, Ar-H), 7.67 (2H, d, $J = 8.5$ Hz, Ar-H), 7.55

(1H, t, $J = 8.0$ Hz, Ar-H), 7.44 (1H, t, $J = 8.0$ Hz, Ar-H). ^{13}C NMR (100 MHz, CDCl_3): δ ppm: 167.1, 154.5, 135.4, 133.0, 132.6, 129.3, 126.9, 125.8, 125.8, 123.7, 122.0; MS: m/z 289.9 $[\text{M} + 1]^+$

2-(4-Hydroxyphenyl) benzothiazole (Table 2 entry 3d): Yellow solid; IR (KBr) ν (cm^{-1}): 3094, 2999, 1606, 1540, 1587, 1482, 1483, 1433, 1385, 1287, 1250, 1227, 977, 827, 798, 756 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ ppm: 8.06 (d, $J = 7.9$ Hz, 1H, ArH), 7.91 (d, $J = 8.1$ Hz, 1H, ArH), 7.48-7.51 (d, $J = 8.5$ Hz, 2H, ArH), 7.37-7.40 (m, 2H, ArH), 6.95-6.98 (m, 2H, ArH), 5.49 (s, 1H, OH); ^{13}C NMR (100 MHz, CDCl_3) δ ppm: 169.0, 160.6, 153.6, 134.2, 128.8, 126.1, 124.5, 124.7, 121.7, 121.3, 115.5; MS: m/z 228.0 $[\text{M} + 1]^+$.

2-(3-Nitrophenyl)-benzothiazole (Table 2 entry 3f): Yellow solid; IR (KBr) ν (cm^{-1}): 3,086, 3,070, 1,658, 1,531 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3): δ ppm: 8.95 (s, $J = 8.0$ Hz, 1H), 8.45 (d, $J = 8.0$ Hz, 1H), 8.36 (d, $J = 8.0$ Hz, 1H), 8.15 (d, $J = 8.0$ Hz, 1H), 7.98 (d, $J = 8.0$ Hz, 1H), 7.73 (1H, t, $J = 7.9$ Hz), 7.59 (1H, $J = 7.5$ Hz), 7.49 (1H, $J = 7.6$ Hz); ^{13}C NMR (100 MHz, CDCl_3): δ ppm: 164.9, 153.9, 148.7, 135.3, 135.1, 133.0, 130.1, 126.8, 126.0, 125.2, 123.7, 122.3, 121.8, MS: m/z 257.0 $[\text{M} + 1]^+$

2-(4-Chlorophenyl)-benzothiazole (Table 2 entry 3g): White solid; IR (KBr) ν (cm^{-1}): 3055, 1589, 1476, 1317, 1089 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ ppm: 8.06 (1H, d, $J = 8.2$ Hz, Ar-H), 8.01 (2H, d, $J = 8.5$ Hz, Ar-H), 7.90 (1H, d, $J = 8.0$ Hz, Ar-H), 7.47 (3H, m, Ar-H), 7.40-7.36 (1H, m, Ar-H); ^{13}C NMR (100 MHz, CDCl_3) δ ppm: 166.5, 154.0, 137.0, 135.0, 132.1, 129.2, 128.7, 126.4, 125.4, 123.3, 121.6; MS: m/z 246.0 $[\text{M} + 1]^+$

2-(4-N,N-Dimethylphenyl)-benzothiazole (Table 2 entry 3h): Yellow solid; IR (KBr) ν (cm^{-1}): 3052, 1600, 1435, 1372, 1313, 1168, 1037, 946, 821 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ ppm: 7.86 (2H, d, $J = 8.5$ Hz); 7.62 (1H, d, $J = 7.8$ Hz); 7.16 (1H, t, $J = 7.7$ Hz); 7.08 (1H, t, $J = 7.6$ Hz); 7.02 (1H, d, $J = 7.6$ Hz); 6.75 (2H, d, $J = 8.9$ Hz); 3.07 (6H, s); ^{13}C NMR (100 MHz, CDCl_3) δ ppm: 159.5, 152.7, 149.7, 131.8, 130.8, 128.8, 126.5, 125.8, 125.5, 124.4, 117.1, 111.5, 40.1; MS: m/z 254.09, 157.9, 131.9, 114.0, 102.1, 86.2, 72.4

2-(4-Methylphenyl)-benzothiazole (Table 2 entry 3i): White solid; IR (KBr) ν (cm^{-1}): 3026, 2811, 2343, 1606, 1581, 1520, 1361, 1297, 1258, 1152, 1034, 951, 867 and 659 cm^{-1} . ^1H NMR (400 MHz, CDCl_3) δ ppm: δ 8.00-8.06 (3H, m, Ar-H), 7.96 (1H, d, $J = 8.0$ Hz, Ar-H), 7.51 (1H, t, $J = 8.4$ Hz, Ar-H), 7.41 (1H, t, $J = 8.4$ Hz, Ar-H), 7.36 (2H, d, $J = 8.1$ Hz, Ar-H), 2.45 (3H, s, $-\text{CH}_3$), ^{13}C NMR (100 MHz, CDCl_3) δ ppm: δ 167.9, 154.2, 141.6, 135.0, 130.9, 129.6, 127.3, 126.1, 124.9, 122.9, 121.6, 21.2; MS: m/z 225.1 $[\text{M} + 1]^+$

3. BIOLOGICAL EVALUATION

3.1. Antimicrobial Activity: The antimicrobial activity of heterocyclic compound studied by turbidometric assay⁽⁴²⁻⁴⁵⁾. In which sample were prepared in dimethyl sulphoxide (DMSO) solvent as per the required concentration of solvent for microbial culture (Luria Bertani broth and potato dextrose Luria Bertani). Microbial cultures are growing in media for 24 hr Incubation. Before use of microbial culture for antimicrobial activity count of micro-organism was carried out. Microbial culture for activity taken as 10^5 in freshly prepared Luria Bertani broth (bacteria) and potato dextrose Luria Bertani (*Candida albicans*) to active final volume 200 μL in 96 well plate and concentration of newly synthesized compound added in seeded culture of 96 well plate. Control was taken as culture and respective media. For this assay penicillin is used as standard in same plate with culture and

media. Microbial plate was incubated for 24 hr. at 37 °C temperature and OD is measured at 600nm by using 96 well plate reader. Assay was run in triplicates for same concentration and experimental condition. From obtained OD antimicrobial activity of compound was calculated by using following formula.

$$\% \text{ of inhibition} = \frac{(\text{O. D. of Control} - \text{O. D. of Sample})}{(\text{O. D. of Control})} \times 100$$

3.2. Antioxidant Activity: The antioxidant activity of the synthesized compounds was determined by using DPPH stable free radical method ^[46-48] and ascorbic acid was used as a standard. Stock solution of the DPPH radicals was prepared by dissolving in methanol to obtain 0.1 mM concentration. The assay was carried out in a 96 well plate. 500µg of compound was added in 200µL of methanolic 0.1 mM of DPPH. The mixture was shaken and kept in the dark at 37°C temperature for 10 min. After 10 min the absorbance values were measured at 517 nm and were converted into the percentage antioxidant activity (%) using the formula ^[45]. All experiment performed in triplicate manner.

$$\% \text{ of inhibition} = \frac{(\text{O. D. of Control} - \text{O. D. of Sample})}{(\text{O. D. of Control})} \times 100$$

4. RESULTS AND DISCUSSION

To explore the use of ionic liquid ethyl ammonium nitrate (EAN) as a solvent/catalysts, a reaction of 2- aminothiophenol **1** and benzaldehyde **2** was conducted as a standard model reaction for the preparation of 2-arylbenzothiazoles (**3a-n**) (Scheme 1). In general, all the reactions were very clean and the substituted 2-arylbenzothiazole derivatives were obtained in high yields under mild reaction conditions. When we carried out same reaction in the absence of ethyl ammonium nitrate did not give any desired product even at a longer time (Table 1 entry 1). To determine the exact amount of the catalyst, we investigated the model reaction using different concentrations of EAN (Table 1). During this study, we observed that 2 mL EAN was proved to be an efficient catalyst to conduct the reaction smoothly.

Encouraged by this result, in order to build the generality of the reaction, various aromatic aldehydes bearing electron-donating groups (Me, OMe) and electron-withdrawing groups (NO₂) gave the desired products in quantitative yields in 10-20 min (Table 2, entries 3b, 3e, 3h, and 3i). Results show that the nature of substituent groups did not play any significant role in the reactivity of the substrate.

In order to understand the efficiency and greenness of the method, we compared our results on the synthesis of 2-phenyl benzothiazole using ethyl ammonium nitrate with the well-known data from the literature (Table 4). As shown in (Table 4, entry 3 and 4) reported an efficient ionic liquid catalyzed benzothiazole derivatives using [bmim][BF₄] and [bmim][PF₆] as catalyst and solvent in reaction medium. However, ILs especially imidazolium based systems containing PF₆ and BF₄ anions are toxic in nature as they liberate hazardous HF and their high cost and disposability make their utility limited ^[42]. On the contrary, EAN ionic liquid can act as a suitable catalyst with respect to reaction times and yields of the products due to the inexpensive, thermally stable, high acidity, non toxic and recyclable.

Table 1: Screening of ethyl ammonium nitrate catalyst for the synthesis of 2-arylbenzothiazole^a

Entry	Ethyl ammonium nitrate (mL)	Time (min)	Yield (%) ^b
1	0.0	120	No reaction
2	0.4	90	25
3	0.8	60	45
4	1.2	40	65
5	1.6	20	82
6	2.0	10	94
7	2.4	10	94

^aReaction conditions: Aromatic aldehyde (1 mmol), 2-aminothiophenol (1 mmol), ethyl ammonium nitrate (2 mL) at room temperature. ^bIsolated yield.

Table 2: Multicomponent reaction of aromatic aldehyde **1** and 2-aminothiophenol **2** for the synthesis of **3a-n**^a

Entry	Aldehyde	Time (min)	Yield ^b (%)	Melting point °C [Ref.]
3a	C ₆ H ₅	10	94	112-114[40]
3b	4-CH ₃ OC ₆ H ₄	12	92	124-126[40]
3c	4-BrC ₆ H ₄	15	90	130-132[15]
3d	4-OHC ₆ H ₄	20	87	228-230[15]
3e	4-NO ₂ C ₆ H ₄	13	92	224-226[40]
3f	3-NO ₂ C ₆ H ₄	14	88	182-184[40]
3g	4-ClC ₆ H ₄	10	94	114-116[15]
3h	4-N(CH ₃) ₂ C ₆ H ₄	12	92	172-174[15]
3i	4-CH ₃ C ₆ H ₄	12	93	81-82 [15]
3j	2-ClC ₆ H ₄	15	91	74-76 [40]
3k	2-OHC ₆ H ₄	18	86	130-132[15]
3l	2,4-diCl-C ₆ H ₃	16	89	218-220[20]
3m	2,3-diCl-C ₆ H ₃	17	88	116-118[41]
3n	2-NO ₂ C ₆ H ₄	15	89	122-124[15]

^aReaction conditions: Aromatic aldehyde (1 mmol), 2-aminothiophenol (1 mmol), ethyl ammonium nitrate (2 mL) at room temperature. ^bIsolated yield.

Table 3 Reusability of ethyl ammonium nitrate for synthesis of 2-arylbenzothiazole^a

No. of cycles	Fresh	Run 1	Run 2	Run 3	Run 4
Yield (%) ^b	94	94	93	91	89

^aReaction conditions: Aromatic aldehyde (1 mmol), 2-aminothiophenol (1 mmol), ethyl ammonium nitrate (2 mL) at room temperature. ^bIsolated yield.

Table 4: Comparison of the ability of various catalysts with ethyl ammonium nitrate for the synthesis of 2-arylbenzothiazole

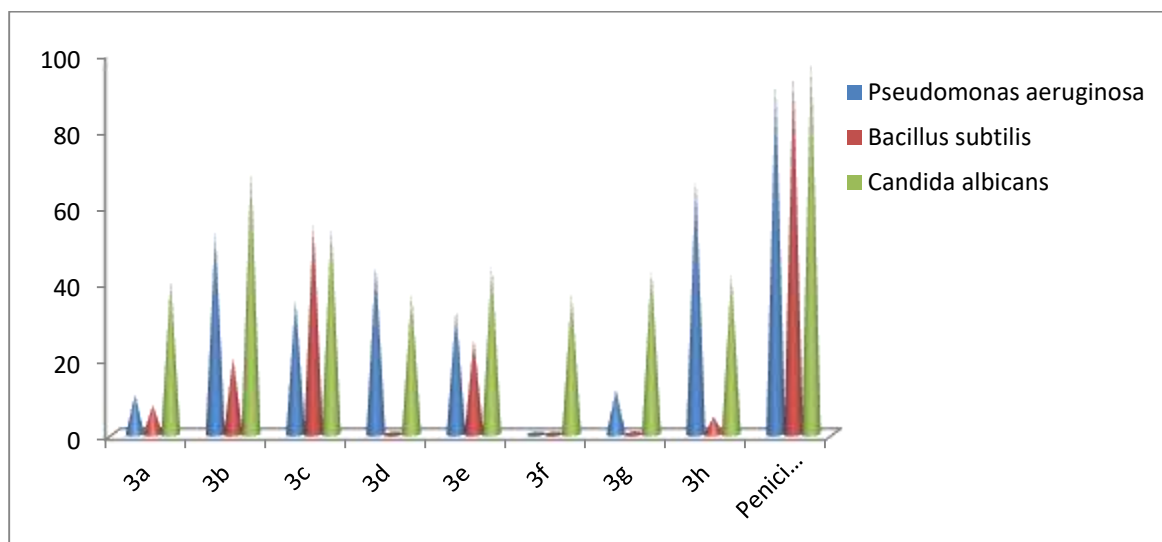
Entry	Catalyst and Solvent	Reaction condition	Time	Yield (%) ^b [Ref.]
1	[pmIm]Br	MW, 120 W	3 min	99 [8]
2	[pmIm]Br	80°C	6 hr	90 [8]
3	RuCl ₃ , [bmim]PF ₆	80°C	30 min	83 [11]
4	Pd(OAc) ₂ , (bmim)PF ₆ & (bmim)BF ₄	60-75 °C	10 hr	88 [16]
5	Acetic acid	MW/Δ, 70°C	4/15 min	84/90 [9]
6	Cu(OAc) ₂	Et ₃ N, ethanol, 90 °C	6 hr	86 [21]
7	EAN	Room temp.	10 min	94 Present work

Finally, the recyclability of ethyl ammonium nitrate was studied by using 2-aminothiophenol **1** and benzaldehyde **2** as the substrates. It turned out that ethyl ammonium nitrate could be reused directly for a new cycle after the EAN was recovered from the aqueous layer by removal of water at 70°C under reduced pressure. The recovered EAN was recycled and reused for four times and desired products were obtained in high yield after 1-4 runs (Table 3, Run1–4). It means that catalyst is stable and reused without loss of catalytic activity.

The antimicrobial activity of heterocyclic compound studied by turbidometric methods results demonstrate that most of the compound showing promising activity. The experimental result out come for the active ingredients has mentioned in **Table 5**. Standard microbial culture antimicrobial activity profile was studied with respect to standard antibiotic penicillin. The synthesized compounds (**3a-h**) were evaluated for their *in vitro* antibacterial activity. Among the synthesized compounds only the compounds **3b** and **3h** show high activity against gram-negative bacteria (*Pseudomonas aeruginosa*) at 100µg sample remaining were moderate to less active against gram-negative bacteria and compound **3c** show maximum activity against gram-positive bacteria (*Bacillus subtilis*) at 100µg sample remaining were less active against gram-positive bacteria compared to standard Penicillin. Also, maximum anti-fungal activity was observed for compound **3b** and **3c** and remaining compound were shows moderate activity at 100µg sample against *Candida albicans* compared to standard Penicillin. Newly synthesized active molecules 3b, 3c, 3g and 3h might be important for future research aspect and antimicrobial field.

Table-5: % Inhibition of Antibacterial and Antifungal activity of synthesized scaffolds

Compound	<i>Pseudomonas aeruginosa</i>	<i>Bacillus subtilis</i>	<i>Candida albicans</i>
	% inhibition	% inhibition	% inhibition
3a	10.29	7.64	40.40
3b	52.91	20.16	68.59
3c	35.28	54.91	54.38
3d	44.08	NI	36.68
3e	32.18	24.72	44.31
3f	NI	NI	36.68
3g	11.76	0.80	43.29
3h	66.69	4.65	42.01
Std-5 μ g Penicillin	91.78	93.71	97.74

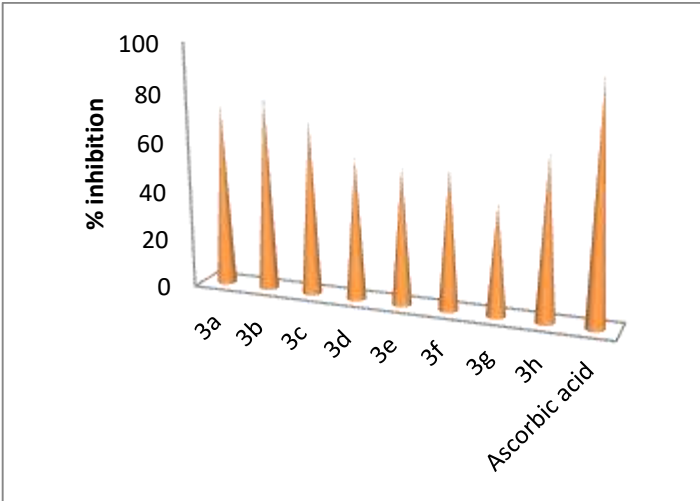


Reactive oxygen species and reactive nitrogen species involved generation of free radicals. These free radical are responsible for aging, cardiovascular disorder, cancer etc. diseases. The free radical mediated diseases can be controlled or modulated up to certain limits by providing antioxidants. Considering that scenario in account newly synthesized organic compounds was studied for antioxidant activity against standard free radical like DPPH. Newly synthesized compound mentioned in **Table 6** was studied for antioxidant activity. Result obtained from study are mentioned in table indicate that most of the compounds showing free radical scavenging activity. Maximum free radical scavenging capacity was found for **3a**, **3b**, **3c** and **3h**. Variation in activity might be observed because of the functional groups and electron donating capacity of compound for scavenging free radicals. The

overall study result could be useful further study of compounds for different in vitro and in vivo free radical models.

Table 6. Antioxidant activity of compounds **3a-h** by DPPH method.

Compound	DPPH assay
	% inhibition
3a	74.19
3b	78.38
3c	70.25
3d	57.01
3e	54.87
3f	56.42
3g	44.15
3h	65.20
Ascorbic acid	95.22



Compound	% inhibition
3a	74.19
3b	78.38
3c	70.25
3d	57.01
3e	54.87
3f	56.42
3g	44.15
3h	65.20
Ascorbic acid	95.22

CONCLUSION

In summary, we have developed an efficient and facile method for the synthesis of 2-arylbenzothiazole derivatives by treatment of corresponding aldehydes and 2-aminothiophenol by using ionic liquid EAN at room temperature in 10-20 min. The Synthesized compounds were screened for antimicrobial activities against Gram-positive bacteria (*Bacillus subtilis*), Gram-negative bacteria (*Pseudomonas aeruginosa*) and fungus (*Candida albicans*). The antioxidant activities of these compounds were determined by DPPH scavenging activity. In this method we have avoid the use of environmentally unfavorable volatile organic solvents. The mild reaction conditions, less expensive reaction medium, simple workup, and high yields are the advantages of this protocol. Ionic liquid mediated reactions are very useful both from environmentally and economical point of view.

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Research Article

Theme- *New horizons in chemical sciences.*

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An efficient synthesis of 2-arylbenzothiazoles: A natural approach.

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ABSTRACT

An efficient, simple and green protocol has been developed for the synthesis of 2-arylbenzothiazole via condensation of 2-aminothiophenol with various types of aromatic aldehydes using tamarind juice as a natural catalyst. The key advantages of this method are mild reaction conditions, inexpensive catalyst, short period of time and high to excellent yield.

KEYWORDS

2-arylbenzothiazole, Aromatic aldehydes, Tamarind juice, 2-Aminothiophenol.

1. INTRODUCTION

2-Arylbenzothiazoles is an important class of heterocyclic compounds due to their wide range of applications [1–9] in medicinal, industrial, and agricultural chemistry, material chemistry and nonlinear optics. Benzothiazoles bearing substituents at C₂ position are of great interest as these structural frameworks have proved to be an important class of privileged bicyclic substructures owing to their potent utility as imaging agents for β -amyloid, antituberculous, chemiluminescent agents, calcium channel antagonists, antitumor, antiparasitics and photosensitizers [10-16].

Because of their wide range of synthetic, industrial and pharmacological application, many methods for the preparation of benzothiazole are reported in the literature. Among these methods are the condensation of 2-aminothiophenol with substituted nitriles, carboxylic acids, aldehydes, acyl chlorides or esters [17]. A number of catalysts namely, (PmIm)Br [18], TMSCl [19], I₂ [20], ZrOCl₂·8H₂O [21], PCC [22], H₂O₂, CAN [23], electro oxidation [24], Baker's yeast [25], PTSA [26], Silica sulfuric acid [27], FeCl₃/montmorillonite K-10 [28], Sm(OTf)₃ [29-30], Lithium bromide [31] and nano BF₃/SiO₂ [32].

Today, there is a great demand in organic synthesis for green and inexpensive acids instead of conventional mineral acids such as HF, H₂SO₄ and HCl in chemical processes. Mineral acids are corrosive and hazardous catalysts [33]. Due to the presence of tartaric and ascorbic acid in the tamarind fruit extract is sour in taste which could act as an effective acid catalyst by activating the carbonyl group of the aldehydes in organic reactions. The fruits of *Tamarindus indica* the aqueous extracts can be easily prepared (*vide* experimental). Easy preparation, handling and availability, inexpensive, non-hazardous nature and easier waste disposal are among the most common characteristics that make it a green catalyst. Although, a variety of catalysts have been reported for the synthesis of 2-aryl benzothiazole most of them suffer from disadvantages such as long reaction times, forceful conditions, low yields, low selectivity, tedious workup, and use of toxic or expensive reagents. Consequently, a new procedure that avoids these drawbacks is desirable.

2. MATERIALS AND METHODS

2.1. Materials

All the chemicals were purchased from commercial suppliers either from S. D. Fine, Spectrochem and they were used without further purification. Melting points were recorded by the open tube capillary method and are uncorrected. The progress of the reaction was monitored by thin-layer chromatography (TLC) analytical silica gel plates (Merck 60 F250). ¹H NMR and ¹³C NMR spectra were recorded on Bruker Avance (400 and 100 MHz, respectively) instrument in CDCl₃ solvent, chemical shifts are given in δ ppm relative to tetramethylsilane (TMS) and coupling constants (*J*) are expressed in Hertz (Hz).

2.2. Preparation of Tamarind Juice from the Fruits of *Tamarindus Indica*

The raw Tamarind fruit was purchased from the local market. The upper shell of unripped fruit and its inner grain were removed. The hard green material (10 g) was boiled with water (50 ml),

cooled and it was centrifuged using micro-centrifuge (REMI RM-12C). The tamarind fruits of the clear portion of aqueous extract (pH=3) was used as catalyst for the reactions.

2.3. General procedure for the synthesis of benzothiazoles

Tamarind Juice (2 mL) was added to a stirred solution of the aromatic aldehyde (1 mmol) and 2-aminothiophenol (1 mmol) in ethanol (3 mL) and the mixture was stirred at room temperature for appropriate time (Table 2). The progress of the reaction was monitored by thin layer chromatography (TLC) (Hexane: Ethyl acetate, 8:2), after completion of the reaction, solid products were isolated by filtration and the crude products was recrystallized from ethanol.

2.4. Selected spectral data

2-(4-Methylphenyl) benzothiazole (3b)

IR (KBr pallets): ν_{\max} 3026, 2811, 2343, 1606, 1581, 1520 cm^{-1} . ^1H NMR (400 MHz, CDCl_3): δ =8.00-8.06 (m, 3H), 7.96 (d, 1H, J = 8.0 Hz), 7.51 (t, 1H, J = 8.4 Hz), 7.41 (t, 1H, J = 8.4 Hz), 7.36 (d, 2H, J = 8.1 Hz), 2.45 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3): δ = 168.0, 154.2, 141.6, 135.0, 131.0, 129.7, 127.3, 126.2, 125.0, 122.9, 121.6 and 21.2.

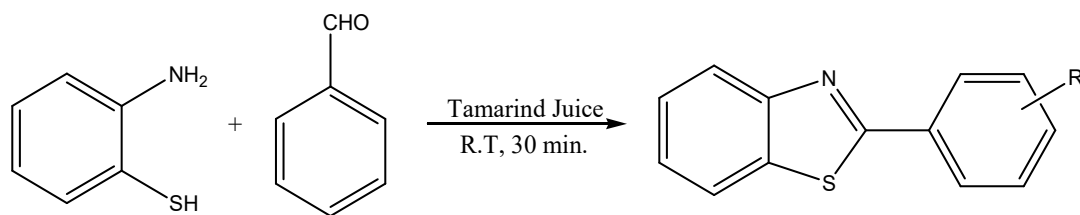
2-(4-Chlorophenyl)benzothiazole(3d)

IR (KBr pallets): ν_{\max} 3081, 3032, 1613, 1593 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ = 8.06 (d, J = 8.2 Hz, 1H), 8.01 (d, J = 8.5 Hz, 2H), 7.88 (d, J = 8.0 Hz, 1H), 7.52 – 7.36 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ = 166.6, 154.0, 137.0, 135.0, 132.1, 129.2, 128.7, 126.5, 125.4, 123.3, 121.6.

2-(4-*N,N*-Dimethylphenyl)benzothiazole(3g) IR (KBr)/ ν : 3355, 2358, 1598, 1478, 1210, 1017, 965, 743 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 7.97 (t, J = 8.7 Hz, 3H), 7.83 (d, J = 7.9 Hz, 1H), 7.43 (t, J = 7.7 Hz, 1H), 7.30 (t, J = 7.6 Hz, 1H), 6.74 (d, J = 8.9 Hz, 2H), 3.05 (s, 6H). ^{13}C NMR (100 MHz, CDCl_3) δ = 168.8, 154.4, 152.2, 134.5, 128.9, 126.0, 124.2, 122.3, 121.4, 121.3, 111.7, 40.1.

3. RESULTS AND DISCUSSION

To explore the use of Tamarind Juice as a catalyst, reaction of benzaldehyde and 2-aminothiophenol for the preparation of 2-arylbenzothiazole was considered as a standard model reaction (Scheme 1). Model reaction was carried out in the absence of catalyst did not lead to desired product formation, indicating that intervention of catalyst was must for initiation of the reaction. To determine exact requirement of catalyst for the reaction, we investigated the model reaction using different amount of Tamarind Juice (Table 1). During this study, we observed that, 2 mL of tamarind juice proved to be an efficient catalyst to carry out the reaction smoothly. We further investigated the effect of solvents for the synthesis of 2-phenylbenzothiazole. During this study solvents like ethanol, water and aqueous ethanol were tested but, use of ethanol proved to be suitable solvent (Table 1). Encouraged by this result, in further set of experiments, in order to build the generality of the reaction, variety of electron-donating or electron-withdrawing substituted aromatic aldehydes were converted to 2-arylbenzothiazole derivatives in high to excellent yields (Table 2).

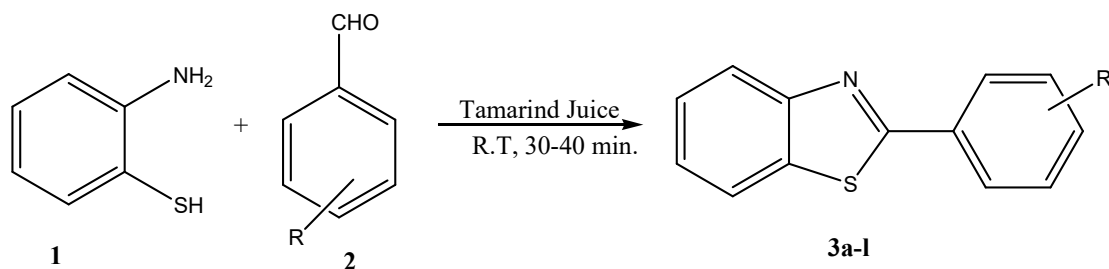


Scheme 1. synthesis of 2-phenylbenzothiazole.

Table 1. Effect of solvent and catalyst evaluation in synthesis of 2-phenylbenzothiazole at room temperature^a.

Entry	Solvent	Catalyst (mL)	Time (min.)	Yield % ^b
1	H ₂ O	-----	60	Trace
2	H ₂ O:EtOH	1	50	65
3	EtOH	2	30	94
4	EtOH	3	30	94

^aReaction conditions: benzaldehyde(1 mmol), 2-aminothiophenol (1 mmol), Tamarind Juice(2mL) at room temperature. ^bIsolated yields.



Scheme 2. Synthesis of 2-arylbenzothiazole.

Table 2. Synthesis of 2-arylbenzothiazole in the presence of Tamarind Juice^a.

Entry	Aldehydes	Products	Time (min.)	Yield ^b (%)	M.P ^o C [Ref.]
3a			30	94	112-114 [14]
3b			35	96	80-82 [27]

3c			35	94	125-126 [14]
3d			30	96	114-116 [27]
3e			32	96	224-226 [14]
3f			40	92	228-230 [27]
3g			35	95	172-174 [27]
3h			35	90	74-76 [14]
3i			35	91	122-123 [27]
3j			40	87	130-132 [27]
3k			35	95	130-132 [27]
3l			35	91	182-184 [14]

^a Reaction of aldehyde 1 (1 mmol), 2-aminothiophenol 2 (1 mmol), and Tamarind Juice (2 mL) in ethanol (3 mL), at room temperature. ^b Isolated yields.

4. CONCLUSION

In summary, in this paper we report synthesis of 2-arylbenzothiazoles from the condensation of 2-aminothiophenol and various types of aromatic aldehydes catalyzed by *Tamarind Juice* in mildness of the reaction conditions, short reaction times, high to excellent yields, easy workup and eco-friendly of the catalyst are noteworthy advantages of these methods.

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